

# NGK REPORT 2022



**NGK INSULATORS**

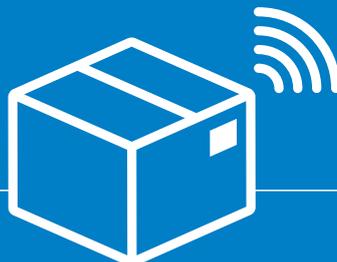
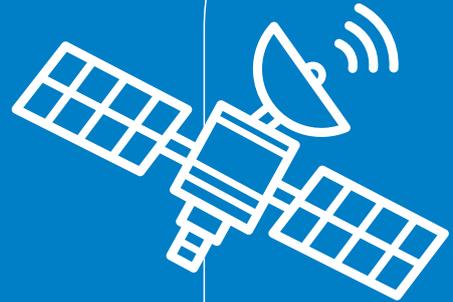


**CN**

Carbon  
Neutrality

**DS**

Digital  
Society



# Surprising Ceramics.

The NGK Group has been using unique ceramics technologies to create innovative products for over 100 years. We will continue offering surprising products that provide new value to the world.

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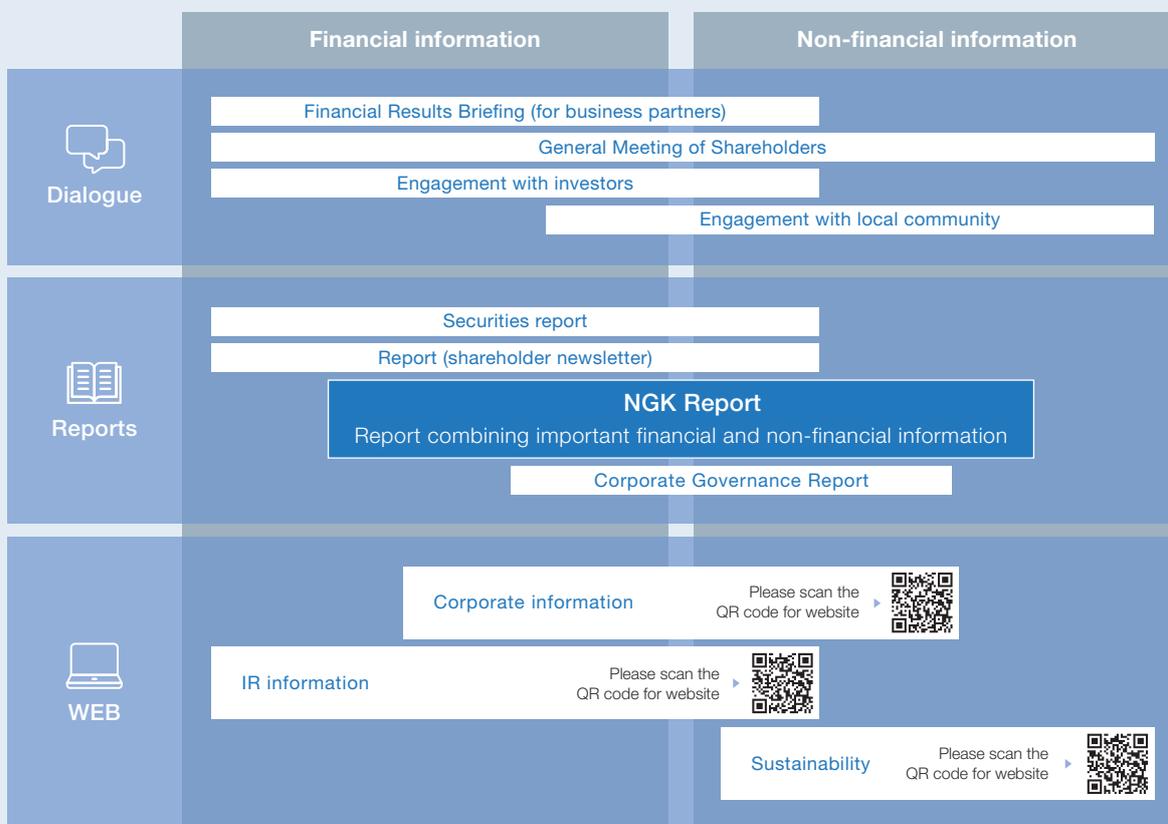
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## How we communicate



## Editing Policy

The NGK Group positions the NGK Report 2022 as an important tool for communicating with our various stakeholders, including our shareholders and investors. To provide a structural understanding of the NGK Group's corporate value and our future vision, we strive to introduce financial information, non-financial information, and information regarding our business strategy in a highly comprehensible format. During the creation of the NGK Report, we reference the Integrated Reporting Framework by the International Integrated Reporting Council (IIRC) and Guidance for Collaborative Value Creation by the Ministry of Economy, Trade, and Industry.

Furthermore, we provide details on our ESG information via the NGK Group Sustainability Website Data 2022.

### Applicable Organizations

Applicability will vary with each organization. As such, applicable organizations are indicated in report articles and alongside the presented data.

### Applicable Period

April 1, 2021 to March 31, 2022



## About Forward-Looking Statements

Earnings forecasts and other forward-looking statements indicated in this report are based on available information and certain assumptions deemed reasonable at the time of creation. However, please note that it is possible actual results could differ from the statements presented in this report due to any number of factors.

## Greetings from Our Chairman



## Becoming a corporate group that contributes to the development of society and achieves continued growth

The importance of sustainability for the global environment and society is increasing. Corporations today are expected to transform their business from a medium- and long-term approach while contributing to the resolution of social issues through their business activities. Amid such an operating environment, there is an increasing emphasis on the role of integrated reports that combine financial information with non-financial information related to long-term improvements in corporate value. Our Group publishes the NGK Report as a tool for promoting constructive dialogue with our stakeholders. We hope the NGK Report will provide a greater understanding of our medium- to long-term value creation story.

The NGK Report 2022 introduces the characteristics and strengths of our Group with a particular focus on the NGK Group Vision: Road to 2050. Through this report, we introduce how we are pursuing value creation towards achieving our Group vision.

The NGK Group Vision: Road to 2050, is designed to realize our philosophy of “Enriching Human Life by Adding New Value to Society” by

outlining our future goals and the steps we must take to achieve those goals. The NGK Group Vision: Road to 2050 comprises our vision of a future society, the results of internal discussions on the ideal corporate image of the NGK Group, and the key points of transformation we must achieve as we head towards the future. Realizing this vision will require not only that we improve our unique ceramic technologies, but also that we implement fundamental changes in how we sell products and manage operations. In April 2022, we implemented major organizational changes. These changes will enable us to create new products and services that answer the needs of society while also accelerating initiatives to address sustainability issues and strengthen marketing.

In recent years, a sense of urgency concerning global warming has driven various initiatives related to carbon neutrality. The world is adopting digital advancements such as AI and IoT while also accelerating towards green and digital technologies. In such an environment, we will aim to be a company that contributes to the long-term development of society and achieves continued growth by expanding business in domains related to carbon neutrality and the digital society to support more enriched lifestyles. We will continue to fulfill our corporate social responsibilities as we strive to be a company that continuously generates new value.

We ask for the continued support and understanding of our stakeholders.

## 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/philosophy/>

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.

## We use unique ceramic technologies to provide new value to society

With ceramic technologies at our core, the NGK Group applies three strengths to engage in business operations. We contribute to the realization of carbon neutrality and a digital society by developing business related to the environment, digital society, energy & industry as we strive to meet the needs of society.

### NGK Group background



#### NGK founding principle

**We do this for the sake of society's future, and not for own profit.**

The history of the NGK Group starts with a decision made by our first president, Kazuchika Okura.

1905 saw the rapid spread of electric power in Japan. Fragments of American-made insulators were brought to Nippon Toki. Engineers at Shibaura Seisakusho (currently Toshiba) were concerned that most of the special high-voltage insulators essential to power transmission facilities were expensive imported products. Impressed by Nippon Toki's technological capabilities, Shibaura engineers requested the manufacturing of a domestic product. It was Okura, then a senior executive at Nippon Toki, who overcome objections within the company and led the company's engagement in the insulator business. At the heart of this determination was the principle, "We do this for the sake of society's future, and not for own profit."

Nippon Toki overcame various technical difficulties to achieve commercialization of their insulators, which saw a rapid increase in sales. In 1919, the decision was made to make the insulator business an independent division. This marked the beginning of NGK Insulators, Ltd., the current NGK Group.

**1**  
STRENGTH

#### Global expansion

We have expanded our business globally since we first began exporting insulators in the 1930s. Today, we operate in some 20 countries, with more than 60% of our employees and 70% of our sales coming from overseas business.

**2**  
STRENGTH

#### Quality improvements

In 1921, we compared our insulators with American manufacturers and found that the quality of our insulators varied. Since then, our commitment to quality improvements has been passed down through the generations. Today, we are IATF16949 certified and continue working to improve quality.

**3**  
STRENGTH

#### Diversification

The NGK Group slogan "Surprising Ceramics." We have continuously created innovative products based on our ceramic technologies, and we will continue to diversify our business by creating new value for the world.

## Contributing to carbon neutrality and a digital society

# DS

### For a digital society

We will develop new products to support the explosive evolution of digital technology such as maintenance-free IoT, advanced security, and the realization of next-generation high-speed, large-capacity communication networks.

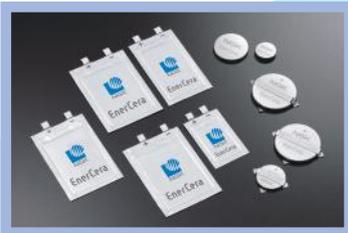
# CN

### For carbon neutrality

We will develop products used in various devices to help realize carbon neutrality such as high-precision CO<sub>2</sub> separation and recovery devices and storage of renewable energy.

## For the future of the NGK Group

## Expected product group to create the future



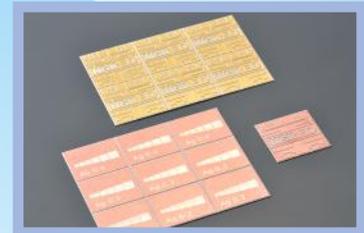
**Lithium-ion rechargeable batteries  
EnerCera®**

A compact, thin lithium-ion rechargeable battery with high energy density.



**Wafer Products**

High-performance composite wafers using our unique precision polishing technology and bonding technology.



**DCB\*1 and AMB\*2 substrates**

Substrates for power modules with excellent reliability and thermal conductivity.



**Zinc rechargeable batteries**

Highly safe and high-capacity storage battery that can be installed indoors.



**Separation membranes**

Various sub-nanoceramic membranes that can separate a specific gas from a mixed gas and a specific liquid from a mixed liquid.

\*1 DCB: Direct Copper Bonding  
\*2 AMB: Active Metal Brazing

SECTION

# 01

## The NGK Group Value Creation Story

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# Creating Our Next Value

## Highlights of Section 01



- Commitment to business structure transformation
- Progress of NGK Group Vision
- Initiatives related to new business creation
- Steadily promoting digital transformation (DX)
- Medium-term business portfolio forecast
- New challenges presented by business segment restructuring

## Realizing the NGK Group Vision: Road to 2050 Launching Five Transformations and Implementing Major Organizational Reforms Applying NGK Group strengths to resolve societal issues while achieving corporate growth

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The world is on the cusp of dramatic changes as it faces a myriad of issues, including responding to global warming, the spread of new infectious diseases, and geopolitical fluidity. Amid such an environment, the NGK Group took our first step towards realizing the NGK Group Vision of contributing to carbon neutrality and a digital society.

We are working on Five Transformations that represent the core strategies of our vision. While we have just completed our first year of initiatives related to these reforms, more than ever I feel that the unique ceramic technologies we have cultivated for more than 100 years since our founding will contribute to the realization of our vision.

Our vision, Road to 2050, will not be a simple endeavor. However, I am increasingly confident that we can realize our goal of contributing to the resolution of societal issues and achieving sustainable growth for the NGK Group.

### Four goals I outlined when I became President

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#### Policies and progress towards achievement

When I assumed the role of President, I embraced four goals aimed at implementing structural reforms that will prepare us for the coming times. First, I want to introduce and provide a progress report for each goal.

My first goal is to produce results for more than 250 billion yen in capital investments we have conducted over the past three years. We made these investments to respond to increasing demand, particularly in automotive and semiconductor-related businesses. We are forecasting continuous gains in line with profit projections for both businesses. In addition to the recovery of the global automobile market, favorable conditions for semiconductor-related business resulted in steady growth in product shipments.

My second goal is to create new businesses and products that will support the future of the NGK Group. We are advancing Five Transformations under our vision through 2050. One of those reforms is the distribution of R&D budget mainly into two fields: carbon neutrality and a digital society.

My third goal is to promote globalization. The NGK Group has offices in 20 countries across the globe, with overseas sales exceeding 70% of Group net sales. I personally have exchanged opinions with customers and employees all over the world. I have hopes of promoting further globalism but this past year forced us to mostly rely on online interactions due to the impact of COVID-19. While it does depend on future conditions, I want to proactively interact with



President

*Shigeru Kobayashi*

Profile

Joined in 1983. Has served in numerous roles in the company, including working in overseas sales and marketing in the Energy Infrastructure Business Division before becoming Manager of sales and marketing department of the NAS Battery Business Division, serving as President of an overseas subsidiary, Manager of overseas sales and marketing department for the Ceramic Products Business Group, and as Group Executive of the Energy Infrastructure Business Group. Kobayashi assumed the role of President of the NGK Group in April 2021.

Kobayashi will lead the charge towards realizing the NGK Group Vision based on a philosophy of "creating a company that is a source of pride and trust for all our stakeholders."

person in-person and work to build stronger relationships.

My fourth goal is to develop the NGK Group into a corporation that instills pride in its employees and earns the trust of all our stakeholders. We have continued efforts to reform our corporate culture and become a transparent and enjoyable workplace where everyone embraces a challenging spirit and exerts their creativity. For example, over the past year, I have

created opportunities to personally speak to employees about the NGK Group Vision. By sharing this vision with many so employees, we are cultivating a culture that invites free and open discussions that is not limited by age or seniority. I can feel the growing sense of motivation towards these reforms. Reforming organizational culture is not something that can be done overnight but we will aim to be a corporation that is trusted by all our stakeholders.

## Business environment surrounding NGK Group and strengths

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### Carbon neutrality and a digital society are tailwinds for growth

The NGK Group Vision outlines our ideal future as being a company that uses our unique ceramic technologies to contribute to carbon neutrality and a digital society. The current NGK Group business structure is weighted heavily towards products used in the internal combustion engines of gasoline and diesel vehicles. This includes products such as ceramic substrates for purifying automobile exhaust. With the continued growth of electrified vehicles, our most important and highest priority issue is determining how we will reform our business structure and maintain and expand revenues. With the NGK Group possessing such unique ceramic technologies, I believe this change will serve as a tailwind for growth for our Group.

For example, storage cells are critical to the realization of carbon neutrality. NGK Group technology includes products capable of meeting a diverse range of needs in the storage cell domain. These products include our NAS<sup>®</sup> batteries, which are capable of storing megawatts of power, and our zinc rechargeable batteries, which offer high capacitance and safety. Other

technology and products include sub-nano ceramic membranes capable of separating and recovering CO<sub>2</sub>, and solid oxide electrolysis cells (SOEC).

The NGK Group is also highly competitive in the digital society domain. Our product line includes EnerCera<sup>®</sup>, an ultra-compact, ultra-thin lithium-ion rechargeable battery that achieves high output and high capacitance. We also offer high-performance wafers that support next-generation high-speed, high-volume communications. We are able to provide new value in the age of an ultra-smart society that continues to adopt AI, IoT, and high-speed communications networks such as 5G and 6G. We also have accumulated technology and knowhow related to the integration of electronics systems into automobiles, including advanced driving assistance systems (ADAS) and network connections designed to support growing IoT applications. I believe the application of this technology and knowhow will open a path to significant opportunities for our Group.

## Specific policies for realizing the NGK Group Vision

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### Launching Five Transformations and making solid progress towards future goals

Under the NGK Group Vision: Road to 2050, we started work on Five Transformations that representing the core of this vision: (1) ESG Management; (2) Profitability Improvement; (3) Research & Development; (4) Commercialization;

and (5) Digital Transformation (DX). NGK has several strengths beyond our technology. One of these strengths is the spirit of “We do this for the sake of society’s future, and not for own profit.” This spirit dates back to the origins of NGK when



## Accelerating reforms by looking to the future and leading with innovation.

it was founded as a member of the Morimura Group\*1.

More than 100 years ago, our company was created to resolve societal issues in Japan related to the dissemination of electricity. Supported by that spirit, we have continued to achieve growth throughout changes such as diversification and globalization. Along the way, we cultivated a DNA for taking on new challenges without ever giving up. The NGK Group will continue to embrace the spirit of “doing for the sake of society’s future, and not for own profit” and our DNA for taking on new challenges. We will apply these strengths to turn the major changes we face in society into a tailwind that drives us forward.

The following is a report on progress after the first year of our reform efforts.

### ESG management

ESG management is a reform initiative that is directly linked to the operating objectives (purpose) of the NGK Group. Since our establishment some 100 years ago, NGK has engaged in management practices rooted in the current concept of ESG: resolving social issues through our products and services. This commitment remains unchanged today and will continue into future. I believe we must respond to the demands of society with a modern perspective.

As part of our environmental initiatives (the “E” in ESG), in the spring of 2021 we formulated the NGK Group Environmental Vision and set a goal of contributing to carbon neutrality through our products and services while working to achieve net zero CO<sub>2</sub> emissions by 2050. In addition to adopting renewable energy at our domestic and overseas sites, we will also review our production methods and switch to alternative fuels to reduce CO<sub>2</sub> emissions.

We started collaborative efforts with Ena City in Gifu Prefecture and Abashiri City in Hokkaido Prefecture to locally produce and consume electricity involving the use of NAS batteries. We also established new local electric power companies “Ena Electric Power” and “Abashiri Electric Power”. Utilizing renewable energy such as solar power and wind power, we will promote electricity self-consumption at the regional level. We are also aiming to improve safety and security by taking measures against power outages in the event of a disaster, and to reduce environmental load. We plan to expand this model nationwide to contribute to the expansion of renewable energy use.

In line with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD), in April 2022 we published information to our website on the status of NGK Group efforts related to four items, governance, strategy, risk management, and metrics and targets.

To address issues related to society (the “S” in ESG), we are focusing on diversity based on the belief that encouraging the active participation of diverse human resources will lead to the creation of new value. When I took office as President, I indicated “promoting globalization” as one of the measures I planned to undertake, and I am actively promoting the hiring of local human resources at our overseas locations. I lived abroad

for a long time, including being assigned overseas, and have personally experienced the importance of respecting diversity in different cultures. I believe accepting and collaborating with people of diverse backgrounds and values is the key to promoting globalization. We are also working to create a motivating work environment for employees, including by expanding our system for promoting women's workplace advancement and providing diverse career paths that enable employees to pursue growth autonomously.

We are addressing governance (the "G" in ESG) by developing a system that enables prompt and decisive decision-making while ensuring transparency and fairness that gives due consideration to various stakeholders. From this fiscal year, we established an ESG Management Committee, on which I serve as chairman, to take a universal approach to addressing ESG issues facing the NGK Group. We also established a system to ensure the Board of Directors appropriately supervises these activities.

#### Profitability improvement

To improve profitability, we will aim to further increase our earning power over the next five years and create a virtuous cycle of securing profits and investing.

As a measure to further improve profitability, in 2021 we started "Manufacturing ∞ (Chain) Innovation". We will use digital technology to promote manufacturing visualization and global collaborations with a focus on production innovation activities that bridge the gap between the ideal and real situations along the

manufacturing chain. We will also implement cost reduction activities that improve manufacturing costs by reducing losses at each factory.

#### R&D and commercialization

R&D and commercialization are the core reforms of the NGK Group Vision. We set a goal of "New Value 1000", which aims to generate sales of 100 billion yen from new products and new businesses by 2030. To achieve this goal, we will accelerate the creation and business development of products that contribute to carbon neutrality and a digital society. In particular, we will emphasize the speed from development to commercialization and market engagement. We will develop a system that leads to the development of innovative ceramic materials in a short period of time. This includes adopting practical applications for materials informatics\*<sup>2</sup>, which involves creating a database from the massive amounts of experimental data we possess as a corporate asset, and combining the database with AI technology.

#### DX (digital transformation)

To promote DX, in April 2021, we established the Digital Transformation and Innovation Department as a department specializing in DX to unify efforts related to digitalization, and to promote a company-wide change in thinking regarding data utilization. In April of this year, we formulated and published the NGK Group Digital Vision.

\*1 One of the world's largest ceramics corporate groups, which originated from Morimura Gumi, a ceramics trading company.

\*2 A method for developing materials using information processing technologies such as big data, AI, and machine learning.

### Restructuring and establishment of new organizations

## Implemented strategy reorganizing four business groups into three, and established Corporate NV Creation

One of our organizational restructuring initiatives is the review of business segments. Based on the business domains related to carbon neutrality and a digital society, which we position as core areas in our vision, we reorganized our previous structure of four business groups into a structure with three business groups. The Environment Business Group will promote business in new markets such as decarbonization technology in addition to its mainstay automobile-related

business. The Digital Society Business Group promotes businesses related to a digital society, such as semiconductors, electronic components, and various electronic devices. The Energy & Industry Business Group promotes businesses related to carbon neutrality, such as energy storage, industrial equipment and products, and insulators. While increasing synergy between departments, we are combining organizations to implement reforms from a different perspective.

# Working toward new value creation by cultivating a culture that accepts failures and encourages a challenging spirit.



As another organizational restructuring initiative, to accelerate commercialization we established a new marketing unit, the Corporate NV Creation, to lead the New Value 1000. While the NGK Group has unwavering strengths in technology, we also recognize our challenges related to marketing, including approaching markets and disseminating information. We will speed up the creation of new products and our commercialization process by promptly identifying needs, encouraging inter-departments collaborations and external cooperation on the development of products and the provision of services and systems.

We started this spring with a system of about 100 people by gathering various human resources

from each business groups and head office departments. We have begun to extract and propose technologies and themes to be tackled. This is an unprecedented attempt, and our efforts may fail.

As I stated, the NGK Group embraces its DNA for taking on new challenges. At the same time, it is also true that many employees are incredibly cautious and tend to be afraid of failure. Not all challenges work, but the insatiable determination to take on new challenges is the source of new ideas and new value. To achieve unprecedented change, I believe we must evaluate challenges and create a corporate culture that tolerates failure. I want to use the efforts of the Corporate NV Creation as an opportunity to adopt such a culture.

## To all our stakeholders

### The NGK Group has set out on a new path towards our “Third Foundation”

Under the NGK Group Vision: Road to 2050, in 2021 we started many reforms, including reorganizing and establishing new departments within the organization. This represents the start of a long-term and dramatic new strategy at a time when we face major changes in our operating environment. I regard this major milestone as our

“Third Foundation.” Moving forward, the NGK Group will continue to transform and take on challenges with flexibility and a sense of speed. We will move forward towards becoming a company that is trusted by our stakeholders.

We would like to ask our stakeholders for your continued support.

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

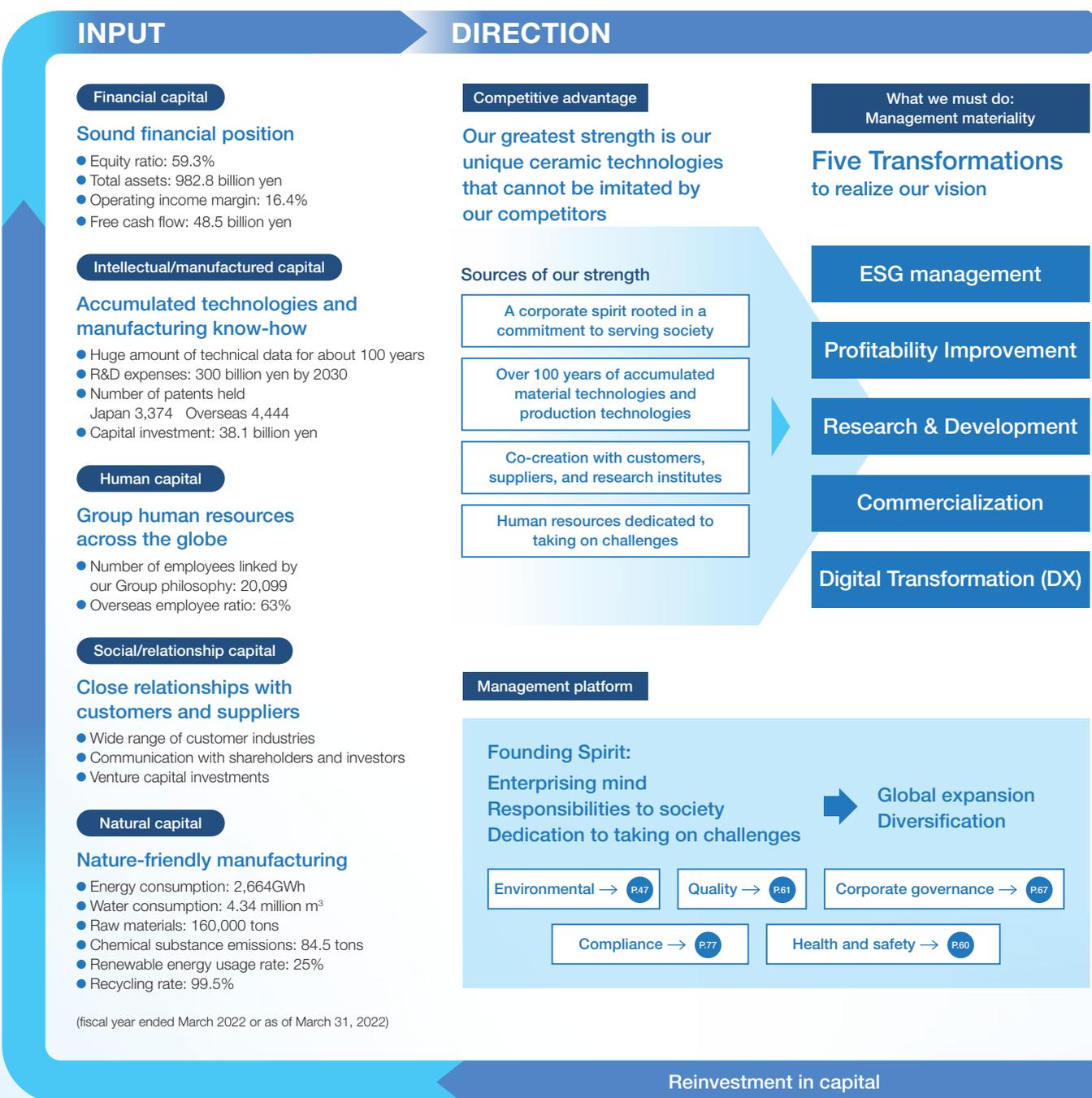
**External environment and megatrends**

**External environment and societal issues**

- Respect for human rights
- Increasing climate change risks
- Increasing geopolitical risks
- Conservation of biodiversity
- Achieving a circular economy
- Promoting diversity

**Megatrends facing the NGK Group**

- Making mobility clean and safe
- Making clean energy highly efficient
- Making a smart society more pleasant
- Making manufacturing sites innovative



**NGK Group Philosophy**

**Our Mission**

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

**Our Values**

Quality of People    Embrace challenges and teamwork.

Quality of Product    Exceed expectations.

Quality of Management    Social trust is our foundation.

## OUTPUT / OUTCOME

### 2030 targets

Net sales from newly launched businesses: **100 billion yen**  
(New Value 1000)  
CN/DS sales ratio: **50%**

### Performance targets for 2025

Net sales: **600 billion yen**    Operating income: **90 billion yen**

### Results (the fiscal year ended March 2022)

Net sales: **510.4 billion yen**    Operating income **83.5 billion yen**

### Main products

#### Environment Business

- Ceramics for purifying automobile exhaust
- NOx sensors



#### Digital Society Business

- Ceramics for electronics and electric devices
- Ceramics for semiconductor manufacturing equipment
- Metals and mold products



#### Energy & Industry Business

- Insulators and power-related devices
- Energy storage systems
- Industrial equipment and devices



### External impact

Contributing to sustainable development for society



### Internal impact

#### Enhancing input

- Financial structure with high investment/risk tolerance
- Expanding business domains and partnerships
- Acquiring and developing human resources
- Accumulating technologies and increasing intellectual capital

## IMPACT

### What we want to be

#### NGK Group Vision

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

### Goals

**By 2050**  
**Carbon neutrality and digital society-related**  
**Grow to 80% of sales**

### Products and services that contribute to resolving social issues

#### CN ..... For carbon neutrality

- Atmospheric CO<sub>2</sub> adsorption modules
- Industrial CO<sub>2</sub> separation membranes
- Beryllium copper components for hydrogen-related infrastructure
- Honeycomb structural reactors for synthetic fuel
- Solid oxide electrolysis cells
- Large-format storage batteries for renewable energy storage
- Power supply services
- Electronic parts for EV

#### DS ..... For a digital society

- Ultra-compact, ultra-thin batteries that support IoT
- Parts for next-generation semiconductor manufacturing equipment
- Piezoelectric micro-actuators for HDDs
- New bonded wafer for sensing devices
- Bonded wafers for next-generation communication networks
- Wafers for next-generation power semiconductors
- New ceramic packages
- Mobility sensors

NGK Group Vision: Road to 2050

NGK Group Vision:

# Road to 2050

Current

## External environment

- Respect for human rights
- Increasing climate change risks
- Growing geopolitical risks
- Conservation of biodiversity
- Realization of a circular economy
- Promotion of diversity



## Our view of current conditions

- An environment undergoing major transformation
  - > Carbon neutralization
  - > Remarkable digital evolution

NGK Group

Our Mission

Enriching Human Life  
by Adding New Value  
to Society.

NGK Group

What we must do

Convert our business  
structure through Five  
Transformations

Promoting transformation for  
sustainable growth

## Transforming our business structure

Developments such as the shift to electric vehicles are driving the automobile industry into a once-in-a-century period of dramatic change. The ceramics that are indispensable to purifying automobile exhaust gas accounts for roughly 40% of our net sales. As such, the NGK Group must pursue new development opportunities. For us to fulfill an even greater role in the sustainable development of society, we must transform into a company that provides products and services that anticipate the needs of a future society. We will strengthen our initiatives, which can be said to be our Third Foundation, and promote the transformation of our business structure by setting our CN/DS-related sales composition ratio as a milestone.

### CN/DS-related sales composition ratio



In April 2021, we drafted the NGK Group Vision. Amid a period of dramatic global transformation, the NGK Group Vision clarifies “what we want to be” and “what we must do”. This vision was established based on the perspective of backcasting from the future society of 2050, aiming to be a corporate group that will be appreciated by society in the future. We will challenge ourselves to new value creation in the fields of carbon neutrality (CN) and a digital society (DS), and work to achieve the NGK Group Philosophy by transforming our business structure.

**Philosophy**

**Our Values**

- Quality of People  
**Embrace challenges and teamwork.**
- Quality of Product  
**Exceed expectations.**
- Quality of Management  
**Social trust is our foundation.**

**2050**

**Vision**

Backcasting from what we want to be

What we want to be

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

Backcasting from our 2050 vision

**Our image of 2050**

- Future technology
- The future of fine ceramics
- Social issues that will be exposed in the future



Future social issues being evaluated by the NGK Group

- A society centered on renewable energy
- AI innovation enabling a smart society in all aspects of life

Challenging new value creation with unique ceramic technologies

**Pursuit of new value propositions**

**CN**

Carbon Neutrality

**Toward carbon neutrality**

To achieve carbon neutrality, we will develop various items based on our unique ceramic technologies.



**DS**

Digital Society

**Toward a digital society**

To contribute to the further development of a digital society, we will promote the development of new products based on our unique ceramic technologies.

In anticipation of social changes likely to occur as we head towards 2050, our Group is engaged in initiatives aimed at contributing to society in two ways: 1) carbon neutrality (CN) where humans coexist with the natural environment, and 2) a digital society (DS) where people can live in safe, convenient, comfortable, and healthy lives. We will pursue new value propositions by utilizing our unique ceramic technologies and strengthening our efforts to society.

# Five Transformations

The NGK Group will transform into what we want to be by pursuing Five Transformations. Under our Group slogan of “Surprising Ceramics,” we will transform our business structure toward what we call our Third Foundation.

## 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\*1 in 2030
- Investment of 300 billion yen in R&D over the next 10 years  
Concentration in the CN and DS areas (80%)



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

- ROIC\*3 / 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

\*1 Businesses just launched and to be newly launched in the future

\*2 DX: Digital Transformation

Transform business models and corporate structure with digital technology

\*3 NGK ROIC (see page 32)

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ESG Management</b>              | 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 (environmental), 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. |
| <b>Profitability Improvement</b>   | Regarding improvement in earning power, we are going to take on the following initiatives:<br>- Generating cash by securely increasing our earning power over the next five years as explained earlier<br>- Instilling management utilizing ROIC and analysis and improvement of profitability in each business within the entire NGK Group<br>- Starting new actions in production processes to continue to reinforce our strengths as a manufacturer                               |
| <b>Research &amp; Development</b>  | 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.                                                                                                                                                                             |
| <b>Commercialization</b>           | 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.                                                                                                                                                                                                            |
| <b>Digital Transformation (DX)</b> | We will use the power of digital to accomplish the above business transformation.                                                                                                                                                                                                                                                                                                                                                                                                    |

# Speaking with Key Persons Promoting Five Transformations

The NGK Group aims to become a company that provides new value to society through our unique ceramic technologies. We are working to transform our business structure by promoting Five Transformations.

In April 2022, we reevaluated our business segments and established the Corporate NV Creation to improve our ability to respond to changes in technology and in our operating environment. We also drafted the NGK Group Digital Vision, which aims to promote transformation at NGK, a company that have come to take the use of data and digital technology for granted. To improve short-term profitability, medium- to long-term growth potential, and ultra-long-term social performance, we adopted the NGK version of value added. These initiatives represent the start of our transformation efforts. By steadily promoting these initiatives with a sense of urgency, we will achieve sustainable growth for the NGK Group.

## Accelerating Our Transformation



Speaking with  
key persons  
promoting Five  
Transformations

Creating  
New Value

# New Value 1000

Strengthen collaborations and  
commercialize new products to achieve  
net sales of 100 billion yen

Senior Vice President  
Group Executive,  
Corporate Manufacturing Engineering

Atsushi Miyajima



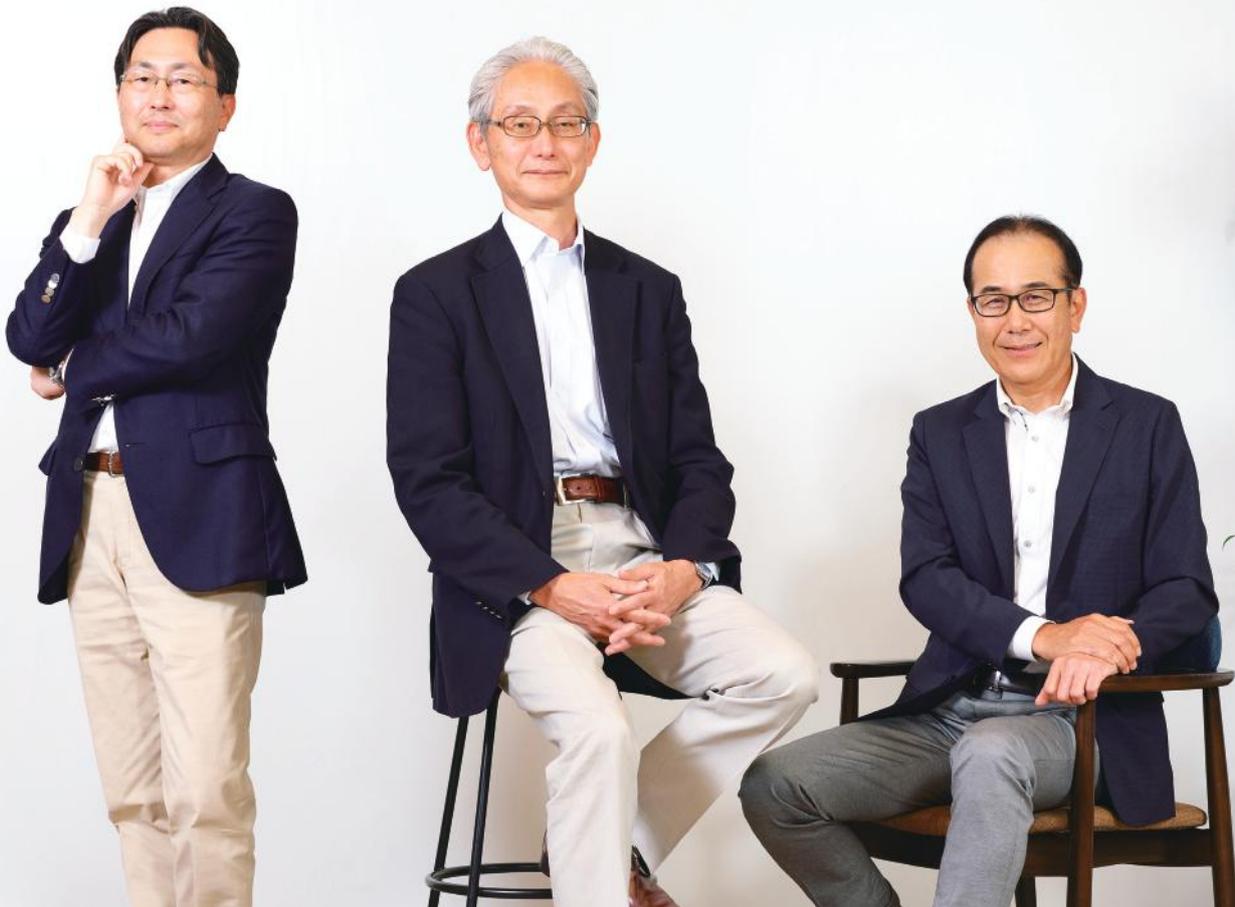
Executive Vice President  
Group Executive,  
Corporate NV Creation

Ryohei Iwasaki



Senior Vice President  
Group Executive,  
Corporate R&D

Tsutomu Nanataki



In the NGK Group Vision: Road to 2050, we outline our core strategy for business structure transformation as “strengthening collaborations and commercializing new products to create new value and achieve net sales of 100 billion yen (NV1000).” We spoke with the leaders of the Corporate NV Creation, the Corporate R&D, and the Corporate Manufacturing Engineering, driving forces behind strategy implementation and promotion.

**NV1000 is a declaration of our commitment to transformation**

— NV1000 initiatives are fully underway at the company.

**Iwasaki:** The operating environment influencing the NGK Group is entering a paradigm shift. The shift to electrified vehicles (EV) represents an avoidable situation in which we will see a decline in medium-term demand in products for purifying automobile exhaust. Despite projections for growth in products for semiconductor manufacturing equipment, ensuring sustainable growth for the NGK Group will require that we develop businesses that will become the next pillars of growth for the Group. The NGK Group Vision: Road to 2050, recognizes this situation and outlines the direction we must head to contribute to society by solving the issues facing modern society. NV1000 represents our medium-term goals for R&D, one of the Five Transformations we must engage in to achieve this vision. This goal involves aiming for 100 billion yen or more from newly commercialized products by 2030. Reaching this goal will require that we increase R&D expenses to 300 billion yen over a 10-year period. Of that amount, we are planning to allocate 80 percent to R&D related to carbon neutrality and a digital society. This is a challenging goal the company has outlined towards achieving transformation for the NGK Group. But through collaboration between the Corporate NV Creation, the Corporate R&D, and the Corporate Manufacturing Engineering Group, we will promote and work to accelerate product commercialization, another one of the Five Transformations.

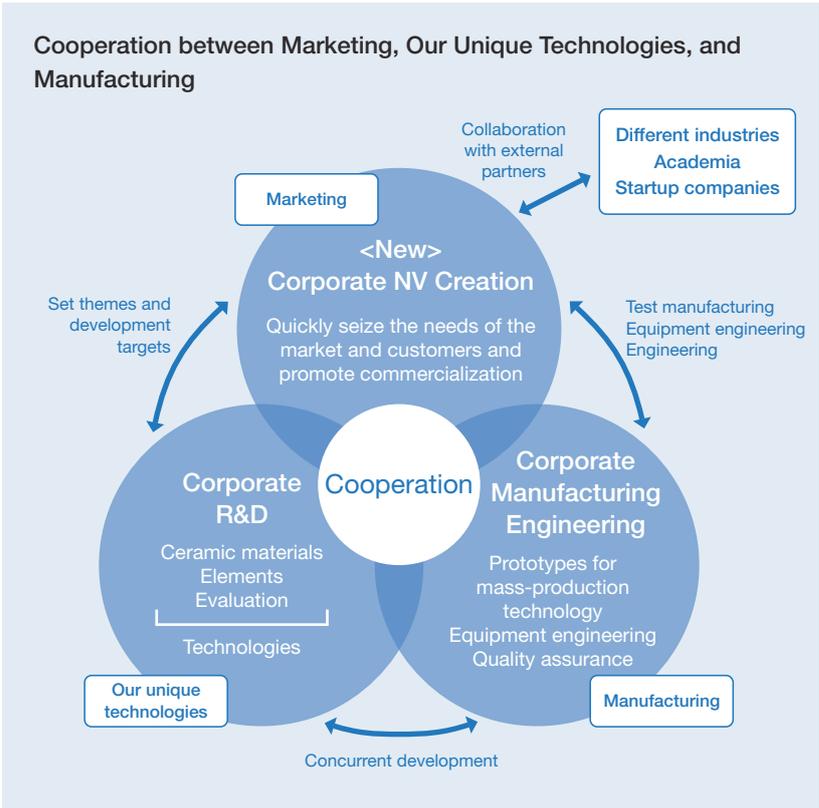
**Nanataki:** NV1000 is a very lofty goal, and I have a healthy awareness of the fact that this is not something we can achieve without being fully committed. As the Corporate R&D, we must focus more than ever on creating new, distinctive technology that can serve as a source of competitiveness. We will also need to continuously create promising

R&D themes while also accelerating our efforts. In the past, some products took 10 years or more to develop. However, in times of dramatic change, we must link R&D to commercialization more effectively and more rapidly. Also important to increasing the rate of success for our R&D themes will be our ability to thoroughly engage in basic marketing. This refers to our ability to identify promising markets, measure our probability of success on those markets, and determine what we need to win on those markets.

**Miyajima:** As the group in charge of prototypes, mass production technology and mass production quality, the ability to commercialize newly developed products and quickly convert them into a format that can generate revenue comes down to the Corporate Manufacturing Engineering Group. The company's ability to commercialize newly developed products and make them profitability depends on us. The highest priority issue in the manufacturing process is achieving greater speed. I believe that we must work to close collaboration to



reduce time losses in every phase. Thus far, our main role has been the expansion of existing business but, moving forward, we will demonstrate the power of engineering through our manufacturing technology development for new products.



Focusing on marketing while increasing the speed of new product commercialization and new business development

—Tell us about the initiatives being undertaken by each headquarters.

**Iwasaki:** The Corporate NV Creation was established as a new organization to lead marketing with the goal of dramatically increasing our new market development capabilities to promote early realization of NV1000. Gathering a diverse range of personnel from each operating division and the head office, we launched activities this spring as a group with 100 members, an unprecedented scale for the NGK Group. Staff with sufficient sales experience and staff with deep technical knowledge work together to gather high value information towards increasing global recognition of our products and technology. While the NGK Group has a strong foundation in technology, we have had cases of not achieving returns in line with expectations due to progressing with development without conducting sufficient marketability validation. Moving forward, the Corporate NV Creation and the Corporate R&D will engage in close-knit information sharing from the point of development theme conceptualization. We will improve theme success rates by thoroughly identifying markets and



customers, and analyzing competition. Through mechanisms such as Business Development Promotion Meetings (NV Gate Promotion Meetings), which we began from this fiscal year, we will also make judgments on the investment of management resources. How we choose themes in which we engage in the dynamic and focused allocation of management resources is an issue that will influence the failure or success of the NGK Group. We will thoroughly discuss this issue and make decisions based on practical and highly transparent decision-making.

**Nanataki:** As I mentioned earlier, R&D will dedicate ourselves to creating new distinctive technology. Over the years, NGK has used ceramic crystal orientation technology, hydrothermal synthesis technology, and precision bonding and compounding technology for dissimilar materials to manufacture proprietary products including bonded wafers for surface acoustic wave (SAW) filters, the lithium-ion rechargeable battery EnerCera®, and sub-nano ceramic membranes. Moving forward, we will fulfill our mission of creating even more distinctive technology at an even greater development speed. We will accomplish this by collaborating with the Corporate Manufacturing Engineering Group from the early phase, in other words, we will engage in concurrent development. Additionally, we will incorporate next-generation DX (digital transformation) technology such as materials informatics (MI)\*1 to take advantage of accumulated data and link our efforts to faster business development.

\*1 Materials informatics (MI): Applying informatics (information science) such as machine learning and big data, the core technology of AI, towards new materials and new component development.

**Miyajima:** The Corporate Manufacturing Engineering will need to change our mindset related to conventional manufacturing processes. In the past, our conventional process involved the Corporate R&D completing a prototype, after which our division would then start work on a pilot plant design and conduct validation to confirm product feasibility

before finally moving into mass production. However, moving forward, we will strive to dramatically accelerate our methods by engaging in concurrent development that advances multiple processes simultaneously. Specifically, we will get involved in projects from the upstream phase of development. This will enable us to begin evaluating mass production facilities from the early stages of development and create the manufacturing processes necessary for mass production. We will incorporate 3D printers and other technology that will help us optimize the prototype creation process. We will also rapidly provide feedback to the Corporate R&D to promote the simultaneous resolution of the various issues that occur at each stage of development.

**Iwasaki:** I think it will be important to proactively incorporate external knowledge. Thus far, our company has largely practiced a philosophy of finding solutions through internal efforts but moving forward it will be difficult to win by embracing such a philosophy. As global manufacturers work towards technological innovation related to carbon neutrality and a digital society, ensuring that our technology is adopted by society will require that we utilize external knowledge from various resources. This includes not only academia and dedicated research organizations, but also means incorporating technology from global startups. With this in mind, we have begun investing in venture capital and startup companies.

**Nanataki:** To increase the speed of R&D while focusing on new distinctive technology, in addition to increasing the number of development personnel and upgrading our facilities, more than ever we must actively engage in open innovation. Our scope of innovation can be expanded by utilizing external resources such as seeds from universities and public institutions, and by engaging in joint research. Collaborating with researchers with different perspectives can lead to unexpected new ideas. We will continue to

collaborate with a wide range of partners towards advancing our R&D.

**Iwasaki:** As another new approach, this spring we opened the ID-Room TOKYO Satellite. Located in the Marunouchi Building in Tokyo, this innovation room will serve as a space for promoting collaboration with partners. The space features various elements, including using projection mapping to introduce impactful companies, remote conferencing that uses several large liquid crystal panels for an augmented experience, and an exhibition corner where visitors can actually interact with the products that interest them. My hope is that the entire company, including the business divisions, makes use of this space as a place for creating opportunities that lead to new collaborations.

**Corporate NV Creation taking the lead in accelerating initiatives**

— Please comment on future actions towards achieving NV1000.

**Iwasaki:** The Corporate NV Creation will be involved in every process from new product creation to commercialization, and I think this will speed up our actions towards achieving NV1000. We will increase our marketing strengths with the conviction of doing whatever we think is necessary to rapidly advance development themes to a point where they can be passed on to a business division. This will also mean increase our numbers of talented staff so we also plan on enhancing our recruitment activities. I feel a huge sense of responsibility, but it is also very motivating.

**Nanataki:** I am very encouraged about having the Corporate NV Creation, which will enable collaborations from an early stage and pursue both commercial feasibility and benefits for our customers. Taking an R&D theme to commercialization involves for phases: (1) Concept creation, (2) Feasibility study, (3) Commercial feasibility verification, (4)

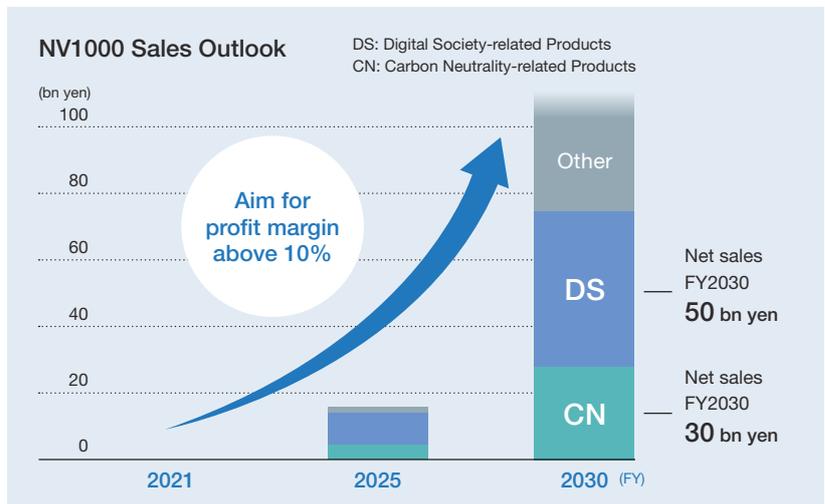
Commercial feasibility validation. The Corporate NV Creation will utilize internal and external networks to promote the smooth advancement of promising themes to the next step. At the same time, the knowledge of the Corporate NV Creation will be central in deciding on commercial feasibility, which will make it easier to make decisions regarding stopping R&D. Knowing when to stop R&D can be very difficult, but it is sometimes necessary to downsize or withdraw in order to concentrate resources on promising themes.

**Miyajima:** By evaluating mass production from the R&D phase, I think that we can build a system that will enable the efficient transition to mass production without having to redo certain work. For example, costs are an important issue when it comes to mass production. This type of method will reduce the chances of having to redo evaluations from the beginning due to costs considerations. I also think such close-knit collaborations will increase transparency and create a more positive development cycle. Collaboration between the three groups will be a key point to achieving NV1000. I want to engage in frank communication and create a framework that functions organically towards realizing our common goal.

**Iwasaki:** While there is an element of a sense of urgency in response to changes in our environment, both



NV1000 and the Corporate NV Creation are the result of policies originating from positive ideas. They represent our commitment to using our existing core technology and working with domestic and overseas Group partners to take on new challenges without a fear of failure. The Corporate NV Creation is an organization comprised of a diverse range of personnel and every member of this group is excited about the opportunity to contribute to the creation of new value. We will apply our collective knowledge towards taking on challenges in various fields. I believe actions based on this commitment represent our path to realizing NV1000, and will lead to the type of transformation the NGK Group aims to achieve.





Promoting DX to Accelerate Five Transformations

Executive Vice President

Chiaki Niwa



## Promoting DX to support business and management that leads to new value creation

The NGK Group is proactively promoting digital transformation (DX) to achieve corporate reforms that will position us for the future. In April 2022, we outlined the NGK Group Digital Vision and a roadmap for promoting initiatives through 2030.

We will increase our market competitiveness, efficiency, and productivity to achieve growth as a corporation and the new value creation made possible through these initiatives.

### Drafting the NGK Group Digital Vision DX as the driving force of Five Transformations

In the past, NGK's core strength was in the conventional manufacturing of products. From generation to generation, we inherited the skills and knowhow cultivated over the years to establish market differentiation and a competitive advantage not easily mimicked by other companies. Our shift towards the adoption of digital technology began some 10 years ago. We realized that, amid intensifying global competition, differentiating ourselves and securing a competitive advantage would require that we accumulate qualitative elements such as skills and knowhow as quantitative data that could be applied towards further improving our production efficiency.

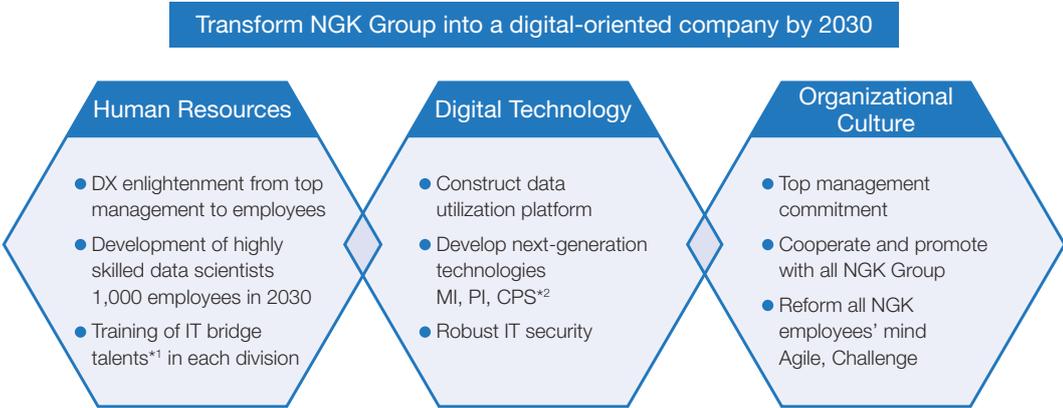
Our current environment is known as the era of VUCA (volatility, uncertainty, complexity and ambiguity), an age in which technological advancements are creating environments of increasing complexity and making it difficult

to forecast the future. As uncertainty increases during the winds of changes coming from all directions, achieving sustainable growth for the NGK Group will require that we shift away from conventional thinking about business and work processes. We must adopt thinking and concepts that fit with the changing times. The key to this will be to transform our corporate structure and business models by adopting data and digital technology. In other words, we must undergo a digital transformation. The NGK Group must take unprecedented efforts to accelerate our DX and create new value.

In April 2022, we drafted the NGK Group Digital Vision, which we linked to our medium- and long-term vision. As our vision of what we want to be, we want to contribute to carbon neutrality and a digital society by using DX as the driving force of Five Transformations that will help us realize what we call our Third Foundation. We will seamlessly incorporate data and digital technology to identify the needs of our customers and society. We will reform our products,

# NGK Group Digital Vision

Apply digital technologies as a key driving factor of “Five Transformations” to realize the “Third Foundation” and lead to carbon neutrality and digital society.



\*1 Bridge talents: Human resources that can adopt measures that strike a balance between management, operations and IT  
 \*2 MI: Materials Informatics, PI: Process Informatics, CPS: Cyber Physical Systems

services, and business model to establish a sustainable competitive advantage. Through these initiatives, we will achieve the “Third Foundation” where we use DX to drive our Five Transformations will lead to new value creation and innovation that helps resolve social issues and promotes corporate growth.

### Three pillars of DX promotion Human resources, digital technology, and organizational culture

Transforming into a company capable of the seamless adoption of technology will require more than simply using data and digital technology. This will require the company-wide digital transformation. Critical to this transformation will be the development of human resources, and the reform of our organization and corporate culture. With this in mind, we positioned human resources, digital, and organization and culture as the three core policies of the NGK Group Digital Vision.

In the area of human resources, we will hold in-person seminars and web meetings on the use of our internal portal and DX, as well as provide opportunities to interact with other companies as a part of enlightenment activities for all employees, including senior management. To foster the development of human resources capable of utilizing data, we will aim for the development of 1,000 staff members by 2030. For example, the DX Study Exchange we launched in 2021, in an internal program that provides staff the opportunity to leave their assigned department for one year. During this period, employees are allowed to focus on data

analysis and digital technology without having to also perform their existing duties. This program is designed to develop the leaders who will play a core role in promoting DX. We chose three members for the program in FY2021 and expanded this to 13 members for FY2022. By 2030, we are planning to develop a total of 110 leaders. Aiming to increase overall IT literacy for the Group, we also are recommending employees take the Information Technology Passport Examination (a national examination for measuring basic IT knowledge) and are even planning to make this a required for employee promotions. We will also focus on the development of “bridge talents”, staff members capable of proposing policies that strike a balance between business management, operations, and IT. These bridge personnel will also serve as key personnel in our initiatives to promote DX.

As initiatives related to digital, we will work to build, implement, and improve on a data utilization platform that will support the future activities of the NGK Group now that we have completed the transition from legacy systems. From materials informatics (MI)\*3, which we introduce later in this report, and process informatics (PI)\*4 to cyber-physical systems (CPS)\*5, we will aggressively develop and integrate next-generation technology. Particularly with MI, which will become a core technology for NGK, we will aim to reduce our development lead time by 90 percent. Additionally, we will reevaluate and strengthen IT security measures for the entire NGK Group. Specifically, by the end of FY2024, for the entire NGK Group we will (1) build a targeted attack defense system, (2) establish and SOC+EDR\*6 to strengthen detection capabilities, and (3) upgrade to a secure backup that is highly resistant to virus attacks. These measures are

NGK Group Vision: Road to 2050  
 Promoting DX to Accelerate Five Transformations

in line with the approach outlined by the US National Institute of Standards and Technology (NIST).

To address our organization and culture, we will ensure awareness and understanding of management's strong commitment to promoting DX as a part of our management strategy. The entire NGK Group will unite towards building a framework for collaborating on these initiatives. We will also strengthen collaborations with our overseas locations and engage in activities that promote mutual success, including holding global conferences based on the adoption of common KPI. To ensure the success of our DX initiatives, we will work to cultivate a mentality centered on reform through which everyone from management to local site employees all embrace the importance of transforming how we think and taking a proactive role in operational reforms.

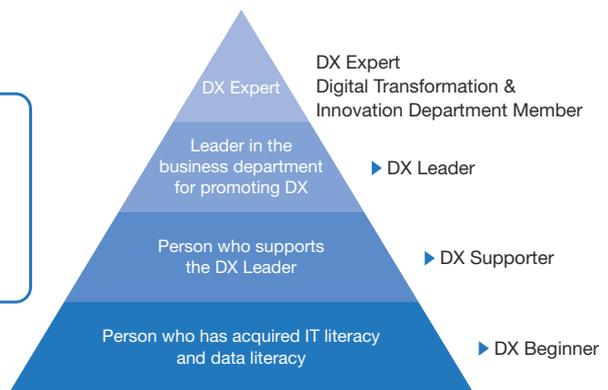
Through these efforts, we will increase our annual project numbers from the current 100 per year to 300 per year.

We will engage in inter-departmental collaborations to promote DX activities based on these three core initiatives. By 2030, we are aiming to be a company capable of the seamless utilization of data and digital technology.

- \*3 Materials informatics (MI): Applying informatics (information science) such as machine learning and big data, the core technology of AI, towards new materials and new component development
- \*4 Process informatics (PI): Applying information sciences to new process development.
- \*5 Cyber-physical system (CPS): Creating value by using real-world data to recreate virtual spaces for analysis, and then provide feedback for real-world applications.
- \*6 Security Operation Center (SOC): An external dedicated organization that conducts 24-hour monitoring of device and service logs to quickly detect viruses on internal systems and other external threats.  
 Endpoint Detection and Response (EDR): Software that monitors for suspicious activity or communications on PCs and servers to detect and respond to infiltration by computer viruses and other external threats.

Tier-based education

- DX Leader** : A leader who promotes DX in the business division
- DX Supporter**: Human resources who work together with departments and sites to resolve individual technical issues using data analysis
- DX Beginner** : Personnel who can apply data analysis methods in their work



Common education and training for leaders and supporters

DX Study Exchange

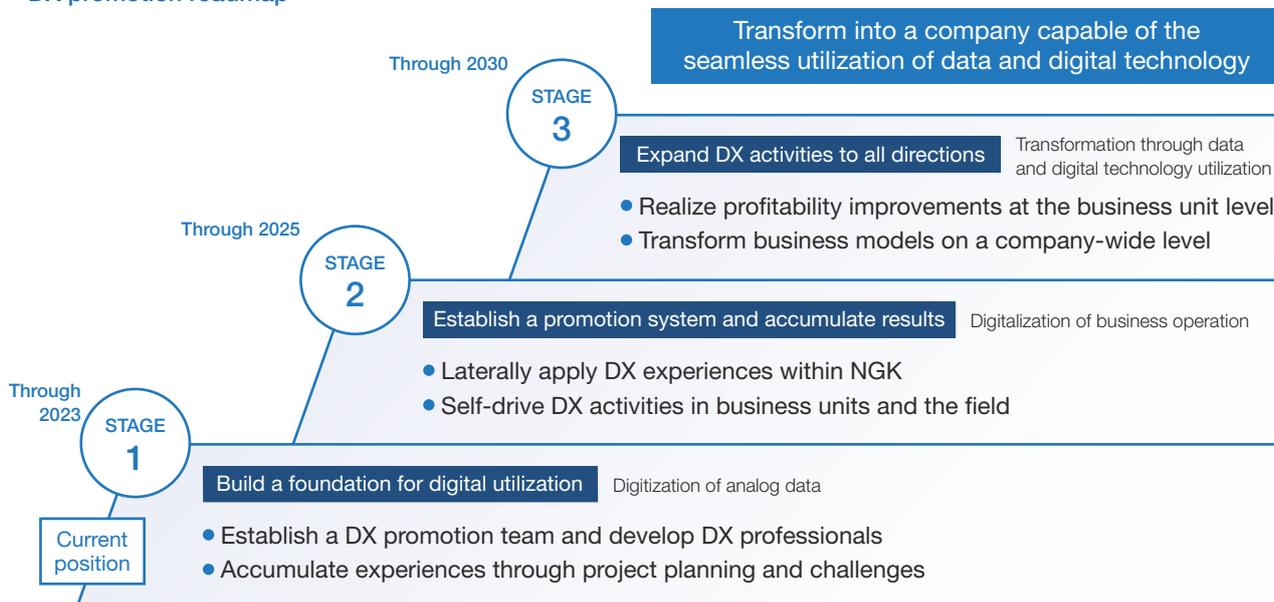
Report meeting

第1回 NGK データサイエンスアカデミー 報告会

Long-term plan

|               | 2021                     | 2022              | 2023 | 2024            | 2025                | What we want to be by 2030         |
|---------------|--------------------------|-------------------|------|-----------------|---------------------|------------------------------------|
| DX Experts    |                          |                   |      | 2-3 people/year | Total of 6 people   | DX Experts: Total of 20 people     |
| DX Leaders    | 3 people in initial year | 5-15 people/year  |      |                 | Total of 35 people  | DX Leaders: Total of 110 people    |
| DX Supporters |                          | 20-30 people/year |      |                 | Total of 100 people | DX Supporters: Total of 300 people |
| DX Beginners  | 20-40 people/year        |                   |      |                 | Total of 300 people | DX Beginners: Total of 600 people  |

## DX promotion roadmap



## DX promotion roadmap Gradual initiatives in 3 steps

The driving force behind DX promotion will be the Digital Transformation and Innovation Department, which we newly established in April 2021. Conducting activities across the entire company, this department will link digital technology such as AI and IoT with the expertise of each business division, Corporate R&D, and headquarters departments. The Digital Transformation and Innovation Department will also fulfill the role of supporting and promoting business reforms. Furthermore, the following is the DX promotion roadmap we formulated to transform into a company capable of utilizing data and digital technology.

### STAGE1 > Build a foundation for digital utilization

We will build a foundation for using digital technology by establishing a DX promotion organization and developing DX human resources. We will advance the digitization of analog data, the basis of our DX strategy, to improve operational efficiency and save labor while also working to improve the digital literacy of our employees.

### STAGE2 > Establish a promotion system and accumulate results

We will adopt our successes from STAGE2 throughout the company and promote the digitalization of each business and manufacturing process. We will make DX activities autonomous with business departments and local sites, change and reconstruct operational processes using digital technology, and link these efforts to the discovery of new needs.

### STAGE3 > Expand DX activities to all directions

We will leverage data and digital technology to transform our business model on a company-wide level. We will establish a competitive edge by reforming our corporate culture, organization, and operational processes while also improving the profitability of each business division. Furthermore, we will pursue continuous innovation to create unparalleled value.

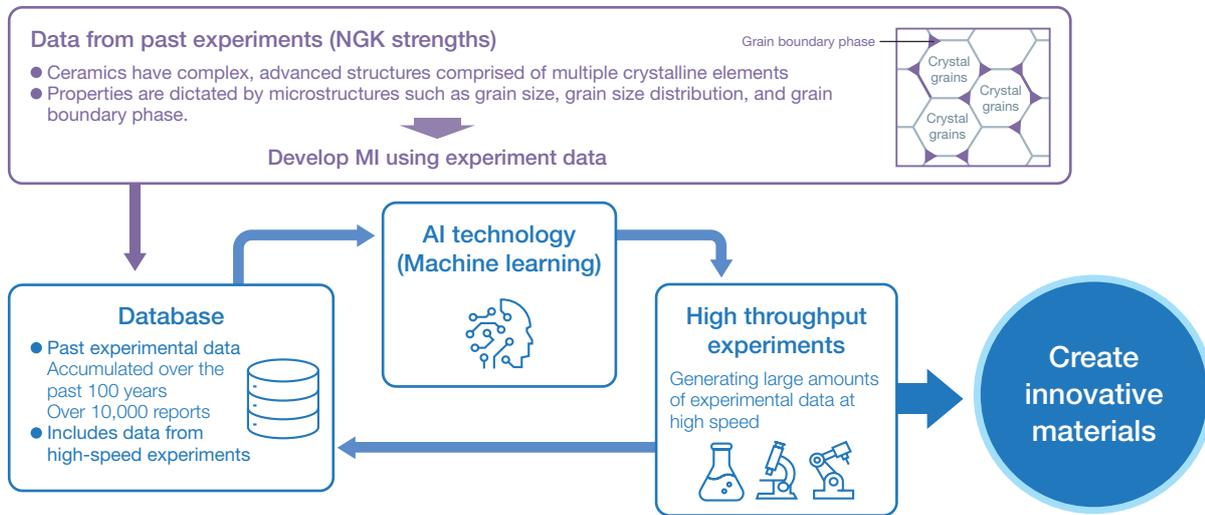
The NGK Group is currently in STAGE1. Looking ahead to what we want to be in 2030, all employees in all divisions of the company will conduct backcasting and gradually implement initiatives with a sense of urgency as we work to increase our experience and maturity.

## Establishing DX unique to NGK “Materials Informatics”

One of the next-generation technologies that we are focusing on is a development method called Materials Informatics (MI). This involves creating a database of calculated data based on simulations and accumulated experimental data. This data is then analyzed by AI to efficiently search for new materials. The adoption of this technology is expected to speed up the development of advanced materials.

Thus far, there we have seen examples of practical applications for MI in the calculated data for organic materials. However, with inorganic materials such as ceramics, no progress has been made in the application of MI due to the fact that ceramics are complex structures

Materials informatics unique to NGK



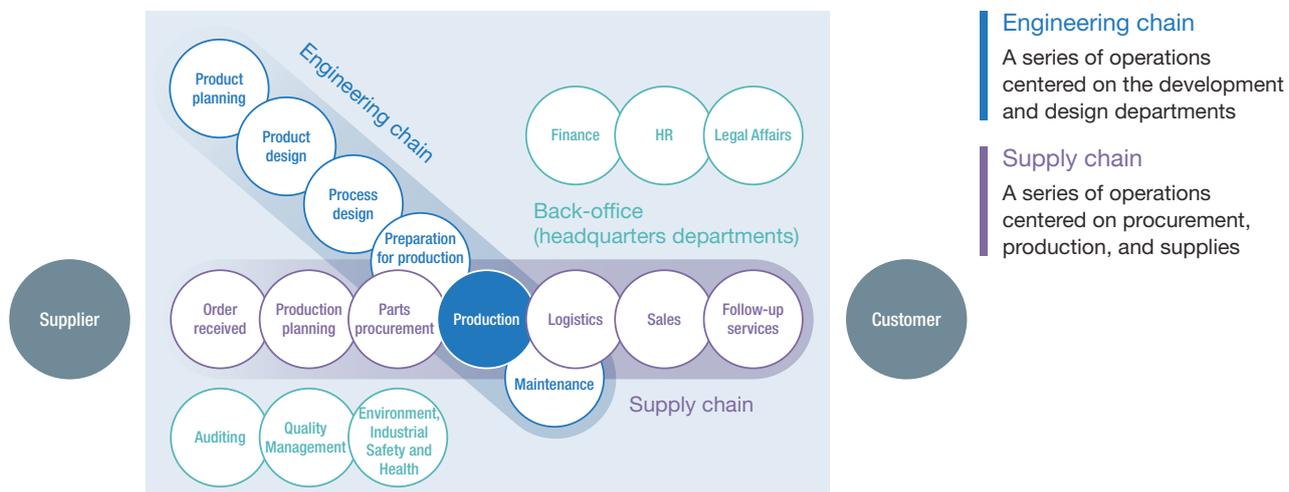
Application to material development for all NGK products by the end of fiscal 2030

comprised of multiple crystalline elements, making high-precision simulations more difficult than with organic materials.

The NGK Group has more than 10,000 sets of experimental data accumulated over the past 100 years, and we are developing MI that leverages this vast experimental data that other companies do not possess. Our goal is to use MI to shorten development lead-time by 90 percent and establish MI unique to NGK that will lead to future growth. The Corporate R&D Group, Digital Transformation and Innovation Department, and Corporate Manufacturing Engineering Group will engage in a company-wide project towards achieving this goal.

Seamless connection of all processes along our engineering and supply chains

Based on the NGK Group Digital Vision, our vision of manufacturing in 2030 is one where all processes along the engineering and supply chains are seamlessly connected through digital technology. To achieve this vision, on the engineering chain, we will introduce next-generation technologies such as MI to speed up development and improve productivity by digitizing human experience and technology. On the supply chain, we will digitize data and create an environment that facilitates the utilization of data gathered by the Manufacturing, Sales, and Procurement Divisions. These activities are being promoted in close



coordination with one of our company-wide initiatives, Manufacturing ∞ (Chain) Innovation. It will also be essential to reform the back-office functions (headquarters departments) that support manufacturing. Through DX, we will improve the efficiency of low-value-added work and improve the speed of management by becoming experts in strategy/decision-making tasks.

### Promoting DX is essential to expanding services

The NGK Group is expanding our business beyond product manufacturing to provide services, systems, and solutions. We are working towards the utilization of data and digital technology in these areas as well.

One example is the regional new electric power project (Ena Electric Power, Abashiri Electric Power) that utilizes large-scale storage batteries and NAS® batteries. Our product in this project is the NAS battery, but we have launched a business that sells not only NAS batteries, but also provides megawatt-class power storage systems that offer large capacity, high output, and long service life. Renewable energy sources such as solar power have issues with stable power supply because the amount of power generated varies depending on the weather. NGK applied digital technology to build a system that can forecast power generation and demand while finding the optimal balance between charging and discharging to provide stable power supply over the long term. The adoption of this system by society will enable the realization of local production and consumption of electricity, and promote the spread of renewable energy. This will create new value for NGK Group and contribute to resolving social issues at the same time. The importance of storage batteries for "adjustment flexibility", the ability to provide a stable supply of electricity, is increasing. In the future, we

plan to combine NAS batteries with larger energy management systems to help expand the adoption of renewable energy throughout society.

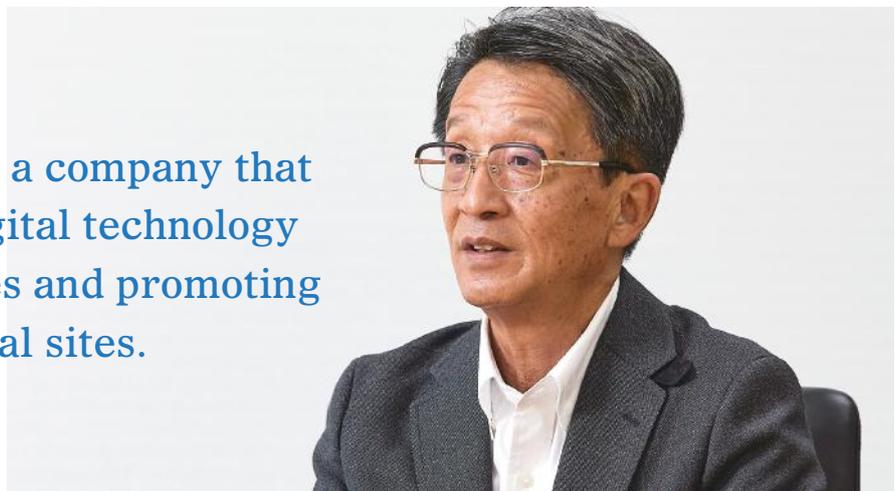
We believe that promoting DX is essential to developing our own competitive products into service provision and new business expansion.

### Achieving change toward what we want to be

DX is a keyword of modern times, but human capabilities remain indispensable to achieving true DX that goes beyond mere digitization and operational efficiency. People are the main players in DX, and DX promotion initiatives will require that all employees to understand the essence of DX and work together as a group. The important thing is not to be satisfied with the status quo. Even small changes can make a difference in our operations. Each and every one of us must always embrace an attitude of "trying to change." Through gradual advancements, we can make changes to departmental operations and manufacturing processes. We believe we can optimize the ensure NGK Group through a transformation resulting from a combination of multiple processes based on Group-wide collaborations between people and departments. An important management theme when promoting DX is the repetition of speedy planning, execution, evaluation, and improvement. The path to a successful DX strategy is the agile implementation of the PDCA cycle and to aim for improvement without fear of failure.

The connections between people, products, and services created by digital technology serve as a bridge to new value creation and innovation. The NGK Group will accelerate our DX promotion with a strong desire to transform into a corporation capable of utilizing data and digital technology.

**Transforming into a company that seeks to utilize digital technology in all our processes and promoting reforms at our local sites.**





## Financial and Capital Strategies for Supporting Transformations

# Promoting management that emphasizes capital efficiency while maintaining financial soundness

Director and Senior Vice President

**Hideaki Shindo**



To achieve the NGK Group Vision, we will aim to improve our corporate value by increasing profitability and contributing to resolving social issues through optimal capital allocation and the transformation of our business portfolio.

### Progress relative to the NGK Group Vision

In the NGK Group Vision we announced in April 2021, based on assumed exchange rates of 1 US dollar = 100 yen and 1 euro = 120 yen, we set targets of 600 billion yen in net sales and 90 billion yen in operating income for FY2025.

In FY2021, net sales increased by 12.9% year-on-year to 510.4 billion yen and operating income increased 64.3% year-on-year to 83.5 billion yen. In addition to a significant increase in demand for automotive-related products and products for semiconductor manufacturing equipment, there was also the impact of the yen depreciation. As a result, we set new record highs for both net sales and operating income.

Based on the same exchange rate assumptions as in the Group Vision, net sales would have been approximately 487 billion yen with operating income of approximately 73 billion yen. We are making steady progress in the first year of

initiatives related to our Group Vision, and we will continue to take steps to achieve targets without allowing increased performance due to foreign currency rates to distract us from our goals.

In FY2022, although profits from automobile-related products will be sluggish due to increased costs associated with the situation in Ukraine, we are forecasting an increase in net sales and operating income, with net sales of 580 billion yen and operating income of 90 billion yen. This reflects increased demand for products for semiconductor manufacturing equipment and yen depreciation. We will appropriately allocate management resources with the goal of achieving our performance targets for FY2025 ahead of schedule.

### Medium-term business portfolio approach

The NGK Group Vision positions carbon neutrality and a

digital society as future growth domains, and we are transforming our business structure so that products related to these domains will account for 50% of sales in 2030, and 80% of sales in 2050. Looking at the Environment Business, which is currently a core driver of earnings, we expect a gradual decline in the internal combustion engine business moving forward due to the dissemination of electrified vehicles. However, we will work to maximize profits by ensuring a stable global supply structure to respond to demand growth related to a recovery in the global automotive market and the tightening of exhaust restrictions in various countries. In addition to using secured profits towards further expanding the Digital Society Business, which we position as a growth domain, we will first work to improve the short-term profitability of the Energy & Industry Business while also looking to expand products related to carbon neutrality products over the long term. By maintaining and improving the profitability of each business, we plan to increase medium- and long-term sales and profits.

**Priority investment in the fields of carbon neutrality and digital society to achieve the NGK Group Vision**

Regarding cash allocation, we anticipate continuous returns from capital investments conducted over the past five years, and our policy is to maintain a balance between input into growth areas and returns to stakeholders.

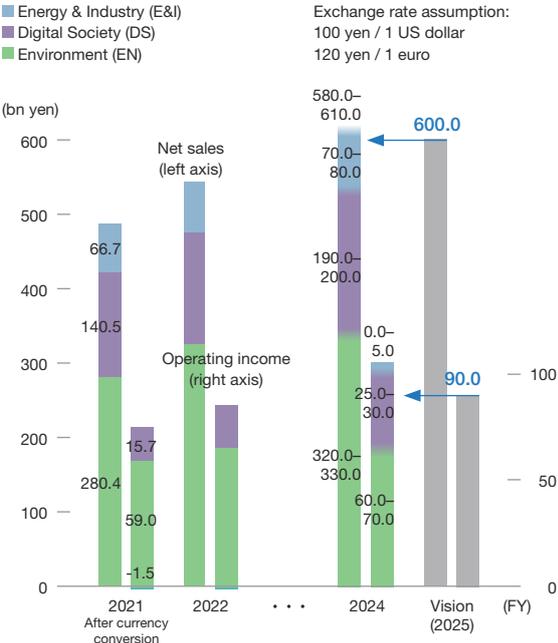
On the subject of input to growth areas, we will focus

on capital investments and R&D in the carbon neutrality and digital society domains, which we position as the cornerstone of the NGK Group Vision. We will aim for sales of 100 billion yen from newly launched businesses by 2030 as we work to achieve New Value 1000. We are planning on capital investments for FY2022 totaling 59 billion yen. This is mainly represented by renewal investments in the Environment Business and increased production in the Digital Society Business. Over the next several years, we are anticipating roughly 60 billion yen per year in investments, mainly in the Digital Society Business. Additionally, we are gradually expanding our environmental investments aimed at achieving net-zero CO<sub>2</sub> emissions. We will advance these initiatives efficiently by reflecting economic perspectives based on internal carbon pricing into our investment decisions.

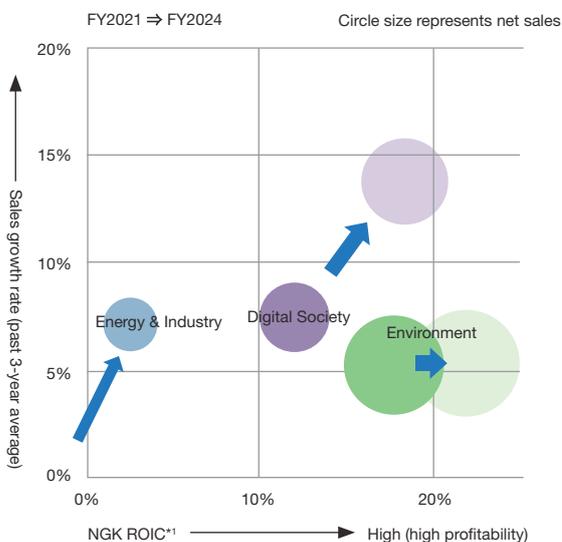
Regarding R&D expenses, in the NGK Group Vision we outline 300 billion yen in investments for research and development over 10 years. We plan to invest 26 billion yen in FY2022, of which approximately 60% will be invested in themes related to a digital society and carbon neutrality.

Looking to promote future growth, we will also proactively consider M&A. We are focused on two main directions for M&A. One is to consider targets that will lead to further strengthening and new growth expansion in the peripheral domains of existing businesses. The other direction is to consider investments in companies with which we can collaborate towards creating new products and new businesses. We will actively pursue opportunities based on these two criteria.

**Progress relative to the NGK Group Vision**



**Medium-term business portfolio approach**



\*1 NGK ROIC = Operating income ÷ (Accounts receivable + Inventories + Fixed assets)  
 Instead of "capital" and "liabilities", this is calculated based on business assets (accounts receivable, inventories, fixed assets) that can be managed by business divisions

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### Improving profitability by promoting the NGK ROIC

On the subject of capital policy, we are focused on ensuring profitability that exceeds the cost of capital while maintaining financial soundness, profit margins, capital turnover, and financial leverage at sound levels consistent with our business strategy. Using return on equity (ROE) as a key management indicator, we will promote management that emphasizes capital efficiency. We also use return on invested capital (NGK ROIC: operating income ÷ business assets), which is closely related to ROE, as a management indicator.

Instead of invested capital and profit after tax, we are adopting business assets (accounts receivable, inventories, fixed assets) and business unit operating income. This will allow business units to manage their own targets. Since adopting this indicator in FY2016, the concept of ROIC management has been adopted widely throughout the company. Since FY2021, we have been using an ROIC tree to improve our business by incorporating figures such as cost of sales ratio, SG&A ratio, inventory and accounts receivable holding months for each business division. With a medium- and long-term perspective on maintaining an ROE of 10% or higher, we have set an ROIC of 10% or higher as a company-wide standard, with each business setting targets to improve profitability, prioritize investments, and be conscious of the appropriate inventory levels. These efforts will work towards improving ROIC.

In FY2021, we secured an ROE of 12.9% thanks to improved performance and other factors. Regarding our debt/equity structure, we aim for a Debt Equity ratio of around 0.4 to ensure we can at least maintain our current bond rating of A+ (R&I), while also remaining focused on the effective use of debt. For capital procurement, our principle basic policy is to procure interest-bearing debt

and reduce risks by diversifying debt into long-term and short-term loans.

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### Policy on profit returns

We prioritize the interests of our shareholders, and position sustainable improvements to corporate value and profit returns as one of our most important management policies. We will maintain a good balance between securing appropriate investment funds for growth and returning profits with a focus on capital efficiency.

Regarding dividends, we aim to maintain a dividend on equity ratio of 3% and a consolidated dividend payout ratio of around 30% over the medium and long term, while giving consideration to the link between net asset management in line with changes in business risks and our three-year return on equity (ROE).

We also give consideration to cash flow forecasts and other factors when determining allocation. Based on this approach, we have decided to implement a shareholder dividend of 63 yen per share for FY2021.

We have also been conducting share buybacks to improve capital efficiency and enhance shareholder returns. Last fiscal year, we repurchased and canceled five million shares (9.7 billion yen). Going forward, we will continue to flexibly implement these measures while comprehensively considering factors such as growth investments, dividend levels, cash on hand, and share price.

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### ESG management and financial strategy

The NGK Group promotes management from an ESG perspective. We are also working to strengthen our ESG initiatives and enhance our financial information disclosure. Recent major initiatives are as follows.



**Focusing on improving both financial and non-financial value to promote medium- and long-term growth.**

● Promoting sustainable finance

In December 2021, we issued the Group's first green bond (unsecured corporate bond). We will use the capital to provide environmentally effective products and services, and to promote carbon neutrality in our business and production activities. We will also promote initiatives aimed at realizing the NGK Group Vision and the NGK Group Environmental Vision. Going forward, we will continue to consider the use of green bonds as a strategic means of raising capital.

● Information disclosure based on TCFD recommendations

In February 2020, the NGK Group announced its endorsement of the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD). In April 2022, we provide disclosure of information related to scenario analysis conducted based on the four categories recommended by the TCFD: governance, strategy, risk management, and indicators and targets. Moving forward, we will continue to enhance our disclosure of climate change-related information and continue to engage in environmentally friendly business activities as we strive to contribute to the realization of a sustainable society and improve our corporate value.

● Adopting NGK Value-Added as a new management indicator

We have introduced NGK Value-Added as a new management indicator. NGK Value-Added incorporates CO<sub>2</sub> emissions costs, labor costs, R&D costs, and ESG target achievement rates into operating income. The aim is to visualize invisible value, such as human and intellectual capital, the source of future competitiveness. This also aims to promote efforts that reduce our environmental impact and ensures human rights accountability. In addition to financial value, such as short-term profits and medium- and long-term growth potential, we intend to increase our

non-financial value, which is not reflected in financial indicators, as part of efforts to increase our corporate value.

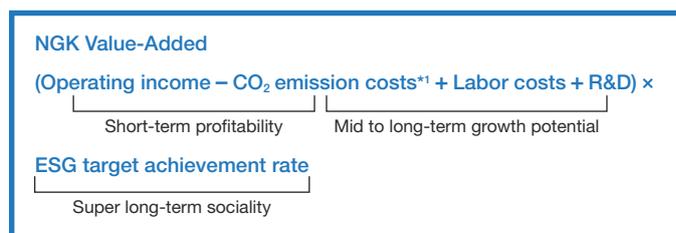
Engaging in IR activities focused on dialogue with investors and shareholders

Since the 1990s, the NGK Group has been conducting IR activities with the goal of improving ROE. In addition to holding earnings briefings for investors twice a year, we also conduct forums for overseas investors run by our lead underwriter, as well as overseas IR and IR for individual investors. Recently, due to the impact of COVID-19, we are also using online communication. We conducted roughly 130 activities through methods including telephone interviews and individual visits to institutional investors last fiscal year.

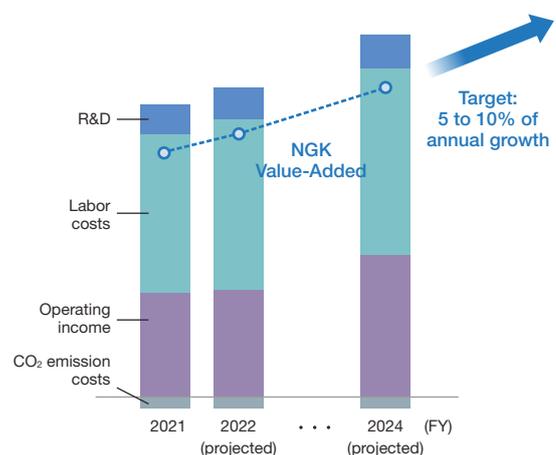
We believe that feedback from our stakeholders is extremely beneficial in improving the quality of our management. Proactive IR activities that promote such dialogue will also lead to a reduction in capital costs.

To improve our corporate value, we will continue to focus on ESG perspectives and strive to enhance opportunities for dialogue to deepen mutual trust with all stakeholders.

NGK Value-Added



\*1 CO<sub>2</sub> emission costs: Calculated based on ICP (\$130/t-CO<sub>2</sub>) introduced in FY2022





## Segment-Specific Strategies for Achieving Our Vision

Environment Business

Environment Business Group



Senior Vice President  
Group Executive,  
Environment Business Group

**Jun Mori**

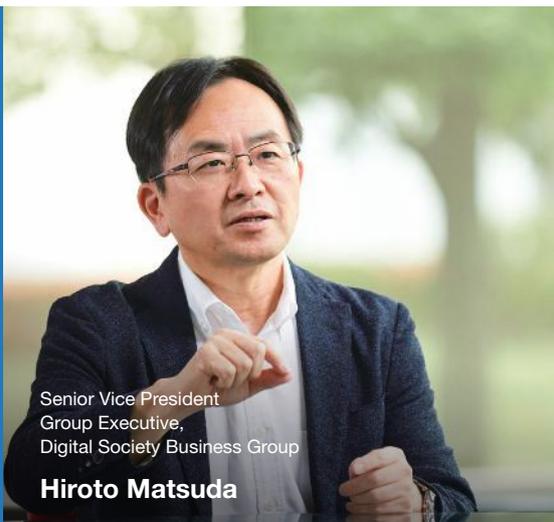
### A profit center for supporting revenues Developing products that contribute to carbon neutrality

Formerly known as the Ceramic Products Business Group, the newly launched Environment Business Group encompasses all environment-related needs by expanding beyond automotive-related products to include markets related to carbon neutrality, which are expected to see global market expansion moving forward. The new group name "Environment" represents the NGK Group's commitment to achieving new growth by engaging in businesses that use our unique ceramic technologies to make broad contribution to the environment.

It has been nearly 50 years since we began the manufacturing and sales of HONEYCERAM®, ceramic substrates for automotive

Digital Society Business

Digital Society Business Group



Senior Vice President  
Group Executive,  
Digital Society Business Group

**Hiroto Matsuda**

### With a sense of urgency Aiming to grow into a second core business

The Digital Society Business Group will aim to expand business and contribute to resolving issues facing a digital society by offering various products in the electronics field. Our most important mission is to grow into a second core business to follow the automotive products business. By 2030, we expect overall Digital Society Business sales will reach a scale similar to automotive products, which means nearly doubling our current sales. With the awareness that 2030 is only eight years away, we must emphasize speed as we implement our business strategies.

Our main growth strategy involves significantly increasing resources for the next-generation product development in the SPE

Energy & Industry Business

Energy & Industry Business Group



Senior Vice President  
Group Executive,  
Energy & Industry Business Group

**Shuhei Ishikawa**

### Expand social infrastructure related business by shifting advanced technology from "products" to "services".

The Energy & Industry Business Group strives to achieve a carbon neutral society by identifying customer needs and providing broad-based solutions to all areas of the social infrastructure business.

Our main growth strategy for the energy storage business will focus on business innovation and growth driven by NAS battery systems for electric energy storage, the mainstay product for this business. For NAS batteries, which are garnering increased attention due to accelerating decarbonization efforts, it will be critical that we not only sell batteries, but that we sell services by providing solutions that incorporate renewable energy. We will build various business models that take advantage of the NAS battery's high capacity, high

catalytic converters, in 1976. The NGK Group possesses technology that we have polished over the years while continuously adapting to changes in society and our business circumstances. We have been accumulating the knowhow related to environmental purification over the years, which could apply in a variety of fields. With the accelerating shift from automobiles to electric vehicles (EVs), we see this period of change as a major opportunity and will work to develop and introduce high-value-added products and services that contribute to carbon neutrality. Marketing is critical to quick and steady business expansion. We will achieve results by collaborating with the Corporate NV Creation, an organization specializing in marketing, to acquire multifaceted and comprehensive information on marketability. We have sent lots of personnel from our business group to the Corporate NV Creation, and we have great expectations for achieving innovation based on new concepts. At the same time, we are projecting that demand for products related to internal combustion engines will

continue to grow through around 2025, and one of the important missions of our business group is to support earnings as a profit center by applying our global stable supply system. In addition to existing products, we will also focus on expanding our lineup of new high-performance products that meet stricter exhaust gas regulations in various countries, including high-performance gasoline particulate filters (GPFs), NOx sensors for gasoline engines, and electrically heated catalysts (EHCs).

Since the days of the former Ceramic Products Business Group, our business group has embraced a culture of open communication and superior interdepartmental cooperation. We will maintain those characteristics while embracing a positive attitude that encourages enjoying change. With this philosophy, we will unite as a business group to increase motivation and move forward while evaluating both our current situation and the future trends.

business. This will support business expansion and respond to the medium- and long-term needs of the semiconductor manufacturing equipment market, which is expected to see continued growth. We will also allocate human resources in Japan and expand partnerships with our customers as we work to expand business to match the speed of market growth in the US and Asia. For the Electronic Devices Business, we will continue to expand operations in response to increased demand for mainstay products such as piezoelectric micro-actuators for HDDs and bonded wafers. At the same time, we will collaborate with the Corporate NV Creation on marketing for products facing fierce market competition such as the lithium-ion rechargeable battery EnerCera® and DCB and AMB substrates. In the Metal-related business, demand trends for wrought products are strong, so we will make large-scale investments in domestic plants to improve domestic production efficiency. We will also share market

information, develop applications for production technology, materials, and processing technology, collaborate on DX promotion, and improve efficiency. Through these initiatives, we will generate synergy between the three businesses from various perspectives and help stimulate business.

We will work to realize the NGK Group Vision by continuously challenging ourselves to new endeavors, including developing new products and pioneering and engaging in new markets. This environment will create numerous opportunities for all involved. In particular, this will create opportunities for younger members to gain experience that will lead to growth. I am committed to fostering a spirit of taking on challenges without a fear of failure or change. I will maintain a keen focus on personnel development and utilization while aligning our efforts with head office vectors to lead us towards achieving our goals.

energy density, and long service life. In addition to providing value as an emergency power supply solution for BCP and collaborating with local governments on the local production and consumption of electricity, we will promote NAS batteries for their use as “adjustment power” that contributes to stable power supply by bundling the electricity stored in NAS batteries located in various places. In the insulator business, domestic electric power companies continue to limit their capital investments. However, as a top insulator manufacturer, we will continue to manufacture and sell high-quality, highly reliable insulators for power transmission, substation, and distribution, and related equipment. We also are anticipating medium- to long-term market change, and will respond flexibly and efficiently to strengthen profitability. Due to the effects of streamlining and price revisions, in the fiscal year ending March 31, 2022, the insulator business returned to profitability for the first time in six years. In the industrial process business, we provide cutting-edge ceramic

technologies to industries seeking new technologies, including membrane separation systems for pharmaceuticals and chemicals equipped with both ceramic and organic membranes, and high-performance glass lining products with antistatic functions. Sales of firing furnaces for electronic components and cathode materials for lithium-ion batteries were also strong. We will continue to introduce products and equipment that contribute to social and environmental conservation, and carbon neutrality. We will also target the pharmaceutical and chemical industries as we look to expand our business areas.

I feel very fortunate to be involved in three businesses as the Business Group Executive during this period of change. I will apply my own experience in the electronics field and apply a sense of urgency as we work to advance the development and expansion of the solutions business.

# Environment Business Group

Providing products that respond to trends in increasingly stricter global automobile emission regulations. Focusing on initiatives in markets related to carbon neutrality.

## Business operations

We manufacture and sell environmental protection and energy-saving products all over the world including Japan, Europe, the United States, and China. Our products include ceramic substrates for automotive catalytic converters, filter products for removing particulate matter (PM) (diesel vehicles: DPFs; gasoline vehicles: GPFs), and NOx sensors for measuring nitrogen oxide (NOx) concentrations in automobile exhaust.

**Net sales ratio by business**  
 (fiscal year ended March 2022)



- Main markets**
- Automotive market
- Main customers**
- Automobile manufacturers

### Main products



#### PM filters (DPFs, GPFs)

Reliably collects particulate matter (PM) with micropores. Removes up to 99% of PM. Silicon carbide (left side of photo), which has excellent heat resistance, is mainly used in passenger cars, while lightweight cordierite is used in larger vehicles.



#### In-vehicle high-precision NOx sensors

Features a built-in element that applies the oxygen pump functions of zirconia. This product is chosen for installation in clean diesel vehicles around the world due to its excellent detection capabilities and durability.



#### HONEYCERAM®, Ceramic Substrates for automotive catalytic converters

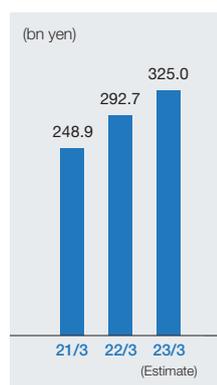
Features a catalyst retained in a small honeycomb structure that can cover an area equivalent to the size of two soccer fields to detoxify harmful substances in automobile exhaust. Used by automobile manufacturers around the world.

## Business overview and forecast

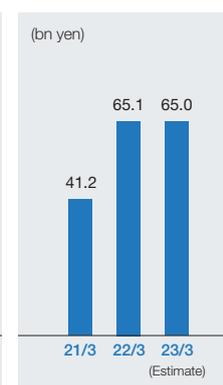
The fiscal year ended March 2022 resulted in increased sales and profits. Although the global automotive market was impacted by a semiconductor supply shortage, demand for products increased due to a recovery in sales of passenger cars and trucks, and the impact of stricter emission regulations.

For the fiscal year ending March 2023, we are forecasting net sales of 325 billion yen and operating income of 65 billion yen, representing increased revenues but profit that is almost the same year on year. In addition to an increase in demand for GPFs and large size substrates due to stricter emission regulations in China, we expect an increase in sales due to increased demand for other products driven by a recovery in passenger car sales. However, in terms of profits, negative impacts such as soaring raw material costs and increased labor costs due to inflation are expected to offset the effect of higher sales.

### Net sales



### Operating income



### Strengths

- Material technology, product development, mass production technology, and the on-site Gemba capabilities to embody them
- The ability to flexibly respond to laws and regulations in each country, regional characteristics, and demand fluctuations. Also, the capability to make proposals to automotive companies

### Recognition of external environment

|                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <h4 style="background-color: #0056b3; color: white; padding: 2px;">Opportunities</h4> <ul style="list-style-type: none"> <li>• Stricter global emission regulations</li> <li>• Expansion of motorization</li> <li>• Expansion of global decarbonization initiatives</li> </ul> | <h4 style="background-color: #0056b3; color: white; padding: 2px;">Risks</h4> <ul style="list-style-type: none"> <li>• Vehicle electrification</li> <li>• Growing geopolitical risks</li> </ul> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Basic Strategies for the NGK Group Vision: Road to 2050

- Fulfill role as a profit center to promote resource allocation towards expanding sales in CN and DS related markets
- Use unique technology to develop new CN-related products and collaborate with the Corporate NV Creation on exploring new markets

### Individual policies

- Strengthen response to demand for exhaust purification systems for internal combustion engines, which is expected to increase until around 2025
- Promote analysis of data obtained from manufacturing processes and improve productivity through automation and Manpower Saving. (Honeycomb product: Creation of next-generation honeycomb production system HPDX)
- Apply DX to all processes of management, development, and production to achieve overall efficiency (Sensor products: Smart Operations)
- Promote carbon-neutral initiatives in our manufacturing processes

Focus

## Contribute to CN with advanced ceramic technology for both of internal combustion engines and other (various) fields

NGK develops, manufactures and sells environment friendly products utilizing the characteristics of ceramics such as separation, reaction, adsorption and thermal manipulation. Our PM removal filters have a membrane filter function boasting high separation performance to provide even higher functionality. We are also improving products for existing internal combustion engines.

Our goal is to apply the characteristics of ceramics in various fields such as CO<sub>2</sub> recovery/separation, SOEC, and methanation, in order to contribute to a new era of carbon neutrality.

We have already begun exchanging specific information with customers on some development projects, and we will work to accelerate development.

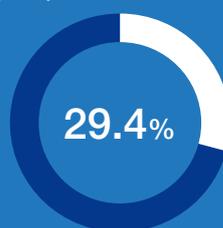
# Digital Society Business Group

Pursuing unique technology in the rapidly evolving field of electronics.  
Contributing to solving the problems of an ever-developing digital society.

## Business operations

We manufacture and sell ceramics for semiconductor manufacturing equipment that contributes to improving semiconductor manufacturing productivity, piezoelectric micro-actuators required for the precision positioning of magnetic heads that read and write data, and beryllium copper products that improve the reliability of electronic devices and help achieve device miniaturization.

**Net sales ratio by business**  
(fiscal year ended March 2022)



**Main markets**

- Semiconductor market
- Electronic components market

**Main customers**

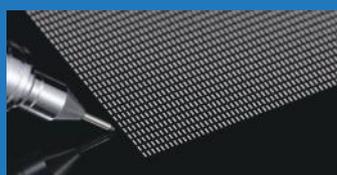
- Semiconductor manufacturing equipment manufacturers
- HDDs manufacturers
- Communication device manufacturers

### Main products



#### Ceramics for semiconductor manufacturing equipment Ceramic heaters

A stage for uniformly controlling the temperature of silicon wafers during the membrane formation process. Uses a unique structure comprised of a tube (shaft) attached to the bottom of the heating element stage on which the wafer is placed to protect the terminals and conductors from halogen gas.



#### For hard disk drives (HDDs) Piezoelectric microactuator

Ultra-compact piezoelectric micro-actuators for HDDs, which are indispensable for the precision control of magnetic heads, play an active role in data centers around the world as devices that are key to providing large-capacity and high-reliability hard disk drives.



#### Beryllium copper products

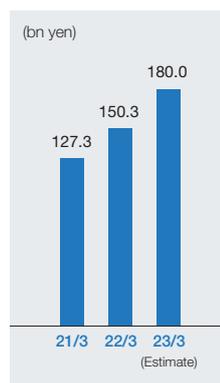
In addition to the excellent electrical and thermal conductivity of copper, these products also offer high strength and durability. The strip is widely used as a high-performance conductive spring material in various fields such as automobiles, industrial equipment, and mobile devices.

## Business overview and forecast

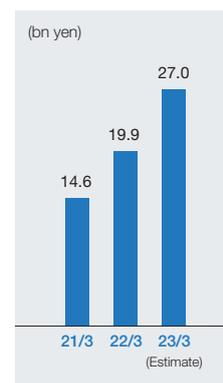
In the fiscal year ended March 2022, sales of products for semiconductor manufacturing equipment (SPE) increased thanks to an increase in shipments driven by favorable conditions on semiconductor markets. Demand for beryllium copper strip, piezoelectric micro-actuators for hard disk drives (HDDs), and ceramic packages were strong, resulting in increased sales.

For fiscal year ending March 2023, we are forecasting net sales of 180 billion yen and operating income of 27 billion yen, both of which represent a year on year increase. Demand for SPE is expected to continue to grow on strong investment sentiment, particularly for foundries. For electronic devices, we are forecasting increased sales of piezoelectric elements for HDDs thanks to favorable data center investments as well as on demand for ceramic packages. In regards to Metal-related products, demand is expected to remain strong, particularly for industrial equipment.

### Net sales



### Operating income



### Strengths

- Using our unique materials technology and manufacturing process technology to engage in fields that are difficult for our competitors
- Closely communicating with customers to develop high value-added products

### Recognition of external environment

|                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <h4>Opportunities</h4> <ul style="list-style-type: none"> <li>• Global increase in data traffic</li> <li>• Increased speeds of mobile communications</li> <li>• Increased investments in semiconductors to resolve semiconductor shortages</li> </ul> | <h4>Risks</h4> <ul style="list-style-type: none"> <li>• Misreading our development roadmap</li> <li>• Trade friction and difficulty in procuring raw materials</li> <li>• Emergence of local manufacturers</li> </ul> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Basic Strategies for the NGK Group Vision: Road to 2050

- By consolidating product groups that contribute to a digital society, we will generate synergy by linking internal and external information.
- Expand sales of DS-related products with a focus on semiconductor-related products, and aim for net sales of over 300 billion yen by 2030
- Develop carbon-neutral products for EV/HV and hydrogen-related infrastructure: DCB and AMB substrates, beryllium copper materials

### Individual policies

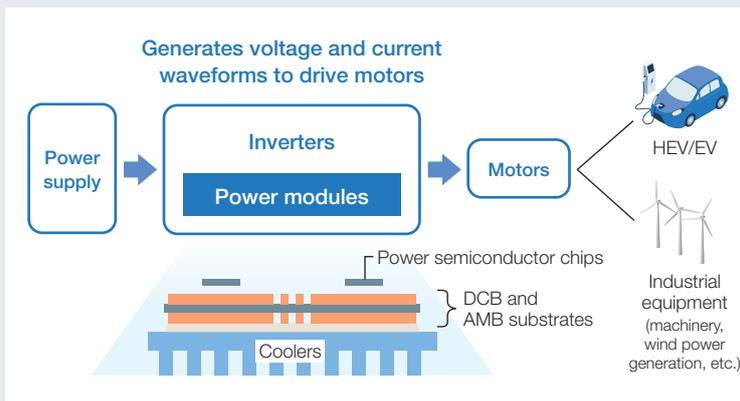
- Capture expanding demand for semiconductors and electronic components, make timely capital investments, reduce costs and improve productivity
- Incorporate DX (data utilization, process automation) to establish smart factories
- Early profit contributions from new products: Achieve by collaborating with Corporate NV Creation



### Products with future growth potential DCB\*1 and AMB\*2 substrates

\*1 DCB: Direct Copper Bonding  
\*2 AMB: Active Metal Brazing

A ceramic circuit board that combines the high heat dissipation properties of copper with the insulation performance of ceramics. These products provide excellent reliability and heat conduction, and are used in the power modules that perform motor drive control and power conversion control for generators. In addition to the electrification of automobiles (EV/HV), we also forecast increased demand for renewable energy and other industrial equipment applications.



Insulated heat dissipation circuit board with high heat dissipation and electrical insulation

# Energy & Industry Business Group

Contributing to carbon neutrality and contributing to society by supporting infrastructure in the power and industrial fields.

## Business operations

Starting from this April, we adopted a new structure that merges our existing power-related businesses, the insulator business and the energy storage business, with the industrial process business into a new business group operating in the power and industrial equipment-related fields. We will provide products and services that support social infrastructure and meet needs related to carbon neutrality and environmental conservation.

<Products of each business>

- Insulator business: Insulators for power transmission, substation and distribution, and related equipment.
- Energy storage business: NAS battery
- Industrial process business: Firing furnaces, drying furnaces, refractory products, pharmaceutical water equipment, ceramic membranes, low-level radioactive waste treatment systems for nuclear power plants, etc.

**Net sales ratio by business**  
(fiscal year ended March 2022)



### Main markets

- Power-related fields
- Industrial equipment-related fields

### Main customers

- Power-related fields
  - Power companies
  - Engineering companies
- Industrial equipment-related fields
  - Electronic component manufacturers
  - Pharmaceutical manufacturers
  - Chemical, steel manufacturers, etc.

### Main products



#### NAS battery

The world's first commercially available megawatt-class energy storage system. This battery is unique for its ability to supply power at high output for long periods of time, and has a track record of operation at more than 250 locations in Japan and overseas.



#### Insulators

Insulators play an important role in supporting transmission lines and ensuring insulation between steel towers and equipment. With products that include the world's strongest power transmission insulators, we support power supply with strength and unwavering quality that can withstand harsh environments.



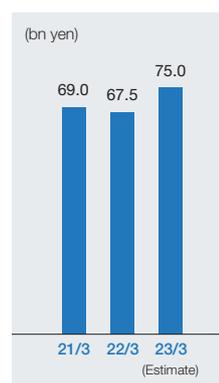
#### Ceramic membrane filter Cefilt

Uses fine ceramics (long-life filter) with excellent heat and chemical resistance. Boasts a multi-layered structure with good backwash regeneration. Also achieves high separation performance thanks to well-designed pore distribution.

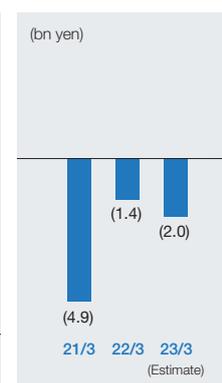
## Business overview and forecast

In the fiscal year ended March 2022, insulator business net sales decreased due to continued constraints on capital investments among domestic power companies and railway companies, and due to sluggish shipments of NAS<sup>®</sup> batteries. However, we were able to reduce losses through streamlining initiatives in the insulator business as well as thanks to the benefits of price revisions. Looking ahead to fiscal year ending March 2023, in the Industrial Process Business, we are forecasting increased demand for firing furnaces for lithium-ion battery cathode materials and electronic components, as well as increased revenues from growth in overseas exports for the Insulators Business. However, we expect continued losses due to the impact rising raw material prices and difficulties in procuring parts will have on the Insulators Business and the ES Business. Looking at the Industrial Process Business, in addition to demand related to firing furnaces, demand for pharmaceutical water equipment is also strong, and inquiries for NAS batteries are booming on global growth in the adoption of carbon-neutral systems. We are advancing preparations to strengthen profitability moving forward.

### Net sales



### Operating income



### Strengths

- Long history of networks in a wide range of industries
- Ability to provide value/solutions, including engineering
- Proprietary, high-quality ceramic manufacturing technology

### Recognition of external environment

|                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <h4 style="background-color: #0056b3; color: white; padding: 2px;">Opportunities</h4> <ul style="list-style-type: none"> <li>• Global trend toward carbon neutrality</li> <li>• Growth in renewable energy</li> <li>• Promotion of digital infrastructure</li> </ul> | <h4 style="background-color: #0056b3; color: white; padding: 2px;">Risks</h4> <ul style="list-style-type: none"> <li>• Prolonged supply chain disruption</li> <li>• Stagnant economic growth</li> <li>• Emergence of competition</li> </ul> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Basic Strategies for the NGK Group Vision: Road to 2050

- Establish a comprehensive energy business with sights on all aspects of energy
- Capturing the growing CN-related market, establish sales of products and services in the electric power and industrial fields, increase earnings

## Individual policies

- Strengthen the profitability of existing businesses by efficiently utilizing the portfolio of the three businesses
- Apply NAS batteries to expand solutions business, including offering solutions for local production for local consumption of renewable energy for local governments and proposals for improving resilience
- Collaborate with partner companies to expand sales and reduce costs for NAS batteries
- Expand the Industrial Process Business to overseas markets

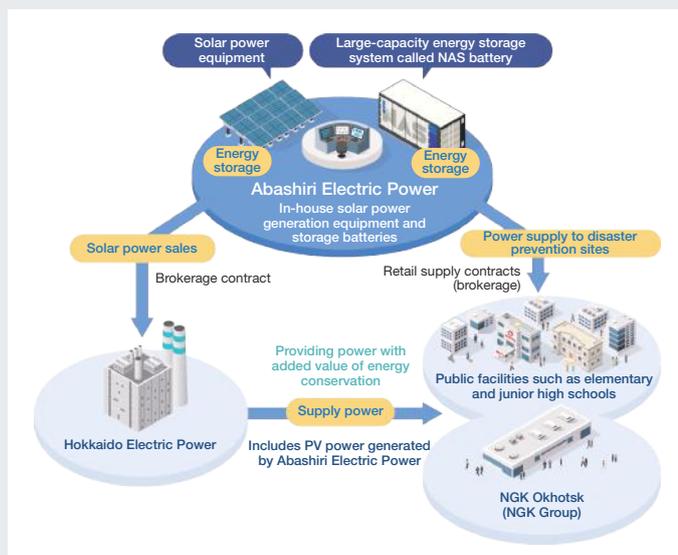


### Local production and local consumption of renewable energy

## Contribution to carbon neutrality through Abashiri Electric Power

In recent years, there have been concerns about how declines in drift ice in the Sea of Okhotsk will impact the fishing and tourism industries. Abashiri City must engage in further efforts to address the global issue of reducing greenhouse gas emissions. Abashiri City also experienced a large-scale blackout due to the 2018 Hokkaido Eastern Iburi earthquake. There is a need for concrete measures related to emergency power supply in the event of disasters that could occur at any time. NGK established Abashiri Electric Power, a new local electric power company, with the aim of resolving these regional issues.

Possessing our own solar power generation equipment and NAS batteries, we aim to establish a model for the local production and consumption of renewable energy that does not rely on the renewable energy feed-in tariff (FIT) system. In normal times, the stable use of renewable energy through solar power generation and shifting energy from solar power generation using NAS batteries will enable the supply of power collected through solar power generation, even at night. This system will also provide power in emergencies such as natural disasters.



We will strengthen our ability to respond to increasingly severe natural disasters, including by supplying power to disaster prevention sites through private power lines.

SECTION

# 02

## Foundation that Supports the NGK Group's Sustainable Value Creation

### Contents

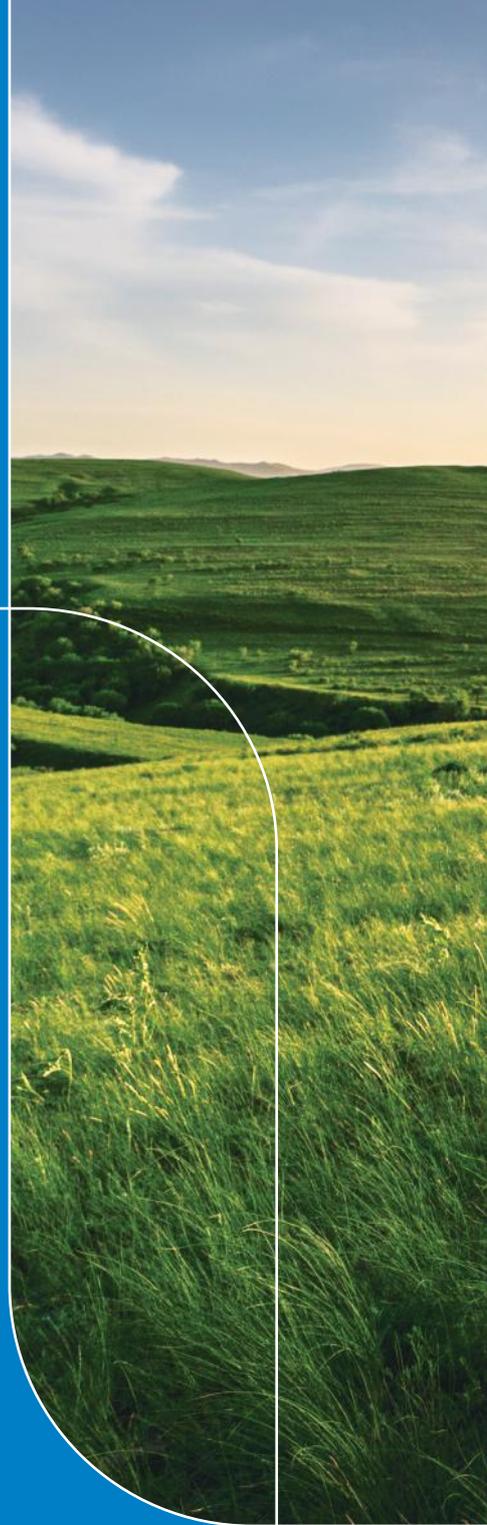
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# Improving Our Sustainability

## Highlights of Section 02



- Stance on promoting ESG towards achieving sustainable growth
- Initiatives for achieving our Environmental Vision
- Information disclosure based on TCFD recommendations
- Developing human resources capable of generating corporate value
- Corporate governance for increased management transparency and effectiveness
- Challenges and expectations discussed by outside directors

# ESG Management

ESG is central to management and will facilitate sustainable growth of the NGK Group

## ESG Management

### Basic View

With the Sustainable Development Goals (SDGs) adopted by the United Nations in mind, the NGK Group seeks to provide new value to society with our unique ceramic technologies and thereby contribute to realizing a sustainable society and winning positive expectations and trust from society. This is

our basic view on sustainability. We formulated NGK Group Vision: Road to 2050, based on the NGK Group Philosophy of enriching human life by adding new value to society. We will continue to leverage our unique ceramic technologies to help achieve carbon neutrality and a digital society.

### ESG Action System

ESG (Environmental, Social, Governance) is central to the management of the NGK Group. As we expand our overseas business, we seek to ensure greater management transparency and autonomy by maintaining an environment that cultivates a sense of fairness in every member of the NGK Group. This encourages them to make decisions and act according to international standards.

In 2019, the ESG Committee was established as a venue for sharing information, exchanging opinions, and discussing policies at the management level. In 2021, the ESG

Management Department was established to implement ESG-related activities and improve communication of information about these activities across the NGK Group. In April 2022, the ESG Committee was reorganized as the ESG Management Committee, which is chaired by the president. This committee was reorganized to strengthen initiatives to address sustainability issues that incorporate elements of ESG and the SDGs and to better oversee the Board of Directors.

### ESG Action System



## Key ESG Activity Themes in FY2022

| Key Themes                                                                  | Main Activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Activity Leader                                          |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Environmental initiatives aimed at achieving NGK Group Environmental Vision | <ul style="list-style-type: none"> <li>Internal carbon pricing, energy-savings, shift to non-fossil fuels, and use of renewable energy to achieve targets net zero CO<sub>2</sub> emissions</li> <li>Visualization of greenhouse gas emissions during the lifecycle of main products</li> <li>Formulation and follow-up on 5-Year Environmental Action Plan and annual plan</li> <li>Response to facilitate a recycling-oriented society</li> <li>Response to maintain and enhance biodiversity</li> </ul> | Environment Action Subcommittee                          |
| Climate change countermeasures                                              | <ul style="list-style-type: none"> <li>Specific initiatives on the four themes outlined in the TCFD recommendations: Governance, Strategy, Risk Management, and Metrics and Targets</li> </ul>                                                                                                                                                                                                                                                                                                             | TCFD Subcommittee                                        |
| Initiatives to ensure respect for human rights                              | <ul style="list-style-type: none"> <li>NGK Group human rights due diligence</li> <li>Promotion of hiring, cultivation of human resources and improvement of labor practices</li> <li>Diversity and inclusion</li> </ul>                                                                                                                                                                                                                                                                                    | HR Committee<br>Environment, Safety and Health Committee |
| Supply chain development                                                    | <ul style="list-style-type: none"> <li>Implementation of CSR procurement (human rights, labor, environment, fair business activities, etc.)</li> <li>Assessment of Scope 3 in carbon neutrality</li> </ul>                                                                                                                                                                                                                                                                                                 | Supply Chain Subcommittee<br>HR Committee                |
| Continuous review of the governance system                                  | <ul style="list-style-type: none"> <li>Integration of management with sustainability issues</li> <li>Strengthening the supervisory function of the Board of Directors</li> <li>Compliance with Corporate Governance Code</li> <li>Ensuring appropriate information disclosure and transparency</li> </ul>                                                                                                                                                                                                  | Governance Subcommittee                                  |
| Social Contribution Activities                                              | <ul style="list-style-type: none"> <li>Summary and disclosure of NGK Group's social contribution activities</li> <li>Support for foreign nationals</li> </ul>                                                                                                                                                                                                                                                                                                                                              | Social Contribution Activities Subcommittee              |

## FY2021 ESG Committee Record

| Meeting No. | Date          | Topics of Discussion                                                                                                                                                                                                                                          |
|-------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1st         | April 2021    | <ul style="list-style-type: none"> <li>Decisions on FY2021 action plans and key themes</li> </ul>                                                                                                                                                             |
| 2nd         | June 2021     | <ul style="list-style-type: none"> <li>Review of Board of Directors and Executive Committee operation</li> </ul>                                                                                                                                              |
| 3rd         | July 2021     | <ul style="list-style-type: none"> <li>Planning and progress on FY2021 Net Zero CO<sub>2</sub> Emissions project</li> <li>Summary of the fourth 5-Year Environmental Action Plan, and annual targets of the fifth 5-Year Environmental Action Plan</li> </ul> |
| 4th         | October 2021  | <ul style="list-style-type: none"> <li>Planning and progress on the FY2021 Carbon Neutrality (CN) new business promotion project</li> </ul>                                                                                                                   |
| 5th         | November 2021 | <ul style="list-style-type: none"> <li>Social Contribution Activities</li> <li>Compliance with the revised Corporate Governance Code</li> </ul>                                                                                                               |
| 6th         | December 2021 | <ul style="list-style-type: none"> <li>Report on Net Zero CO<sub>2</sub> Emissions project</li> <li>Progress report on the TCFD Task Force</li> </ul>                                                                                                         |
| 7th         | February 2022 | <ul style="list-style-type: none"> <li>Implementing ESG management (activity outline for next fiscal year)</li> </ul>                                                                                                                                         |
| 8th         | March 2022    | <ul style="list-style-type: none"> <li>Measures to improve ESG ratings</li> </ul>                                                                                                                                                                             |
| 9th         | March 2022    | <ul style="list-style-type: none"> <li>Information disclosure based on TCFD recommendations</li> <li>Support for Science Based Targets (SBT) and Renewable Energy 100 (RE100)</li> </ul>                                                                      |

## NGK Group Signs UN Global Compact

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

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

The NGK Group has pursued business in the energy, ecology, and electronics sectors since its founding in an effort 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 achieving the SDGs. We will continue to provide new value by leveraging our unique ceramic technologies to help create a sustainable society.



# Environmental

Striving for carbon neutrality, a recycling-oriented society, and harmony with nature by actively working to reduce our environmental impact

## Policy, Vision, and Action Plan

### NGK's Core Policy on the Environment

Recognizing that protecting the environment is a vital issue that all of humanity must face, the NGK Group formulated its Core Policy on the Environment in April 1996 in order to bring its corporate activities into harmony with the environment. Based on the NGK Group Environmental Vision announced in April 2021, we will promote initiatives to contribute to

carbon neutrality, a recycling-oriented society, and harmony with nature. On the basis of this policy, the NGK Group works to reduce the environmental impact of business activities, and actively strives to help protect the environment by developing products and technologies to that end.

\*Revised April 2021

### 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.

### NGK Group Environmental Vision

In April 2021, we announced the NGK Group Environmental Vision, which clearly states our goals of contributing to carbon neutrality through our products and services, and

achieving net zero CO<sub>2</sub> emissions for the NGK Group in 2050. The entire Group is pushing ahead on initiatives aimed at achieving the vision.

#### 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.

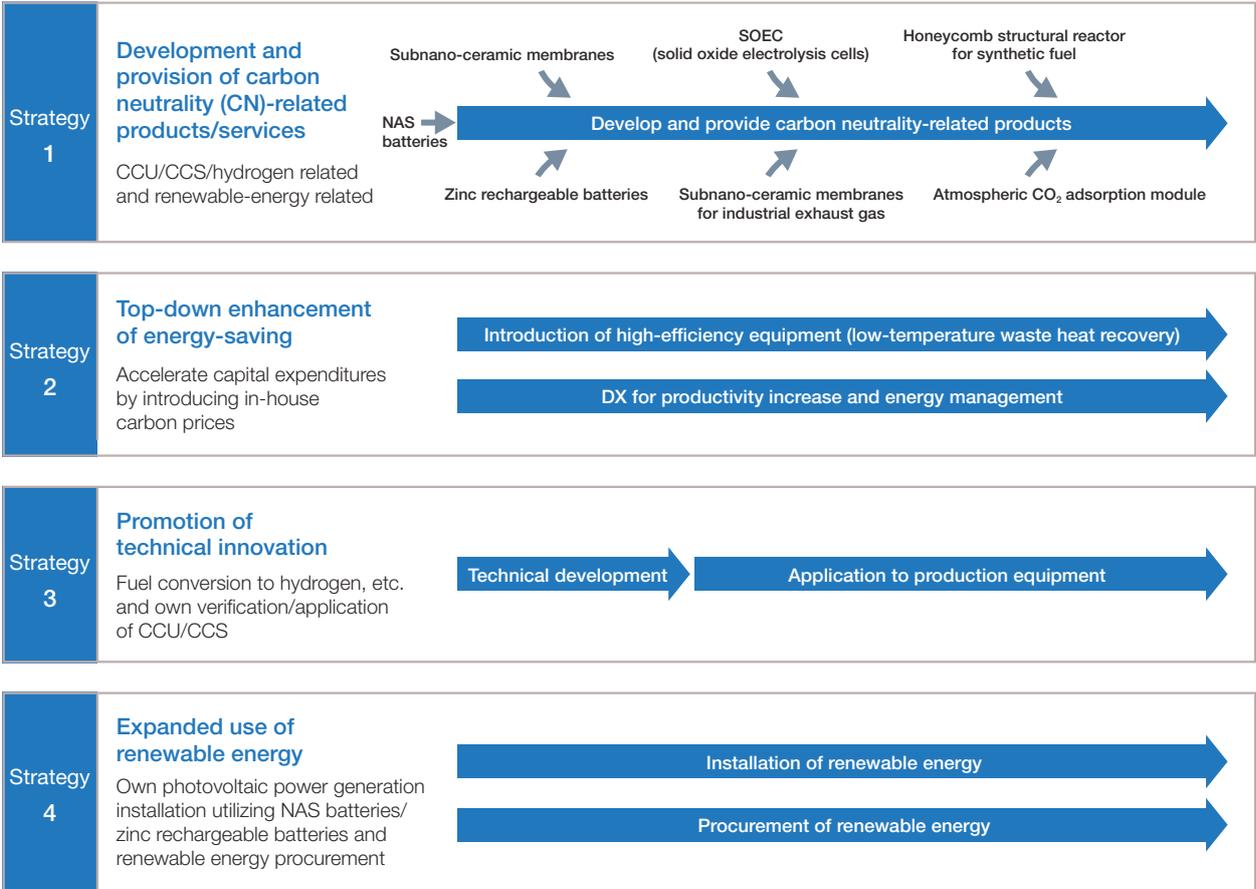
### Carbon Neutrality Strategic Roadmap

The NGK Group has drawn up its Carbon Neutrality Strategic Roadmap comprising four strategies as a guide to realizing the goals of the NGK Group Environmental Vision.

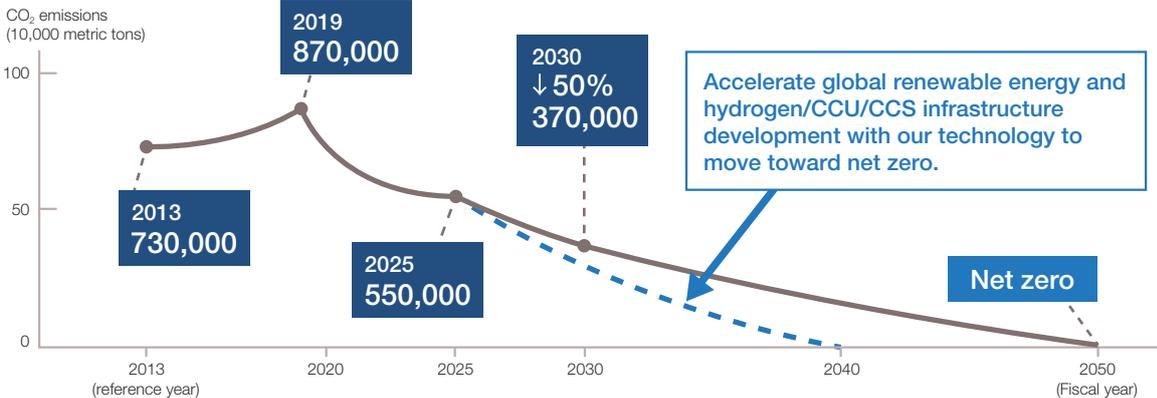
We have established a Group-wide target of net zero CO<sub>2</sub> emissions by 2050, with milestone targets along the way of 550,000 metric tons by FY2025 (25% reduction compared

with the FY2013 reference year) and 370,000 metric tons by FY2030 (50% reduction). In the future, we will consider advancing our efforts to achieve net zero ahead of schedule by promoting the development of related technologies such as hydrogen, CCU and CCS (carbon capture, use and storage).

#### Four Strategies



### Carbon Neutrality Strategic Roadmap



## 5-Year Environmental Action Plan (FY2021-2025)

In FY2021, we established the Fifth 5-Year Environmental Action Plan, which encompasses our environmental action targets through FY2025.

This is the first 5-year plan aimed at realizing the NGK Group Environmental Vision announced in April 2021, which targets 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."

### Reference Year, Target Year, Control Scope

Reference Year: FY2013 (for some, FY2019)

Target Year: FY2025

Control scope: Consolidated (for some, Japan)

| Category                                                                                                                               | Item                                                                              | KPI                                                          | FY2025 Target                                                                                                                                | FY2022 Target                                                                                                              | Related SDGs                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <br>Initiatives toward carbon neutrality              | Reduce CO <sub>2</sub> emitted by manufacturing activities                        | CO <sub>2</sub> emissions (consolidated)                     | 550,000 metric tons (Reduced by 25% from FY2013)                                                                                             | 600,000 metric tons (Reduced by 18% from FY2013)                                                                           |    |
|                                                                                                                                        |                                                                                   | Rate of renewable energy usage (consolidated)                | 50%                                                                                                                                          | 25%                                                                                                                        |                                                                                       |
|                                                                                                                                        | Reduce CO <sub>2</sub> emitted across value chain                                 | Plan progress                                                | <ul style="list-style-type: none"> <li>Expand scope of Scope 3 calculation</li> <li>Life-cycle assessment (LCA) of major products</li> </ul> | <ul style="list-style-type: none"> <li>Scope 3 consolidated disclosure</li> <li>Expand scope of LCA calculation</li> </ul> |                                                                                       |
| <br>Initiatives toward a recycling-oriented society | Reduce waste emitted from manufacturing                                           | Basic unit per net sales of waste emitted (consolidated)     | Reduced by 50% from FY2013                                                                                                                   | Reduced by 46% from FY2013                                                                                                 |  |
|                                                                                                                                        |                                                                                   | Reduction rate against BAU for waste emitted (consolidated)  | Reduced by 30% from FY2013                                                                                                                   | Reduced by 27% from FY2013                                                                                                 |                                                                                       |
|                                                                                                                                        | Promoting Resource Recycling                                                      | Recycling rate (Japan)                                       | Maintained 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 level                                                                                                               |                                                                                       |
| <br>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                                                                                      |  |
| <br>Contributions to environmental society          | Develop and distribute products/services contributing to environmental protection | Number of registered products                                | Increase number of CN-related products/services registered                                                                                   | Increase registered products                                                                                               |  |
|                                                                                                                                        | Promote CSR procurement                                                           | Plan progress                                                | Ascertain environmental data of suppliers                                                                                                    | Specific response to suppliers                                                                                             |                                                                                       |
| <br>Promotion of environmental communication        | Contribute to local communities                                                   | Plan progress                                                | Continually enhance actions partnering with local communities                                                                                | Collaboration with EPOC and Aichi Mirai Forum                                                                              |  |
|                                                                                                                                        | Increase environmental awareness                                                  | Plan progress                                                | Continually enhance environmental training and information disclosure                                                                        | Publicize NGK Group Environmental Vision                                                                                   |                                                                                       |

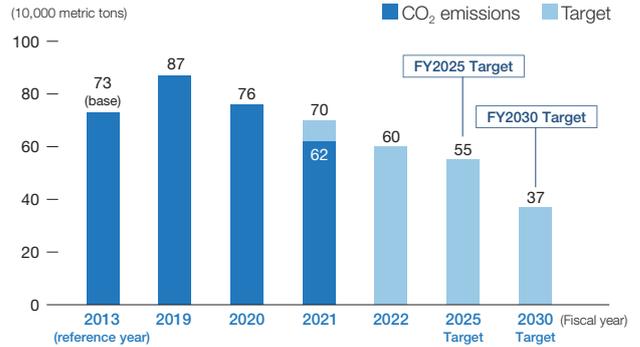
## Achieving Our Environmental Vision

### Climate Strategy/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\*<sup>1</sup>) in CO<sub>2</sub> emissions volume by 2030 compared with the reference year of FY2013. 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.

The graph at right shows the trend in CO<sub>2</sub> emissions. In FY2021, NGK exceeded its emissions target of 700,000 metric tons and achieved 620,000 metric tons. We will continue to work toward the FY2025 and FY2030 targets.

#### Trend in CO<sub>2</sub> Emissions (all NGK Group production sites)



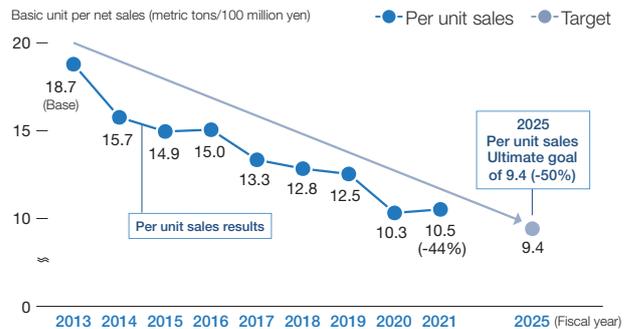
\*1 The calculation standards for emissions have been revised to match the market standards stipulated by the GHG Protocol. More specifically, the electric power factor (factor for converting electricity used to CO<sub>2</sub> emissions) will change from the existing fixed factor to the actual results of the electric power companies each fiscal year. This will reflect the renewable energy utilization rate.

### Initiatives Targeting a Recycling-oriented Society

From the perspective of resource recycling, the NGK Group has long set high targets and achieved them by pursuing reduction in the volume of waste generated and improving resource recovery. We also set a volume target for the amount of water used for the first time in our Fifth 5-Year Environmental Action Plan and are pursuing effective use of water resources. In the future, we will consider our policy for targeting 2050 by minimizing resource use, recycling in the manufacturing process and products, and other efforts to achieve a circular economy.

The graph at right shows the total amount of waste generated per 100 million yen in sales. We are making steady progress towards the FY2025 target.

#### Trend in Waste Generated (metric tons per 100 million yen in sales; all NGK Group production sites)



### Initiatives for Harmony with Nature

As the NGK Group strives toward the realization of a sustainable society, we see our approach to protecting biodiversity as an important issue, and are carrying out the following initiatives. In FY2021, we considered a target for

post-2020 biodiversity and also learned the general outlines of the Task Force on Nature-related Financial Disclosures (TNFD) and SBTi-N (SBTi targets for nature). Hereafter, we plan to lay out a roadmap and policies toward 2050.

## Reducing CO<sub>2</sub> Emissions in Scope 3

The NGK Group is pursuing initiatives to reduce CO<sub>2</sub> emissions outside of its own business locations. These are called Scope 3 emissions. In FY2021, we calculated CO<sub>2</sub> emissions in all upstream and downstream categories of Scope 3. We will begin to ascertain environmental impact in

addition to the cooperation on CSR procurement requested of our suppliers to reduce upstream emissions in the future. NGK will also pursue development of products and services that will contribute to reduction in downstream emissions and going carbon neutral.

## Introduction of Internal Carbon Pricing

Internal carbon pricing (ICP) refers to the establishment and use of in-house carbon pricing for the purpose of promoting decarbonization-focused investment and policies. Setting internal pricing for greenhouse gas emissions (GHGs) enables the company to convert GHG emissions to a financial indicator. TCFD also recommends ICP as a tool for companies to ascertain risks and opportunities associated

with the transition to a low-carbon society.

To achieve the target of net zero CO<sub>2</sub> emissions by 2050 raised in the Environmental Vision at NGK, we are considering the use of ICP to promote investment in high-efficiency equipment and equipment related to renewable energy. The operating assumption for FY2022 is \$130/t-CO<sub>2</sub>.

## Evaluation by External Organizations

The external organizations listed at right evaluate NGK on environmental management and ESG-related elements.

In FY2021, we were ranked B by CDP-Climate Change and CDP-Water Security and A by CDP SUPPLIER ENGAGEMENT.

| Rating Indices                         | Survey Year |      |      |      |      |
|----------------------------------------|-------------|------|------|------|------|
|                                        | 2017        | 2018 | 2019 | 2020 | 2021 |
| CDP Climate Change                     | B           | B    | A-   | B    | B    |
| CDP Water Security                     | B           | B-   | B-   | B    | B    |
| CDP SUPPLIER ENGAGEMENT                | B           | B    | B    | B    | A    |
| Nikkei Environmental Management Survey | 50th        | 62nd | —    | —    | —    |

## Use of Green Bonds\*<sup>1</sup>

In December 2021, the NGK Group issued its inaugural green bond (unsecured corporate bond), which aims to achieve its goals of NGK Group Vision: Road to 2050 and NGK Group Environmental Vision. The proceeds of the green bonds will be used to finance carbon-neutral R&D and the Group's decarbonization projects, all designed to put the

vision into practice. NGK's green bond framework has received the highest rating of Green 1 (F) in the JCR Green Finance Framework Evaluation of Japan Credit Rating Agency, Ltd. (JCR), a third-party agency.

\*1 Green bonds: Bonds issued with limits on the use of proceeds, which is specifically for projects that improve the environment

## Information Disclosure Based on TCFD Recommendations

In February 2020, the NGK Group announced our support for recommendations issued by the Task Force on Climate-Related Financial Disclosures (TCFD) created by the Financial Stability Board (FSB). Since then, we have evaluated how to apply the TCFD framework towards resolving issues facing our Group operations, such as the risks and opportunities posed by climate change, and towards necessary information disclosure. Below, we disclose information related to scenario-specific analyses conducted based on the four themes outlined in the TCFD recommendations: Governance, Strategy, Risk Management, and Metrics and Targets.

NGK continues to analyze these issues in greater depth,

disclose more information, and engage in dialog with stakeholders. We also continue to strive for sustained growth of our business by clarifying the impact of climate change-related issues on business and taking strategic action in response.



\*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 March 31, 2022, 758 companies and organizations have announced endorsement.)

### Governance

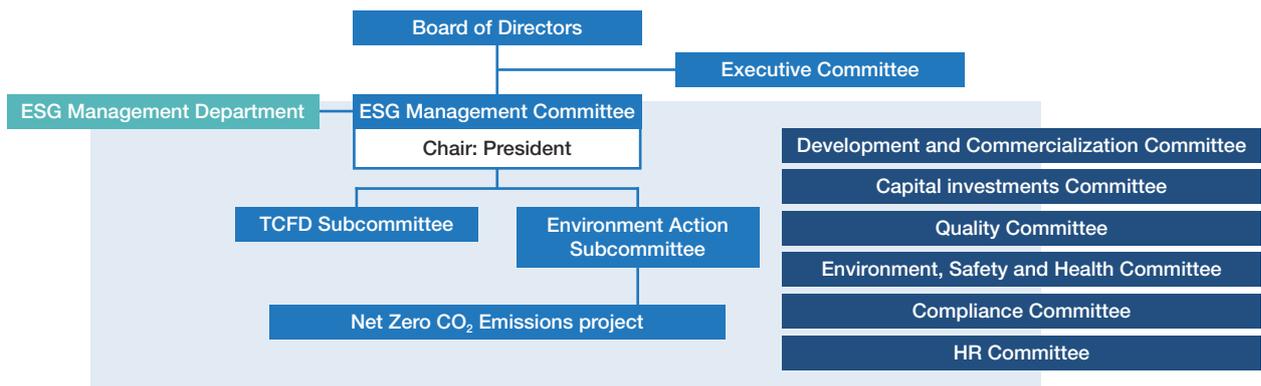
In April 2021, we announced the NGK Group Vision: Road to 2050. In this Group Vision, we position responding to ESG issues as a core management theme and outline the goal of being a company that contributes to carbon neutrality and the digital society using our ceramic technologies. Recognizing climate change response as one of the highest-priority issues to achieving sustainability for our planet, we drafted the NGK Group Environmental Vision as an extension of the NGK Group Vision. In this Environmental Vision, we outline achieving net zero CO<sub>2</sub> emissions for our business activities by 2050. In terms of specific actions, we have set KPI and annual targets to achieve in our 5-Year Environmental Action Plan. These are deliberated in ESG Management Committee meetings chaired by the president and reported to the Board of Directors (at least once per year). We also have incentivized CO<sub>2</sub> emissions reduction by adding achievement benchmarks to the performance-linked bonus evaluation criteria for directors and executive officers.

We established a TCFD Subcommittee within the ESG Management Committee. This subcommittee includes members from relevant divisions who gather to evaluate measures for information disclosure based on TCFD recommendations. The subcommittee's results are then deliberated by the ESG Management Committee before being reported to the Board of Directors. We also established an Environmental Action Subcommittee within the ESG Management Committee. This subcommittee is focused on achieving carbon neutral business activities by no later than 2050, one of the goals outlined in our Action Plan. The subcommittee works towards this goal by promoting measures such as energy conservation and furnace fuel conversion.

The ESG Management Committee submits reports on its deliberations, including ESG issues such as our disclosure response for the CDP (former name: Carbon Disclosure Project), to the Board of Directors (at least once per year).

For reference: NGK Group Vision → pages 17-18  
 NGK Group Environmental Vision → page 47

### Climate Change Response Framework



## Strategy

### General Strategy

In April 2021, we announced the NGK Group Vision: Road to 2050, which outlines our vision through 2050. At the core of this Vision is how we define what we want to be: A company that contributes to carbon neutrality and the digital society using our ceramic technologies. We are shifting our business structure so that by 2050, carbon neutral products and products related to the formation of a digital society comprise 80% of our sales.

Along with the NGK Group Vision, we also drafted the

NGK Group Environmental Vision. In line with this Vision, we will develop and offer products and services that contribute to the realization of a carbon neutral society. At the same time, we will apply the policies of this Vision towards Group business activities to aim for net zero CO<sub>2</sub> emissions by 2050. As part of this initiative, we drafted our Fifth 5-Year Environmental Action Plan. This plan outlines targets for the environmental activities we will conduct between FY2021 and FY2025.

### Climate Change Risks and Opportunities

We applied the risk and opportunity themes outlined in TCFD recommendations to analyze the risks, opportunities, and potential impact of climate change as it relates to NGK Group business.

### Assumptions

(1) Timeframes set: Short-term, Medium-term, and Long-term

| Timeframe   |        | Reason for Setting                                                       |
|-------------|--------|--------------------------------------------------------------------------|
| Short-term  | FY2025 | Final fiscal year of the Fifth 5-Year Environmental Action Plan          |
| Medium-term | FY2030 | Interim goal year of the NGK Group Environmental Vision                  |
| Long-term   | FY2050 | Goal year of the NGK Group Vision and the NGK Group Environmental Vision |

(2) Scenarios: 1.5°C Scenarios and 4°C Scenarios

| Scenarios       | Summary                                                                                                                                                                                                                                                               | Main External Scenarios Used as Reference                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| 1.5°C Scenarios | Rapid changes in policy, regulatory systems, and markets to aim for carbon neutral by 2050 and limit the average global temperature increase to 1.5°C compared to pre-industrial revolution temperatures.                                                             | International Energy Association (IEA) Net Zero by 2050 scenario<br>SSP1-2.6 scenario, etc. |
| 4°C Scenarios   | Lack of progress in government policy, regulatory systems, or social initiatives result in an average global temperature increase of 4°C compared to pre-industrial revolution temperatures. Massive impact from disasters and other events caused by climate change. | SSP5-8.5 scenario, etc.                                                                     |

(3) Material risks and opportunities: We conducted qualitative assessments while referencing the risk assessment criteria for all Group companies.

Furthermore, this analysis is a method of evaluating our responses to climate change-related risks and opportunities. This analysis may differ from the future vision we outline in the NGK Group Vision.

 For reference: Particularly Important Risks and Opportunities → pages 55-56

## Risk Management

The NGK Group manages the day-to-day risks that impact our Group, including risks related to climate change, based on a related-position system and in accordance with our Basic Rules of Crisis Management. Furthermore, we work to avoid and prevent serious risks through the activities of the

 For reference: Risk Management Framework → page 80

## Risk Management Process

All risks with the potential to impact the operations or financial status of the NGK Group are organized and re-evaluated to identify serious risks. Those risks are deliberated by the ESG Management Committee before submitting a final report to the Board of Directors on Group risks requiring management.

For risks related to climate change, the TCFD

 For reference: Risk Identification Process → page 80

various committees established within the company. In cases of particularly serious risks, the Corporate Planning Office Executive Officer may decide to convene a response committee, which includes participation by the Company president, to address said risk.

subcommittee within the ESG Management Committee creates scenarios and conducts a scenario analysis to identify serious risks. Through this process, we extract risks and opportunities, and draft response strategies. These results are deliberated by the ESG Management Committee and then a report is submitted to the Board of Directors.

## Metrics and Targets

We drafted the Carbon Neutrality Strategic Roadmap to promote achievement of goals that will enable us to realize the NGK Group Environmental Vision. We set milestone targets ahead of our 2050 goal of net zero CO<sub>2</sub> emissions for the entire Group. These milestone targets call for a 550,000 metric tons reduction in missions by 2025 (25% reduction compared to FY2013 (reference year)) and a 370,000 metric tons reduction by FY2030 (50% reduction compared to FY2013).

We drafted our Fifth 5-Year Environmental Action Plan to help realize the NGK Group Environmental Vision. This plan outlines targets for the environmental activities we will conduct between FY2021 and FY2025. The objective of this Plan is to make it easy to understand our progress towards net zero by 2050 and our 2030 milestone target of a 50% reduction compared to 2013. As part of our initiatives to expand our use of renewable energy, we set new targets for renewable energy utilization rates that we apply to electricity consumption for the entire Group. We also set targets to

 For reference: NGK Group Environmental Vision → page 47  
Carbon Neutrality Strategic Roadmap → page 48  
5-year Environmental Action Plan → page 49

increase the number of products registered as carbon neutral-related products.

The TCFD recommends disclosing the ratio of assets and businesses vulnerable to physical risks as a benchmark. In response, we assessed the depths of floods caused by river floods and storm surge at the NGK Group manufacturing sites around the world. Using simulations based on the Climate Score Global (CSG) model developed by Jupiter Intelligence in America, we conducted assessments, including for future climate, of manufacturing site locations at a resolution of 90m.

From these assessments, we learned that, in a 4°C scenario (SSP5-8.5), there are regions where the risk of water incursion from flooding or high tide with a likelihood of occurring once every 100 years will be higher in 2050 compared to 2020. The NGK Group is already implementing measures from the perspective of advancing our BCP and we will continue to evaluate and implement necessary measures.



LINK

CO<sub>2</sub> emissions Scope 1·2  
<https://www.ngk-insulators.com/en/sustainability/environment-performance.html>

CO<sub>2</sub> emissions Scope 3  
<https://www.ngk-insulators.com/en/sustainability/environment-performance.html>



## Particularly Important Risks and Opportunities

### (1) Carbon Neutral Society Transition Risks (1.5°C scenario)

| Category     | Summary of Assumed Scenario                                                                                                                                                                                                                                                                                                                                                                         | Business Risks & Opportunities                                                                                     |               |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------|
| Policy/Legal | <ul style="list-style-type: none"> <li>• Rapid reduction in emissions required to achieve carbon neutral by 2050.</li> <li>• Adoption of carbon pricing against CO<sub>2</sub> emissions of our company and our supply chain.<br/>2030: 130\$/t-CO<sub>2</sub><br/>2050: 250\$/t-CO<sub>2</sub></li> </ul>                                                                                          | Increased cost of responses to further reduce greenhouse gas emissions                                             | Risks         |
|              |                                                                                                                                                                                                                                                                                                                                                                                                     | Increased costs due to adoption of carbon pricing                                                                  | Risks         |
| Technology   | Growing battery demand leading to decline in prices for rechargeable lithium-ion and other batteries. Also seeing the emergence and adoption of new battery technology with high added value.                                                                                                                                                                                                       | Risks and opportunities associated with battery technology innovation and the emergence/adoption of new technology | Opportunities |
|              | Rapid growth in CO <sub>2</sub> capture volume in various sectors, including fuel production, power generation, and industry.                                                                                                                                                                                                                                                                       | Market growth driven by widespread adoption of CCU/CCS (CO <sub>2</sub> capture, utilization, and storage)         | Risks         |
| Market       | <ul style="list-style-type: none"> <li>• In the short-term, vehicle emissions restrictions will be stricter, increasing demand for improved fuel economy.</li> <li>• In the medium- to long term, the proportion of electric vehicles (EVs) and fuel cell vehicles (FCVs) in automobile sales will rise rapidly, and the proportion of internal combustion engine vehicles will decline.</li> </ul> | Changes in demand for automotive parts                                                                             | Opportunities |
|              | The capacity of power storage batteries and demand for lithium-ion rechargeable batteries for EVs will rapidly expand.                                                                                                                                                                                                                                                                              | Increased storage battery demand                                                                                   | Risks         |
|              | Demand for semiconductors will increase with electrification in various fields such as industry and transportation.                                                                                                                                                                                                                                                                                 | Growth in demand for semiconductor-related products                                                                | Opportunities |
| Reputation   | <ul style="list-style-type: none"> <li>• Regular and growing trend of investors and financial institutions factoring climate change risk into investment decisions and requiring lenders to set SBT*.</li> <li>• Customers are increasingly demanding renewable energy adoption and reductions in CO<sub>2</sub> emissions.</li> </ul>                                                              | Improving assessments by contributing to carbon neutrality                                                         | Opportunities |
|              |                                                                                                                                                                                                                                                                                                                                                                                                     | Decline in trust from stakeholders due to delays in responding to climate change                                   | Risks         |

### (2) Physical Risks associated with advancing climate change (mainly 4°C scenario)

| Category | Summary of Assumed Scenario                                                                                                                                                      | Business Risks & Opportunities                                 |       |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------|
| Sudden   | <ul style="list-style-type: none"> <li>• Frequency of flooding increasing in regions such as Japan and Asia.</li> <li>• The frequency of violent typhoons increasing.</li> </ul> | Impact of wind and flood damage on factories and supply chains | Risks |
| Chronic  | Sea levels continue to rise.                                                                                                                                                     | Impact of storm surge on coastal factories                     | Risks |

\*Short for Science-based Targets, an initiative demanding that companies establish CO<sub>2</sub> emission reduction goals that are based on scientific data.



Subnano-ceramic membranes product information  
<https://www.ngk-insulators.com/en/rd/subnano/>



Gallium nitride (GaN) wafers product information  
<https://www.ngk-insulators.com/en/rd/gan-wafer/>



| Details of Risks & Opportunities                                                                                                                                                                                                                                                                                                                                         | Timeframe            | Response Strategy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incurring response costs related to equipment replacement and upgrades for energy conservation, renewable energy procurement, electrification of energy sources, and energy conversion from natural gas as a furnace fuel to fuels sources such as hydrogen or ammonia.                                                                                                  | Short- to long-term  | <ul style="list-style-type: none"> <li>Trend and prediction monitoring for the regulations and carbon pricing systems of various countries</li> <li>Promote enhanced energy conservation, technological innovation, and initiatives towards expanding the use of renewable energy in line with the NGK Group Environmental Vision and Carbon Neutrality Strategic Roadmap</li> <li>Monitor supply status of fuels with low greenhouse gas emissions</li> <li>Promote greenhouse gas emissions reductions in accordance with NGK Group's Supply-Chain CSR Guideline</li> <li>Expand Scope 3 calculations and range of disclosure, conduct life cycle assessments (LCA) for major products to identify reduction targets</li> </ul> |
| Costs increase due to adoption of carbon pricing on company emissions and emissions along the upstream of our supply chain                                                                                                                                                                                                                                               |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ul style="list-style-type: none"> <li>Increased competitiveness by advancing proprietary technology development</li> <li>Increased storage battery needs</li> </ul>                                                                                                                                                                                                     | Medium- to long-term | <ul style="list-style-type: none"> <li>Monitoring of trends in technology innovation</li> <li>R&amp;D advancement</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Competitiveness of our technologies will decline as competitors advance proprietary technology development                                                                                                                                                                                                                                                               |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Growth in CCU/CCS market will increase business opportunities for our ceramic products (subnano-ceramic membranes, etc.)                                                                                                                                                                                                                                                 | Medium- to long-term | <ul style="list-style-type: none"> <li>Monitoring of technology innovation and market trends</li> <li>Business expansion in the CCU/CCS market, new product development promotion marketing, business schemes, promotion of New Value 1000 to accelerate new product development</li> <li>Research, development, and provision of subnano-ceramic membranes, solid oxide electrolysis cells (SOEC), and the establishment of carbon cycles to use them.</li> </ul>                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"> <li>In the short term, demand for catalyst substrates for controlling automotive emissions and NOx sensors will increase due to stricter exhaust gas regulations.</li> <li>In the medium- to long-term, demand for gallium nitride (GaN) wafers, DCB and AMB substrates, and beryllium copper alloy for EVs will increase.</li> </ul> | Short- to long-term  | <ul style="list-style-type: none"> <li>Monitoring of regulatory, market, and demand trends</li> <li>Plan and implement production and capital expenditures in response to the plans of automobile manufacturers</li> <li>Cover decline in demand for internal combustion engine vehicles due to tougher exhaust gas regulations by increasing the number of new products and high-performance products</li> <li>Expand adoption of gallium nitride (GaN) wafers, beryllium copper alloy, and DCB and AMB substrates for EVs and plug-in hybrid vehicles (PHEVs)</li> <li>Develop and offer products for heat management in EVs, new products for synthetic fuels, etc.</li> </ul>                                                 |
| Demand for products for internal combustion engine vehicles will decline over the medium- to long-term                                                                                                                                                                                                                                                                   |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ul style="list-style-type: none"> <li>Increased demand for NAS batteries and Zinc Rechargeable Batteries</li> <li>Increased business opportunities in the heating and refractory business for lithium-ion rechargeable batteries</li> </ul>                                                                                                                             | Short- to long-term  | <ul style="list-style-type: none"> <li>Monitoring of power policies and customer trends in each country</li> <li>Enhance production systems in response to growing demand</li> <li>Provide new value through solutions services</li> <li>Commercialize Zinc Rechargeable Batteries</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Increased demand for parts for semiconductor manufacturing equipment and electronic parts/metals in the electronics business                                                                                                                                                                                                                                             | Short- to long-term  | <ul style="list-style-type: none"> <li>Monitoring of demand trends</li> <li>Enhance production systems in response to growing demand</li> <li>Partner with semiconductor manufacturing equipment manufacturers, increase facility capacity, personnel, facility systems, etc. as necessary</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Assessments by stakeholders can be improved by proactively responding to climate change and providing products and services that contribute to carbon neutrality.                                                                                                                                                                                                        | Short- to long-term  | <ul style="list-style-type: none"> <li>Business structure conversion, one of the goals outlined in the NGK Group Vision</li> <li>Promote measures to reduce greenhouse gas emissions</li> <li>Conduct information disclosure in line with the TCFD framework</li> <li>Ascertain customer demands and implement responses accordingly</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                   |
| Delays in climate change measures will have a negative impact on brand, capital procurement, transactions, etc.                                                                                                                                                                                                                                                          |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Details of Risks & Opportunities                                                                                                                                                                                                                                                                                                     | Timeframe            | Response Strategy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Increasing impact of factors such as property damage to facilities and machinery caused by wind and flooding, profit losses due to the suspension of business, and difficulty in employees coming to work.</li> <li>Supply chain disruption due to increased wind and flood damage</li> </ul> | Short- to long-term  | <ul style="list-style-type: none"> <li>Flood risk assessments for major sites including future climate</li> <li>Create and promote BCP (Business Continuity Plan), including for supply chains</li> <li>Create a structure that enables global substitutions by decentralizing sites</li> <li>Prepare for supply chain disruption by evaluating alternative procurement methods in advance (focus on production areas with high disaster risks)</li> <li>Evaluate the flood risk assessments of major suppliers</li> </ul> |
| <ul style="list-style-type: none"> <li>Increased storm surge risk, increased property damage and profit losses due to flood damage</li> <li>Costs incurred for measures such as height elevation and barriers and relocation</li> </ul>                                                                                              | Medium- to long-term |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |



Substrates with superior insulation and heat dissipation product information  
<https://www.ngk-insulators.com/en/product/search-business/electron/>



Zinc rechargeable batteries product information  
<https://www.ngk-insulators.com/en/rd/>



# Social

## Striving to earn the trust of stakeholders and create a sustainable society

### Human Rights

#### NGK Group Human Rights Policy

We formulated the NGK Group Human Rights Policy in April 2021 to accelerate initiatives to ensure respect for human rights. This policy outlines our thinking and actions on human rights.

#### NGK Group Human Rights Policy

The NGK Group hereby establishes this “NGK Group Human Rights Policy” (this “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.

##### 1. Basic Approach to Human Rights

The NGK Group supports and respects the “International Bill of Human Rights” adopted by the United Nations (consisting of the Universal Declaration of Human Rights and the International Covenants on Human Rights), the “ILO Declaration on Fundamental Principles and Rights at Work”, the “OECD Guidelines for Multinational Enterprises” and other international norms.

With NGK INSULATORS, LTD. (“NGK”) signed up to the United Nations Global Compact, the NGK Group supports and respects the Ten Principles of the United Nations Global Compact.

##### 2. Applicable Laws and Regulations

The NGK Group will comply with laws and regulations (the “Legislation”) of each of the countries and regions where it operates. In case of any conflict between internationally accepted principles of human rights and the Legislation of any country or region, the NGK Group will seek ways to respect the internationally accepted principles of human rights to the utmost extent.

##### 3. Scope of Application

This Policy applies to all directors, officers and employees of the NGK Group (the “Directors and Employees”). The NGK Group expects that its suppliers will also comply with this Policy.

##### 4. Education and Training

The NGK Group will provide the Directors and Employees with appropriate education and training to effectively implement this Policy throughout its group-wide business operations.

##### 5. Main Focus of the Group's Commitment to Human Rights

The NGK Group will:

- Comply with international norms on human rights and respect diversity of people;
- Respect human rights and undertake business activities without the use of forced labor or child labor; Provide young workers with fair working conditions that strictly comply with the Legislation of each country and region.
- Respect the individuality and independence of each employee and not engage in discrimination on the basis of race, citizenship, gender, age, religion, belief, existence of handicaps, sexual diversity or any other aspect; and
- Prevent the occurrence of harassment in the workplace and take prompt and appropriate action in the case where it occurs.

The NGK Group will:

- Strictly comply with the Legislation of each country and region relating to safety and sanitation, provide a safe and enjoyable work environment that is comfortable for everyone to work in for all;
- Strictly comply with the Legislation of each country and region relating to labor, safety and sanitation, we provide fair working conditions such as working hours, holidays, vacations, wages, and welfare programs.
- Respect employees’ right of freedom of association and of collective bargaining in accordance with the Legislation of each of countries and regions where it operates.
- Aim to harmonize work and life, and support a variety of working styles;
- Build up a relationship of trust through sincere debate and discussion with employees;
- Give educational opportunities to employees and provide opportunities to stretch their motivation and abilities; and
- Encourage free and open discussions and aim to create a corporate culture conducive to active communication.

**6. Human Rights Due Diligence**

The NGK Group will establish a system of human rights due diligence, and will implement processes to identify, prevent and mitigate adverse human rights impacts that the NGK Group's business operations may cause.

**7. Remedy**

If it is revealed or suspected that the NGK Group has caused adverse human rights impacts (whether directly through its business operations, or through its suppliers), the NGK Group will endeavor to deliver appropriate and effective remedy through good-faith dialogue with related parties.

**8. Dialogues and Discussions**

In the process of implementation of this Policy, the NGK Group will earnestly engage in dialogue and discussions with stakeholders, acquiring and drawing on independent external expertise on human rights.

**9. Information Disclosure**

NGK will disclose the status and results of implementation of this Policy on its website and integrated reports or through other channels.

**10. Responsible Persons**

NGK will designate the director in charge of the personnel division as the director responsible for the implementation of this Policy. The Board of Directors will oversee the status of implementation of this Policy by having the director regularly report the implementation status to the Board of Directors.

This Policy has been approved by NGK's Board of Directors and signed by NGK's Representative Director and President.

NGK Insulators, Ltd.  
President

*Shigeru Kobayashi*



LINK

NGK Group Human Rights Policy

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



**Management System**

The HR Committee was established in April 2020. The executive in charge of the HR Department chairs this committee. It is the body that discusses corporate activities that enhance respect for human rights and personnel matters that should be addressed across the entire NGK Group.

The committee works with related committees and

departments on initiatives to ensure respect for human rights, depending on the content and importance of the initiative.

The Board of Directors also monitors the status of implementation through regular reports on implementation of initiatives by the director in charge of the Human Resources Department.

**The NGK Group Prioritized Implementation of the Following Measures on Protecting Human Rights in FY2021.**

1. Revision of the NGK Group Human Rights Policy
2. Formulation and disclosure of a new UK Modern Slavery Act Statement
3. Expansion of the scope of human rights due diligence to overseas Group companies

- April 2021: Disclosed NGK Group Human Rights Policy
- August 2021: Revised the policy
- November 2021: Newly formulated and disclosed Statement on the UK Modern Slavery Act
- October 2021: Investigated grievances relating to human rights at domestic and overseas Group companies during the first half of FY2021 (Grievances relating to human rights at the NGK head office are investigated and recorded on a case by case basis)
- December 2021 to March 2022: Conducted a human rights due diligence survey of the NGK Head Office and domestic and overseas Group companies

## Due Diligence Process, Assessments, and Corrective Steps

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

### Self-assessments by Group Companies

NGK and 39 domestic and overseas Group companies conducted a self-assessment consisting of 55 questions in the three categories of labor, safety and health, and ethics, based on the RBA\* Code of Conduct.

The results confirmed that no incidents occurred in which the laws or regulations of any country were violated. However, multiple incidents that did not comply with the RBA Code of Conduct were identified, even though no legal violations occurred.

Improvements have already been implemented for the

minor incidents among these (such as providing information on safety and health in a language that employees can understand). For incidents involving employment procedures, working hours, and other matters based on the laws and regulations, customs, and practices of each country, we have recognized the issues and will consider the response.

\*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.

### Risks to Employees' Human Rights

Risks to employees' human rights are reported through the whistleblowing system 24/7 and information is compiled. NGK receives reports from Group companies once every 6 months through Human Rights Grievance Survey.

We also conduct a Corporate Risk Survey (CRS) once every two years to ascertain potential risks.

In FY2021, we confirmed that each of the several incidents of harassment was handled appropriately.

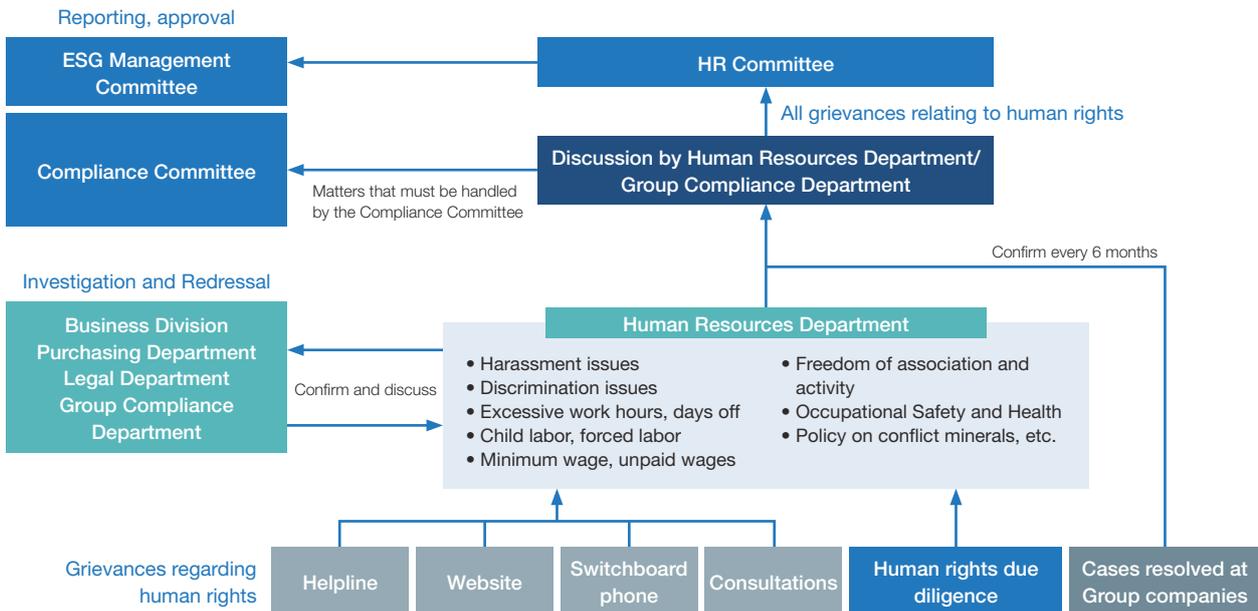
### Risks to Human Rights in the Supply Chain

Every year, we request our suppliers, including companies that are new to our supply chain, to sign an agreement to comply with NGK Group's Supply-Chain CSR Guideline. In FY2021, we also had domestic suppliers complete a self-assessment survey to ascertain the degree of

understanding and status of activities relating to CSR procurement.

The HR Committee reviewed the responses and reported them to the Board of Directors.

### System for Responding to Grievances and Correction/Redressal



## Safety and Health

### Enhancing Safety and Health Activities

NGK views the enhancement of safety and health activities as one of its top priorities. In addition to rigorous operation of our occupational safety and health management system, we developed our second three-year action plan built around the key themes of risk management and enhanced governance.

As key initiatives, we are promoting efforts to prevent and minimize incidents that could lead to serious injury or accidents, such as getting caught in rotating equipment, electric shock, and explosions.

#### Results of FY2021 Activities

| Medium-Term Action Plan     | Fiscal Year Implementation Items                                            | Key Activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strengthen Risk Management  | Reduce risk of serious injuries/accidents in the workplace                  | We completed a reexamination of equipment/operations that present workers with potential for serious injury or accident, such as being caught in rotating machinery, electric shock or explosions, and we put into place operational safeguards (e.g., administrative measures) at all production sites to control these risks. We are also mostly 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 the dedicated department of the Head Office, Group company governance was strengthened through internal audits of Group companies by Business Group specialized teams responsible for overseeing them.                                                                                                                                                                                                                  |
|                             | Acquire international certification for safety and health management system | ISO 45001 certification has been obtained for all production sites of Group companies in Japan and overseas.                                                                                                                                                                                                                                                                                                                                                                                    |

## Diversity

### Promoting Diversity

The policy of the NGK Group is to provide stable and equal employment opportunities to people possessing a diverse range of attributes, regardless of race, nationality, gender, age, religion, creed, disability, and sexual diversity. We promote even greater efforts to achieve diversity through educational activities to support work-life balance, employ people with disabilities, and advance understanding of

diversity. In addition to this, we also maintain an environment that enables diverse human resources to enjoy a wide range of workstyles by utilizing telecommuting, providing other flexible workstyles, and offering a wide range of career paths that each employee can pursue individually, according to personal inclination, suitability, and type of work.

#### Views on Hiring Locally

Ninety-eight percent of the roughly 13,000 employees in the NGK Group who work overseas are hired locally. We believe that it is our corporate responsibility to contribute to the

development and vitalization of the local economies and communities where we operate our business in each country and region, and actively hire locally at each location.

#### Holding Lectures to Promote Diversity

We asked Emiko Hamada, an outside director of NGK, to give a lecture on the theme of encouraging men in NGK to take childcare leave.

Director Hamada talked about how it benefits the company when men participate in childcare and take leave. She stressed the need to communicate clearly and foster a culture that encourages this, and to instill the awareness that it promotes the growth of the individual.



Outside Director  
Emiko Hamada



LINK

For more information on promoting diversity  
<https://www.ngk-insulators.com/en/sustainability/society-diversity.html>



# Quality

## Quality Policy

The NGK Group considers the provision of products and services that contribute to a better social environment to be one of our most important missions. We strive to maintain a customer’s perspective and create quality that is trusted by society.

Under the quality policy based on the NGK Group Code of Conduct, we set quality goals every year and work to create quality from the customer’s perspective.

**Quality policy**

NGK is dedicated to quality and committed to providing valuable products and services that are trusted by our customers and respected by society.

**Quality Objectives FY2022**

A focus on Organizational Self Discipline is required to improve our “Quality of Operation”.

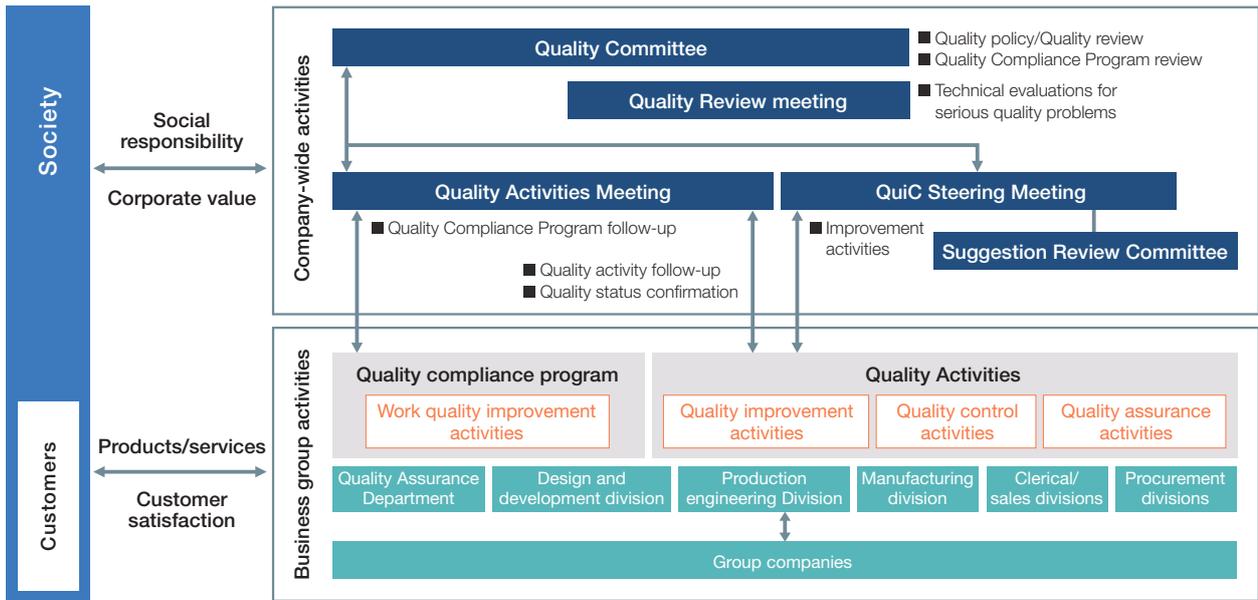
## Quality Activity System

The NGK quality activity system consists of a group-wide structure headed by the chairman of the Quality Committee and an activity system within each business group headed by the group executive. For group-wide activities, we have established a quality committee that serves as a deliberating body to assist the chairman of the Quality Committee. As an activity system within each business group, we also built quality system suitable for each business division and have acquired ISO9001 or IATF16949 certification. Through this system, we promote activities such as quality assurance, quality control, quality improvement, and quality education.

Each business group has a point of contact with customers, and strives to further improve customer satisfaction by reflecting field failure improvement and customer requests into products and services.

In FY2021, we began quality management education for sales and technical staff, who serve as the points of contact with customers, and convey the importance of quality of operation that fulfills customer contracts. We also actively communicate with our partners to provide not only quality improvement guidance, but also to actively identify potential problems.

## Quality Activity System



## Product Quality Risk Elimination Activities

NGK started promoting Quality Risk Elimination-Process (QRE-P) activities throughout the Group from 2017. QRE-P activities serve to further promote providing high-quality products that satisfy our customers. QRE-P activities identifies points to note in product realization in order to eliminate risk while improving quality.

In activities thus far, we have been working on enlightenment for QRE-P activities providing training to business group staff to help them understand the content of QRE-P and also providing practical support in actual case using quality tools such as QFD and FMEA which are applied the QRE-P concept.

Since FY2021, we have incorporated the concepts of QRE-P by focusing on any weaknesses found in quality management systems or product realization concepts in terms of eliminating quality risks. In this activity we regard a field failure as the critical weakness. In addition to its technical countermeasure, we also work with the business group staff to analyze what was lacking in our work progression methods and then we apply the results of that analysis towards the system improvements. We believe this activity leads to the prevention of the field failure.

In the future, we plan to extend this activity to Group companies as well.

## Activities to Improve “Quality of Operation”

In 2018, the NGK Group discovered a case of non-conformity in testing procedure. Since then, we have been promoting activities that focus on improving “quality of operation” while embracing the fundamental principle that “Social trust is our foundation.”

We are making a unified effort to incorporate activities aimed at improving “quality of operation” into existing company-wide quality activities. In addition to expanding education designed to promote awareness of the importance

of noticing and pointing out problems to section managers and supervisors, each business group managers are also sending messages encouraging employees to point out anything that they think is strange. Aiming to ensure that all of our employees autonomously improve “quality of operation”, we are engaging in unique activities such as gathering opinions from the workplace, holding study sessions, and conducting patrols to develop a division-level activity system.

## “QuiC Activities”: Quality Improvement Activities Featuring Full Employee Participation

“QuiC (Quality up innovation Challenge) activities” are small group activities and individual improvement and proposal activities conducted since 2003 that are designed to improve the quality of products and work. We hold a group contest every year at our head office, where part of the activities includes sharing excellent improvement examples throughout entire group. In FY2021, we held a contest in August consisting of both an in-person venue and online participation as a countermeasure against COVID-19. To help motivate employees and revitalize the workplace, from FY2020 we also started “NGK-BOX/Surprising Challenges!” These presentations provide opportunities to share various innovations and best practices that can be adopted on a company-wide level. The event for FY2021 was held in November.



Company-wide contest to announce excellent quality improvement activities

## Expanding Quality Assurance to Service Provision

To realize the NGK Group Vision, in addition to selling products, we are also working on selling services. This entails aiming to further improve customer satisfaction by providing product-related services, systems, and solutions. In new business fields, we believe it is necessary to develop this quality of providing services in addition to quality of products.

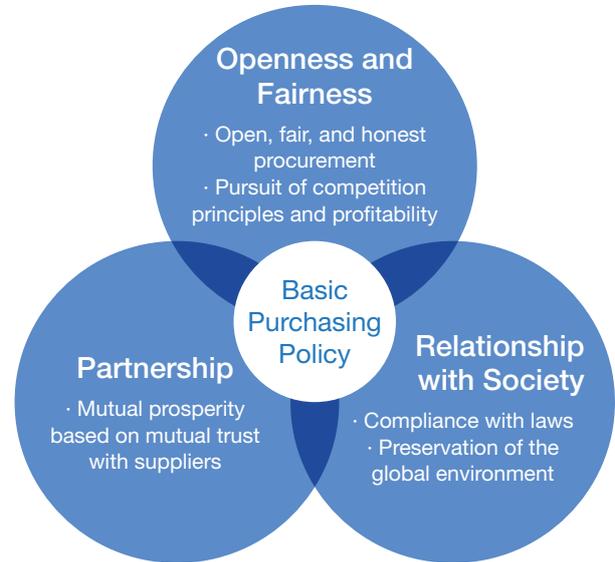
Thus far, quality activities have centered on the quality of

products. However, moving forward, we will incorporate the elements necessary to achieve quality assurance for providing services into activities designed to eliminate product quality risks and the activities to improve quality of operation. We will continue to innovate and take on challenges in our activities.

## Supply Chain Management

### Basic Purchasing Policy

Our basic policy centers on the three principles of open and fair, partnership, and relationship with society. In line with this, the NGK Group has established a Basic Purchasing Policy to promote fair and honest business transactions and help ensure prosperous relationships with the procurement partners in our supply chain. In 2021 we submitted a Declaration of Partnership Building as advanced by the Cabinet Office Small and Medium Enterprise Agency. We continue to promote partnership with our suppliers as well as fair and honest dealing.



### 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.

### Promoting CSR Procurement

The NGK Group promotes CSR procurement as a response to rising social expectations for CSR-oriented supply chain management. We preferentially select CSR-conscious

companies and purchase CSR-sensitive raw-materials and services.

### NGK Group's Supply-Chain CSR Guideline

The NGK Group created NGK Group's Supply-Chain CSR Guideline in FY2010 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 2013, the Guidelines were integrated with the Green Procurement Guidelines for preferential purchase of environmentally friendly products and services. Since then, we have revised the Guidelines (and added compliance items) to adjust to changing social conditions and new global issues.

Every year we ask suppliers to sign an agreement to comply with the Guidelines and ask new suppliers to sign the same agreement when beginning new business transactions. NGK Group's Supply-Chain CSR Guideline is posted on our corporate website in Japanese, English, and Chinese.



 NGK Group's Supply-Chain CSR Guideline and supplementary material  
<https://www.ngk-insulators.com/en/sustainability/society-scm.html>



## Supply Chain Evaluation

Within NGK, raw materials and molding molds for main production items\*1 are considered critical items, and of the suppliers who supply these items to NGK, 38 companies (22 Tier 1 companies, 16 Tier 2 companies) are considered critical suppliers from the standpoint of transaction volume (accounting for 80% or more of raw materials and molds supply for main production items), and BCP (single company supply ratio of 70% or more).

In order to identify sustainability-related risks in the supply chain, which includes these suppliers, we perform partner maintenance and selection based on NGK Group's Supply-Chain CSR Guideline, as well as visit suppliers to identify who are our high-risk procurement partners.

\*1 Main production items: Ceramics for purifying automobile exhaust, insulators and related devices for electric power, ceramics for electronic and electrical devices and ceramics for semiconductor manufacturing equipment

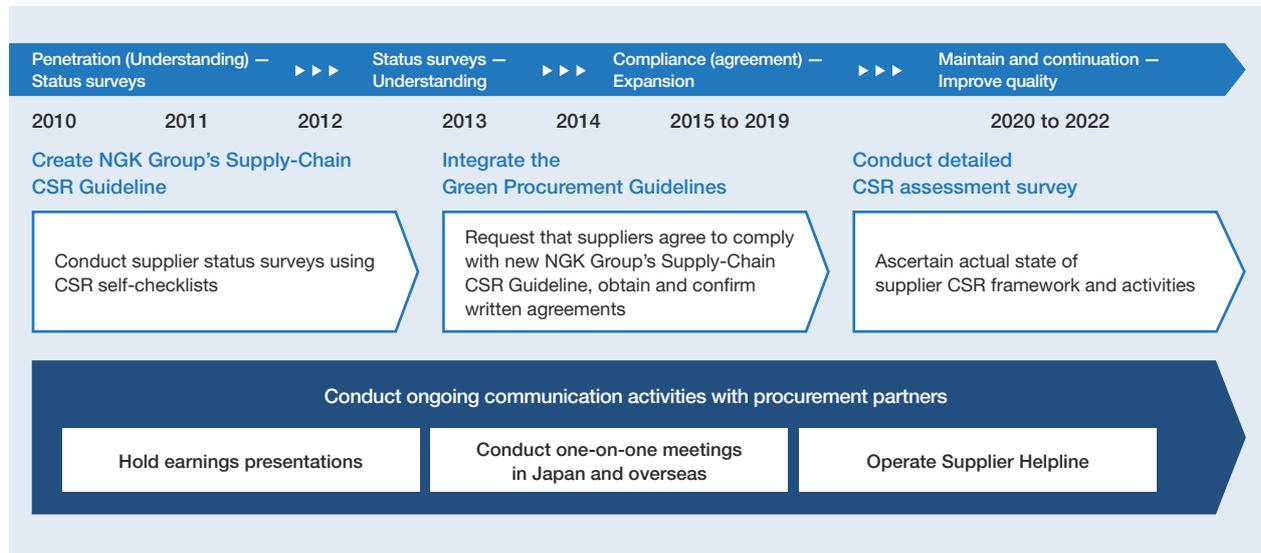
## Expanding CSR Procurement

At the NGK Group, we engage in activities which deepen understanding to promote CSR procurement, such as visiting individual suppliers and conducting on-site inspections.

Not only do we ask suppliers to sign an agreement to comply with our existing NGK Group's Supply-Chain CSR Guideline, but in 2021 we conducted a fact-finding survey to perform a detailed CSR assessment. It contained 114

questions on nine topics, including human rights, labor, and the environment. In FY2022 we are providing improvement support to suppliers according to their importance and business conditions. Our group companies are also moving forward incrementally with a Self Assessment Questionnaire (SAQ) for all major suppliers both in and outside of Japan.

## Ongoing Promotion of CSR Procurement



LINK

Supplier helpline  
<https://www.ngk-insulators.com/en/sustainability/society-scm.html>



## Procuring Resources and Raw Materials Responsibly

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

\*Minerals including tin, tantalum, tungsten, and gold produced in the Democratic Republic of the Congo and surrounding countries, and used as a source of funding for armed conflict in the area. Additionally, in response to requests from customers, we investigate suppliers regarding their responsible procurement of resources and raw materials.

## Human Resource Development

### Basic View

We have positioned “Embrace challenges and teamwork” as the top value in Our Values and “Enriching human life by adding new value to society” as our Mission in the NGK Group Philosophy. In addition to providing educational programs, we also work with superiors and create a

workplace environment that enables employees to take the initiative in their own growth. The goal of this is to enable employees to contribute to the business in the environment in which they work.

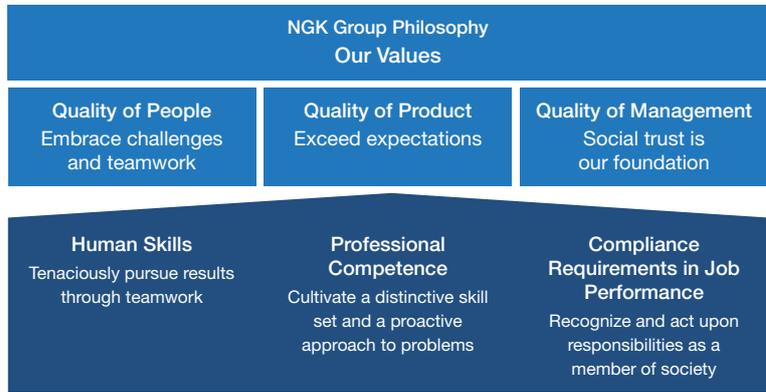
### Skills Development for Employees

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.

\*Since FY2020 we have continued to curtail some training programs to reduce the risk of COVID-19 infection.



LINK

For more information on human resource development  
<https://www.ngk-insulators.com/en/sustainability/society-skills.html>



### Developing Digitally Proficient Human Resources

Based on the NGK Group Digital Vision, we will educate all employees, from management to general employees, in digital transformation (DX), and will develop human resources who are skilled in the use of data and human resources to bridge the gap to DX. We provide training by grade level,

according to experience and the role served. In the business units, training is segmented into levels such as “Leaders” to drive the pursuit of DX, “Supporters” who assist the leaders, and “Beginners” who learn how to view and process data.

#### (Examples of Development Measures)

- In the “Leaders” development program, employees leave the division they are affiliated with and participate in an internal internship in a specialist division for one year to concentrate on learning data analysis and digital technology.
- New employees learn IT (information technology) skills through e-learning during the first year after they join the company.



For reference: NGK Group Digital Vision ➔ page 26



LINK

For more information on the NGK Group Digital Vision  
<https://www.ngk-insulators.com/en/info/d-vision/>





**David Miller**

Vice President  
President, FM INDUSTRIES, INC.

**Profile of FMI**

FM Industries was founded in 1989 by two experienced Silicon Valley entrepreneurs with a mission to deliver manufacturing solutions to their customers' complex challenges. FMI joined the NGK Group in 2002 and subsequently acquired LJ Engineering in 2010 and Praxair's Advanced Components Group in 2012. Both acquisitions provided customer and product diversity, with the latter adding Atmospheric Thermal Spray technology to our service portfolio. Over the last decade, FMI has leveraged this platform to become a premier supplier of critical components to the Semiconductor Equipment industry, with eight manufacturing sites across Northern California and Arizona and over 1,200 team members.

**Our rewarding team culture differentiates us from the competition and is vital for NGK Group's 2050 Vision success**

**People development**

FM Industries (FMI) was founded in the San Francisco Bay Area in 1989 and joined the NGK Group in 2002. FMI has become a leading supplier to the Semiconductor Equipment industry with eight manufacturing sites in the Western United States and over 1,200 team members. Our team plays a critical role in realizing NGK Group's 2050 Vision. In a very challenging employment market, FMI strives to maintain a competitive advantage by investing in long term employee-focused initiatives to maintain and reward our team members. Simultaneously, we focus on the recruitment, training, and development of the next generation of leaders. A new team member is introduced to our company through an extensive On Boarding process that covers important aspects of Health & Safety, Quality, Employee Benefits, and team building. We ensure all staff at every level receive a complete introduction to our business and industry. Once on board all FMI Team Members have access to significant Training & Development resources. FMI's custom Learning Center provides opportunities for everyone to improve their technical skills and enhance their management abilities. Training content is provided through a comprehensive internet-based platform where team members can access and complete training at their pace and on their schedule. In addition, we provide an Apprenticeship Program, a Leadership Development Program, and technical skills training all designed and executed by our in-house training team. Other important elements of our human resource program are communication and team member feedback. FMI utilizes a company intranet and a quarterly newsletter titled "FMI Connections" to keep our members apprised of the latest news and developments. We also seek our members' feedback through our quarterly opinion survey, quickly identifying opportunities for engagement and improvement.

By maintaining a positive work culture, where we provide career opportunities, celebrate success, and show appreciation to our team, we differentiate ourselves from our competition. We fully understand the success of our team is vital to achieving NGK Group's 2050 Vision.

**FMI's ongoing efforts to achieve NGK Group's Vision 2050**

To support the "NGK Group Vision: Road to 2050", launched in April 2021, FMI has developed its own 2050 Roadmap. Our roadmap focuses on digital transformation (DX), one of the "Five Transformations" of NGK Group's 2050 Vision. In developing our DX Roadmap, FMI created a cross functional leadership team consisting of subject matter experts in their field. Our mission is to utilize technology to further enable our Team Members' creativity and effectiveness. As an example, many valuable labor hours are committed to data generation, capture, and review. We plan to automate many of these processes and deliver real time trends to the production floor enhancing our team members' real time decision making and creativity. We envision reducing mundane manufacturing tasks and allowing our team to allocate more time on high value processes. In addition, FM Industries Technology Roadmap includes materials research and development, application of metal bonding technologies, and further automation of our critical manufacturing processes. These activities are targeted to drive efficiency, add market share gains, and ultimately contribute to increased profitability.

# Governance

## Striving to increase management transparency and effectiveness and enhance corporate value over the medium and long term

### Corporate Governance

#### Views on Corporate Governance

NGK's basic policy on corporate governance is to ensure legality in business activities and transparency in management. The Company has established a structure that can respond swiftly to changes in the business environment and built and maintains shareholder-focused system to ensure fair management.

To put this policy into practice, NGK has chosen the governance structure of a company with an Audit & Supervisory Board. We have established a corporate governance system that increases the effectiveness of corporate governance through debate and deliberation on important matters. This was accomplished by establishing the Executive Committee and various other committees to support the president in making decisions, in addition to the General Meeting of Shareholders, Board of Directors, and Audit & Supervisory Board.

NGK recognizes the need for swift, optimal decision-making and execution to respond to changes in the business environment. We have therefore introduced a executive officer system to segregate the management decision-making and supervisory function from the business execution function to clearly define the roles of and strengthen each function.

To strengthen the supervisory and oversight function of the Board of Directors, we have mandated reporting to Board of Directors from the key committees among committees that handle various risks surrounding NGK. To ensure that the objectives of the Corporate Governance Code are thoroughly implemented, we established the Nomination and Compensation Advisory Committee, Corporate Council, Conference of Outside Directors and Outside Audit & Supervisory Board Members, the Business Ethics Committee, and other committees.

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. In January 2019, the NGK Group Code of Conduct was revised with an emphasis on the realization of a sustainable society through business activities, respect for human rights, and thorough compliance to reflect changes in society since the previous revision.

#### Corporate Governance System

We have established the following system to ensure legality in business activities and transparency in management. This system makes it possible to respond swiftly to changes in the

business environment and maintains a shareholder-focused system to ensure fair management.

##### **A** Board of Directors

Constituent members: 9

Number of meetings in FY2021: 13

One-third of directors are outside directors. The Board of Directors makes decisions on matters specified in the Companies Act and the NGK's Articles of Incorporation as well as other important matters concerning management, and supervises the job performance of directors. Taku Oshima, the chairman of NGK, serves as the chairman of the Board of Directors.

##### **B** Audit & Supervisory Board

Constituent members: 4

Number of meetings in FY2021: 14

The Audit & Supervisory Board consists of Audit & Supervisory Board members. The board supervises the decision-making process and job performance of directors by attending Board of Directors meetings and other means. It reviews the establishment and operation of the internal control system and confirms the appropriateness of the audit methods and results of the accounting auditor.

##### **C** Nomination and Compensation Advisory Committee

Constituent members: 5

Number of meetings in FY2021: 4

The committee consists of a majority of independent directors and a committee chairperson who is selected from among the independent directors. One outside Audit & Supervisory Board member attends committee meetings as an observer to confirm the appropriateness of the deliberation process. The committee deliberates personnel matters concerning directors and Audit & Supervisory Board members, matters concerning compensation of directors and executive officers, proposals for the total compensation limit for all Audit & Supervisory Board members, and chief executive succession plans, and reports the results to the Board of Directors.

**D Business Ethics Committee**

Constituent members: 6  
 Number of meetings in FY2021: 5  
 The committee consists of outside officers and the internal director in charge of compliance. Its members monitor for fraud or illegalities involving officers and others of NGK, as well as compliance with competition laws and the Foreign Corrupt Practices Act.

**E Corporate Council**

Constituent members: 11  
 Number of meetings in FY2021: 2  
 The committee consists of outside officers and internal directors. Outside officers provide advice to members of management about various issues concerning business management.

**F Conference of Outside Directors and Outside Audit & Supervisory Board Members**

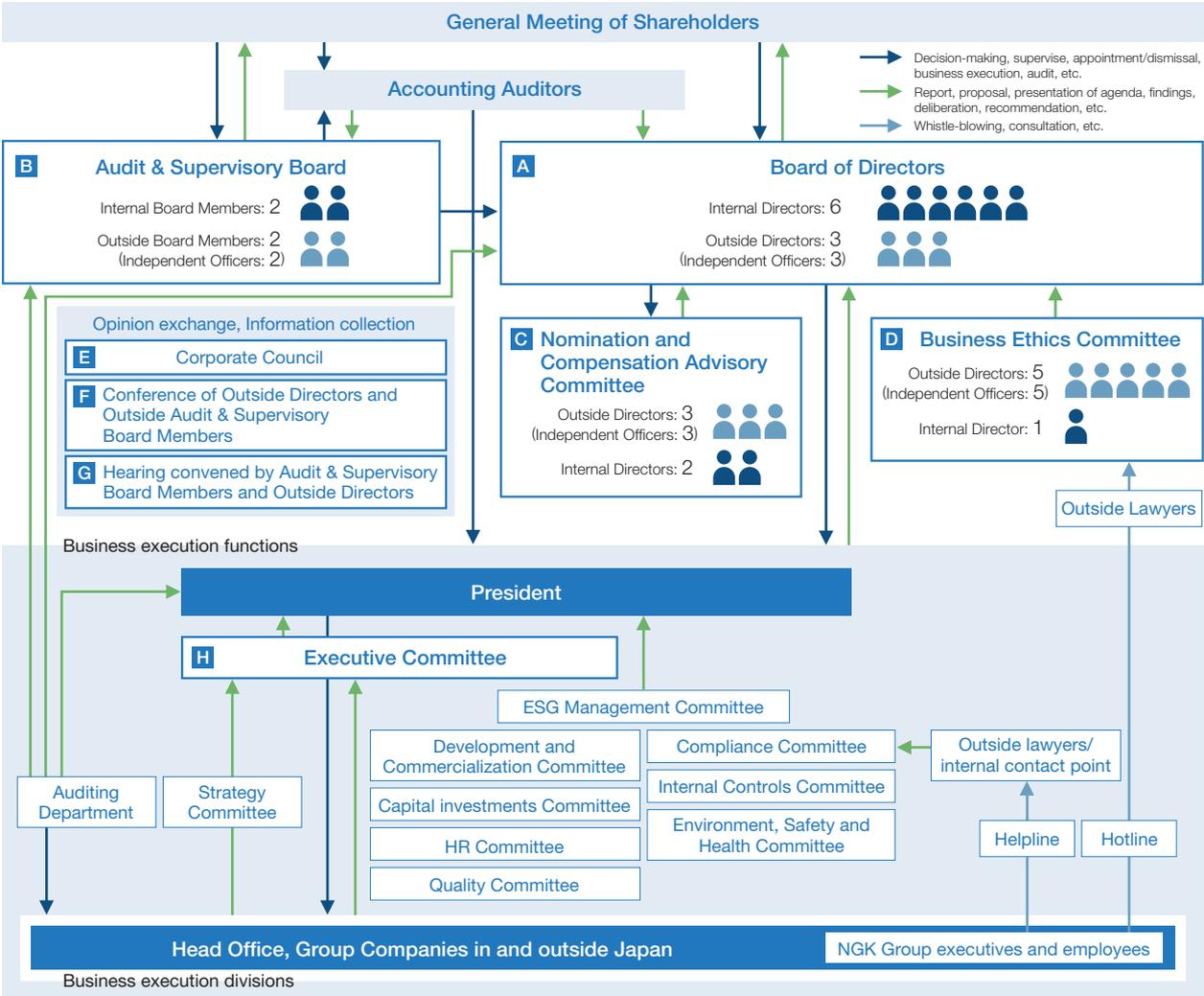
Constituent members: 5  
 Number of meetings in FY2021: 2  
 The conference consists of outside officers (outside directors and outside Audit & Supervisory Board members). Members exchange opinions on management issues and other matters concerning NGK so they can actively contribute to discussions in Board of Directors meetings.

**G Hearing convened by Audit & Supervisory Board Members and Outside Directors**

Constituent members: 7  
 Number of meetings in FY2021: 14  
 The Hearing consists of Audit & Supervisory Board members and outside directors. Members gather information on the company's business environment and issues from the relevant people in the NGK.

**H Executive Committee**

Constituent members: 16  
 Number of meetings in FY2021: 18  
 This committee consists of the president, executive vice presidents, executive officers of business groups, the group executive for Corporate NV Creation, the group executive of Corporate R&D, the group executive of Corporate Manufacturing Engineering, executive officers in charge of each division, senior fellows, and full-time Audit & Supervisory Board members, as well as executive officers, committee chairs, general managers, and division heads designated by the president. The committee deliberates on necessary matters to assist the president in making decisions. Shigeru Kobayashi, the president of NGK, serves as the committee chair.



## Steps Taken to Strengthen Corporate Governance

We continue to strengthen the corporate governance system. Enhancements include introducing an executive officer system to improve the management supervision and monitoring functions and other functions, and to provide suggestions on all aspects of management.

|               |                                                                                                                                                                                                 |                              |                                                                                                  |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------|
| April 1999    | Established the NGK Code of Conduct                                                                                                                                                             | January 2019                 | Revised the NGK Group Code of Conduct                                                            |
| April 2003    | Revised guidelines into the NGK Group Code of Conduct                                                                                                                                           | April 2019                   | Established the ESG Committee                                                                    |
| June 2005     | Introduced an executive officer system                                                                                                                                                          | February 2020                | Endorsement of recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) |
|               | Introduced a stock option                                                                                                                                                                       |                              | April 2020                                                                                       |
|               | Introduced an outside officer system                                                                                                                                                            | Established the HR Committee |                                                                                                  |
| July 2005     | Established the CSR Committee                                                                                                                                                                   | April 2021                   | Formulated the NGK Group Vision                                                                  |
| April 2007    | Established the CSR Office                                                                                                                                                                      |                              | Formulated the NGK Group Human Rights Policy                                                     |
| June 2010     | Appointed independent directors                                                                                                                                                                 |                              | Established the NGK Group Basic Guidelines for Compliance Activities                             |
| July 2011     | Revised the NGK Group Code of Conduct                                                                                                                                                           |                              | Established the ESG Management Department                                                        |
| April 2015    | Signed on to the UN Global Compact                                                                                                                                                              | June 2021                    | Outside directors increased to 1/3rd of Board of Directors                                       |
| June 2015     | Established the Global Compliance Office                                                                                                                                                        |                              | An outside director made the chair of the Nomination and Compensation Advisory Committee         |
| 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 | April 2022                   | Established the ESG Management Committee                                                         |
| June 2017     | Appointed one additional outside director                                                                                                                                                       | June 2022                    | Introduced a Restricted Share Compensation Plan                                                  |
| October 2018  | Appointed a Chief Compliance Officer                                                                                                                                                            |                              |                                                                                                  |



LINK

Corporate Governance Report

[https://www.ngk-insulators.com/en/resource/pdf/sustainability/governance\\_en.pdf](https://www.ngk-insulators.com/en/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 including 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 employees, etc.) 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.

## Key Focuses in FY2021

- Budgeting and account settlement
- Dissolution and liquidation of Group companies, investment in joint ventures (establishment of new regional power companies)
- Capital investment in production facilities and equipment
- Formulation of the NGK Group Vision
- Formulation of the NGK Group Environmental Vision and the fifth 5-Year Environmental Action Plan
- Revision of the NGK Group Human Rights Policy
- Revision of policies on determining compensation of directors and other senior management
- Formulation of the Basic Policy on the Business Portfolio
- Progress reports on company-wide projects (Carbon Neutrality project , etc.)
- Reports on committee activities and intellectual property activities

## Evaluation on the Effectiveness of the Board of Directors

NGK's Board of Directors conducts a survey of directors and Audit & Supervisory Board members at the close of each fiscal year to evaluate the effectiveness of Board of Directors meetings. The Board entrusts analysis and evaluation of the responses to an external organization, which reports the results to the Board

of Directors. The Company continually strives to improve effectiveness through such means as considering the importance and necessity of each issue identified and reinforcing efforts in Board of Directors meetings during the next fiscal year.

### Summary of the Evaluation of Effectiveness in FY2021

A survey conducted to evaluate Board of Directors meetings in FY2021 (ended March 31, 2022) in early April of this year was comprised of 50 questions and free-response entry. The results were reported at the Board of Directors meeting held on June 9, 2022. The initiatives and improvements listed on the right are being implemented for items recognized as issues. The overall evaluation from the external organization revealed the need for ongoing discussion on further improvements in effectiveness and directed at realizing the Group Vision.

We will endeavor to ensure and enhance effectiveness of the Board of Directors through ongoing efforts based on the evaluation results.

- Discussed important medium to long-term and strategic themes in expanded strategy committee meetings attended by outside officers in addition to the main business executives in charge, and freely debated and reported on such themes in Board of Directors meetings.
- Reported the status of allocation, treatment, and development of top management candidates and shared information in Corporate Council meetings attended by outside officers. Also partially revised the succession plans for the chief executive and approved the plans in a Board of Directors meeting.

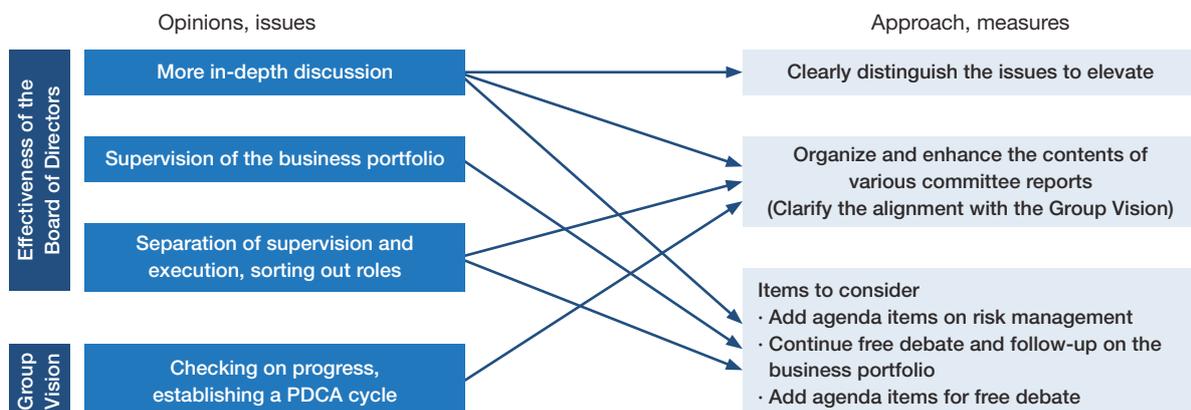
### Overall Comments by the External Organization

- The NGK Board of Directors has maintained the elements that form the foundation necessary as a Board of Directors since the previous evaluation, including the commitment and leadership of each member and a healthy culture. Evaluation of corporate strategy and policy decisions, risk management, and the composition of the Board of Directors has also improved. We can see the positive impacts of the structural change to one-third outside directors and discussion on formulating the vision. As can be seen from the increase in the overall score, we think the Board of Directors continues to be effective due to the specification of problems and concrete steps the Board of Directors has taken to achieve improvement.
- Opinions in the free-comment section were divided on whether or not the recent reforms increased the effectiveness of the Board of Directors. A certain number of comments demanded

concrete efforts to further improve actual effectiveness, rather than in form only. In particular, some think the Board needs to devise ways to separate execution from supervision, clearly distinguish between reporting items and discussion items according to this separation of functions, and reduce the number of items elevated to the Board of Directors, among other improvements.

- Although the overall evaluation of discussion on formulating the vision was high, some desired continued discussion on strengthening the PDCA cycle, better follow-up, supervision of the business portfolio, effective use of assets, and other topics.
- Some think there is a need to share and perform the checks to the level expected in regard to the Nomination and Compensation Advisory Committee, succession plans, and evaluations of executive management.

### Initiatives Targeting Further Improvements in Effectiveness



## Board of Directors (as of June 30, 2022)

| Name, position, and age                                                                                                                                                      | Years in office/No. of NGK shares held | Reasons for appointment                                                                                                                                                                                                                                                                                                                                                                     | Board of Directors meeting attendance record |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--|
|  <p><b>Taku Oshima</b><br/>Chairman<br/>65</p>                                              | 8<br>10,000 shares                     | Mr. Oshima has experience in development, design, and manufacture of NAS battery system for electric power storage, and experience in entering markets. He was appointed Representative Director and President in 2014, Representative Director and Chairman in 2021, and possesses extensive operating experience in NGK and knowledge of all aspects of management.                       | 12/13                                        |  |
|  <p><b>Shigeru Kobayashi</b><br/>President<br/>61</p>                                       | 2<br>10,126 shares                     | After working in overseas sales, Mr. Kobayashi served as President of an overseas subsidiary, Group Executive of the Energy Infrastructure Business, and in various other positions. He was appointed Representative Director and President in 2021, has extensive operating experience in NGK as well as knowledge of and personal contacts for business operations.                       | 12/13                                        |  |
|  <p><b>Chiaki Niwa</b><br/>Executive Vice President<br/>62</p>                             | 7<br>10,000 shares                     | Mr. Niwa has served as Representative Director and Executive Vice President since 2020 and is currently responsible for all technology in the Group. He possesses extensive operating experience in NGK and knowledge of project management and manufacturing technology.                                                                                                                   | 13/13                                        |  |
|  <p><b>Ryohei Iwasaki</b><br/>Executive Vice President<br/>62</p>                         | 13<br>10,000 shares                    | Mr. Iwasaki has served as President of an overseas subsidiary, General Manager of the Corporate Planning Office, and Group Executive of the Electronics Business. He currently leads new product creation and commercialization as Group Executive of the Corporate NV Creation. He has extensive operating experience and knowledge of business operation in NGK.                          | 13/13                                        |  |
|  <p><b>Tadaaki Yamada</b><br/>Director and Senior Vice President<br/>61</p>               | Newly appointed<br>5,000 shares        | Mr. Yamada has served as General Manager of the General Affairs Dept. and the Human Resources Dept., among other roles. He is currently responsible for the Auditing Dept., Human Resources Dept., Group Compliance Dept., Legal Dept., Intellectual Property Dept., General Affairs Dept. in Head Office, and possesses extensive operating experience in and knowledge of NGK.            | —                                            |  |
|  <p><b>Hideaki Shindo</b><br/>Director and Senior Vice President<br/>57</p>               | 1<br>5,000 shares                      | Mr. Shindo has served as General Manager of the Corporate Planning Office and General Manager of the Finance & Accounting Dept., among other roles. He is currently in charge of the ESG Management Dept., Corporate Planning Office, Secretarial Office, Finance and Accounting Dept., Purchasing Dept. in Head Office, and possesses extensive operating experience and knowledge in NGK. | 10/10                                        |  |
|  <p><b>Independent Officer</b><br/><b>Hiroyuki Kamano</b><br/>Outside Director<br/>76</p> | 11<br>1,000 shares                     | Mr. Kamano possesses considerable expertise as an attorney, extensive experience and an established record in the legal world, and possesses broad, international knowledge. He provides recommendations on the compliance system and operational execution and supervises management appropriately.                                                                                        | 13/13                                        |  |
|  <p><b>Independent Officer</b><br/><b>Emiko Hamada</b><br/>Outside Director<br/>63</p>    | 5<br>5,000 shares                      | Ms. Hamada utilizes the insights she has developed, through R&D and product development in operating companies and research activities mainly in joint research by industry, academia, and government, to provide appropriate recommendations on operational execution and supervision of management at NGK.                                                                                | 13/13                                        |  |
|  <p><b>Independent Officer</b><br/><b>Kazuo Furukawa</b><br/>Outside Director<br/>75</p>  | 3<br>5,000 shares                      | Mr. Furukawa possesses experience in telecommunications and other technical areas as well as in managing the operation of large organizations. He utilizes this experience to provide appropriate recommendations on operational execution and in supervision of management at NGK.                                                                                                         | 13/13                                        |  |

|  | Attendance record with committee members       |                           | Main career history and expertise |                                            |           |                              |                       |                  |          |     |                                 |
|--|------------------------------------------------|---------------------------|-----------------------------------|--------------------------------------------|-----------|------------------------------|-----------------------|------------------|----------|-----|---------------------------------|
|  | Nomination and Compensation Advisory Committee | Business Ethics Committee | Field of experience               |                                            |           |                              | Specialized knowledge |                  |          |     |                                 |
|  |                                                |                           | Overall management                | Overseas business International experience | Marketing | Manufacturing technology R&D | Finance               | Legal Compliance | HR/Labor | ICT | Environment Energy conservation |
|  | ○<br>(4/4)                                     |                           | ○                                 | ○                                          |           | ○                            |                       | ○                | ○        |     | ○                               |
|  | ○<br>(4/4)                                     |                           | ○                                 | ○                                          | ○         |                              |                       |                  |          |     | ○                               |
|  |                                                |                           | ○                                 |                                            |           | ○                            |                       | ○                |          | ○   | ○                               |
|  |                                                |                           | ○                                 | ○                                          | ○         |                              |                       |                  | ○        |     |                                 |
|  |                                                | ○<br>(-)                  |                                   |                                            | ○         |                              |                       | ○                | ○        |     |                                 |
|  |                                                |                           | ○                                 | ○                                          |           |                              | ○                     |                  | ○        |     |                                 |
|  | ○<br>Chairperson<br>(4/4)                      | ○<br>Chairperson<br>(5/5) | ○                                 | ○                                          |           |                              |                       | ○                |          |     |                                 |
|  | ○<br>(4/4)                                     | ○<br>(5/5)                | ○                                 | ○                                          |           | ○                            |                       |                  |          | ○   | ○                               |
|  | ○<br>(4/4)                                     | ○<br>(5/5)                | ○                                 | ○                                          |           | ○                            |                       |                  | ○        | ○   | ○                               |

## Audit & Supervisory Board Members (as of June 30, 2022)

| Name, position, and age                                                                                                                                                                       | Years in office/No. of NGK shares held | Reasons for appointment                                                                                                                                                                                                                                                                                                     | Board of Directors meeting attendance record | Audit & Supervisory Board meeting attendance record | Committees                                     |                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------|------------------------------------------------|---------------------------|
|                                                                                                                                                                                               |                                        |                                                                                                                                                                                                                                                                                                                             |                                              |                                                     | Nomination and Compensation Advisory Committee | Business Ethics Committee |
|  <b>Nobumitsu Saji</b><br>Full-time Audit & Supervisory Board Member<br>63                                   | 1<br>5,000 shares                      | We are confident that Mr. Saji can contribute to strengthening the governance of NGK by utilizing his extensive experience and knowledge in business operation and compliance to audit all aspects of management.                                                                                                           | 13/13                                        | 10/10                                               |                                                |                           |
|  <b>Takeshi Shimazaki</b><br>Full-time Audit & Supervisory Board Member<br>62                                | 3<br>817 shares                        | We are confident that Mr. Shimazaki can contribute to enhancing the corporate value of NGK by utilizing his extensive experience and knowledge in finance and accounting, and business audits to audit NGK's businesses.                                                                                                    | 13/13                                        | 14/14                                               |                                                |                           |
|  <b>Masayoshi Sakaguchi</b><br>Outside Audit & Supervisory Board Member<br>64<br><i>Independent Officer</i> | 3<br>0 shares                          | We are confident that Mr. Sakaguchi can contribute to enhancing the corporate value of NGK by utilizing his extensive experience in government administration and record in managing large organizations to audit all aspects of management at NGK from the perspectives of the legality of operations and risk management. | 13/13                                        | 14/14                                               | Observer                                       | ○<br>(5/5)                |
|  <b>Takashi Kimura</b><br>Outside Audit & Supervisory Board Member<br>67<br><i>Independent Officer</i>     | Newly appointed<br>0 shares            | We are confident that Mr. Kimura can contribute to enhancing the corporate value of NGK by utilizing his experience and knowledge in finance and corporate governance as well as his extensive experience and knowledge as an auditor of listed companies to audit all aspects of management at NGK.                        | —                                            | —                                                   |                                                | ○<br>(—)                  |

## Executive Officers (as of June 30, 2022) (\*Serve concurrently as directors)

|                    |                          |                                                                                                                                                                                                                                                                                                                                                                                      |                    |                       |                                                                                                                                    |
|--------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Shigeru Kobayashi* | President                | Overall Corporate Management; Executive Committee Chair; Strategy Committee Chair; ESG Management Committee Chair                                                                                                                                                                                                                                                                    | Hiroharu Kato      | Senior Vice President | General Manager, Global Sales & Marketing Div., Environment Business Group                                                         |
| Chiaki Niwa*       | Executive Vice President | Top Executive R&D, Manufacturing Engineering; Corporate R&D and Manufacturing Engineering Group Executive; Responsible for Digital Transformation and Innovation Dept., Quality Management Dept., Environment, Industrial Safety & Health Dept.; Development and Commercialization Committee Chair; Quality Committee Chair; and Environment, Safety and Industrial Health Committee | Atsushi Miyajima   | Senior Vice President | Group Executive, Corporate Manufacturing Engineering; Capital Investments Committee Chair                                          |
| Ryohei Iwasaki*    | Executive Vice President | Responsible for Business Groups; Group Executive, Corporate NV Creation; Development and Commercialization Vice Committee Chair                                                                                                                                                                                                                                                      | Hiroyuki Shinohara | Senior Vice President | General Manager, Corporate Planning Office                                                                                         |
| Tadaaki Yamada*    | Senior Vice President    | Responsible for Auditing Dept., Human Resources Dept., Group Compliance Dept., Legal Dept., Intellectual Property Dept., and General Affairs Dept.; General Manager, Human Resources Dept.; Chief Compliance Officer; Compliance Committee Chair, Internal Controls Committee Chair; HR Committee Chair; General Manager, Osaka Branch                                               | Iwao Ohwada        | Vice President        | In charge of Global Business Creation, Corporate NV Creation                                                                       |
| Shuheii Ishikawa   | Senior Vice President    | Group Executive, Energy & Industry Business Group                                                                                                                                                                                                                                                                                                                                    | Tatsumi Ichioka    | Vice President        | General Manager, Energy Storage Div., Energy & Industry Business Group; General Manager, Komaki Site                               |
| Tsutomu Nanataki   | Senior Vice President    | Group Executive, Corporate R&D                                                                                                                                                                                                                                                                                                                                                       | Ryo Ishihara       | Vice President        | General Manager, ESG Management Dept.; In charge of Secretarial Office; General Manager, Tokyo Main Office                         |
| Hiroto Matsuda     | Senior Vice President    | Group Executive, Digital Society Business Group; General Manager, High Performance Ceramics Div.                                                                                                                                                                                                                                                                                     | Mayumi Inagaki     | Vice President        | In charge of Auditing Dept., Group Compliance Dept., Legal Dept., and Intellectual Property Dept.; Compliance Vice Committee Chair |
| Hideaki Shindo*    | Senior Vice President    | Responsible for ESG Management Dept., Corporate Planning Office, Secretarial Office, Finance and Accounting Dept., and Purchasing Dept.; Senior Officer in charge of Group Companies                                                                                                                                                                                                 | Hirofumi Sakamoto  | Vice President        | General Manager, Engineering Div., Environment Business Group                                                                      |
| Jun Mori           | Senior Vice President    | Group Executive, Environment Business Group; General Manager, Nagoya Site                                                                                                                                                                                                                                                                                                            | Hideki Shimizu     | Vice President        | President, NGK ELECTRONICS DEVICES, INC.                                                                                           |
| Hiroshi Kurachi    | Senior Vice President    | General Manager, Sensor Div., Environment Business Group                                                                                                                                                                                                                                                                                                                             | Kazushi Tada       | Vice President        | General Manager, Sales & Marketing Div., Energy & Industry Business Group; General Manager, Insulator Div.                         |
| Masanobu Inoue     | Senior Vice President    | In charge of Digital Transformation and Innovation Dept., Quality Management Dept., and Environment, Industrial Safety & Health Dept.                                                                                                                                                                                                                                                | Ryugo Takeda       | Vice President        | President, NGK EUROPE GMBH (Germany)                                                                                               |
|                    |                          |                                                                                                                                                                                                                                                                                                                                                                                      | David Miller       | Vice President        | President, FM INDUSTRIES, Inc.                                                                                                     |
|                    |                          |                                                                                                                                                                                                                                                                                                                                                                                      | Takao Onishi       | Vice President        | General Manager, Electronic Devices Div., Digital Society Business Group                                                           |
|                    |                          |                                                                                                                                                                                                                                                                                                                                                                                      | Takashi Yoshino    | Vice President        | General Manager, SW Development Dept., Corporate R&D                                                                               |
|                    |                          |                                                                                                                                                                                                                                                                                                                                                                                      | Motoo Noritake     | Vice President        | General Manager, Industrial Process Div., Energy & Industry Business Group                                                         |
|                    |                          |                                                                                                                                                                                                                                                                                                                                                                                      | Yoshihide Natsume  | Vice President        | General Manager, New Metals Div., Digital Society Business Group; General Manager, Chita Site                                      |

## Policies for Determining Compensation of Directors

The compensation 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.

Compensation of directors (excluding outside directors) and corporate officers consists of three components: basic compensation, a performance-linked bonus, and stock-based compensation.

NGK only pays fixed annual compensation to outside directors and Audit & Supervisory Board members. We do not pay them performance-linked bonuses and stock-based compensation by granting restricted shares.

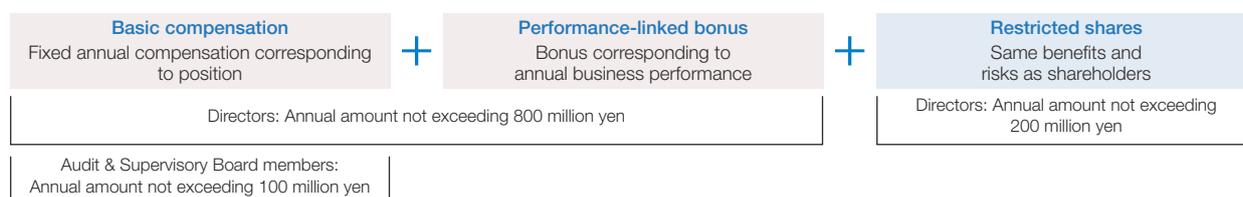
The relative proportions of variable compensation and fixed annual compensation are determined from the perspective of focusing on stability and improvement in performance over the medium and long term. Total variable compensation consists of a performance-linked bonus and the cash conversion value of restricted shares granted. It is set at an appropriate percentage of total compensation. The total amount of compensation, including basic compensation, is set according to the position

and rank of the recipient. It is also taking into consideration the level of compensation according to the size of the company, which is based on data from a reliable external organization.

The Nomination and Compensation Advisory Committee consists 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. The committee deliberates on and proposes the range of compensation for all directors and Audit & Supervisory Board members, basic compensation, and the basic amounts used as the basis for calculating performance-linked bonuses, and the number of restricted shares to grant (the level of monetary claims for payment as compensation for restricted shares granted) according to the position and rank of each individual director and corporate officer; and deliberates and proposes the amount of the performance-linked bonus for each individual director. The committee then reports its decisions on these matters to the Board of Directors.

The Board of Directors determines the amounts of compensation for directors and corporate officers after sufficient consideration of the recommendations received from the Nomination and Compensation Advisory Committee, as described above.

## Composition of Director and Corporate Officer Compensation



## Performance-Linked Bonus Calculation Method (FY2022)

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 FY2022: Net sales, operating income, net income, and return on invested capital (ROIC)* (target at the beginning of (or during) the fiscal year and results)</li> <li>Consolidated performance results for FY2021: Net sales, operating income, and net income</li> </ul> |
| <b>Medium to long-term perspective</b> | <ul style="list-style-type: none"> <li>Medium and long-term performance targets established in the NGK Group Vision: Operating income</li> <li>Creation of new products and new businesses—Keep Up 30</li> <li>Initiatives to Reduce CO<sub>2</sub> Emissions</li> </ul>                                                                                 |

\*NGK ROIC is calculated based on operating income, sales receivables, inventories, and fixed assets.

|                           | Short-term perspective                                       |                                                              | Medium-to-long-term perspective                                          |                                                                                          | Individual evaluation (100%)               |
|---------------------------|--------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------|
| <b>Basic bonus amount</b> | 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%)               |                                            |
| <b>Amount paid</b>        | Percentage returned on invested capital<br>← -100 to +100% → | Change from the previous year's results<br>← -100 to +100% → | Increase/decrease from previous fiscal year results<br>← -100 to +100% → | Percentage achieved on important issues for the current fiscal year<br>← -100 to +100% → | Individual evaluation<br>← -100 to +100% → |

(The basic bonus amount is allocated among the various performance indicators. Calculation of the bonus amount for each performance indicator ranges from -100% to +100%, according to the degree of achievement. As a result, the total amount of the performance-linked bonus ranges between -100% to +100% of the basic bonus amount.)

### Overview of Restricted Shares

- Restriction period: The period extending from the date on which shares were granted as restricted share compensation for 2022 until the directors (excluding outside directors) and corporate officers resign from their positions as determined by the Board of Directors in advance.
- Conditions for release from restriction period: The restrictions on shares will be released when the restriction period has expired, provided that the individual granted the shares has continuously served in any of the positions determined by the Board of Directors in advance during the period extending from the date on which individual assumed the position until the immediately prior to the conclusion of the first annual Shareholders' Meeting subsequently convened.
- Gratis acquisition of shares by NGK: NGK will acquire all of the shares granted without paying compensation when certain grounds specified in the allotment agreement apply, such as when the grantee has violated laws and regulations.

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

### Compensation for Directors and Auditor & Supervisory Board Members (FY2021)

| Officer category                                                                        | Total compensation (million yen) | Total compensation by type (million yen) |                                 |               | Applicable officers (people) |
|-----------------------------------------------------------------------------------------|----------------------------------|------------------------------------------|---------------------------------|---------------|------------------------------|
|                                                                                         |                                  | Fixed compensation                       | Performance-linked compensation | Stock options |                              |
| Directors (excluding Outside Directors)                                                 | 685                              | 341                                      | 278                             | 66            | 11                           |
| Outside Directors                                                                       | 41                               | 41                                       | —                               | —             | 3                            |
| Audit & Supervisory Board Members (excluding Outside Audit & Supervisory Board Members) | 67                               | 67                                       | —                               | —             | 3                            |
| Outside Audit & Supervisory Board Member                                                | 27                               | 27                                       | —                               | —             | 2                            |

Notes: 1. The total amount of compensation for directors (excluding outside directors), the total amount of compensation by type, and the number of applicable officers noted above include five directors who resigned from their positions on June 28, 2021 and the compensation each received.

2. The total amount of compensation for Audit & Supervisory Board members (excluding outside Audit & Supervisory Board members), the total amount of compensation by type, and the number of applicable officers noted above include one Audit & Supervisory Board member who resigned from his position on June 28, 2021 and the amount of compensation he received.

### Officers Receiving Total Compensation of ¥100 Million or More (FY2021)

| Name              | Officer category | Company category   | Total compensation by type (million yen) |                                 |               | Total compensation (million yen) |
|-------------------|------------------|--------------------|------------------------------------------|---------------------------------|---------------|----------------------------------|
|                   |                  |                    | Fixed compensation                       | Performance-linked compensation | Stock options |                                  |
| Taku Oshima       | Director         | Submitting company | 68                                       | 69                              | 14            | 152                              |
| Shigeru Kobayashi | Director         | Submitting company | 68                                       | 69                              | 13            | 151                              |
| Hiroshi Kanie*    | Director         | Submitting company | 45                                       | 45                              | 10            | 101                              |
| Chiaki Niwa       | Director         | Submitting company | 45                                       | 45                              | 10            | 101                              |

\*Resigned on June 27, 2022

## Management Succession Planning

The revised NGK Group Chief Executive Officer Succession Plan was approved by resolution of the Board of Directors in April 2022. This succession plan establishes the required qualities, development policies, selection procedures, and other actions

for developing chief executive officer successors. Based on this, the president provides the Nomination and Compensation Advisory Committee with a progress report on the plan each year, and the committee reviews the appropriateness of the plan.

## Training Policies for Officers

Directors and Audit & Supervisory Board members have been tasked with the responsibility of exercising the due care of a good manager. The Company therefore has established a training policy of providing the following types of opportunities to sharpen skills and knowledge so that they can fully execute their duties as experts in various kinds of management or as supervisors of business execution.

1. For internal officers: Training on the Companies Act, the Financial Instruments and Exchange Act, competition laws, Competition Law), and other aspects of corporate governance and compliance
2. For outside officers: Mainly providing separate explanations from the division in charge concerning items on the agenda of the Board of Directors and regularly providing information on the business environment and issues as well as opportunities for exchanging opinions

## 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 in each operating division. NGK has also 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 on sincerely engaging in business activities and fulfilling its responsibilities to society.

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 consists of managers from NGK divisions. The Business Ethics Committee handles matters concerning improper acts and legal violations involving NGK executives, and ensuring compliance with competition laws and Foreign Corrupt Practice Act.

The Board of Directors adopted an amendment to the "Resolution for the Development of Systems to Ensure the Appropriateness of Operations" at the March 2022 board meeting.

## Audit Structure

At NGK, we conduct separate Audit & Supervisory Board audits, accounting audits, and internal audits. The members of the Audit & Supervisory Board, accounting auditor, and internal Auditing Department who lead each of these audits regularly exchange information related to auditing policy, planning, results, and other areas pertinent to improving auditing effectiveness and efficiency.

NGK's Audit & Supervisory Board consists of two full-time members and two outside members. One person is assigned as dedicated support staff and possesses the appropriate knowledge, skills, and experience to assist the Audit & Supervisory Board members.

Transfers, evaluations, and other decisions concerning

support staff must be approved by the Audit & Supervisory Board to more fully ensure independence from the Board of Directors and the ability of support staff to effectively implement the instructions of Audit & Supervisory Board members.

Internal audits are performed by the 14 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 audits are performed by departments within the NGK Group that possess specialized knowledge in these areas.

As of July 2022, accounting audits are overseen by two certified public accountants from Deloitte Touche Tohmatsu LLC.

## Policy on Cross-Shareholdings

NGK holds shares in listed companies that contribute the long-term business development of the NGK Group as cross-shareholdings, primarily to maintain and strengthen transactional relationships. We also hold shares in each company in the Morimura Group, which shares a common founder. We hold these shares to mutually enhance management quality because the Morimura Group brand is part of NGK's corporate value through its philosophy and history.

As part of our asset portfolio, all cross-shareholdings are positioned as assets to supplement the liquidity considered necessary for our business plans. We always keep shrinking the size of cross-shareholdings in mind from the perspective of asset efficiency, and the size of cross-shareholdings may change due to changes in overall business trends and risks, financial conditions, the transactional relationship with each company whose shares we hold, and other such factors.

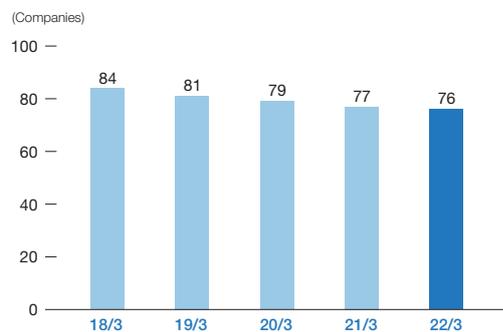
The Board of Directors regularly reviews NGK's capital policy

and whether it is appropriate to continue holding these shares based on certain indicators in addition to significance of holding shares from the perspective of the transactional relationship. Such indicators include the credit rating and other indicators of the safety in holding shares, and the dividend yield and other indicators of efficiency. With respect to the cost of capital, shareholdings are not evaluated in isolation. We also evaluate cross-shareholdings as part of the balance sheets for each business, which have different risks and anticipated rates of return, in managing the return on invested capital (NGK ROIC) for each business.

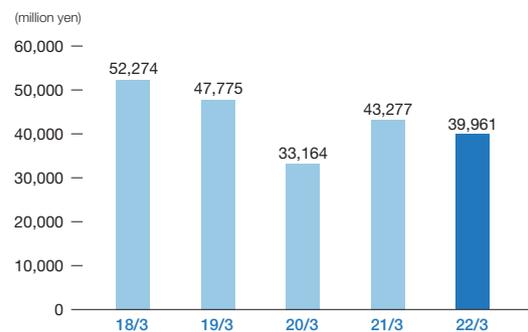
When exercising voting rights on cross-shareholdings, we focus on whether the business is being managed with an emphasis on enhancement of corporate value, shareholder return, in addition to evaluation from the perspective of the content of resolutions and whether they will adversely affect shareholder return.

## Status of Cross-Shareholding

### Number of Cross-Shareholding Companies



### Reported Cross-Shareholdings Balance



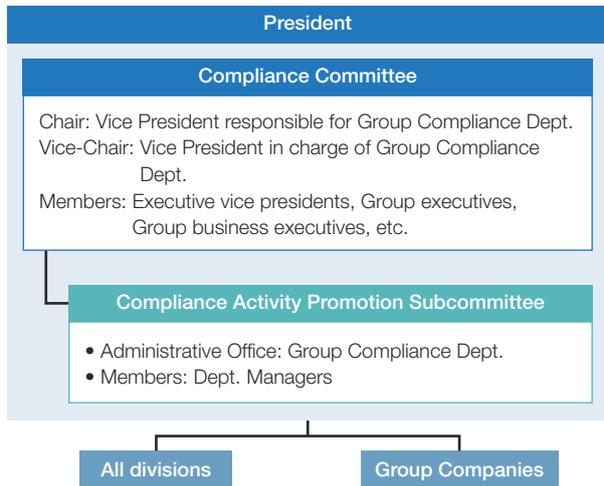
# Compliance

## Compliance Promotion Structure

The NGK Group has established a Compliance Committee, which reports directly to the president. A Compliance Activity Promotion Subcommittee was established as part of the Compliance Committee to ensure proper execution of the Committee's work.

In FY2021, we asked Group companies to select compliance administrators and compliance officers and began discussions with them to establish the foundations of an effective and efficient compliance structure for the entire NGK Group. The Group Compliance Department is also leading the introduction of innovative training formats in each company using hybrid communication that includes group discussions as well as online and in-person meetings in an effort to enhance learning through interactive education. The goal of pursuing these efforts is to make sure that each NGK Group company will be able to independently formulate, implement, confirm effectiveness, and improve compliance measures in the future.

## Compliance Promotion Structure



## Observing Competition Laws, 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. These standards are strictly enforced by the NGK Group. 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. The Competition Laws Compliance Activity website we established posts practical manuals to guide compliance with competition laws. The Competition Laws Compliance Handbook was revised in FY2021 to accommodate changes in social conditions.

## Independent Review of Competition Laws Compliance Program

Since FY2015, NGK has contracted PwC Advisory LLC (hereinafter, "PwC") as an independent compliance professional. We retain PwC to perform an annual review of the NGK Group's implementation of its competition law compliance program according to the Competition Laws Compliance Rules. PwC also assesses the overall oversight and reporting structures in place for NGK Group companies, both in Japan and overseas

locations. In FY2017, PwC began conducting interviews with the directors overseeing NGK's various business groups in order to assess the tone of each director's approach toward competition law compliance and further enhance their awareness of these efforts. The results of these reviews are used in operating and improving the competition law compliance program and other purposes.

## Corruption Prevention Structure

The NGK Group Code of Conduct states, "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 FY2015, 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. These rules prohibit engaging in acts of bribery, either directly or indirectly through a third party (entertainment, gifts of money and/or goods). The rules likewise prohibit payments to public officials to facilitate administrative procedures. Our Auditing Department also began reviewing overseas money transfers and entertainment expenses from FY2017.

## Conducting Anti-Bribery Training

In addition to having in-house lecturers provide job grade-specific training to NGK employees, in FY2019 we began conducting training for sales department employees that incorporates

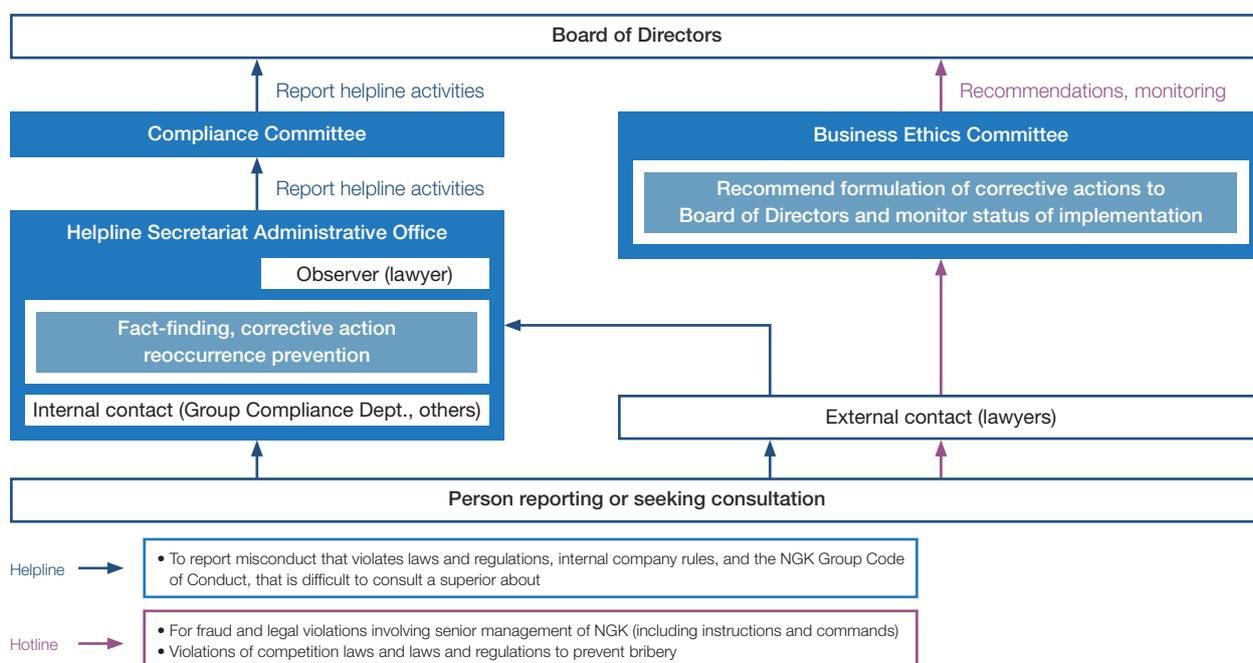
interactive lectures by outside lawyers and group discussion of case studies. We also arrange attorney-led seminars and other training at all Group companies.

## Whistleblowing System

Our whistleblowing system (helplines and hotlines) can be used by everyone who works at NGK and every Group company location. This includes officers, employees, employees dispatched on external assignments, advisors, contract employees, temporary employees based on a temporary employment agreement, and resident employees accompanying a service contract. Consultations and reports should be handled

by a designated agent in principle, but it is also possible to seek consultation anonymously through an outside hotline. Our company rules guarantee protection of those seeking advice or reporting issues. We have also revised the company rules and established a structure to align with enforcement of the revised Whistleblower Protection Act.

### Organization of Whistleblowing System



## Helpline

We have established a helpline to receive inquiries and reports from employees aimed at curtailing and preventing activities contrary to the spirit of the NGK Group Code of Conduct and to facilitate quick resolution when issues occur. Each Group company outside Japan has its own helpline. In FY2021, these helplines received requests for consultation on a variety of issues, including harassment, rule violations, and quality issues.

### Number of Helpline Consultation Cases (NGK)

| FY2019 | FY2020 | FY2021 |
|--------|--------|--------|
| 55     | 28     | 43     |

## Hotline

We have established a hotline as a whistleblowing system for responding to fraud and legal infractions committed by senior management of NGK, and all violations related to competition laws and anti-corruption laws. Outside lawyers manage the hotline and the Business Ethics Committee, which consists mainly of outside directors, handles issues. The Committee reports these issues to the Board of Directors and takes corrective steps.

We continue to set up hotlines at Group companies outside Japan to respond to fraud and legal infractions committed by senior management, while taking the circumstances in each country into consideration. All Group companies outside Japan have set up hotlines for matters related to competition laws and anti-corruption law-related violations.

## Information Security

### Information 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. Employees are also told that they must contact the General Affairs Department and ICT Department if the device is lost, infected with a computer virus, or otherwise compromised. Under the rules of employment, employees are subject to disciplinary action if improper use of an information device results in the leaking of confidential

information or results in other harm that significantly impacts the company. Personnel from NGK’s ICT Department visit several Group companies each year to conduct on-site checks and provide guidance on implementation of IT security measures. In FY2021, 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 in order to share with them the IT security enhancement policies and measures implemented over the medium term. Additionally, we established a meeting body called the IT Global Meeting. This meeting body is split into the four regions of North and Central America, Europe and Africa, China, and Asia Pacific. Group companies located within each region participate in regional meetings where they discuss NGK’s ICT and DX strategies, including IT security.

### Formulation of the Basic NGK Group IT Security Standards

We formulated the NGK Group IT Security Standards in FY2010 and have continued to revise them as needed to develop an IT security structure based on commonly shared Group standards and enhance IT security.

Every year, each Group company drafts action plans for the

enactment of countermeasures in an attempt to systematically strengthen security. Via these action plans, NGK confirms initiatives at each Group company and provides guidance as necessary.

### Information Security Training

We conduct training sessions throughout the year to ensure strict adherence to information security among all employees.

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

| Item                                    | Participants | Participation rate |
|-----------------------------------------|--------------|--------------------|
| Training for newly hired employees      | 105          | 100%               |
| Training for newly promoted supervisors | 116          | 100%               |
| Training for newly promoted managers    | 68           | 100%               |
| E-learning                              | 5,601        | 100%               |

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

### Ensure IT Security Against Cyberattacks

As a countermeasure against cyberattacks, NGK is strengthening each category of protection, detection, response, and recovery from cyberattacks following the cybersecurity framework announced by the National Institute of Standards and Technology (NIST) of the U.S.

In FY2021, we worked to improve and strengthen our detection capabilities in particular. This included upgrading our

anti-virus software on all company devices and sending its logs in order for an outside specialist to monitor and analyze. We prepared a SOP for response to and recovery from cyberattacks based on the latest trends ensuring we are prepared for any cyber contingency. In FY2022 and beyond, we plan to conduct annual training exercises on IT security incidents as well as verify and upgrade the effectiveness of relevant documents.

### Privacy Policy and Organization for Personal Information Protection

The NGK Group has established internal rules on privacy protection compliant with the Amended Act on the Protection of Personal Information of Japan which took effect from April 1, 2022 in an effort to ensure strict handling, management, and protection of personal information obtained from customers. In FY2015, we formulated and published our Basic Policy on the Proper Handling of Specific Personal Information in response to

the enforcement of the Act on the Use of Numbers to Identify a Specific Individual in Administrative Procedures.



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



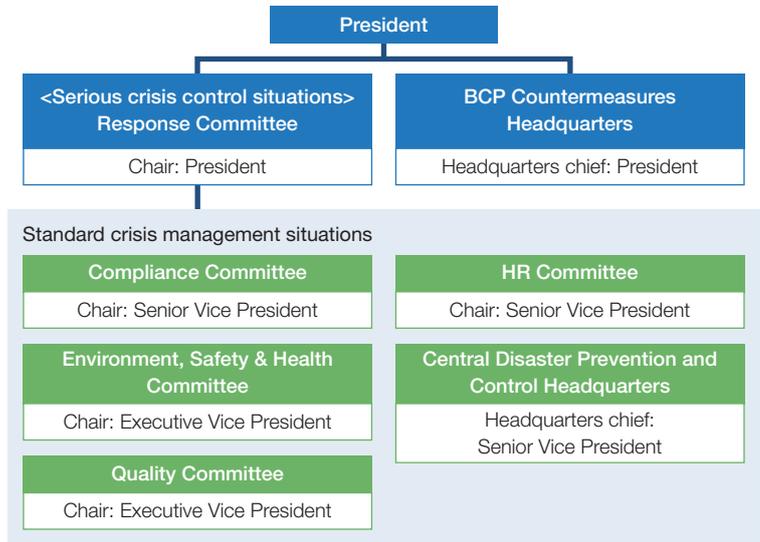
## Risk Management

### Basic View

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 senior 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



### 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 NGK Group are collected, reevaluated, and serious risks were identified in FY2019. The ESG Committee (former name in 2019) then deliberated and

designated which identified risks need to be managed by the NGK Group as a whole.

In FY2021 we began considering building a company-wide risk management framework which includes the risk identification process, and we aim to implement it in FY2022.



|                  |   |                         |    |    |
|------------------|---|-------------------------|----|----|
| Degree of impact | 5 | 10                      | 3  | 0  |
|                  | 4 | 12                      | 8  | 0  |
|                  | 3 | 28                      | 17 | 9  |
|                  | 2 | 29                      | 30 | 11 |
|                  | 1 | 28                      | 30 | 25 |
|                  |   | 1                       | 2  | 3  |
|                  |   | Frequency of occurrence |    |    |

The NGK Group uses the above results to create a risk heat map

## Risks, Risk Summaries, Risk Responses

| Risk                                                                                                                                                                                                                                   | Summary                                                                                                                                                                                                               | Response                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Business operation risks                                                                                                                                                                                                            | All operations                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Demonstrations, terrorism, war, infectious or communicable diseases, and other unforeseen circumstances</li> </ul>                                                             | <ul style="list-style-type: none"> <li>Construct globally distributed, alternative systems</li> </ul>                                                                                                                                                                                                                                                                                                                       |
|                                                                                                                                                                                                                                        | (1) Environment Business                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Changes that lead to a decline in demand for internal combustion engine vehicles</li> </ul>                                                                                    | <ul style="list-style-type: none"> <li>Develop and launch new and high-performance products in line with stronger exhaust regulations</li> </ul>                                                                                                                                                                                                                                                                            |
|                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Drop in market share due to rising competition from Chinese market</li> </ul>                                                                                                  | <ul style="list-style-type: none"> <li>Strengthen competitiveness via technical responsiveness that anticipates environmental regulations and via supply stability</li> </ul>                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Decline in demand due to downturn in business, delayed timing of regulations, or other factors</li> </ul>                                                                      | <ul style="list-style-type: none"> <li>Respond appropriately to the nature and timing of environmental regulations and trends in demand</li> </ul>                                                                                                                                                                                                                                                                          |
|                                                                                                                                                                                                                                        | (2) Digital Society Business                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Greater than expected decline in demand for semiconductors</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., as appropriate</li> </ul>                                                                                                                                                                            |
|                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Drop in market share due to delayed responsiveness to customer needs</li> </ul>                                                                                                | <ul style="list-style-type: none"> <li>Differentiation through our unique materials, design, and manufacturing technologies</li> <li>Improve product supply capacity</li> </ul>                                                                                                                                                                                                                                             |
|                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Major changes in the semiconductor manufacturing process from innovative inventions</li> </ul>                                                                                 | <ul style="list-style-type: none"> <li>Closely monitor semiconductor manufacturing process trends and revise production systems as appropriate to quickly respond to changes in demand.</li> </ul>                                                                                                                                                                                                                          |
|                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Drop in demand for end-consumer goods</li> <li>Decrease in investment in mobile base stations and data centers</li> </ul>                                                      | <ul style="list-style-type: none"> <li>Carefully monitor customer trends and revise the personnel structure and production system where appropriate to enable quick response to changes in demand</li> </ul>                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Inability to develop new technology or release products compatible with customer needs</li> </ul>                                                                              | <ul style="list-style-type: none"> <li>Carefully monitor customer trends and pursue timely technological development</li> </ul>                                                                                                                                                                                                                                                                                             |
|                                                                                                                                                                                                                                        | (3) Energy & Industry Business                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Spread of competitors' products, such as lithium-ion batteries, that use innovative technologies</li> </ul>                                                                    | <ul style="list-style-type: none"> <li>Point out superior points of NAS batteries (large capacity, long life)</li> <li>Strengthen partnerships with leading overseas companies</li> <li>Take advantage of government support</li> </ul>                                                                                                                                                                                     |
| <ul style="list-style-type: none"> <li>Changes in the energy policies of individual countries</li> <li>Cutbacks in capital investment by electric power companies</li> <li>Use of polymer insulators in the domestic market</li> </ul> | <ul style="list-style-type: none"> <li>Carefully monitor government policy on electric power in each country and revise production systems where appropriate to ensure quick response to changes in demand</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <ul style="list-style-type: none"> <li>Drop in market share from growth in competition in cathode materials for lithium-ion batteries and kiln for electronic components</li> </ul>                                                    | <ul style="list-style-type: none"> <li>Carefully monitor customer trends and pursue innovation in production systems where appropriate to ensure quick response to changes in demand</li> </ul>                       |                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2. R&D-related risks                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>Inability to achieve adequate results with the input received due to increasing competition among technologies</li> </ul>                                                      | <ul style="list-style-type: none"> <li>Set aside a total of 300 billion yen 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) areas</li> <li>Set a target of 100 billion yen in sales from new products and new businesses by 2030 (New Value 1000)</li> <li>Established Corporate NV Creation led by marketing</li> </ul> |

| Risk                                                                    | Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3. Legal compliance, human rights and safety, and quality-related risks | (1) Legal compliance-related risks                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                         | <ul style="list-style-type: none"> <li>Decline in NGK Group's reputation due to actions contrary to social 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>Formulate NGK Group Basic Guidelines for Compliance Activities aligned to international standards</li> <li>The Business Ethics Committee, which consists of outside directors and compliance officers, monitors and prevents serious improprieties or legal/regulatory violations</li> <li>Reduce the possibility of compliance violations through a whistleblowing system</li> </ul> |
|                                                                         | (2) Human rights and safety-related risks                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                         | <ul style="list-style-type: none"> <li>Human rights violations in the NGK Group's business activities</li> </ul>                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>Formulation of the NGK Group Human Rights Policy</li> <li>Issuance of statement on the UK Modern Slavery Act</li> <li>Compliance with international regulations related to human rights</li> <li>Provision of a safe and enjoyable work environment that is comfortable to work in for all</li> </ul>                                                                                                                                                                                                                                                             |
|                                                                         | <ul style="list-style-type: none"> <li>Employee occupational accidents, illness, or physical and mental health problems</li> </ul>                                                                                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>In accordance with NGK Safety and Health Policy, identify serious hazard risks and use risk assessment to facilitate strengthening of preventive measures</li> <li>Follow up on employees who work long hours and conduct job grade-specific mental health education</li> </ul>                                                                                                                                                                                                                                                                                   |
|                                                                         | (3) Quality-related risks                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                         | <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 complaints, contractual violations, or other operational deficiencies</li> </ul>                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>Have the Quality Management Department monitor 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>Establishment of Four Rules for Quality Activities</li> <li>Company-wide deployment of quality risk elimination process activities</li> </ul>                                                                                                                          |
| 4. Information systems-related risks                                    | <ul style="list-style-type: none"> <li>External cyber attacks and unauthorized access</li> <li>Shutdown of data processing caused by unexpected system malfunctions and security issues</li> <li>Negative impact on societal trust or business continuity due to theft, destruction, manipulation, loss, etc., of data</li> </ul>                                                                                                                                                             | <ul style="list-style-type: none"> <li>Establishment of an IT security system based on common standards within the Group</li> <li>Conduct information security training for employees</li> <li>Appropriate application and management of internal information assets</li> </ul>                                                                                                                                                                                                                                                                                                                          |
| 5. Currency exchange, capital, and procurement-related risks            | <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> </ul>                                                                                                                                  | <ul style="list-style-type: none"> <li>Keep production close to local demand centers, finance in local currency, and optimize purchasing according to forex market conditions</li> <li>Hedge risks with forward foreign exchange contracts and other financial instruments</li> </ul>                                                                                                                                                                                                                                                                                                                    |
| 6. Materials procurement and supply chain-related risks                 | <ul style="list-style-type: none"> <li>Rising materials prices and energy costs in each region</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>Reflect in appropriate pricing</li> <li>Reduce costs through competitive purchasing, revising designs, and other means</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                         | <ul style="list-style-type: none"> <li>Delays in materials procurement and backlogged shipments to customers due to supply chain disruptions</li> </ul>                                                                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>Inventory control</li> <li>Diversify product procurement</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 7. Climate change and disaster-related risks                            | <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>Locations facing operational difficulties due to water damage from sea level rise, increased size and magnitude of typhoons, and increased frequency of local torrential rains caused by global warming, or major disasters, fire, or other serious incidents or accidents</li> </ul> | <ul style="list-style-type: none"> <li>Disclose information on risks and opportunities based on recommendations from the Task Force on Climate-related Financial Disclosures (TCFD)</li> <li>Formulated the NGK Group Environmental Vision</li> <li>Develop and introduce products and services that contribute to the realization of a carbon-neutral society</li> <li>Target net zero CO<sub>2</sub> emissions by 2050</li> </ul>                                                                                                                                                                      |
|                                                                         | <ul style="list-style-type: none"> <li>Serious damage to facilities at production bases due to events beyond expectation</li> <li>Long-term supply difficulties due to impacts on the local infrastructure where plants are located by events beyond expectation</li> <li>Decline in operations and negative impact on production and sales due to emergence and spread of major infectious disease, such as COVID-19 pandemic</li> </ul>                                                     | <ul style="list-style-type: none"> <li>Promote business continuity plan (BCP) for entire Group</li> <li>Decentralize production sites for main businesses</li> <li>Purchase from multiple suppliers</li> <li>Implement disaster mitigation for buildings and equipment</li> <li>Secure safety of employees</li> </ul>                                                                                                                                                                                                                                                                                    |

# The NGK Group's "present" and "future" as it pursues transformation

What should the NGK Group do to create sustainable value in a rapidly changing business environment?

We asked the outside directors to speak from various perspectives.

Outside Director

**Hiroyuki Kamano**



Outside Director

**Emiko Hamada**



Outside Director

**Kazuo Furukawa**

Senior Vice President  
General Manager,  
Corporate Planning Office

(MC)

**Hiroyuki Shinohara**



## Looking back on the first year under the new structure

**Shinohara:** The company started a new business structure under President Kobayashi in April 2021. Looking back on the first year, please tell us about your impressions.

**Kamano:** Formulating the NGK Group Vision has clarified the direction of the Group and unified the direction of all employees. I also believe continuously implementing specific measures raised the motivation of the entire Group and led to record-high profits despite the harsh environment caused by the COVID-19 pandemic. For President Kobayashi, I think it has been a very smooth start.

**Hamada:** I think announcing the group vision was a big deal. Clarifying the Group's direction seems like it helps relieve anxiety related to the future of internal combustion engines. With regard to R&D and new businesses as well, I believe outlining the NV1000 and other bold new policies has created a sense of excitement among employees.

**Furukawa:** I highly appreciate President Kobayashi's leadership. We consolidated four business groups into three to streamline the organization and speed up decision-making. We have managed to improve the deficit structure of the insulator business, and in the energy business, we have shifted from the product business to the solution business. This kind of business transformation is quite difficult, but we have carried it out with all our might and this direction has been well received by all of our employees. The product business and the solutions business are completely different things, but once we have a successful case, various roads will open up all at once, so I have high expectations.

**Shinohara:** What are your thoughts

on the changes in the Board of Directors?

**Kamano:** The composition of the Board of Directors changed in June last year, reducing the number of members, which I believe provides opportunities for more active discussion. Agenda items include long-term and strategically important themes with the goal of digging deeper into company-wide issues. As a result, the quality of discussions is also improving.

**Furukawa:** The role of the Board of Directors is to supervise business execution, but at the same time, it must be a place where business plans and management strategies can be freely discussed. By clarifying and setting future goals, I think the company has fostered an atmosphere for thinking together towards achieving goals. The process of thinking has advanced from a simple explanations and confirmations into a forum for discussion.

**Hamada:** What should be done for the company to achieve what it wants to be? I feel that there is a stronger recognition that the Board of Directors is for creating a path towards the future of the NGK Group.

**Shinohara:** How about the issues touched on in last year's NGK Report ?

**Kamano:** Last year, I said that "80% of sales from carbon neutrality and digital society in 2050" would be very challenging, and that achieving it would require the development of a mechanism that enables a transformation in business structure. You can see how serious they took my opinion, including immediately setting up the Corporate NV Creation. In addition to prioritizing ESG management, the NGK Group has formulated a carbon neutral strategy based on the NGK Group Environmental Vision. I think that it is



highly commendable that the company is promoting the creation of a system that is linked to sustainability.

**Hamada:** I talked about becoming an "open company" from the perspective of promoting diversity and the future of R&D, and I have the impression that the atmosphere has changed considerably over the past year. The Corporate R&D is proactively considering exchanges with the outside world, and Corporate NV Creation is actively working to tap external expertise. The Tokyo Main Office also established a base for promoting collaboration with partners. Changes can be seen everywhere.

**Furukawa:** The company has set very clear targets, including targets for carbon neutrality – 550,000 tons of CO<sub>2</sub> emissions by FY2025 (25% reduction compared to FY2013), 370,000 tons by 2030 (50% reduction compared to FY2013). The company is also aiming for New Value 1000 in the form of 100 billion yen in net sales from new products by FY2030. While it requires a certain amount of bravery to make such a clear declaration, I think this is creating an atmosphere of a desire to take on challenges.

## About initiatives related to ESG Management

**Shinohara:** ESG management will be

indispensable for a company to sustain itself for many years to come. The NGK Group is also focusing on ESG management as one of its Five Transformations that should be carried out in order to achieve the NGK Group Vision. Please discuss your evaluation or opinion on the company's efforts thus far.

**Hamada:** Regarding environmental (E), the important point is that the company has formulated the NGK Group Environmental Vision. Concrete initiatives such as the Carbon Neutral Business Promotion Project and the Net Zero CO<sub>2</sub> Emissions Project have been put in place in line with this vision. Furthermore, I think that the company has continuously undertaken drastic measures over the past year, such as even considering the use of ICP (Internal Carbon Pricing).

**Kamano:** Based on the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), this spring the company disclosed information on four items: governance, strategy, risk management, and indicators and targets. Although many companies are struggling to disclose this information, I sensed the Group's positive attitude toward environmental issues in its prompt response to these disclosure demands.



**Furukawa:** Regarding the issue of energy, I would like you to think about new developments from two perspectives: how to promote energy conservation itself, and how to invest in products that contribute to energy conservation. NGK operates in the energy field and has unique know-how that other companies do not possess. I have expectations for products and services that only the NGK Group can provide.

**Shinohara:** What about social (S)?

**Kamano:** Regarding human rights, the company is promoting initiatives with a higher awareness of issues than before, including the implementation of human rights due diligence. Last fiscal year, the company announced the NGK Group Human Rights Policy, which outlines their approach to human rights and details on initiatives. Freedom of association and respect for the right to collective bargaining are among the priority issues, and I believe this is worth mentioning.

**Furukawa:** I think the important point with social (S) is further diversification. And the key to that is globalization. The NGK Group's business regions are globalizing, but the company needs to globalize its overall efforts as well. The more globalization progresses, the more the company will need to respond to various values, which leads to further diversification.

**Hamada:** As social demands increase, so do the demands placed on companies. However, while responding to the issues of society as a whole, having an inner social understanding, outlining what the company wants to be, is also important. I would like you to aim to be a company where diverse human resources gather, where everyone can fully demonstrate their abilities and play an active role, where each employee trusts in the excellence of

the company and does a good job.

**Shinohara:** What about governance (G)?

**Kamano:** I think corporate governance is improving through the reorganization of the Board of Directors. There is a high awareness of highly transparent governance, such as changing the chairman of the Nomination and Compensation Advisory Committee to an outside director, and I feel the company has built a system that gives stakeholders a sense of security. Regarding compliance, I believe that the company is making solid efforts, such as establishing a compliance activity reward system and expanding compliance education.

**Furukawa:** I think that The NGK Group's compliance education is very thorough and impressive. Of course, there is no such thing as "good enough" in education. New people join the company every year, and with globalization, the number of employees will also expand regionally, so I hope that you will continue with your efforts moving forward.

## Towards achieving the NGK Group Vision

**Shinohara:** The NGK Group Vision was just launched. Please tell us your thoughts on how you will respond to the expectations of stakeholders and society going forward.

**Hamada:** Until now, there may have been a lack of communication with the outside world. However, the announcement of the group vision has become a big message, and I think I felt a response. Also, when formulating the Group vision, the company asked employees for their opinions. I think that was very good idea.

**Furukawa:** I agree. Outlining a group

vision led to the formation of a great panoramic view. The year 2050 indicated by the Group vision may seem like a distant future. However, achieving goals will require implementing each measure starting now. On the other hand, the desire to achieve the vision at the time of drafting could decline or changes over time. For this reason, I think continuous monitoring and maintenance will be essential.

**Hamada:** I feel the same way. What starts off as a group vision created with the participation of all the employees could be forgotten at some point, and this vision may be perceived as something that the upper management did on their own. Therefore, it is important to appropriately communicate the progress, degree of achievement, evaluation, etc. to stakeholders.

**Kamano:** I have been an outside director since 2011, but I have never been involved in gathering the opinions of employees and engaging in repeated discussions, or working to align the company and employees on the same vector. I feel that the company has changed a lot over the

past 10 years. While the company could face difficult situations in the future, I would like President Kobayashi to take strong leadership and move forward to earn even more trust from stakeholders.

### The role outside directors should fulfill

**Shinohara:** Lastly, please share your thoughts on how you will fulfill your role as an outside director in order to accelerate the Five Transformations.

**Kamano:** I recognize that one of the duties of an outside director is to assist in the creation of an environment that supports appropriate risk-taking by management. I will take an aggressive approach to supporting healthy risk-taking. At the same time, I believe it is also important to objectively judge whether new investments and new businesses are appropriate. I want to contribute to improving corporate value by exerting a sense of balance that is possible as an independent outside director .

**Furukawa:** I would like to contribute to the promotion of reform by devoting myself to supervising the execution of



business, an important responsibility of an outside director, and placing value on the approach of thinking and creating management together with internal directors.

**Hamada:** I want to use my outside position and expertise towards thoroughly monitoring the Five Transformations from various perspectives. Expectations for the NGK Group are rising, both domestically and internationally, and I will do everything in my power to support the transformation. I would like to support and advise in various ways and move forward together.



From right  
Kazuo Furukawa  
Emiko Hamada  
Hiroyuki Kamano  
Hiroyuki Shinohara

SECTION

# 03

## NGK Group Corporate Data

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# Realizing Our Achievements



## Highlights of Section 03

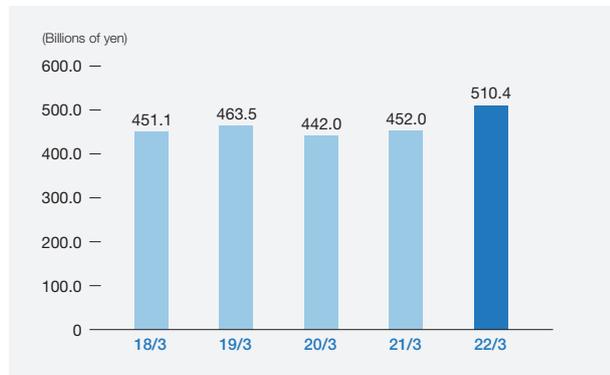
- NGK Group by the numbers
- NGK Group then and now
- NGK Group, a third-party perspective

# Financial and Non-Financial Highlights

## Financial Highlights

### Net Sales

**510.4** billion yen

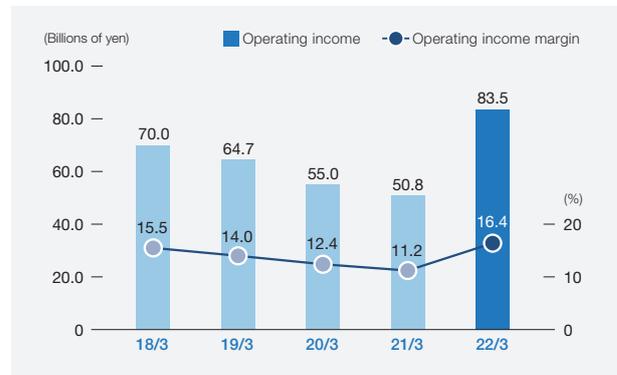


### Operating Income

**83.5** billion yen

### Operating Income Margin

**16.4%**

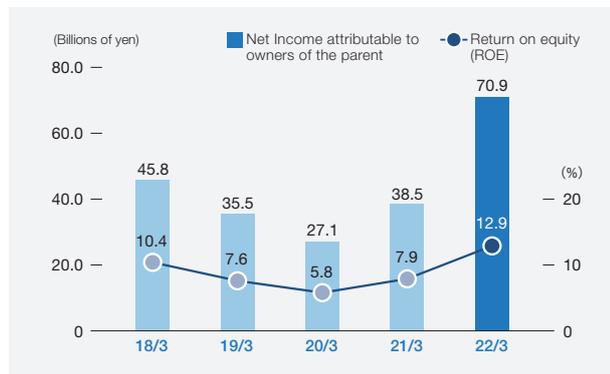


### Net Income Attributable to Owners of the Parent

**70.9** billion yen

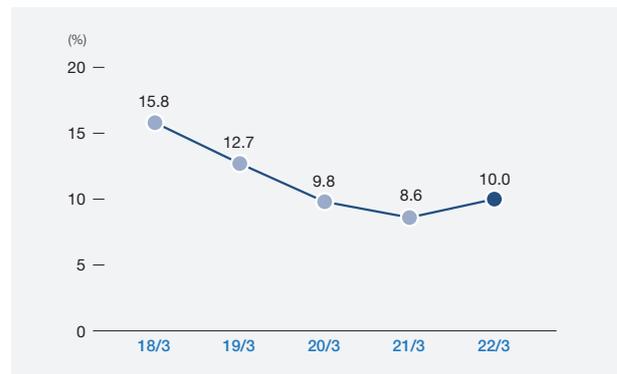
### Return on Equity (ROE)

**12.9%**



### NGK ROIC (return on invested capital)

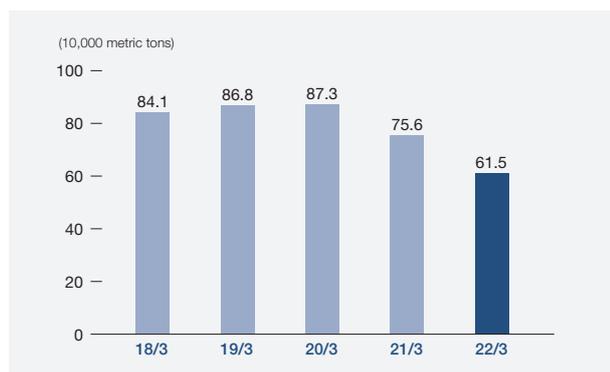
**10.0%**



## Non-Financial Highlights

### CO<sub>2</sub> Emissions (all NGK Group production sites)

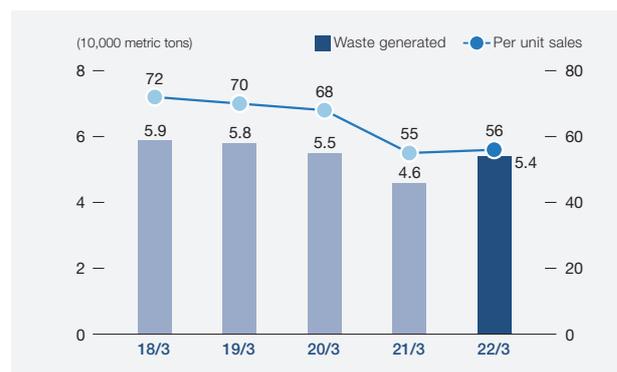
**615,000** metric tons



Note: Excludes non-production sites  
Includes offsets from carbon neutral LNG use from FY2021 onward

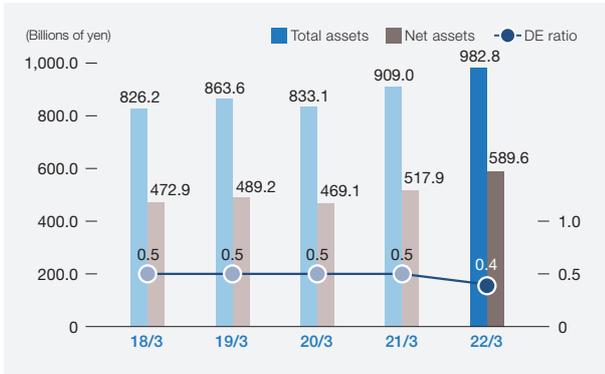
### Waste Generated (all NGK Group production sites)

**54,000** metric tons

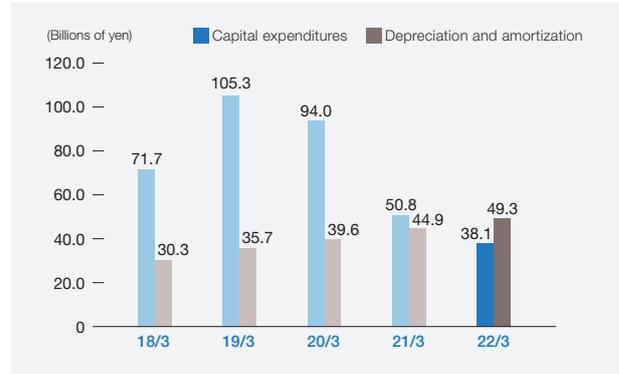


Note: Indexed to FY2013 = 100  
Excludes non-production sites

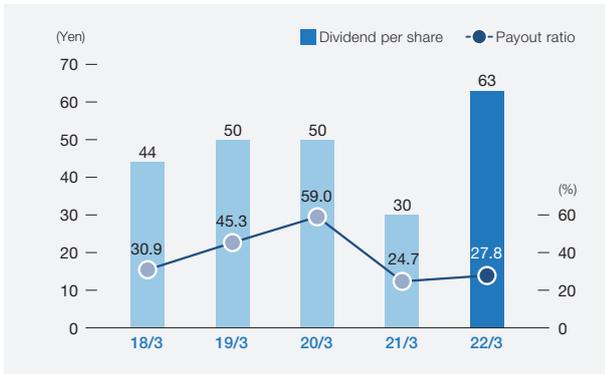
**Total Assets** **982.8** billion yen  
**Net Assets** **589.6** billion yen  
**DE Ratio** **0.4**



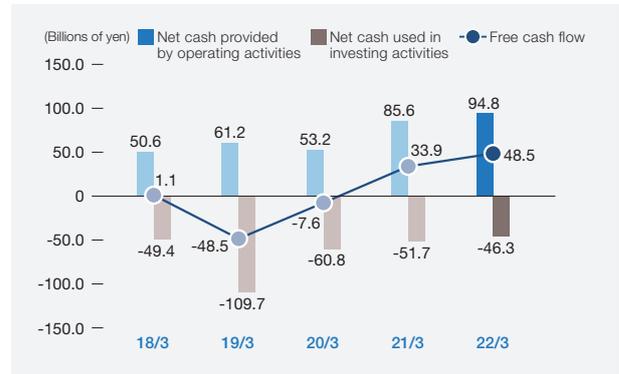
**Capital Expenditures** **38.1** billion yen  
**Depreciation and Amortization** **49.3** billion yen



**Dividend per Share** **63** yen  
**Payout Ratio** **27.8%**

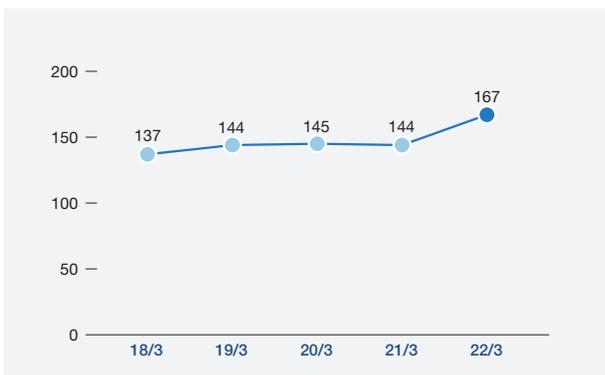


**Net Cash Provided by Operating Activities** **94.8** billion yen  
**Net Cash Used in Investing Activities** **(46.3)** billion yen  
**Free Cash Flow** **48.5** billion yen



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

**167**



Note: Indexed to FY2013 = 100

**Percentage of Female Key Personnel (Managers) (NGK)**

**3.4%**



## 11-Year Key Financial and Non-Financial Data

### Financial Indicators

|                                                 | 2012/3   | 2013/3  | 2014/3   | 2015/3   |
|-------------------------------------------------|----------|---------|----------|----------|
| Net sales                                       | 248,948  | 252,789 | 308,671  | 378,665  |
| Cost of sales                                   | 172,456  | 178,052 | 208,052  | 254,386  |
| Selling, general, and administrative expenses   | 49,986   | 54,041  | 56,366   | 62,700   |
| Operating income                                | 26,504   | 20,695  | 44,252   | 61,577   |
| Net income attributable to owners of the parent | (35,351) | 11,422  | 27,045   | 41,504   |
| Capital expenditures                            | 28,839   | 31,216  | 28,434   | 30,366   |
| Research and development expenses               | 11,428   | 11,315  | 12,060   | 13,942   |
| Net cash provided by operating activities       | 13,850   | 3,681   | 32,647   | 73,002   |
| Net cash used in investing activities           | (45,438) | (582)   | (21,185) | (39,495) |
| Net cash provided by financing activities       | 56,608   | 12,448  | 2,026    | (26,000) |
| Total assets                                    | 523,322  | 563,030 | 614,219  | 702,234  |
| Interest-bearing debt                           | 131,436  | 155,816 | 167,295  | 156,203  |
| Net assets                                      | 264,381  | 303,073 | 344,453  | 404,001  |
| Profit per share (yen)                          | (108.27) | 34.98   | 82.82    | 127.11   |
| Cash dividends per share (yen)                  | 20       | 20      | 22       | 28       |
| Ratio dividends to net worth (%)                | —        | 57.2    | 26.6     | 22.0     |
| Return on equity (ROE) (%)                      | (12.6)   | 4.2     | 8.6      | 11.4     |
| Equity ratio (%)                                | 48.5     | 52.0    | 54.3     | 55.8     |
| Price-earnings ratio (PER)                      | —        | 29.0    | 26.0     | 20.2     |
| Price-book value ratio (PBR)                    | 1.5      | 1.1     | 2.1      | 2.1      |
| Closing stock (yen)                             | 1,181    | 1,013   | 2,150    | 2,565    |
| Number of employees, end of year (persons)      | 12,372   | 13,159  | 13,210   | 16,217   |

### Non-Financial Indicators

|                                                                                            | 2012/3    | 2013/3    | 2014/3    | 2015/3    |
|--------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| GHG emissions (Scope 1: Energy-origin CO <sub>2</sub> )<br>(10,000 metric tons, NGK Group) | 27.5      | 29.6      | 30.2      | 29.0      |
| GHG emissions (Scope 2: Energy-origin CO <sub>2</sub> )<br>(10,000 metric tons, NGK Group) | 31.7      | 36.7      | 43.0      | 39.4      |
| GHG emissions (Scope 3)<br>(10,000 metric tons, non-consolidated upstream )                | —         | —         | —         | —         |
| Total water usage (10,000 m <sup>3</sup> , NGK Group)                                      | 305       | 327.3     | 318.2     | 276       |
| VOC emissions (metric tons, NGK Group)                                                     | 5.7       | 4.8       | 5.3       | 6.3       |
| PRTR substance emissions (metric tons, NGK Group)                                          | 17.3      | 14.8      | 14.3      | 15.4      |
| Total water discharge (10,000 m <sup>3</sup> , NGK Group)                                  | 172       | 215       | 223       | 196       |
| Waste emissions (10,000 metric tons, NGK Group)                                            | 3.6       | 3.9       | 4.2       | 5.7       |
| Number of employees (persons, non-consolidated)                                            | 3,351     | 3,426     | 3,531     | 3,569     |
| Employee breakdown (female) (% , non-consolidated)                                         | 13.1      | 13.4      | 13.3      | 12.9      |
| Percentage of women among managers (% , non-consolidated)                                  | 1.1       | 1.0       | 1.5       | 1.8       |
| Percentage of women among managers<br>(% , overseas NGK Group companies)                   | —         | —         | —         | —         |
| Number/percentage of disabled employees<br>(persons/% , non-consolidated)                  | 43 (1.51) | 49 (1.91) | 53 (2.07) | 56 (2.23) |
| Lost time incident rate (non-consolidated)* <sup>2</sup>                                   | 0.14      | 0.27      | 0.42      | 0.00      |
| Social contribution expenditure<br>(100 million yen, non-consolidated)                     | —         | 3.46      | 3.48      | 3.31      |
| Number of directors (persons, non-consolidated)                                            | 13        | 11        | 12        | 12        |
| Number of outside directors (persons, non-consolidated)                                    | 2         | 2         | 2         | 2         |
| Total compensation of directors (million yen, non-consolidated)                            | 643       | 668       | 624       | 581       |
| Number of patents held (Japan) (non-consolidated)                                          | 2,303     | 2,454     | 2,685     | 2,719     |
| Number of patents held (overseas) (non-consolidated)                                       | 3,981     | 4,087     | 3,990     | 3,911     |

Note: The values for Scope 1 and Scope 2 (CO<sub>2</sub> emissions from energy sources) were calculated by retroactively 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.

(Millions of yen)

|  | 2016/3   | 2017/3   | 2018/3   | 2019/3    | 2020/3   | 2021/3   | 2022/3   |
|--|----------|----------|----------|-----------|----------|----------|----------|
|  | 435,797  | 401,266  | 451,125  | 463,504   | 441,956  | 452,043  | 510,439  |
|  | 289,266  | 272,434  | 312,107  | 323,224   | 313,458  | 329,061  | 347,748  |
|  | 65,633   | 65,619   | 68,991   | 75,574    | 73,496   | 72,158   | 79,163   |
|  | 80,898   | 63,212   | 70,026   | 64,705    | 55,000   | 50,823   | 83,527   |
|  | 53,316   | 36,379   | 45,814   | 35,506    | 27,135   | 38,496   | 70,851   |
|  | 45,437   | 60,101   | 71,713   | 105,336   | 93,997   | 50,831   | 38,130   |
|  | 17,410   | 18,653   | 21,100   | 23,271    | 22,928   | 22,448   | 23,551   |
|  | 59,445   | 80,172   | 50,554   | 61,224    | 53,200   | 85,641   | 94,831   |
|  | (47,772) | (56,452) | (49,413) | (109,743) | (60,830) | (51,724) | (46,291) |
|  | (373)    | (13,013) | 22,546   | 3,564     | (18,796) | 12,250   | (45,263) |
|  | 711,897  | 759,434  | 826,243  | 863,636   | 833,085  | 908,967  | 982,833  |
|  | 163,973  | 174,150  | 211,573  | 229,423   | 234,400  | 264,244  | 252,350  |
|  | 417,972  | 427,593  | 472,863  | 489,245   | 469,118  | 517,892  | 589,594  |
|  | 163.28   | 112.71   | 142.42   | 110.35    | 84.73    | 121.61   | 226.56   |
|  | 38       | 40       | 44       | 50        | 50       | 30       | 63       |
|  | 23.3     | 35.5     | 30.9     | 45.3      | 59.0     | 24.7     | 27.8     |
|  | 13.3     | 8.8      | 10.4     | 7.6       | 5.8      | 7.9      | 12.9     |
|  | 57.1     | 54.9     | 55.8     | 55.3      | 55.0     | 56.3     | 59.3     |
|  | 12.7     | 22.4     | 12.9     | 14.6      | 16.7     | 16.6     | 7.7      |
|  | 1.7      | 1.9      | 1.3      | 1.1       | 1.0      | 1.3      | 0.9      |
|  | 2,079    | 2,520    | 1,834    | 1,608     | 1,417    | 2,024    | 1,753    |
|  | 16,657   | 17,517   | 18,783   | 20,115    | 20,000   | 19,695   | 20,099   |

|  | 2016/3    | 2017/3    | 2018/3    | 2019/3    | 2020/3     | 2021/3     | 2022/3     |
|--|-----------|-----------|-----------|-----------|------------|------------|------------|
|  | 31.1      | 31.7      | 32.0      | 32.3      | 30.9       | 26.4       | 29.0*1     |
|  | 44.9      | 48.7      | 52        | 54.5      | 56.4       | 49.2       | 32.5       |
|  | —         | —         | 87.7      | 104.7     | 97.7       | 89.3       | 122.6*3    |
|  | 285       | 409       | 432       | 453       | 433        | 378        | 434        |
|  | 6.8       | 155.4     | 145.3     | 145.2     | 68.4       | 82.9       | 77.0       |
|  | 14.0      | 163.1     | 154.2     | 127.5     | 76.3       | 89.4       | 83.5       |
|  | 197       | 279       | 287       | 281       | 314        | 253        | 270        |
|  | 5.9       | 5.9       | 5.9       | 5.8       | 5.4        | 4.6        | 5.4        |
|  | 3,700     | 3,937     | 4,142     | 4,119     | 4,224      | 4,316      | 4,382      |
|  | 12.6      | 12.7      | 12.5      | 12.6      | 12.8       | 13.0       | 12.9       |
|  | 1.8       | 1.9       | 2.0       | 2.2       | 2.9        | 3.0        | 3.4        |
|  | 16.6      | 15.3      | 21.0      | 16.0      | 20.2       | 22.7       | 23.1       |
|  | 56 (2.18) | 55 (2.03) | 57 (1.90) | 62 (1.92) | 135 (2.20) | 145 (2.35) | 155 (2.46) |
|  | 0.29      | 0.34      | 0.11      | 0.40      | 0.00       | 0.10       | 0.19       |
|  | 3.46      | 3.15      | 3.00      | 3.02      | 2.73       | 2.96       | 5.33       |
|  | 12        | 13        | 12        | 12        | 13         | 11         | 9          |
|  | 2         | 2         | 3         | 3         | 3          | 3          | 3          |
|  | 723       | 803       | 799       | 698       | 660        | 715        | 820        |
|  | 2,907     | 3,038     | 3,191     | 3,352     | 3,513      | 3,521      | 3,374      |
|  | 4,042     | 4,134     | 4,186     | 4,346     | 4,485      | 4,452      | 4,444      |

\*1 Includes offsets from carbon neutral LNG use from FY2021 onward

\*2 Aggregate for calendar years

\*3 344.9 for consolidated upstream and downstream

# NGK Group History

## Until 1969 since establishment

### 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

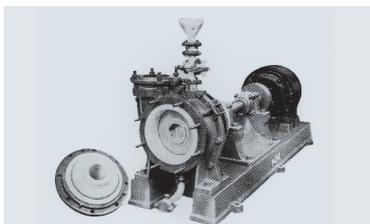
Construction of High Voltage Laboratory was completed.

### 1965

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



Inaugural managers



Acid-proof pump

## 1970s to 1990s

### 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.

### 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.

### 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.

### 1991

Capital participation in Soshin Electric Co., Ltd.

### 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

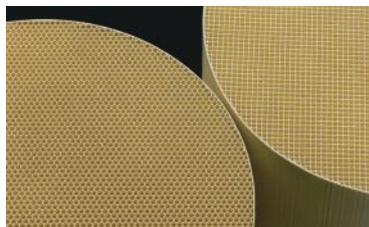
- Mass production of ceramics for semiconductor production devices begins.
- Development of vehicle exhaust gas NOx sensors begins.

### 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.



HONEYCERAM



Beryllium-copper master alloy



High-voltage insulator



Ceramics for semiconductor manufacturing equipment

## 2000s-

### 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.
- Merged the environmental equipment business with the water environment-related business unit of Fuji Electric Co., Ltd. to establish METAWATER Co., Ltd.

### 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.

### 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.

### 2015

Acquired NIPPON STEEL & SUMIKIN Electronics Devices Inc. from NIPPON STEEL & SUMIMOTO METAL Corporation (Currently NGK ELECTRONICS DEVICES, INC.)

### 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

- Revised the NGK Group Philosophy.
- Lithium-ion rechargeable batteries, "EnerCera®" is commercialized.
- 100th anniversary

### 2021

- NGK Group Vision is formulated.
- NGK Group Environmental Vision is formulated.
- Established Ena Electric Power, a new regional electric power company
- Sold Soshin Electric Co., Ltd.

### 2022

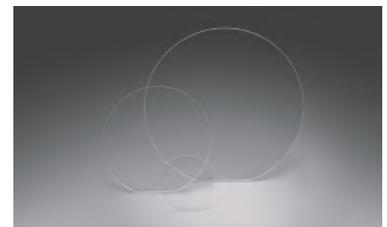
Established Abashiri Electric Power, a new regional electric power company



NAS batteries



Diesel particulate filters (DPF)



Gallium nitride (GaN) wafers



In-vehicle high-precision NOx sensors



Gasoline particulate filters (GPF)



Lithium-ion rechargeable batteries, "EnerCera"

## Corporate Outline/Stock Information (As of March 31, 2022)

### Corporate Outline

|                        |                                                                                  |                                  |                                  |
|------------------------|----------------------------------------------------------------------------------|----------------------------------|----------------------------------|
| <b>Company name</b>    | NGK Insulators, Ltd.                                                             | <b>Consolidated subsidiaries</b> | 45                               |
| <b>Address</b>         | 2-56 Suda-cho, Mizuho,<br>Nagoya 467-8530, Japan<br>Telephone + (81) 52-872-7181 | <b>Equity-method affiliates</b>  | 2                                |
| <b>Established</b>     | May 5, 1919                                                                      | <b>Employees</b>                 | NGK 4,382<br>Consolidated 20,099 |
| <b>Paid-in capital</b> | 69.8 billion yen                                                                 | <b>Stock exchange code</b>       | 5333                             |
| <b>Net sales</b>       | 510.4 billion yen<br>(consolidated, for FY2021)                                  |                                  |                                  |

### Stock Information

**Total number of shares authorized**  
735,030,000 shares

**Total number of shares issued**  
317,211,996 shares  
(Including 5,570,919 shares of treasury stock)

**Total number of shareholders**  
50,996 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)              | 57,566                               | 18.47              |
| Custody Bank of Japan, Ltd. (Trust account)                       | 21,709                               | 6.96               |
| Meiji Yasuda Life Insurance Company                               | 21,695                               | 6.96               |
| The Dai-ichi Life Insurance Company, Limited                      | 21,457                               | 6.88               |
| MUFG Bank, Ltd.                                                   | 7,204                                | 2.31               |
| National Mutual Insurance Federation of Agricultural Cooperatives | 7,029                                | 2.25               |
| Aioi Nissay Dowa Insurance Co., Ltd.                              | 4,387                                | 1.40               |
| State Street Bank West Client – Treaty 505234                     | 4,325                                | 1.38               |
| Custody Bank of Japan, Ltd. (Securities trust account)            | 3,383                                | 1.08               |
| JP Morgan Chase Bank 385781                                       | 3,310                                | 1.06               |

(Note) The Company retains 5,570,919 shares of treasury stock, but those shares are excluded from the above list of major shareholders. Furthermore, the above shareholding ratio is calculated based on the number of shares after deducting the number of treasury shares from the total number of issued shares, rounded down to the nearest one-thousandth.

### Distribution of Shares



## 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 ELECTRONICS DEVICES, INC.  
 NGK CERAMIC DEVICE CO., LTD.  
 NGK METEX CORPORATION  
 NGK FINE MOLDS, LTD.  
 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.  
 ENA ELECTRIC POWER Co., Ltd.  
 ABASHIRI ELECTRIC POWER Co., Ltd.

### NORTH AND CENTRAL AMERICA

NGK-LOCKE, INC.  
 NGK CERAMICS USA, INC.  
 NGK AUTOMOTIVE CERAMICS USA, INC.  
 NGK METALS CORPORATION  
 FM INDUSTRIES, INC.  
 NGK ELECTRONICS USA, INC.  
 NGK INSULATORS OF CANADA, LTD.  
 NGK CERAMICS MEXICO, S. DE R.L. DE C.V.

### EUROPE, AFRICA

NGK BERYLCO U.K. LTD.  
 NGK CERAMICS EUROPE S.A.  
 NGK EUROPE GMBH  
 NGK DEUTSCHE BERYLCO GMBH  
 NGK BERYLCO FRANCE  
 NGK CERAMICS POLSKA SP. Z O.O.  
 NGK CERAMICS SOUTH AFRICA (PTY) LTD.

### ASIA, OCEANIA

NGK INSULATORS (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.

## Data by Area



## Third-Party Opinion



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

**Dr. Kazuhiko Takano**

### 1. Recent changes in the business environment

Over the past year or two, the business environment has changed dramatically. First is the demand for action on the environment and human rights. At the 26th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in November 2021, we called on member nations to take ambitious measures. In accordance with the UN Guiding Principles on Business and Human Rights, in October 2020 Japan formulated the Action Plan on Business and Human Rights, through which it strongly demands efforts related to respecting human rights. Furthermore, in Japan, sustainable investment is expanding rapidly, and investment balances reached approximately 514 trillion yen\* as of the end of March 2021. From the perspective of both complying with international standards and improving corporate value, there is a view that initiatives for the environment and human rights have become one of the most important management issues.

Second is the new demands related to corporate governance. In the revised Corporate Governance Code announced in June 2021, new additions were made regarding the functions of the board of directors, ensuring diversity among core human resources, and addressing sustainability issues.

In this opinion, I would like to examine this report by focusing on whether it is able to present a persuasive value creation process in addition to responding to these demands.

### 2. Commendable points of the NGK Report 2022

The NGK Group Vision: Road to 2050, formulated in April 2021, uses backcasting from the future society of 2050 and defines the social issues to which the NGK Group will contribute as carbon neutrality and a digital society. This constitutes the medium- and long-term vision for the NGK Group.

In particular, for the NGK Group, which accounts for about 40% of sales of ceramics for purifying automobile exhaust gas, how to transform its business structure in response to the shift to EVs in the automobile industry is an important management issue. The NGK Group is envisioning a third foundational period centered on its unique ceramic technologies. The content of the report is persuasive, as it presents a roadmap for value creation while concentrating research and development costs. Specifically, with regard to the realization of carbon neutrality, they are developing businesses involving storage batteries such as NAS batteries and zinc rechargeable batteries, and sub-nano ceramic membranes that can separate CO<sub>2</sub> at the molecular level. For a digital society, they site businesses such as ultra-compact, ultra-thin lithium-ion rechargeable battery and high-performance wafers for high-speed, large-capacity communications.

The foundation to supports the realization of this value creation story is summarized from an ESG perspective. In particular, this year's

content on human rights is remarkable. Since the disclosure of the NGK Group Human Rights Policy in April 2021, it is apparent that the NGK Group is promoting human rights due diligence for domestic and overseas group companies. Furthermore, details on governance are a much more complete than before. The ratio of outside directors on the board of directors is one-third, and the company is also recommending the appointment of women and foreign directors. The company also frequently holds "Conference of Outside Directors and Outside Audit & Supervisory Board Members," where outside officers exchange opinions, and the "Hearing convened by Audit & Supervisory Board Members and Outside Directors," in which Audit & Supervisory Board Members and outside directors hear information from relevant parties within the company. These efforts demonstrate the company's efforts to tap outside expertise. The company's level of corporate governance is outstanding compared to other advanced companies.

Overall, this year's report gives a strong impression of the feasibility of the medium- to long-term vision.

### 3. Expectations of further developments

For further development, I would like to raise the following issues. First, the company should further enhance efforts to promote respect for human rights. With the establishment of NGK Group's Supply-Chain CSR Guideline in 2010, we can see that efforts to respect human rights in the supply chain are progressing steadily, including visits to important suppliers and the use of fact-finding surveys. In the future, I hope that the company will conduct regular social audits not only for important suppliers but also for the entire supply chain and value chain, including indirect suppliers of raw materials overseas. This includes disclosing details of how cases of non-conformance cases are being handled.

Secondly, the company should enhance information related to corporate governance. This report carefully describes the expertise of the directors, but I think it would be even better to extracting risks that may materialize in the future based on the company's value creation story and then link the expertise of the directors to those risks. This will lead to a sense of security that the board of directors can deal with risks that may arise during new business development.

### 4. Encouragement

It is no exaggeration to say that industry is entering a paradigm shift and faces issues such as carbon neutrality and DX. President Kobayashi said, "For the NGK Group, this is a tailwind for growth." This is likely due to the superiority of the NGK Group, which has established its own ceramic technology. I would like to express my respect for the fact that the entire company is working together to proactively pursue reforms. I hope that the NGK Group will continue to develop further in line with its new medium- and long-term vision.

\*Source: JSIF "Sustainable Investment Survey in Japan 2021"

External Evaluation

In November 2021, we were listed to the Dow Jones Sustainability Asia Pacific Index, one of the leading ESG investment indexes on the Dow Jones Sustainability Indices for the sixth consecutive year.

In June 2022, we were selected to the FTSE4Good Index Series\*1, which consists of companies that meet the ESG evaluation criteria set by FTSE Russell.

We have also been selected for the FTSE Blossom Japan Index\*2, the MSCI Japan ESG Select Leaders Index, and the MSCI Japan Empowering Women Index (WIN), which are managed by the Government Pension Investment Fund (GPIF).

We have also obtained various domestic certifications, such as the 2022 Certified Health and Productivity Management Organization (White 500) jointly promoted by the Ministry of Economy, Trade and Industry and Nippon Kenko Kaigi.

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



2022 CONSTITUENT MSCI JAPAN ESG SELECT LEADERS INDEX

2022 CONSTITUENT MSCI JAPAN EMPOWERING WOMEN INDEX (WIN)



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\*1: Click here for details on the FTSE4Good Index Series:  
<https://www.ftserussell.com/products/indices/ftse4good>

\*2: Click here for details on the FTSE Blossom Japan Index:  
<https://www.ftserussell.com/products/indices/blossom-japan>



## **NGK INSULATORS, LTD.**

NGK Group Integrated Report  
**NGK Report 2022**

■ For more information:  
2-56, Suda-cho, Mizuho, Nagoya 467-8530, Japan  
NGK Insulators, Ltd.  
ESG Management Department  
E-mail: [pr-office@ngk.co.jp](mailto:pr-office@ngk.co.jp)

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