



# NGK INSULATORS

Integrated report  
NGK REPORT 2023



# Surprising Ceramics.

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

## CONTENTS

### Vision Story

- 03 NGK Group Philosophy and NGK Group Vision
- 05 Image of the Future Society 2050 and New Value to be Provided by NGK
- 07 Transformations and Challenges
- 09 Sustainable Growth and Trajectory of Our Business Structure Conversion
- 11 Strengths and Evolution
- 13 At a Glance
- 15 Financial and Non-Financial Highlights

### Corporate Strategy

- 17 Message from the President
- 23 Value Creation Process
- 25 Materiality

### Strategic Foundation

- 29 Internal Roundtable: Research & Development and Commercialization
- 35 Digital Transformation (DX)

### Business Strategies

- 37 Financial Message
- 41 Segment-Specific Strategies
  - 41 Environment Business
  - 43 Digital Society Business
  - 45 Energy & Industry Business

### ESG Strategies

- 47 Special Discussion: A Deeper Look at NGK Group's ESG Management
- 51 ESG Management
- 53 Environmental Materiality
  - 53 Initiatives for Climate Change
  - 59 Promotion of Resource Recycling
  - 60 Prevention of Environmental Pollution
  - 61 Conservation and Restoration of Biodiversity
- 62 Social Materiality
  - 62 Pursuit of Quality and Product Safety
  - 64 Contribution to Digital Social Infrastructure
  - 65 Enhancing Value of Human Resources
  - 69 Respecting Human Rights
  - 71 Promotion of Sustainable Procurement

### Governance

- 73 A Talk with Our Outside Directors
- 77 Compliance
- 79 Risk Management
- 80 Information Security
- 81 Corporate Governance
- 91 Directors, Audit & Supervisory Board Members, and Executive Officers

### Corporate Data

- 93 11-Year Key Financial and Non-Financial Data
- 95 Corporate Outline/Stock Information/External Evaluation

## Editorial Policy

### About the NGK Group Vision: Road to 2050

At a time when the world is entering a period of great change, we formulated the NGK Group Vision: Road to 2050 in April 2021 in order to become a corporate group that creates value for today's society as well for the society of the future. The NGK Group Vision envisions what the future society may look like in 2050 and establishes the social issues that we will focus on, which are carbon neutrality (CN) and the achievement of a digital society (DS). For CN and DS, we will work to expand the fields in which our products are actively utilized by further refining the unique ceramic technologies that we have accumulated so far. To that end, we have established the Five Transformations to indicate "what we must do" in the future in order to achieve self-transformation.

### Purpose and Positioning of NGK Report 2023

The NGK Group positions the NGK Report 2023 as an important communication tool used to provide corporate information to our stakeholders, including shareholders and investors.

This report is composed of six sections and based on the concept of Challenges and Transformations for communicating the probability of achieving the NGK Group Vision: Road to 2050.

- **Vision Story:** Explains what we are aiming for and why we are certain we can achieve our goals
- **Corporate Strategy:** Covers the challenges and transformations for achieving our Vision
- **Strategic Foundation:** Provides information about the front lines of self-transformation
- **Business Strategies:** Provides information about our financial strategies and basic strategies/individual strategies for business
- **ESG Strategy:** Provides information about how we are deepening ESG management and our response to Materiality
- **Governance:** Provides information about how we ensure both management transparency and the legality of our business activities



During the creation of the NGK Report, we referenced the Integrated Reporting Framework by the International Integrated Reporting Council (IIRC) recommended by IFRS Foundation 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 2023.

**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, 2022 to March 31, 2023  
(some information not pertaining to the current fiscal year is also included)

#### Positioning of Corporate Media



#### About Forward-Looking Statements

Earnings forecasts and other forward-looking statements indicated in this report are based on currently 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 various factors.

We established the NGK Group Vision, which describes the company that we want to be, in order to realize the NGK Group Philosophy.

Since its founding, the NGK Group has carried on the spirit “NGK products and technologies must create new value and contribute to the quality of life” as expressed by the NGK Group Philosophy. In 2019, which marked the 100th anniversary of our Company, we revised how our philosophy was organized and established the NGK Group Philosophy.

## 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.



# Vision

The NGK Group Vision: Road to 2050 clarifies our ideal vision, which is the company that we want to be in 2050, and outlines what we must do to achieve this vision in order to realize our mission of “Enriching Human Life by Adding New Value to Society” as expressed in the NGK Group Philosophy.



NGK Group Vision:

## Road to 2050

2050

What we want to be

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

What we must do

Convert our business structure through 5 Transformations

NGK Group Corporate Business Principles  
NGK Group Code of Conduct



Firm compliance with NGK Group  
Basic Guidelines for Compliance Activities

## Vision Story

Image of the Future Society 2050 and New Value to be Provided by the NGK Group  
—How we perceive changes in society—

The NGK Group will solve more social issues using its unique ceramic technologies.

## Envisioned Society of 2050

The type of society that we will provide value to

For the envisioned society of 2050, it is assumed that actions to protect the global environment will be widely accepted along with the concept that companies should act in an ethical and just manner, and that renewable energy will be the key source of electricity and other forms of energy. With the advancement of AI, people's life as well as industries that support society will experience an innovative level of efficiency with people and things connected more seamlessly than they are today. Envisioning this type of society in 2050, we thoroughly discussed business areas that would provide the biggest opportunities for the NGK Group. As a result, we decided that we will contribute to the two areas of carbon neutrality (CN) and digital society (DS).

## Value Creation in 2050

The types of values that we will provide to society

In order to achieve carbon neutrality (CN), a state in which the natural environment and humans can coexist, and a digital society (DS), in which people can live safely, conveniently, comfortably, and healthily, we will further refine our unique ceramic technologies that we have accumulated for over more than 100 years and contribute to solving social issues in the future by providing technologies that were difficult to provide in the past from a technical standpoint. The NGK Group already possesses several promising new products. We will create new products and services in the future to provide new value.

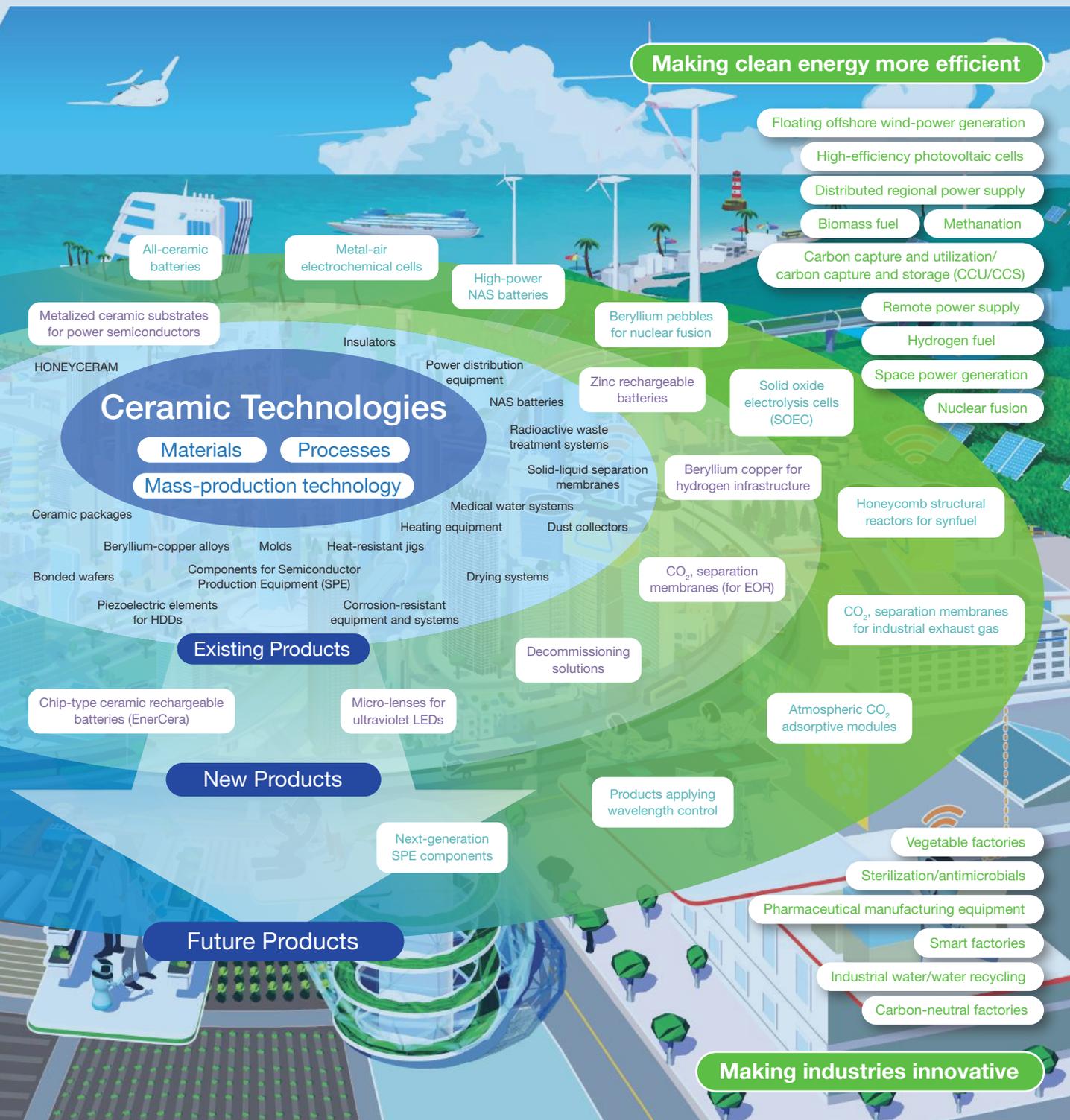
# DS

## Digital Society



# CN

## Carbon Neutrality



Challenges and Transformations  
—Why and how we will change—

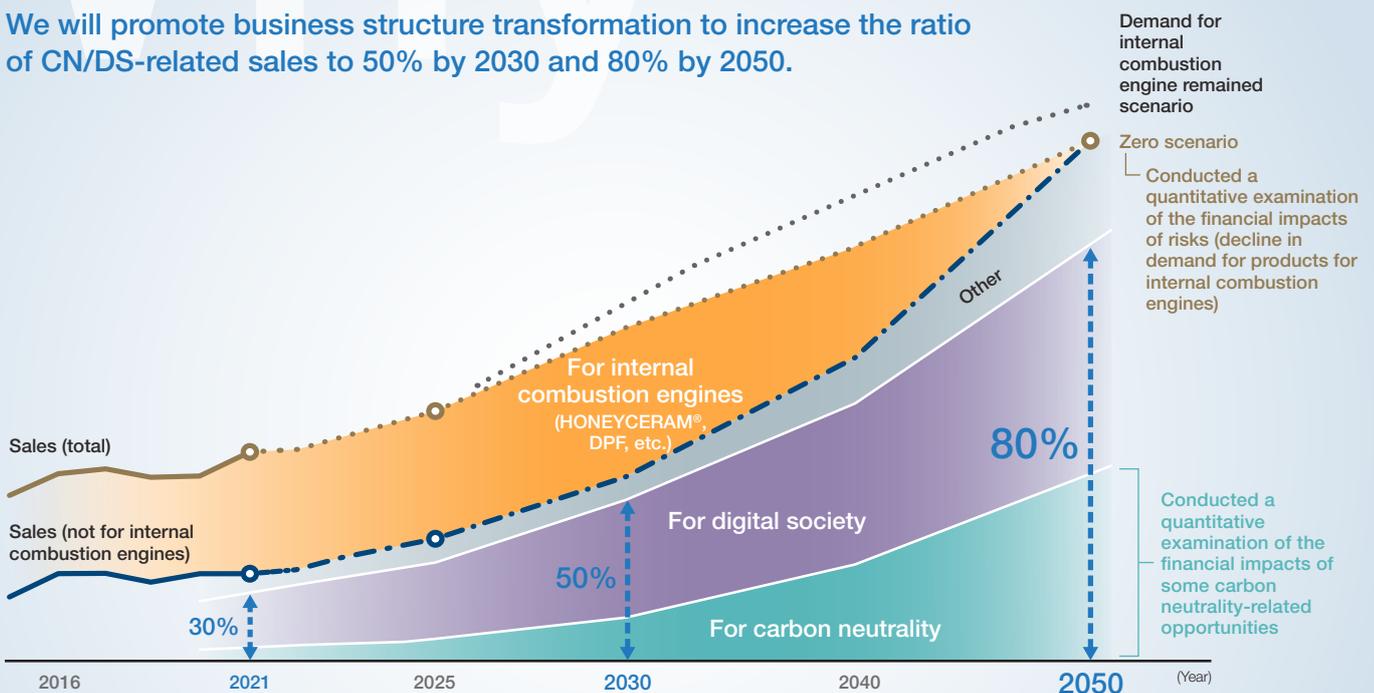
In order to respond to rapid changes in the business environment, we are taking on the challenge of changing our business structure.

Recognition of the External Environment —  
Sense of Urgency to Shift to Electric Vehicles

The environment surrounding the NGK Group is rapidly changing as environmental issues are becoming more serious on a global scale, geopolitical risks are increasing, digitalization progresses, awareness of ESG issues rises, and values and needs diversify. In particular, the automotive industry is undergoing a once-in-a-century transformation which includes the shift to electric vehicles. For the NGK Group, which generates approximately 60% of its sales from products for internal combustion engines such as catalytic converter-related products (HONEYCERAM®, DPF, etc.) that purify automotive exhaust gas, the global trend toward EVs is a matter to be addressed with a sense of urgency. Despite projections for growth in products for semiconductor manufacturing equipment, ensuring sustainable growth for the NGK Group will require that we develop businesses related to CN and DS that will become the next pillars of growth for the Group. We will strengthen this initiative, what we call our Third Foundation, and move forward with the transformation of our business structure, with the ratio of CN/DS-related sales serving as a milestone.

Business Structure Transformation Scenario

We will promote business structure transformation to increase the ratio of CN/DS-related sales to 50% by 2030 and 80% by 2050.



# How

## The Challenge of Self-transformation — The 5 Transformations

In order to respond to rapid changes in the business environment, the NGK Group is moving toward self-transformation by creating value through its own ideas and technologies as well as taking on the challenge of co-creating value through collaboration with other companies in CN/DS-related fields.

In order to achieve our vision, what we want to be in 2050, what we must do is to transform our business structure through the Five Transformations. We will make ESG the core of our management, enhance our earning power, create a cycle for growth, and promote R&D as well as product development. We will also promote digital transformation—the propulsion for the whole transformation. Through these efforts, we will take on the challenge of creating new value in CN/DS-related fields.

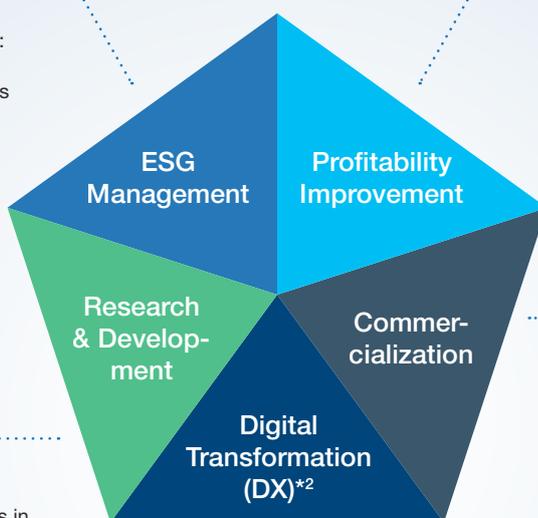
### 5 Transformations

#### ESG as a foundation of management

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

#### Achievement of 'New Value 1000'

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



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

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

#### Reinforcement of societal implementation of our products

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

#### Propulsion for the whole transformation

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

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

\*<sup>2</sup> DX: Digital Transformation Transform business models and corporate structure with digital technology

\*<sup>3</sup> NGK ROIC (see page 38)

## Vision Story

Sustainable Growth and Trajectory of Our Business Structure Conversion  
—Foundation for Achieving Our Vision 1—

1919

For more than 100 years,  
we have transformed our business structure  
by promoting globalization and diversification.

Foundation for Achieving Our Vision:  
NGK Group History, through which We Have Transformed Our Business Structure

### A Corporate Spirit Dedicated to Serving Society

When electric power first began to spread in Japan in the Meiji period, insulators that could withstand high voltages were imported. At the time, Japan relied on imports for high-voltage insulators. “We do this to serve our country, and not for our own profit and provide Japan with its own, domestically manufactured insulators.” Those were the words of Kazuchika Okura, the founding president of NGK. With this sense of mission, he began studying a special high-voltage insulator with a piece of an American-made insulator, and realized special high-voltage insulator production in Japan for supporting the modernization of society. This led to the establishment of NGK, which developed high-voltage, high-strength insulators in response to the growing demand for electric power accompanying the development of people’s lifestyles and industries.

Our founding spirit, which is the desire to contribute to people’s lives and the development of industry, continues to be the cornerstone of our corporate philosophy.



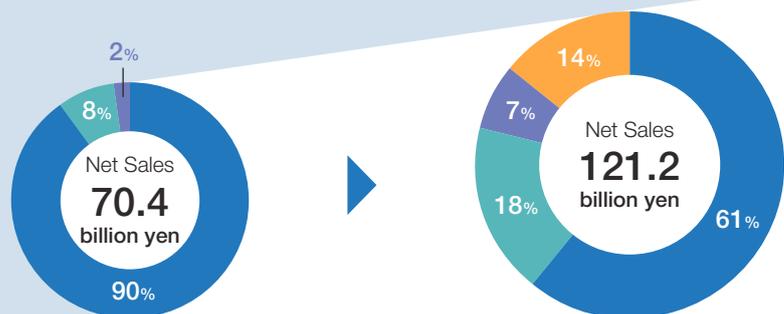
### The NGK Group Has Repeatedly Transformed Its Business Structure

In the 1960s, NGK became the world’s number one manufacturer of insulators and established its first overseas sales company in the U.S. In the 1970s, we established Locke Insulators, Inc. as a joint venture with the American company, General Electric and began local production in the U.S. In addition, we also expanded our production bases in Europe to support global demand for electricity. In 1976, in response to the tightening of automobile emission regulations as a measure against air pollution, which was becoming more serious at that time, we developed HONEYCERAM®, a ceramic substrate for use in catalytic converters, which are used for purifying automobile exhaust, that could be installed directly under an engine, and expanded our business to the automotive parts industry around the world. In the 1990s, NGK, which possesses various ceramic material technologies, entered the semiconductor manufacturing equipment field as the Internet-related market boomed. In 2002, the Company acquired the management rights of FM Industries, a U.S. based manufacturer of modules for semiconductor manufacturing equipment, shifting from being a parts

## NGK Group Business Performance

- Energy Infrastructure Business
- Ceramic Products Business
- Electronics Business
- Process Technology Business
- Materials Business  
Business transferred to another company in 2003
- The Engineering Business  
Merged the Environmental Equipment Business with the water environment-related business unit of Fuji Electric Co., Ltd. to establish METAWATER Co., Ltd.

Notes: The consolidated sales figures are based on the previous segmentation.  
: Transition to new segment classification in FY2022 (P.13)



FY1960

FY1980

Business diversification

1919

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

1976

Began manufacturing and sales of HONEYCERAM, a ceramic substrate for automotive catalytic converters.

2002

Acquired the management rights of FM Industries, a U.S. based manufacturer of modules for semiconductor manufacturing equipment.

1965

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

1996

Began mass production of ceramics for semiconductor manufacturing equipment.

2012

FM Industries acquired semiconductor manufacturing equipment-related business from a U.S. industrial gas manufacturer.

## Taken on Challenges and to Resolve Social Issues

manufacturer to a general module manufacturer. FM Industries has positioned itself as an important chamber component manufacturer for semiconductor manufacturing equipment manufacturers in the U.S. and has been growing its business performance significantly after acquiring LJ Engineering & Manufacturing, Inc. in 2010 and the Thermal Spraying Division of Praxair Surface Technologies, Inc. in 2012, which provides thermal sprays for semiconductor products.

With our unique technological capabilities accumulated through the manufacture of high-quality, highly reliable insulators at the core, in addition to the electric power, automotive, and semiconductor manufacturing equipment industries, we have created products that help solve social issues for a wide range of industries, including the chemical, medical, food, and nuclear power industries, and have actively worked to diversify and globalize our businesses. Repeatedly taking on challenges and repeatedly transforming its business structure in response to business condition that change with the times have shaped the NGK Group into what it is today.

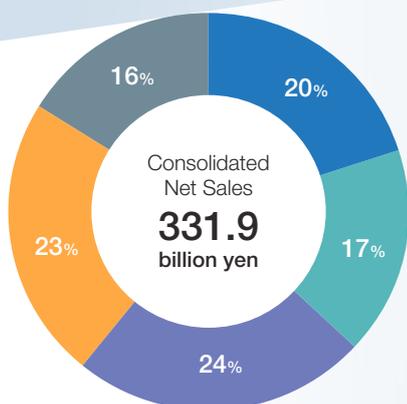
### The Key to the Growth That We Have Experienced Thus Far

#### Uniform Quality Worldwide (Uniformity)

The quality improvement efforts that have been passed down from generation to generation since 1921, when we compared our insulators with American manufacturers and found that the quality of our insulators varied. By expanding this initiative to our production bases around the world and enabling us to provide high-quality products backed by our advanced technological capabilities, we have achieved uniform quality worldwide (uniformity).

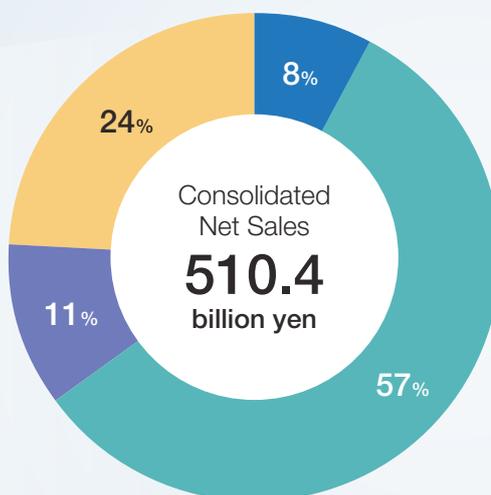
#### Diversification of Businesses

By developing our unique ceramic technologies to a level that makes it difficult for other companies to imitate what we do, we have created something that has never existed in the world before and have achieved diversification of our business.



FY2000

Businesses experience close to equal sales



FY2021

## Vision Story

### Strengths and Evolution — Foundation for Achieving Our Vision 2—

Our greatest strength is our unique ceramic technologies, which no other company can match.

### Foundation for Achieving Our Vision: Our Unique Ceramic Technologies—Tools for Creating New Value

#### Materials Technologies

These technologies are used to create ceramics with dramatically superior properties by manipulating materials in a transformational manner based on a thorough understanding of the mechanical, thermal, electrical, and chemical properties of ceramics.

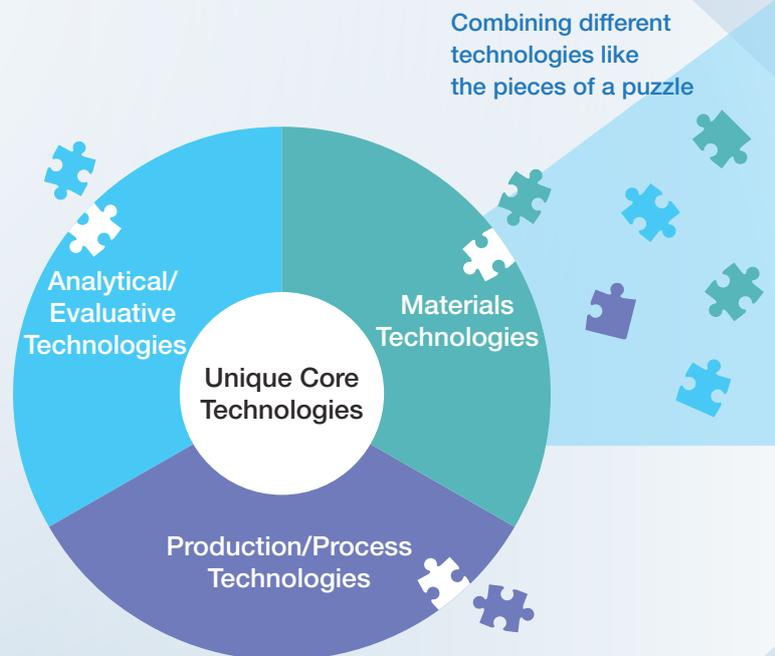
#### Production/Process Technologies

Many innovative and highly competitive products are made using manufacturing equipment developed by the NGK Group.

These technologies are used to create a variety of products by combining molding technologies, such as casting, extrusion molding, and tape casting, as well as firing and processing technologies.

#### Analytical/Evaluative Technologies

These technologies are used to produce high-quality products through the use of advanced computer simulation technology that enables shorter development lead times and inspection technology that does not overlook even the slightest defects.



### Sources of Our Strength



#### A corporate spirit rooted in a commitment to serving society

Kazuchika Okura, the founding president of the NGK Group, said, “We do this to serve our country, and not for our own profit and provide Japan with its own, domestically manufactured insulators.” That intention, which led to the decision to start domestic production of insulators, is still alive and well today in the NGK Group Philosophy of “Enriching Human Life by Adding New Value to Society.” This corporate spirit has led to the birth of many products in the world.



#### Over 100 years of accumulated Materials technologies and production technologies

Since our founding, we have accumulated a variety of technologies with the stance of thoroughly bringing out the potential of a single technology. That has led to the creation of our unique ceramic technologies (indicates technologies that combine the core technologies such as Materials Technologies, Production/Process Technologies, and Analytical/Evaluative Technologies, like puzzle pieces to create products).



“Unique ceramic technologies” describes technologies that combine the core technologies unique to the NGK Group, such as Materials Technologies, Production/Process Technologies, and Analytical/Evaluative Technologies, like puzzle pieces to create products. Our unique core technologies have been accumulated since we started producing insulators 100 years ago. By combining these various technologies, we have created new products that have never existed in the world, diversified our businesses, and contributed to the resolution of different social issues. Our biggest competitive advantage is our ceramic technologies unique to the NGK Group which no other company can match.

### The Key to Our Future Growth

#### Value Created Through Our Unique Ceramic Technologies

We will continue to support the stable supply of electricity around the world, reduce environmental impact, and contribute to a smart society by providing products and services that utilize our unique ceramic technologies, and take on the challenge of creating new value for the development of a more comfortable society.

Value for customers	Stable supply of products, productivity enhancement
Value for the environment	Contribute to reducing environmental impact
Value for society	Provide solutions to various social issues



#### Co-creation with customers, suppliers, and research institutes

Through collaborative creation with customers, suppliers, and research institutes, we are creating a variety of new values, including the value created by solving problems together with customers, the value of realizing the quality improvement and stable supply of products, and the value that leads to innovation such as the development of new technologies and products.



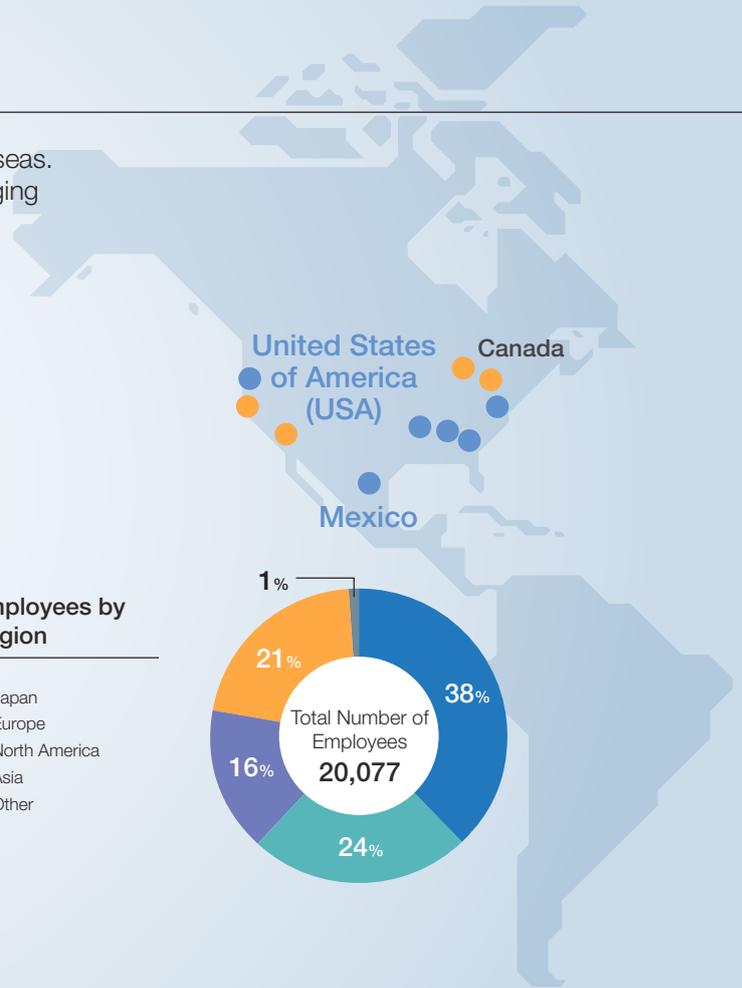
#### Human resources dedicated to taking on challenges with persistence

Human resources who are committed to taking on challenges many times without giving up, are particular about customer needs, are particular about products that only the NGK Group can produce, and are particular about differentiating technologies. These dedicated human resources are shaping the future of the NGK Group.

At a Glance

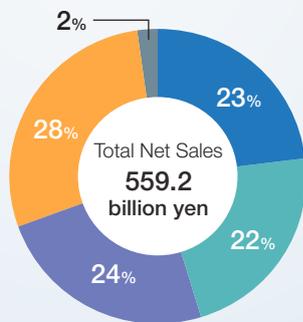
## NGK Group Global Network

More than 70% of NGK Group's net sales are from overseas. We will contribute to society around the world by leveraging our strengths of diversification and uniform quality.



### Sales by Region

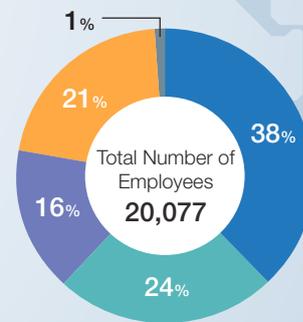
- Japan
- Europe
- North America
- Asia
- Other



(as of March 31, 2023)

### Employees by Region

- Japan
- Europe
- North America
- Asia
- Other

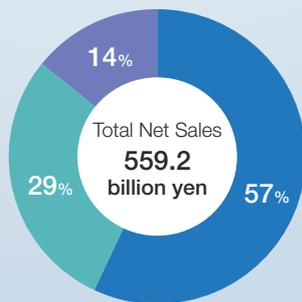


## NGK Group Businesses

Based on its CN/DS-related business domains, the NGK Group will develop its Environment Business, Digital Society Business, and Energy & Industry Business to improve its enterprise value.

### Sales by Business Segment

- Environment Business
- Digital Society Business
- Energy & Industry Business



### Breakdown of Operating Income

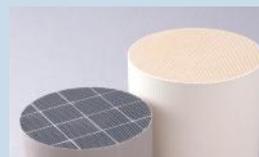
**Total operating income**  
66.8 billion yen (83.5 billion yen)

Environment Business	50.7 billion yen (65.1 billion yen)
Digital Society Business	17.6 billion yen (19.9 billion yen)
Energy & Industry Business	(1.5) billion yen ((1.4) billion yen)

Figures in parentheses are FY2021 results.  
(as of March 31, 2023)

### Environment Business Group

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.



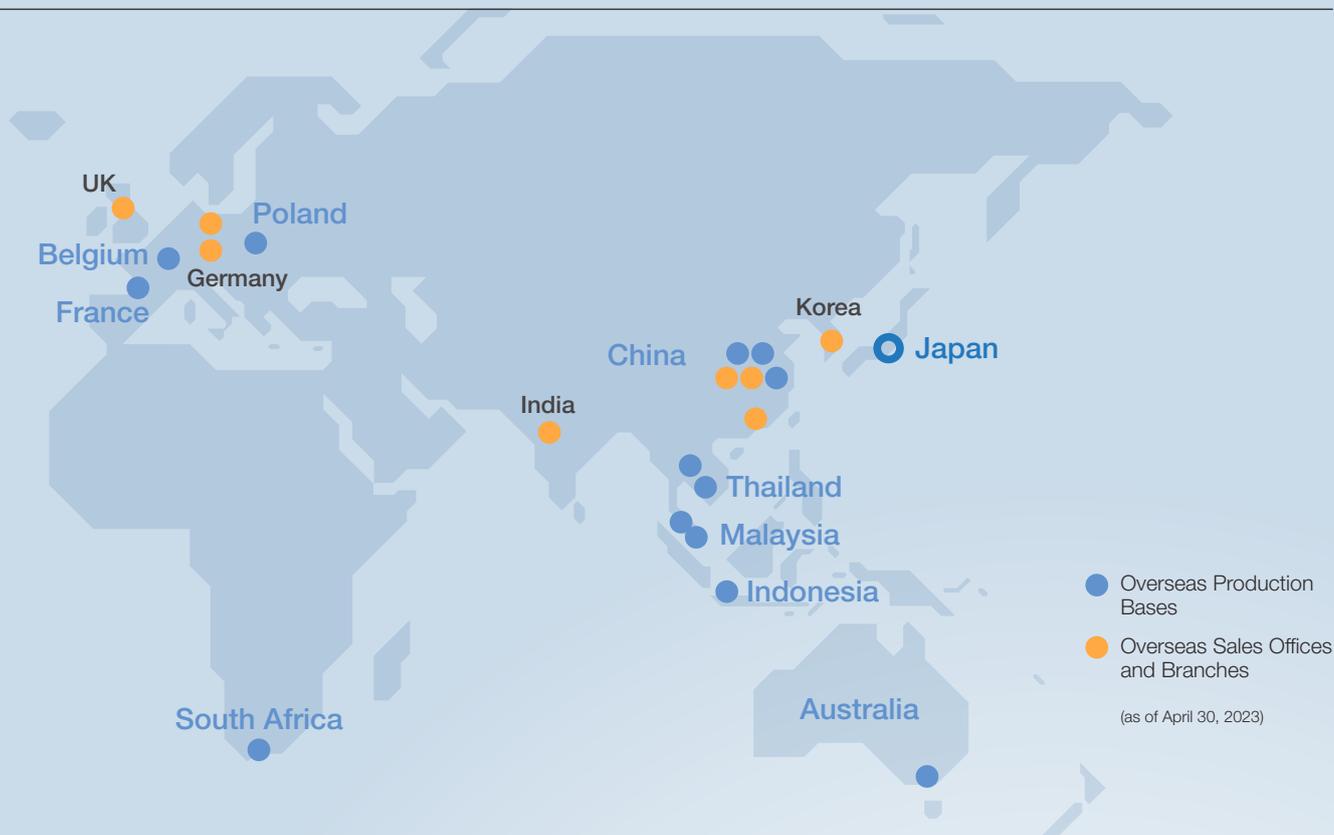
#### PM filters (DPFs, GPFs)

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.



### Digital Society Business Group

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.



**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.



**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.

### Energy & Industry Business Group

Starting from April 2022, 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.



**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.



**Ceramic membrane filter Cefilt**

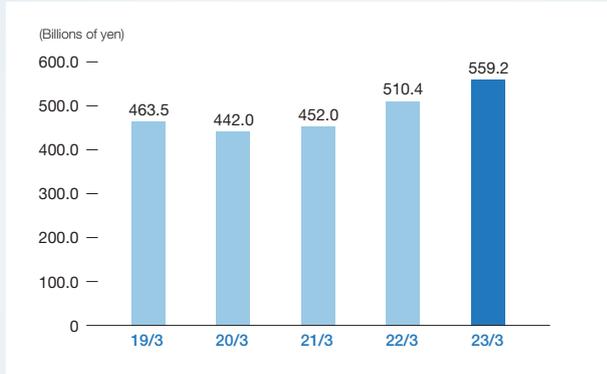
Uses fine ceramics (long-life filter) with excellent heat and chemical resistance. Boasts a multi-layered structure with good backwash regeneration. Also achieves high separation performance thanks to well-designed pore distribution.

Financial and Non-Financial Highlights

Financial Highlights

Net Sales

**559.2** billion yen

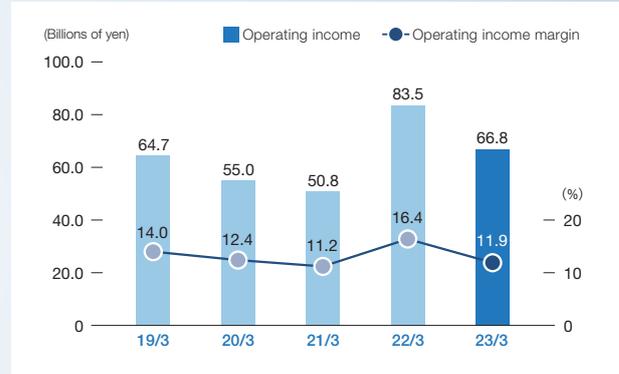


Operating Income

**66.8** billion yen

Operating Income Margin

**11.9%**

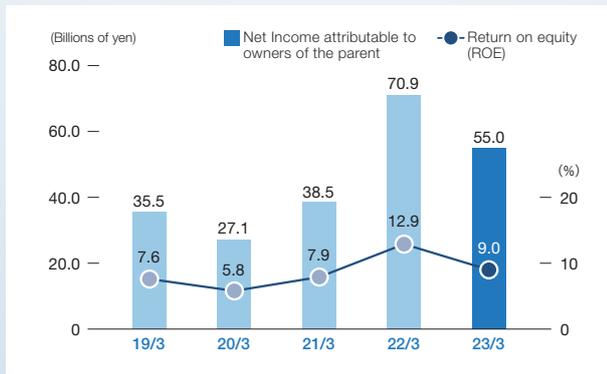


Net Income Attributable to Owners of the Parent

**55.0** billion yen

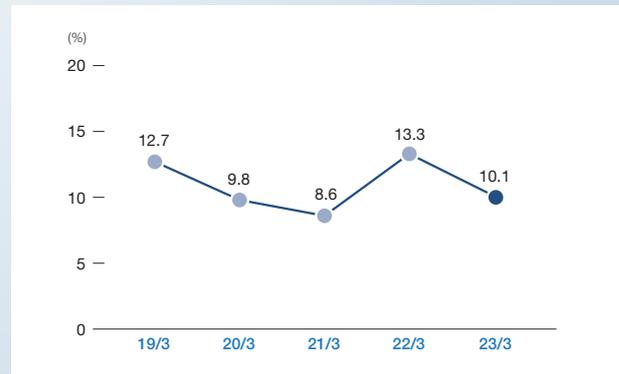
Return on Equity (ROE)

**9.0%**



NGK ROIC (return on invested capital)

**10.1%**

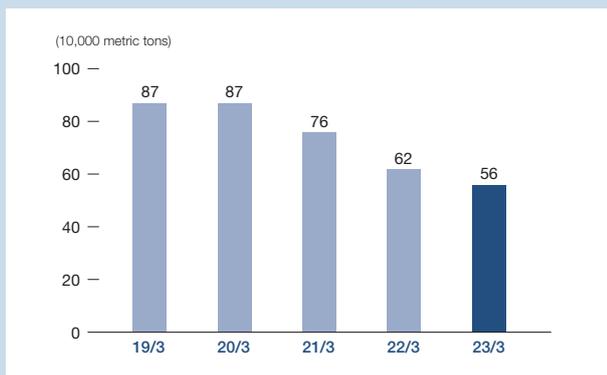


Non-Financial Highlights

GHG emissions

(Scope 1+2: Energy-origin CO<sub>2</sub>, all NGK Group production sites)

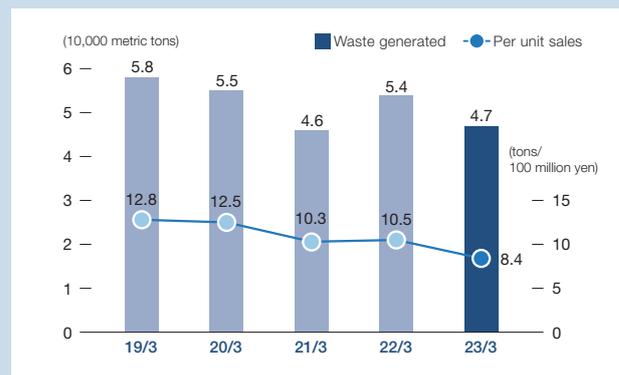
**560,000** metric tons



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

Waste Generated (all NGK Group production sites)

**47,000** metric tons



Note: Excludes non-production sites

**Total Assets**

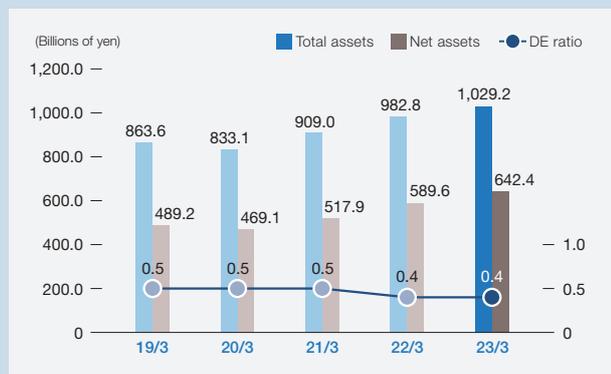
**1,029.2** billion yen

**Net Assets**

**642.4** billion yen

**DE Ratio**

**0.4**

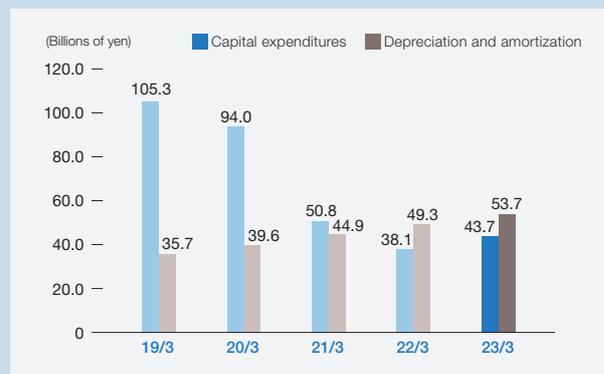


**Capital Expenditures**

**43.7** billion yen

**Depreciation and Amortization**

**53.7** billion yen

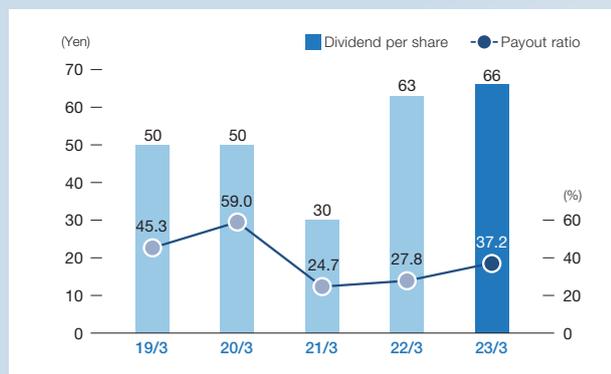


**Dividend per Share**

**66** yen

**Payout Ratio**

**37.2%**



**Net Cash Provided by Operating Activities**

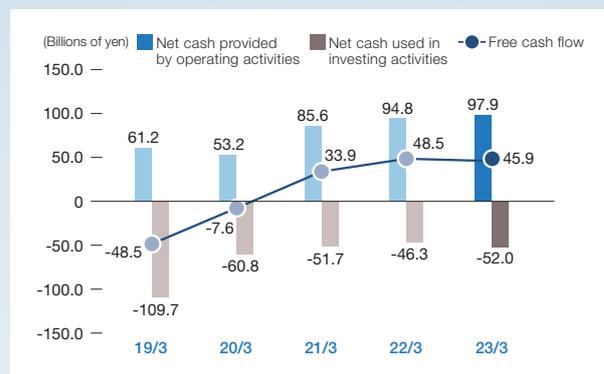
**97.9** billion yen

**Net Cash Used in Investing Activities**

**(52.0)** billion yen

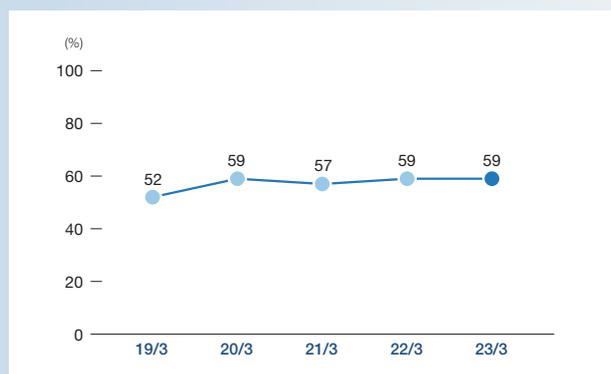
**Free Cash Flow**

**45.9** billion yen



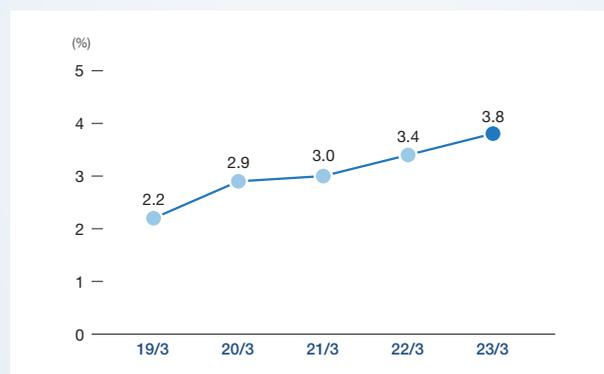
**Sales Ratio for Products and Services Contributing to Environmental Protection (NGK Group)**

**59%**



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

**3.8%**



Message from the President



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."

# As times change, we will continue to evolve toward the NGK Group Vision while persistently embracing challenge and transformation.

Uncertainty in international politics, the growing severity of global environmental issues... the external environment surrounding the NGK Group continues to change dramatically in recent years. Within this business landscape, we have taken steady steps forward guided by the NGK Group Vision: Road to 2050 launched in 2021. We will continue to make progress while always adapting to the changing times with the aim to become a sustainable company that is able to solve social issues through its unique ceramic technologies.

## The Uncertain Future of Changing Times

In 2022, uncertainty continued due to many factors, including higher energy prices driven up by the tense situation happening in Ukraine, the skyrocketing costs of raw materials caused by the weak Japanese yen, and the serious semiconductor shortage. This resulted in an operating income of 66.8 billion yen, down 22% from initial forecasts.

The automotive industry struggled to overcome the semiconductor shortage and was unable to respond to customer needs, which greatly influencing the NGK Group businesses. I can clearly see the tremendous impact any one thing has throughout our supply chains as each becomes broader and more closely interconnected, especially as products become more complex and businesses continue to globalize. We have not been through a global situation like this since the 1979 energy crisis, which makes the future of our times extremely difficult to anticipate.

To not only survive but thrive in these harsh and fiercely changing times, I recognize that a company must transform. When I assumed the role of President in April 2021, I strongly believed

that we cannot stop the changes and transformations my predecessor did his best to pioneer.

The NGK Group has always had an industrious corporate climate with the ability to make steady progress forwards when the path is clear. However, I feel that we struggle to leap into the unknown while trying to take steps on a new path forward.

I myself am not averse to change and adapt quickly thanks to my life living overseas since my childhood. Even after I joined the NGK Group, I spent a majority of my time at Group companies outside of Japan. I think my work away from the head office has given me a relatively objective view by allowing me to observe the NGK Group from the outside in. My goal has been to actively drive forward transformations right for the times while taking advantage of my experience abroad. I hope to share the trajectory that the NGK Group must take with the entire organization. Driven by this passion as President over the last two years, I have pushed forward a variety of different initiatives.

## Group Vision for 2050 and Five Transformations

I announced the NGK Group Vision: Road to 2050, as a medium- to long-term vision for 2050 in April 2021 right after assuming my role as President. We drafted this vision through an exhaustive debate about the specific direction that the NGK Group should take as a company based on the NGK Group Philosophy, which was put in place on our 100th anniversary in 2019.

The first step of this process was to imagine what we want the NGK Group to be by 2050. Next, we backcast the action necessary to realize this vision to define the initiatives necessary now as five transformations that act as priority issues for the NGK Group. These five transformations are the backbone that will support the entire Group in fiercely changing times. I also believe these are a signpost that guides what we must do now.

Previously, our employees often headed in different directions causing disjointed action when trying to start something new or to incite some kind of change. However, these five

transformations have become a key road map for everyone to always keep in mind, which has aligned action in a way that can drive forward solutions to our challenges. I feel we are gradually changing the corporate culture to one in which employees are more proactive and independent-minded when it comes to change. ESG management is core to corporate management and the first of these five transformations. Since the founding of the NGK Group, our purpose has been to resolve social issues through ceramic technologies. We have also integrated strategic growth within these efforts to address a broad range of social problems. I would like to once again review and reaffirm the work that the NGK Group has done thus far from securing and developing excellent human resources to strengthening corporate governance in an effort to connect these initiatives in a way which will strengthen our ESG management.

## Outcomes and Progress of the Five Transformations

Two years have passed since we established the NGK Group Vision. I feel that we have already seen positive outcomes in a variety of areas thanks to these five transformations.

As one example in research and development, the NGK Group has successfully developed various sub-nano ceramic membranes. These molecular sieve with a pore size less than a nanometer can separate a specific gas from a gas mixture or a specific liquid from a liquid mixture at a molecular level. We also expect these sub-nano ceramic membranes to contribute greatly to carbon neutrality for a variety of reasons, including CO<sub>2</sub> separation from emission gases.

Today, a demonstration field test of a CO<sub>2</sub> separation and recovery technology using DDR-type zeolite—one type of sub-nano ceramic membrane—is underway at a Texas oil field in the United States. This proof-of-concept test is a joint project between the Japan Oil, Gas and

Metals National Corporation and the JGC Japan Corporation. Although there are still many challenges to overcome, I hope the repetitive trial-and-error tests will lead to practical use in the near future.

Moreover, we can further expand the uses of sub-nano ceramic membranes by combining many different applications. In particular, the type of technological needs to realize carbon neutrality still remains unclear. That is why I believe this breakthrough product presents a tremendous business opportunity for the NGK Group.

Even after developing an amazing technology, our weakness has typically been the slow pace until reaching social implementation and commercialization of that technology. However, I feel our partnerships with other companies have dramatically shortened the time it takes from development to the launch of a business.

The driving force behind these efforts has been Corporate NV (New Value) Creation, which

The NGK Group has  
already seen some  
benefits come from its  
five transformations.



specializes in commercializing new technologies. We have striven to not only actively approach companies in Japan but also those in Europe. Even in regions where our technologies were relatively unknown before, we have seen an increase in inquiries asking whether the NGK Group can do this or that.

No matter how excellent a technology is, a company working alone becomes complacent and will face limitations in what can be done. Broad technological disclosure and the exploration of pathways to partnerships with other companies will surely expand the uses of each technology, and in turn more readily bring about breakthroughs. Our Group will continue to expand these connections to increase the number of partner companies worldwide that are confident the NGK Group can tackle even the most difficult requests related to ceramics. I also want the NGK Group to be competitive in the global market.

Our transformation to improve profitability faces obstacles, such as the changing external environment I described earlier and a sluggish economy, but the fiscal 2025 targets of 600 billion yen in net sales, 90 billion yen in operating income, and 60 billion yen in current net income set by the NGK Group Vision will not change. We are forecasting consistent income from the Environment Business as our most profitable business currently. The NGK Group will invest these earnings in sectors expected to show significant growth in the future, such as semiconductor and digital social sectors. I hope we can also ride this wave of growth by injecting

new ceramic technologies into the market.

At the same time, we need to rationalize plant equipment, improve productivity, and make other sufficient preparations to immediately capitalize on eventual market recovery. To do this, the digital transformation (DX) set as one of our transformations is essential. The Digital Transformation and Innovation Department launched in 2021 is playing a central role in driving forward the transformation of our engineering and supply chains, which has already proven quite effective. Especially in the research and development stage, we will advance material informatics (MI) to efficiently explore new materials through AI analyses of past data to leverage in product designs. The NGK Group possess a century of experiment data. An MI development approach capitalizing on a wealth of data that no other companies have not only aims to cut the research and development period to one-tenth of current levels but is already producing results. Eventually, our challenge will be to train AI with the expertise the NGK Group researchers have cultivated in material development.

The ESG Management Department launched in 2021 has even taken the lead to execute initiatives to further our ESG management. Over the last two years, I feel the ESG Management Department itself has grown a lot. Although I cannot say that the concepts of ESG have fully penetrated every aspect of business throughout the organization, I am confident we will continue our work in the future to make that happen.

## Toward Sustainable Development—Identification of Materiality

In April 2023, we identified several Materiality to further clarify the current direction of the NGK Group. Some of these issues do coincide with our five transformations, but I feel it is imperative that the NGK Group is able to fully communicate to our stakeholders what our aspirations are as well as what is important when engaging in these businesses, especially as we expand our business globally. In addition, the identification of Materiality will make it easy for employees to understand and accept why they are carrying out a specific business.

Out of numerous social issues, I believe fight against climate change is one that the NGK Group must tackle first. There is tremendous potential for us to take advantage of NGK Group technologies in products and services that will help reduce CO<sub>2</sub> emissions.

Any individual or company can cut their own emissions, but only a few companies can expand businesses that contribute to the direct reduction of CO<sub>2</sub>. Toward that end, first, I want to have the NGK Group broaden specific businesses in the pursuit of further emission reductions. In addition

the respect for human rights is the social issue I would like us to concentrate our efforts in particular. Japan is an island nation with a relatively low awareness of human rights, which could be because of the high ethnic identity. Worldwide though, many different people have a long history of fighting and spilling blood to protect human rights. Within this social landscape, I am highly aware of the importance of treating everyone equally and ensuring a life guaranteeing human rights.

When I first moved overseas as a child with my family for work, I was very shocked to have people throw racial slurs at me. This was my first real experience with discrimination. I feel strongly that Japan should emphasize the importance of respecting human rights more in the future.

Of course, the reality is that international politics and other such circumstances do influence and sway the vision for these values. Even with this said, I want to make sure to adhere to the universal values of democracy and equality. The NGK Group will always keep these values in mind while further identifying Materiality.

## To Become a Company Where People Are Proud to Work

The NGK Group Philosophy established in 2019 advocates that quality people embrace

challenges and teamwork as one value. This year we drafted the new NGK Group Human Capital



Management Policy. As one of our five transformations, ESG management advocates the NGK Group to secure and develop quality human resources. I recognize efforts to develop human capital in the future as one of our challenges.

Japan has a long history of the membership-type lifelong employment system. In recent years, some Japanese companies have adopted the job-type employment system, which is one of many changes in the thinking about employment. Regardless of the type of employment system though, it is vital to value employees, put in place educational opportunities to enhance skills, and build an environment for all to reach their full potential.

Especially in a modern society focused on digital and other technologies, this generation cannot fully leverage their skills unless they both gain experience and learn at least the minimum knowledge necessary. The society of Japan is said to lack educational investment in human resource development. I want to change that by sufficiently investing in our human capital.

Going beyond human resource development, the establishment of a workplace where everyone can actively participate is also important. I am always telling every NGK Group employee to

create a company where everyone can speak their mind without hesitation and colleagues take those ideas seriously. As a result, the atmosphere of the entire organization has changed over the last several years. I feel I am seeing much more constructive and positive ideas shared in and outside of meetings.

I am also constantly encouraging everyone to take on challenges without fear. As I mentioned in the beginning, the NGK Group has many very industrious people as employees. That is why I want all of us to step outside of conventional ideas to incite our transformations. By doing so, I hope everyone can feel excited about coming to work. There was a time in the past when I was young that I hated going into the office because it wasn't fun. I have thought incessantly about how to reduce even one person who has that feeling.

Transformation does come with adversity. An unthinkable disaster or problem could manifest tomorrow. I want our company to be one where everyone can enjoy working together to overcome such adversity. I would like to share this kind of approach with our Group companies around the world as well.

Above all else, I hope to realize a company where every NGK Group employee can work with a sense of pride. That is my goal.

## To Become a Company Trusted by Every Stakeholder

The NGK Group must earn the trust of society, shareholders, customers, suppliers, employees, and every other stakeholder in the future to exist as a company. "I can trust the NGK Group and a relationship with them would be beneficial." Without corporate management giving our stakeholders this level of confidence, the value of the enterprise can only fall. Moreover, I don't think such a corporate entity is a sustainable organization.

To reiterate the point, the mission of the NGK

Group is to resolve social issues through ceramic technologies. If we can spearhead the transformations necessary to accomplish this mission, I am confident that we have the power to evolve as a company regardless of the type of business we find ourselves in the future.

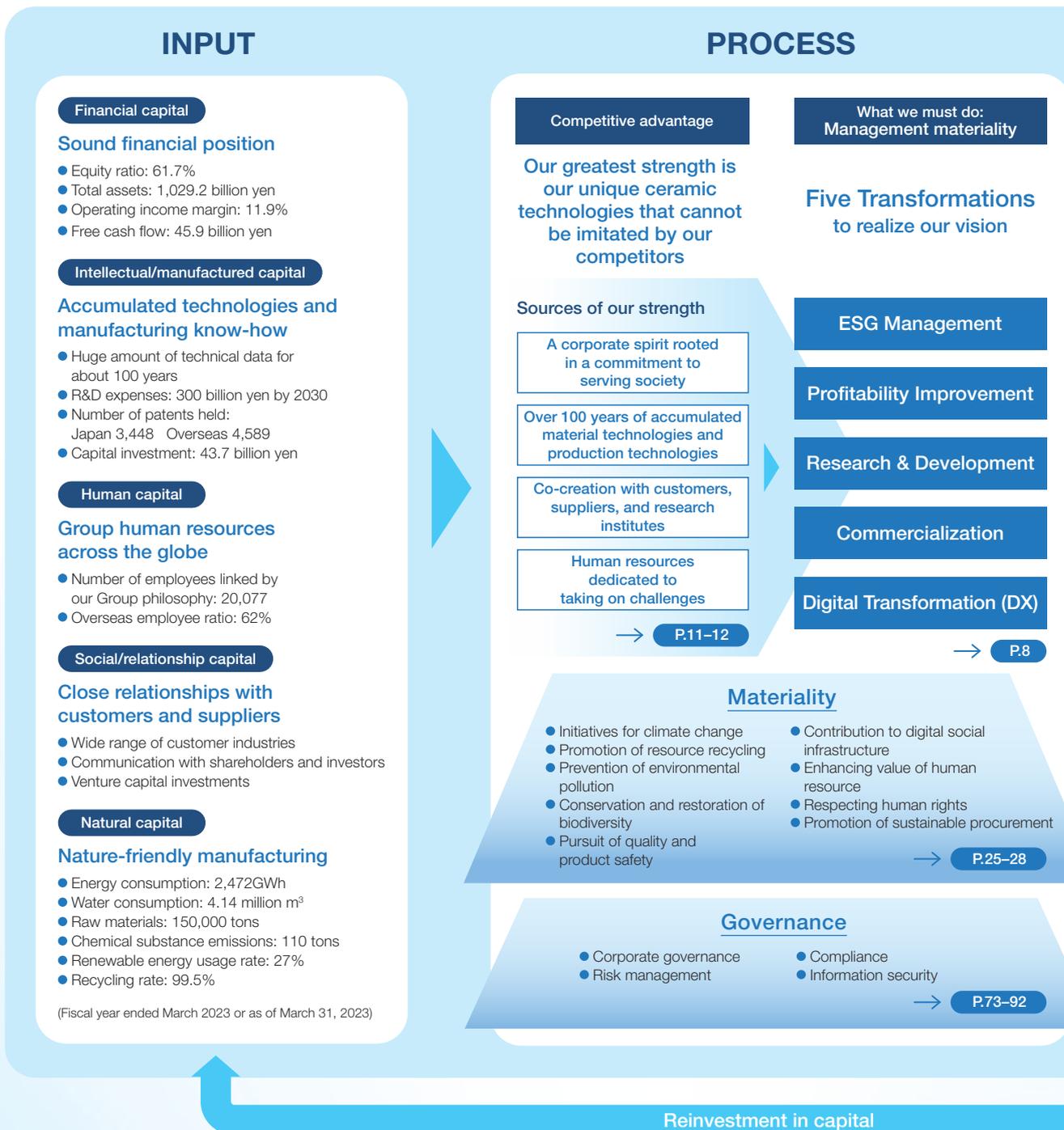
I hope all of our stakeholders will watch our future transformation and evolution. To everyone who shares this passion with me, I ask that you join our circle of stakeholders to help us all engage in better business.

Value Creation Process

**NGK Group Philosophy**

<p><b>Our Mission</b></p>	<p><b>Enriching Human Life by Adding New Value to Society.</b></p>	<p><b>Our Values</b></p>	<p>Quality of People</p> <p>Quality of Product</p> <p>Quality of Management</p>	<p>Embrace challenges and teamwork.</p> <p>Exceed expectations.</p> <p>Social trust is our foundation.</p>
---------------------------	--	--------------------------	---	--

<p><b>External environment and megatrends</b></p>	<p><b>External environment and societal issues</b></p> <ul style="list-style-type: none"> <li>● Respect for human rights</li> <li>● Increasing climate change risks</li> <li>● Increasing geopolitical risks</li> <li>● Conservation of biodiversity</li> <li>● Achieving a circular economy</li> <li>● Promoting diversity</li> </ul>	<p><b>Megatrends facing the NGK Group</b></p> <ul style="list-style-type: none"> <li>● Making mobility clean and safe</li> <li>● Making clean energy highly efficient</li> <li>● Making a smart society more pleasant</li> <li>● Making manufacturing sites innovative</li> </ul>
---	--	---



**Reinvestment in capital**

## NGK Group Vision: Road to 2050

→ P.4

What we want to be: A company to contribute to carbon neutrality and digital society with our unique ceramic technologies  
 What we must do: Convert our business structure through Five Transformations  
 FY2050 Target: 80% of sales from CN and DS products

FY2030 Targets: Net sales from newly launched businesses 100 billion yen  
 CN/DS sales ratio: 50%

→ P.29-34

## OUTPUT

Business performance for the fiscal year ended March 31, 2023

Net sales  
**559.2 billion yen**

Operating income  
**66.8 billion yen**

### Main products

#### Environment Business

- Ceramics for purifying automobile exhaust (Photo: left)
- NOx sensors (Photo: right)

→ P.41-42



#### Digital Society Business

- Ceramics for electronics and electric devices
- Ceramics for semiconductor manufacturing equipment (Photo: left)
- Metals and mold products (Photo: right)

→ P.43-44



#### Energy & Industry Business

- Insulators and power-related devices
- Energy storage systems (Photo: left)
- Industrial equipment and devices (Photo: right)

→ P.45-46



### 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

## OUTCOME

### Value Created by the NGK Group

- Realization of a carbon-neutral society
- Promotion of resource recycling and effective use of water resources
- Contribution to a safe and secure society through pollution prevention
- Conservation and restoration of biodiversity

### Value for the environment

Contribute to reducing environmental impact

### Value for society

Provide solutions to social issues

- Stable supply of safe and reliable products/services
- Advancement of digital technologies globally
- Active participation of personnel with diverse experiences and values in the workplace
- Creation of a society that is free from violation of the human rights of all people
- Promotion of procurement that takes human rights, the environment, and fair business practices into account

## Materiality

As a corporate entity that contributes to the future of energy, protection of the global environment, and development of industries based on its unique ceramic technologies, the NGK Group identifies Materiality in order to become a company that we want to be based on the NGK Group Philosophy of “Enriching Human Life by Adding New Value to Society.”

### > Materiality Identification Process

Based on the NGK Group Basic Sustainability Policy, the NGK Group identified its Materiality in April 2023. We have identified these as issues that are important to both our Group and the stakeholders and as social issues on which our Group should particularly place focus. By efficiently and effectively utilizing our limited management resources to address these material issues, our Group seeks to maximize value creation for both the Group and our stakeholders. We believe that doing so will lead to the realization of the NGK Group Vision.

#### Step 1

##### Listing of issues

With reference to evaluations by ESG evaluation bodies, international frameworks and guidelines such as the GRI Standards and the SDGs, and other resources, we created a list of environmental, social, and governance issues. Of these, we listed those environmental and social issues that have a significant relevance to our Group’s business, while excluding governance issues as items that should be addressed naturally as an organization.

#### Step 2

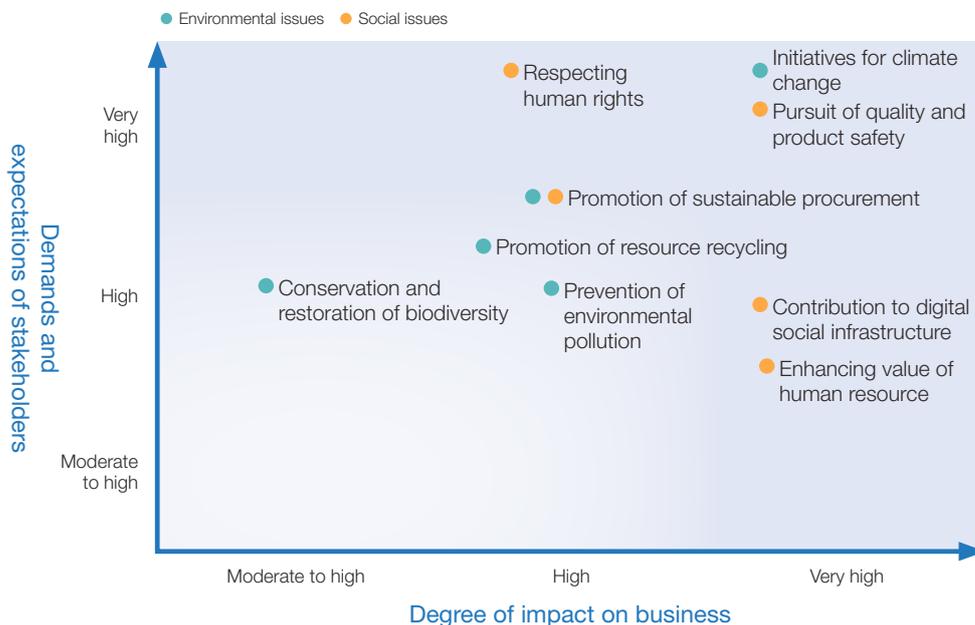
##### Evaluation of the importance of issues

We established a working group composed of representatives from different departments within the Company. The working group mapped the listed issues along two axes of “degree of impact on business” and “demands and expectations of stakeholders,” and then conducted evaluations of the issues. (Evaluation of the latter axis included evaluation by outside experts.) Based on the evaluation results, the ESG Management Committee held deliberations and identified candidates for Materiality. For these candidates, the working group organized the risks and opportunities posed to the NGK Group, particularly those considered to possibly have a significant impact on business, and reviewed our major initiatives.

#### Step 3

##### Confirmation of validity and identification of Materiality

For all of the Materiality candidates, the working group discussed what sort of value the NGK Group wishes to bring to society by addressing the issues. To check for omissions in the scope of consideration as well as consistency with company-wide targets, the working group then laid out the relationships between the issues and our Group Vision, and prepared a draft version of the Materiality items. Based on that draft, the items were then deliberated by the ESG Management Committee in terms of their validity, after which the Board of Directors held deliberations and issued a resolution.



## ➤ The Relationship between Materiality and the Five Transformations

In line with the NGK Group Vision, the NGK Group has positioned the social issues of transitioning to a carbon neutral society and a digital society as fields where business is expected to grow for the NGK Group. Materiality visualizes the sustainability factors (opportunities and risks) that are important in terms of strategy planning among the activities that were being addressed in promoting the Five Transformations. Therefore, Materiality initiatives are linked with the sustainable growth of the NGK Group as well as enhancement of enterprise value in line with the promotion of the Five Transformations.

Materiality issues	Five Transformations				
	ESG Management	Profitability Improvement	Commercialization	Research & Development	Digital Transformation (DX)
Initiatives for climate change	●	●	●	●	●
Promotion of resource recycling	●	●	●	●	●
Prevention of environmental pollution	●		●	●	
Conservation and restoration of biodiversity	●		●		
Pursuit of quality and product safety	●	●	●	●	●
Contribution to digital social infrastructure	●	●	●	●	●
Enhancing value of human resource	●	●	●	●	●
Respecting human rights	●				
Promotion of sustainable procurement	●				

## ➤ Basic Approach to the Five Transformations

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

## ➤ FY2025 Financial Targets

The NGK Group expects to see a significant improvement in free cash flow over the five-year period starting in FY2021 as a result of upfront investments starting in FY2016 while at the same time working to further improve profitability. In addition, we will invest the cash we generate in R&D and product development to provide products and services to solve social issues of transitioning to a carbon-neutral society and a digital society in order to take on the challenge of conducting business in new growth areas. We will also promote DX to accelerate the speed of business transformation. Through this type of business transformation, we aim to achieve our FY2025 financial targets.

	FY2022 Results	FY2025 Financial Targets
Net sales	559.2 billion yen	600.0 billion yen
Operating income	66.8 billion yen	90.0 billion yen
Net income	55.0 billion yen	60.0 billion yen
Capital and dividend policy	ROE 9 % Dividend Payout ratio 37.2 %	ROE 10 % Dividend Payout ratio 30 %
Earnings per share (EPS)	177.47 yen	200 yen

(Assuming an exchange rate of 100 yen to 1 USD and 120 yen to 1 euro)

➤ Materiality for Realizing the Company That We Want to Be

What we want to be	Materiality	The value we bring to society	Related SDGs
A company to contribute to carbon neutrality and digital society with our unique ceramic technologies	Initiatives for climate change	We will tackle carbon neutrality throughout the value chain and aim for net-zero CO <sub>2</sub> emissions in our business activities. By accelerating the development of carbon neutrality-related products through the use of data and digital technologies, and by developing and providing products and services with our unique ceramic technologies at the core, we will contribute to the realization of a carbon-neutral society by 2050.	 
	Promotion of resource recycling	By developing and providing resource-efficient products and services through means including the sustainable use of natural resources, the recycling of wastes, and the utilization of alternative materials, we will contribute to the effective use of resources and to the promotion of resource recycling. Through the development and provision of products and services accompanied by water stress assessments at production sites and by highly efficient water use in production processes, we will also contribute to the effective use of water resources.	     
	Prevention of environmental pollution	By developing and providing pollution prevention-related products and services using our unique ceramic technologies while enforcing proper management of chemicals and pollution prevention in our manufacturing processes, we will contribute to a safe and secure society.	   
	Conservation and restoration of biodiversity	With all employees maintaining a mindset of environmental conservation, we will contribute to the conservation and restoration of biodiversity through the development and provision of products that contribute to environmental protection while minimizing environmental impacts on the ecosystem in our value chain.	  
	Pursuit of quality and product safety	By pursuing trusted quality from the standpoint of our customers and by stably supplying safe and reliable products and services that exceed expectations, we will contribute to the creation of a better society.	  
	Contribution to digital social infrastructure	We will continue contributing to the advancement of digital technologies globally through the supply of products based on our unique ceramic technologies. We also fulfill our responsibilities as a member of a cultural and secure digital society by establishing strong information security.	 
	Enhancing value of human resource	We will add new value to society by developing an enriched and lively workplace environment where personnel with diverse experiences and values can play active roles, and each personnel autonomously embrace challenges and teamwork.	  
	Respecting human rights	We are committed to create a society that is free from violation of the human rights of all people impacted by our business activities by extending initiatives throughout our Company as well as our value chain to respect human rights.	     
	Promotion of sustainable procurement	Based on the three principles of "Open and Fair," "Partnership," and "Relationship with Society" in our basic procurement policy, we work with procurement partners that make up the supply chain to promote procurement that takes human rights, the environment, and fair business practices into account, thereby fulfilling our supply responsibilities and contributing to the happiness and sustainable development of society.	    

	Risks	Opportunities	Main initiatives
	<ul style="list-style-type: none"> <li>● Shrinking of internal combustion engine-related markets</li> <li>● Effects of natural disasters on operations</li> <li>● Geopolitical risks</li> <li>● Increase in costs due to greenhouse gas reduction and energy conversion</li> <li>● Damage to brand reputation</li> </ul>	<ul style="list-style-type: none"> <li>● Expansion of CN-related business opportunities</li> <li>● Reduction of costs</li> <li>● Enhancement of our brand reputation</li> </ul>	<ul style="list-style-type: none"> <li>• Global warming mitigation measures (Business processes)</li> <li>• Assessment and disclosure of emissions</li> <li>• The NGK Group's CN-related products and services</li> <li>• Risk assessment and countermeasures based on climate scenarios (Adaptation measures)</li> <li>• Utilization of sustainable financing</li> <li>• Cooperation with external organizations</li> </ul>
	<p>Resources</p> <ul style="list-style-type: none"> <li>● Depletion of resources; price inflation</li> <li>● Geopolitical risks</li> <li>● Delays in responses to resource conservation and resource reuse</li> </ul>	<p>Resources</p> <ul style="list-style-type: none"> <li>● Expansion of business opportunities related to resource recycling</li> <li>● Expansion of business opportunities associated with the depletion of rare metals, etc.</li> <li>● Utilization of ceramic raw materials</li> <li>● Reduction of costs</li> </ul>	<p>Resources</p> <ul style="list-style-type: none"> <li>• Reduction of emissions</li> <li>• Development of resource recycling-oriented business models</li> <li>• Recycling technology development</li> </ul>
	<p>Water resource security</p> <ul style="list-style-type: none"> <li>● Damage to brand reputation</li> <li>● Impacts on operations; increase in costs</li> <li>● Water pollution</li> </ul>	<p>Water resource security</p> <ul style="list-style-type: none"> <li>● Enhancement of brand reputation</li> <li>● Expansion of business opportunities for water treatment-related products (membranes, etc.)</li> </ul>	<p>Water resource security</p> <ul style="list-style-type: none"> <li>• Sharing of policies and fundamental stance</li> <li>• Effective use of water resources</li> <li>• Management of water risks</li> <li>• Water treatment business-related products</li> <li>• Cooperation with external organizations</li> </ul>
	<ul style="list-style-type: none"> <li>● Compliance</li> <li>● Handling of air, water and wastes</li> <li>● Handling of chemical substances</li> <li>● Impacts on local communities</li> <li>● Shrinking of internal combustion engine-related business</li> </ul>	<ul style="list-style-type: none"> <li>● Expansion of exhaust gas-related business</li> <li>● Expansion of air and water quality-related business</li> <li>● Expansion of nuclear power-related waste treatment business</li> </ul>	<ul style="list-style-type: none"> <li>• Management of chemicals</li> <li>• Handling of exhausts and water discharge</li> <li>• Operation of environmental management system</li> <li>• The NGK Group's products and services that contribute to environmental protection</li> <li>• Contribution to local communities</li> </ul>
	<ul style="list-style-type: none"> <li>● Damage to brand reputation</li> <li>● Impacts on operations</li> <li>● Impacts on supply chains, etc.</li> </ul>	<ul style="list-style-type: none"> <li>● Enhancement of our brand reputation</li> <li>● Expansion of businesses and products with consideration of ecosystems</li> </ul>	<ul style="list-style-type: none"> <li>• Participation in initiatives</li> <li>• Cooperation with suppliers</li> <li>• Biodiversity impact assessments and response</li> <li>• Contribution through pollution prevention products and services</li> <li>• Volunteer activities and greenery development</li> </ul>
	<ul style="list-style-type: none"> <li>● Damage to brand reputation</li> <li>● Litigation risks</li> </ul>	<ul style="list-style-type: none"> <li>● Enhancement of our brand reputation</li> <li>● Enhancement of competitiveness</li> <li>● Expansion of business opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Quality activity system</li> <li>• Initiatives to improve quality of operation</li> <li>• Quality risk reduction activities (QRE-P (Quality Risk Elimination-Process) activities)</li> <li>• QuiC (Quality up innovation Challenge) activities</li> <li>• Strengthening of quality management education</li> <li>• Expanding quality assurance to service provision</li> <li>• Guarantee of product safety</li> </ul>
	<ul style="list-style-type: none"> <li>● Damage to brand reputation</li> <li>● Cyber attacks</li> <li>● Information leaks</li> <li>● Increase in the cost of security enhancement</li> </ul>	<ul style="list-style-type: none"> <li>● Expansion of business opportunities related to digital society, etc.</li> <li>● Enhancement of our brand reputation</li> </ul>	<ul style="list-style-type: none"> <li>• Development of new digital-related products</li> <li>• Expansion of digital-related business</li> <li>• Sharing of policies and fundamental stance</li> <li>• Creation of an organization and implementation for information security</li> <li>• Education and training of information security</li> <li>• Creation of an organization and education for personal information protection</li> </ul>
	<ul style="list-style-type: none"> <li>● Compliance</li> <li>● Damage to brand reputation</li> <li>● Declining competitiveness of recruitment and outflow of personnel</li> <li>● Human resource development</li> <li>● Rigidity of internal systems</li> </ul>	<ul style="list-style-type: none"> <li>● Recruitment and retention of personnel</li> <li>● Active participation of diverse personnel by DE&amp;I promotion</li> <li>● Growth through human resource development</li> <li>● Productivity enhancement</li> </ul>	<p>Labor practices</p> <ul style="list-style-type: none"> <li>• Review of personnel systems</li> <li>• Work-life balance</li> <li>• Labor-management initiatives</li> </ul> <p>Diversity</p> <ul style="list-style-type: none"> <li>• Review of local recruitment policies</li> <li>• Programs to support our diversity promotion system</li> <li>• Initiatives to promote diversity</li> </ul> <p>Human resource development</p> <ul style="list-style-type: none"> <li>• Human resource development for employees</li> <li>• Securing and maintenance of human resources</li> </ul> <p>Occupational safety and health</p> <ul style="list-style-type: none"> <li>• Sharing of policies and fundamental stance</li> <li>• Initiatives for safety, health, and sanitation</li> <li>• External certification of our occupational safety and health management system</li> <li>• Safety and health education</li> </ul> <p>Health and productivity management</p> <ul style="list-style-type: none"> <li>• Sharing of policies and fundamental stance</li> <li>• Initiatives to shorten total working hours</li> <li>• Activities to promote mental and physical health</li> <li>• Tier-based mental care education</li> <li>• Initiatives to promote employee health</li> <li>• Response to infectious diseases and other global health issues</li> </ul>
	<ul style="list-style-type: none"> <li>● Damage to brand reputation</li> <li>● Impacts on business partners</li> <li>● Operational and litigation risks</li> <li>● Increase in costs and liabilities</li> <li>● Recruitment and human resources</li> <li>● Latent human rights risks and its actualization</li> </ul>	<ul style="list-style-type: none"> <li>● Enhancement of brand reputation</li> <li>● Recruitment and retention of personnel</li> </ul>	<ul style="list-style-type: none"> <li>• Sharing of policies and fundamental stance</li> <li>• Human rights risk investigation</li> <li>• Initiatives for human rights due diligence</li> <li>• Introduction of a grievance mechanism</li> <li>• Human rights education</li> <li>• Communication of human rights initiatives</li> </ul>
	<p>Environment</p> <ul style="list-style-type: none"> <li>● Impacts on procurement due to increased environmental impact in the supply chain</li> <li>● Increase in costs due to measures to reduce CO<sub>2</sub> emissions, etc.</li> <li>● Demands from markets regarding waste and recycling</li> <li>● Depletion of raw materials and rare metals</li> <li>● Tightening of regulations on chemical substances</li> </ul>	<p>Environment</p> <ul style="list-style-type: none"> <li>● Enhancement of our brand reputation</li> <li>● Securing of stable procurement and reduction of costs through the utilization of alternative raw materials</li> </ul>	<ul style="list-style-type: none"> <li>• Sharing of policies and fundamental stance</li> <li>• Supply chain management system</li> <li>• Risk assessment and monitoring of suppliers</li> <li>• Requests and demands toward suppliers</li> <li>• Support for suppliers' initiatives</li> <li>• Product design envisioning sustainable procurement</li> </ul>
	<p>Society</p> <ul style="list-style-type: none"> <li>● Damage to our brand reputation</li> <li>● Impacts on our business partners</li> <li>● Impacts on procurement</li> </ul>	<p>Society</p> <ul style="list-style-type: none"> <li>● Enhancement of our brand reputation</li> <li>● Building of a stable supply chain</li> </ul>	



## Strategic Foundation

### Internal Roundtable: Research & Development and Commercialization

# Strategies and Progress of Research & Development and Commercialization to Realize the NGK Group Vision

Executive Vice President,  
Top Executive R&D,

**Chiaki Niwa**

## Transforming the NGK Group According to the Changing Times

— Two years have passed since rolling out the NGK Group Vision: Road to 2050.

**Niwa:** We drafted the NGK Group Vision in 2021 as a unified axis to give the entire Group direction. I've heard people on the front lines have commented on how they have been able to step up to challenges based on this vision, which has changed the corporate climate.

**Iwasaki:** The world is changing faster than ever before. The COVID-19 pandemic inevitably evoked social change, but there is also the tense situation happening in Ukraine, an energy crisis, and more recently the topic of generative AI. In the last two years, we have recognized how to adapt to these changes in the world and begun to confront various challenges to realize the transformations laid out in the NGK Group Vision.

**Niwa:** In April 2022, we established Corporate NV Creation to handle the marketing functions that should move the NV1000 project forward as an important measure to transform our business structure. As we have more opportunities to communicate with our customers through this new division, we are realizing that we will not be able to grow in the future without a firm focus on what the market demands and the value we can provide to our customers.

As an organization that has traditionally been a technology-oriented company, a strong product-out mentality that if we make something good it should sell has taken root in NGK. This way of thinking has to change.

## Development and Commercialization Committee and NV Gate Promotion Meetings to Increase Commercialization Success

— The NGK Group launched a Development and Commercialization Committee.

**Iwasaki:** The Development and Commercialization Committee with Executive Vice President Chiaki Niwa acting as the chair and myself as the vice chair formulates policies on in-house research and development and the commercialization process.

**Niwa:** The NGK Group is a corporate conglomerate that has amazing manufacturing technologies. However, this does not mean the NGK Group can contribute to the world simply because it has superior technologies. This is demonstrated by our lack of market analysis so far and cases where we have been unable to grow businesses as expected. NGK launched this committee to lay the groundwork clarifying our trajectory to engage in

New Value 1000 (NV1000) set as the 2030 target is one milestone of the NGK Group Vision: Road to 2050. Leaders of the Engineering and Marketing Divisions discussed the research and development as well as commercialization strategies, specific initiatives, and progress key to the NV1000 project, which aims to generate over 100 billion yen in net sales as a new business venture.



Executive Vice President,  
Group Executive,  
Corporate NV Creation

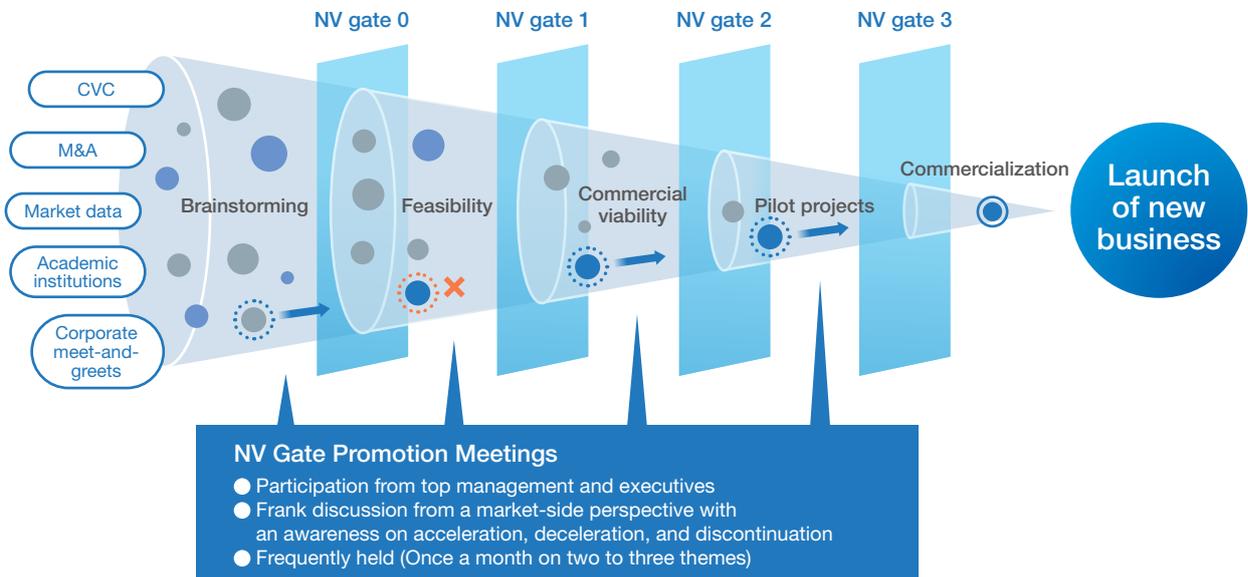
**Ryohei Iwasaki**

development with the goal of commercialization. The important pursuit is social implementation rather than simply chasing technologies.

**Iwasaki:** As a precursor to the new Development and

Commercialization Committee, we also started to convene NV Gate Promotion Meetings. These meetings bring together top executives to discuss what is lacking to move into the next stage of development and how to overcome these obstacles. We keep in mind the market perspective

### NV Gate Promotion Meetings for New Product Commercialization Process and Resolving Issues



## Strategic Foundation

### Internal Roundtable: Research & Development and Commercialization

when speaking frankly about the development themes raised in these discussions from many different angles.

**Niwa:** We convene the NV Gate Promotion Meetings on a monthly basis to thoroughly debate two to three development themes. Some of these themes are more carefully debated over several meetings to go even deeper through a more comprehensive discussion.

**Iwasaki:** We analyze the commercial viability from the initial idea stage, the pros and cons, and consider various other factors in an effort to clarify the challenges. The incorporation of this process acts as an effective venue by creating frequent opportunities for active debate about whether to inject management resources, move forward, or step back a bit. The discussions at the NV Gate Promotion Meetings undertake development and commercialization while giving those in charge of each theme a sense of both security and tension because the managers and executives understand how one another feel about each of these themes. Over the last year, I think these meetings have settled into this fantastic flow.

## Shift from Selling Products to Rendering Services in Order to Achieve NV1000

### —How is the NV1000 project progressing?

**Niwa:** Coordination between the Corporate NV Creation, R&D, and Manufacturing Engineering are key to achieving the NV1000 goals, which is one area where we have made a lot of progress. The Corporate NV Creation marketing team shares the market and customer needs, it has identified with the R&D and Manufacturing Engineering. This new process has begun a cycle that helps develop products



and cultivate businesses generating real value.

**Iwasaki:** We are very aware of the market fit and have been furthering preparations to create new business ventures in a variety of markets. For example, EnerCera® is a series of compact and thin rechargeable lithium-ion batteries that capitalizes on IoT and other such technologies. NGK is already involved in several business tie-ups after many companies with expectations that this integration of technologies will enable broad expansion have reached out to us. EnerCera is a product unlike any other. It offers great potential to bring new added value when combined with a wide range of other solutions. Many have great expectations for EnerCera as one of many examples demonstrating this shift from selling things to rendering services underway throughout the entire NGK Group.

**Niwa:** Our business utilizing the NAS large-capacity battery storage system is another example of our services. The NGK Group has been developing a new local electric power business over the last several years that integrates these NAS batteries into a solar power generation system. Currently, Ena Electric Power (Ena City, Gifu) and Abashiri Electric Power (Abashiri City, Hokkaido) are two local electric power companies using our system. NAS batteries offer a product that can play a major role in carbon neutrality thanks to many benefits that include energy devoted to local production and local consumption. The technology can also contribute to stronger disaster response capabilities when used as an emergency power system. In the future, we will expand our network with local companies and other types of partners nationwide as a basic policy.

**Iwasaki:** As a solution for carbon capture, utilization and storage, known as CCUS, NGK possesses a sub-nano ceramic membrane technology that can be used to filter out elements at a molecular level. The use of this technology enables the separation of not only CO<sub>2</sub>, but also hydrogen, nitrogen, and other chemicals. In the course of efforts to realize carbon neutrality around the world, society has an increasing need for technologies that can capture and collect CO<sub>2</sub> in every setting. That is why NGK will strive to further improve capture functionalities with the aim to roll out practical applications by 2030. We are also focusing on developing new products for direct air capture (DAC), which directly captures CO<sub>2</sub> present in the air by applying our mainstay ceramics for automotive exhaust gas purification. I hope that we can start proof-of-concept testing by 2025.

**Niwa:** The key is to create powerful services unique the NGK Group just for the manufacturing industry. There are many specialized service companies, so it will not be easy to beat the competition. To surpass our competitors, we must identify unique added value which makes people see the NGK Group as a company that makes this or that possible.

## External Partnerships for Business Expansion Around Strengths and More Rigorous Recruitment of Experienced Persons

—Could you please tell us about the strengths of the NGK Group?

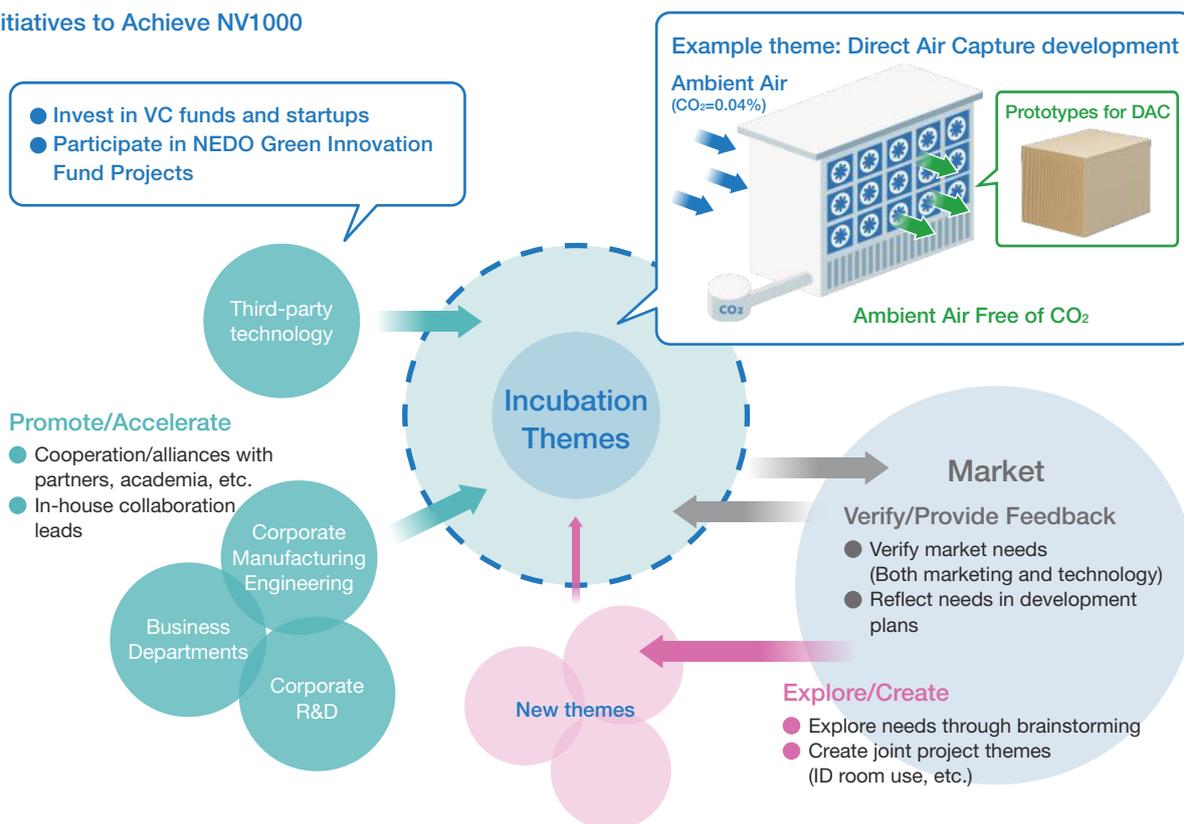
**Niwa:** Our undeniable strength is in the unique NGK ceramic technologies. By taking advantage of the ceramic technologies amassed through the century of history and experience gained since our founding, we are able to provide a broad range of products from ceramic substrates for automotive catalytic converters to parts for equipment to manufacture semiconductors and electronic components. To bring out the full potential of ceramics, we are also expanding applications to numerous industries. There is no question in my mind that only the NGK Group has the technology, knowledge, engineers, and equipment all in place to provide solutions for a wide variety of things.

**Iwasaki:** We will maintain our competitive edge around our strength in ceramic technologies and respond to the needs of society, which I think will help us achieve the NV1000 target in the long run. The key will be to pay attention to the market fit. In other words, it all depends on whether we can create products and services better suited to market and



are strengthening to accomplish this. Over the last year, we gathered a greater number of experts to collaborate with as confidants and advisors in order to ramp up efforts toward social solutions together with partners in various fields. To create new value never seen before, the NGK Group needs the insight of these experts in a wide range of fields. By bringing in these people at the initial stages of development, I have no doubt that we can increase our commercialization success.

### Initiatives to Achieve NV1000



## Strategic Foundation

### Internal Roundtable: Research & Development and Commercialization

**Niwa:** We are also steadily broadening partnerships with academic and specialized research institutes. More specifically, the NGK Group is advancing leading-edge research with several universities in Japan. It has been difficult for us to secure human resources who possess expert knowledge in fields outside of our purview. Partnerships with external institutions provide tremendous benefit by giving us access to the knowledge of researchers who are experts in those fields. As an organization that has only relied on itself in the past, we are very grateful to have some outside perspective. Through these partnerships, we are able to understand our weaknesses and the obstacles in our way so that we can change course at the early stage. As a result, these partnerships have helped accelerate our development and commercialization.

**Iwasaki:** We are also concentrating more on recruiting experienced human capital. Bringing in people who have gained experience at other companies lets us gain new perspectives, knowledge, and networks that the NGK Group currently does not have, which enhances our ability

to create new products and services. Furthermore, in order to capture information on new and innovative technologies and business models, etc., we have begun investing in venture capital and start-up companies.

#### —What kind of challenges do you currently see?

**Iwasaki:** Looking at the marketing team, I think we are still weak at gathering information. We have a tendency to seek out praise and positive information about our technologies. To connect our ideas to business, we have to get a hold of the negative information on what we lack and how to overcome those problems. This negative information is vital to the social implementation of products. In order to receive negative information, it is necessary to establish a solid trusting relationship. That is more difficult than getting good information. Keeping all this in mind, I hope each one of us can hone our communication skills. Moreover, I believe that we will have more opportunities to work with companies outside of Japan in the future. Of course, these collaborations require communication skills aware of the multicultural differences, such as the various challenges related to different languages, cultures, traditions, and values. I think the only choice that we have is to focus on global human resource development that can teach these skills.

**Niwa:** In regard to our human resource development, we recently drafted the new NGK Group Human Capital Management Policy. To accomplish the targets laid out by the NGK Group Vision, I know it is important to develop human resources who can step up to challenges and execute our transformations, key persons who can foster the digital transformations propelling research and development as well as commercialization, and those who have the marketing and technical expertise to participate on the global stage. The NGK Group has launched various initiatives that include those to nurture our internal environment and others to reform personnel policies. There is one other aspect to this as well. Although we have made headway in forging external partnerships, we still tend to have an internal focus. The NGK Group needs to escape this self-reliance and secretiveness to create a more open organization. For example, we should actively release our research and development results to evoke debate, which should provide significant returns to the NGK Group.

**Iwasaki:** Another challenge is accelerating the speed of each process. Social and environmental changes are happening at an unprecedented speed. I think the NGK Group also has to take action with the same emphasis on speed. In research and development, we are also incorporating materials informatics (MI)\* that utilizes accumulated data and promoting DX to speed up and improve efficiency.

\* 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

Ryohei Iwasaki



**The NGK Group will drastically strengthen information acquisition and market creation capabilities.**

Our Group must take on the challenge of more quickly commercializing development themes in order to implement unique NGK technologies into society.



Chiaki Niwa

### Material Risks and Opportunities

—Could you please tell us your thoughts about how to respond to the risks and opportunities tied to the new Materiality the NGK Group has identified?

**Niwa:** The NGK Group has always engaged in what is known as ESG-type management today since its inception a century ago through its products and services because resolving social challenges gives reason for our corporate existence. In light of the changing times and perspectives on sustainability, our Materiality bring shape to this ESG Management. We frequently discussed and formulated the Materiality based on the discussions that took place when the vision was formulated. Responding to climate change, promoting resource recycling, and contributing to digital social infrastructure are directly related to “CN” and “DS,” the two pillars we have set forth, and are the cores of our thinking in the thematic development of new business creation.

**Iwasaki:** One risk and opportunity is the ongoing evolution to electric vehicles. This shift to electric vehicles presents a tremendous risk to the NGK Group. On the other hand, more widespread use of electric vehicles also offers new business opportunities. For example, the use of our ceramic technologies for heat management in power semiconductors applications is a huge opportunity. The sub-nano ceramic membranes mentioned earlier open more doors to a variety of opportunities pertaining to our Materiality from initiatives for climate change and promoting resource recycling to the prevention of environmental pollution. While a digital society does come with security and other such risks, I think a focus on development will expand future business opportunities. This includes the work to develop a variety of wafers used for state-of-the-art devices supporting telecommunication infrastructure. We do have a rational sense of urgency brought by the changing times but are not pessimistic. It would be wonderful if we can inspire new ideas and create new value by taking advantage of these changes. This is the sentiment behind New Value.

### The Bold Challenge to Achieve NV1000

—To conclude, would you mind sharing a message with all of the NGK stakeholders?

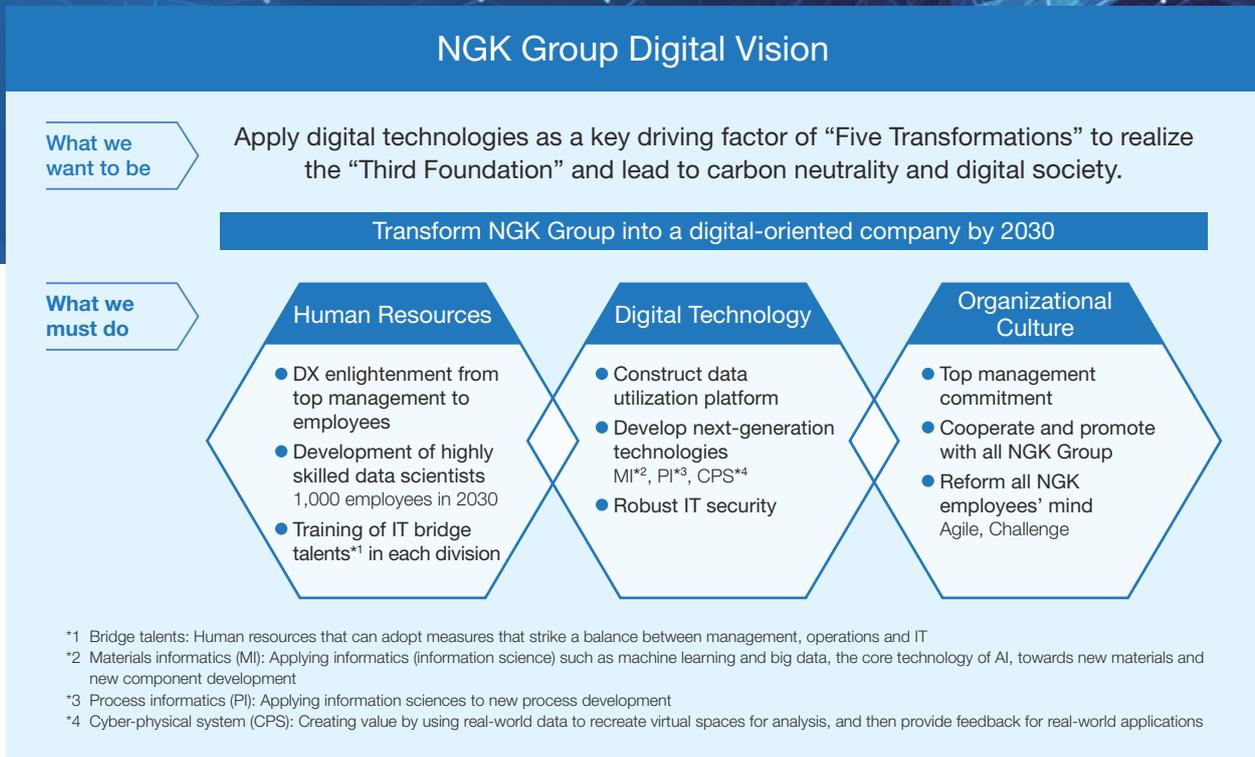
**Niwa:** I want to tell our employees to take on bold challenges. I am not saying I encourage failure, but it is okay if you do not succeed. It is impossible to succeed when talking on every single challenge. The important part of taking on bold challenges is the ability to make any failure a seed for future success. Moreover, we can take on a challenge over and over again. Success will surely come at some point by continuing to persevere without ever giving up.

**Iwasaki:** I want everyone to dare to challenge what they think is difficult. You will face many struggles and a lot of things may not go right. However, joy of accomplishment is great and leads to personal growth. If you feel something would be impossible alone, feel free to take on that challenge as a team. Where there is a will, there is a way, so I want everyone to stay positive while trail blazing into new territory.

**Niwa:** I would like to let all of our stakeholders know that the new NV1000 structure has taken excellent shape into a functional organization. I feel it has created a culture of unity and hard work when goals are set. The collaboration system between the Corporate NV Creation, R&D, and Manufacturing Engineering has steadily laid the groundwork to more smoothly move from research and development to commercialization. I am confident that the NGK Group is headed in the right direction. There is no doubt in my mind that the NGK Group will reach its NV1000 goal by furthering these efforts. I hope everyone will expect great things from the NGK Group.

## Digital Transformation (DX)

The NGK Group has positioned Digital Transformation (DX) as the driving force for its overall business transformation as it focuses its efforts on the Five Transformations. In order to accelerate DX throughout the NGK Group, we have formulated the NGK Group Digital Vision, aiming to become a company where the use of data and digital technology will be commonplace in 2030.



## DX Promotion System

The NGK Group launched the Digital Transformation and Innovation Department in April 2021 in order to promote DX across the entire Group. Involved in activities throughout the Group, the Digital Transformation and Innovation Department links digital technologies, including AI and IoT, with the

expertise of each business unit, Research and Development, Manufacturing Engineering, Corporate NV Creation, and Headquarters to support and promote business transformation.

## Addressing Materiality through DX

Among the Materiality identified in April 2023, the NGK Group reduces risks and expands opportunities through the promotion of DX for the following Materiality Initiatives for climate change, Promotion of resource recycling, Contribution to digital social infrastructure, Pursuit of quality and product safety, and Enhancing value of human resources.

We are specifically focusing our efforts on “Initiatives for climate change” and “Enhancing value of human resources.”

### ● Initiatives for climate change

For “Initiatives for climate change,” the NGK Group is adopting more efficient processes and systems than ever to reduce risks associated with climate change through countermeasures such as energy and resource savings. Also,

by accelerating the development of carbon neutrality-related products through the use of data and digital technologies, and by developing and providing products and services with our unique ceramic technologies at the core, we are working to expand opportunities related to climate change.

### ● Enhancing value of human resources

For “Enhancing value of human resources,” we will promote DX to increase productivity and reduce the burden on employees, thereby reducing risks in terms of occupational safety and health. In addition, efforts such as increasing employee satisfaction and securing excellent human resources also lead to expanding opportunities in this area.

## ➤ Initiatives for Realizing the NGK Group Digital Vision

In FY2022, the NGK Group promoted initiatives aimed at realizing business transformation utilizing data and digital technology. These efforts included development of human resources that are well versed in using digital data, transformation of supply chain management, and initiatives that make use of AI and Cyber-physical Systems (CPS). As these activities were highly evaluated, the NGK Group was selected in May 2023 as one of the “Noteworthy DX Companies 2023” by the Ministry of Economy, Trade and Industry, the Tokyo Stock Exchange, and Information-technology Promotion Agency, Japan under the Digital Transformation Stock Selection (DX Stock) 2023.

FY2023 is the final fiscal year of Stage 1 (Build a foundation for digital utilization) of the DX promotion

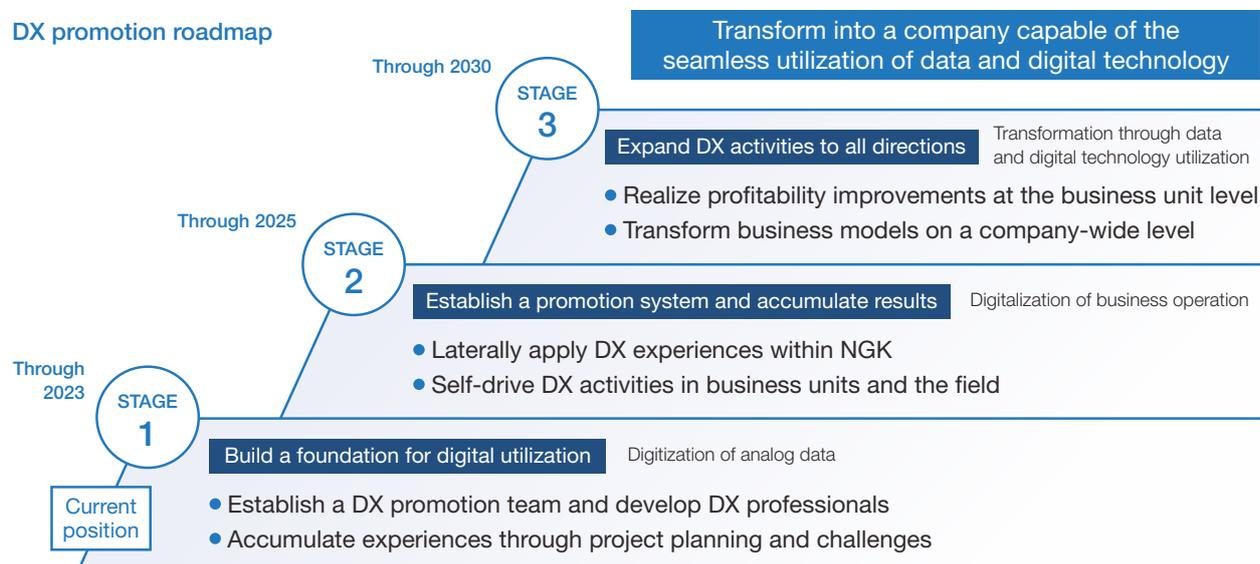
roadmap. Once this foundation is firmly established, we will accelerate activities aimed at the completion of Stage 2 (Establish a promotion system and accumulate results). Moving toward the self-directed promotion of DX, in addition to establishing a DX Promotion Department in our business divisions, we aim to create new value through DX promotion through efforts including the utilization of digital technology in marketing to start creating a system for achieving NV1000.



### NGK Group Digital Vision—Main areas of progress

	FY2030 Targets	FY2022 Results
<b>Human Resources:</b> Development of highly skilled data scientists	1,000 digital-oriented employees	150 digital-oriented employees (progress is ahead of schedule with FY2030 target expected to be achieved in FY2026)
<b>Digital Technology:</b> Construct data utilization platform	Construct data utilization platform in each business divisions	Creation of next-generation honeycomb production system HPDX (Environment Business Group)
<b>Digital Technology:</b> Materials Informatics	Reduce material development lead time for all products to 1/10 of FY2020 level	Reduced development lead time for some materials to 1/3 of FY2020 level through the use of AI and other means
<b>Digital Technology:</b> Cyber-physical Systems	Build a virtual production line and utilize simulations	Reduced test run lead time by 43% for some capital investment projects by utilizing production line simulations to verify operations in advance
<b>Organizational Culture:</b> Establishment of DX Promotion Sections	Establish DX Promotion Teams in all business divisions	Established Digital Transformation and Innovation Department and DX promotion sections in some business divisions

### DX promotion roadmap



## Management practices that factor in the cost of capital while maintaining profitability and financial soundness

Director and Senior Vice President

Hideaki Shindo

We aim to maximize our Enterprise Value with financial and non-financial integration while supporting the transformation toward the realization of the NGK Group Vision through a financial strategy that ensures profitability and maintains financial soundness.



### Achieving the NGK Group Vision

In the NGK Group Vision announced in April 2021, we set targets of 600 billion yen in net sales, 90 billion yen in operating income, and 60 billion yen\* in net income for FY2025.

In FY2022, net sales increased 9.6% year-on-year to 559.2 billion yen, owing to foreign exchange fluctuations due to the dramatic depreciation of the yen. As a result, we set a new record high for net sales. However, operating income fell by 20.1% year-on-year to 66.8 billion yen, due to the major impact of fuel prices rising higher than anticipated and other increased expenses such as rising labor costs caused by inflation. In addition, while tax refunds were received pertaining to the transfer pricing taxation (approx. 11.8 billion yen), net income fell by 22.3% year-on-year to 55 billion yen. This was because of the recorded extraordinary losses to optimize production capabilities for the Environment Business,

including the impairment loss on fixed assets at our Chinese bases and losses incurred by affiliates due to the decision to stop production in South African facilities, as well as the recorded impairment loss due to the decision to discontinue the manufacture and sale of insulators at the Chita site.

In FY2023, we forecast a record high year-on-year of 565 billion yen in net sales, since automotive products sales for the Environment Business are projected to remain strong despite continued market deterioration surrounding the Digital Society Business caused by decreased investments in semiconductors and data centers. In terms of profit, the target for operating income is 56 billion yen due to reduced volumes for the Digital Society Business as well as increased costs for fuel, labor, and other expenses. Although we are projecting a decrease in profits because of temporary market stagnation, we are accelerating our efforts to improve overall profitability by revising sales prices, improving

profits for the Environment Business, expanding the Digital Society Business, and achieving a surplus for the Energy & Industry Business. Going forward, we will appropriately allocate management resources to achieve the targets for the NGK Group Vision while monitoring changes in the external environment and market trends. As part of the capital input into New Value 1000 aiming to achieve sales of 100 billion yen or more from newly launched businesses by FY2030, we plan to invest 300 billion yen in research and development within a 10-year period from 2021. In FY2023, we plan to invest a record of 31 billion yen with carbon neutrality and digital society-related projects accounting for approximately 70% of the total, or over 20 billion yen.

\*Assuming an exchange rate of 100 yen to 1 dollar and 120 yen to 1 euro

### Enhancement of Enterprise Value

We prioritize the interests of our shareholders, and position sustainable improvements to Enterprise Value and profit returns as one of our most important management policies. Our stock market evaluation has a P/B ratio (price-to-book ratio) of less than 1 as of the end of the fiscal year ended March 31, 2023. With the aim of early improvements, the Company will strive to enhance the Enterprise Value by promoting three initiatives: enhanced profitability of capital, secured growth, and the enhancement of non-financial value. The details of these

initiatives are as follows.

#### ● Enhanced profitability of capital

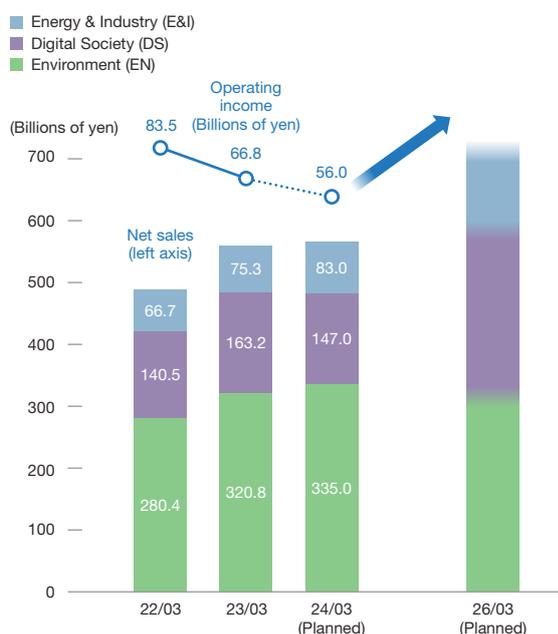
Our shareholders' equity cost is assumed to be 9.1% using CAPM (Capital Asset Pricing Model). In order to exceed this cost we promote management focused on capital efficiency targeting more than 10% return on equity (ROE) from a medium- to long-term perspective. We set targets for each business department to improve profitability using ROE and the relevant NGK return on invested capital (ROIC; operating income ÷ business assets) for deployment within NGK based on the capital policy that factors in financial soundness.

#### ● Secured growth

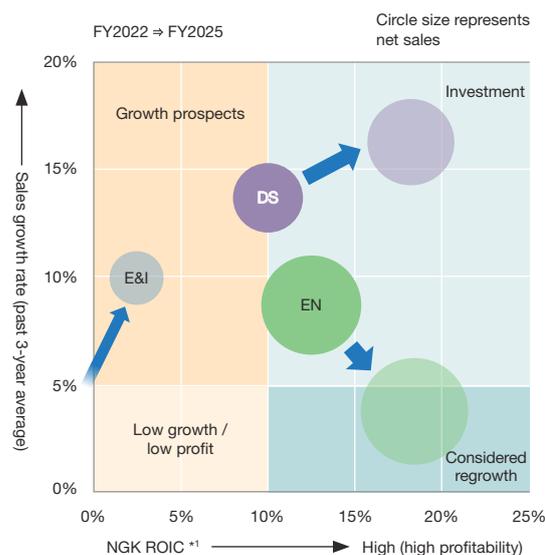
We manage our portfolio focusing on two focal points of profitability and growth, review the standards of 10% NGK ROIC and 5% sales growth rate, and examine priority investments into the businesses expected to grow. At the same time, we individually examine the business continuity assessment for each area categorized as low growth or low profit. In addition, we will strengthen R&D to achieve sustainable growth and secure growth to achieve the targets of New Value 1000 by 2030.

The Environment Business that mainly produces automotive parts has become a core business for the time being. Even though sales growth will be limited as a

### Progress Relative to the NGK Group Vision (performance trends)



### 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

## Business Strategies

### Financial Message

result of the shift to electric vehicles, we endeavor to conduct business operations that are highly profitable and effective while promoting measures for manpower reduction, shortened lead times, and cost cutting. The Environment Business aims to improve cash-generating capabilities in the short-term, factoring in the future transformation to a carbon neutral business structure and the diversion of facilities for these projects, such as direct air capture (DAC).

Moreover, the Digital Society Business, which is the core driver of future growth, increases our competitiveness with the introduction of high value-added products, expands investment, and improves profitability to reinforce growth potential in the medium- to long-term. The Energy & Industry Business improves the profitability for each business to drive future growth areas.

#### ● Enhancement of non-financial value

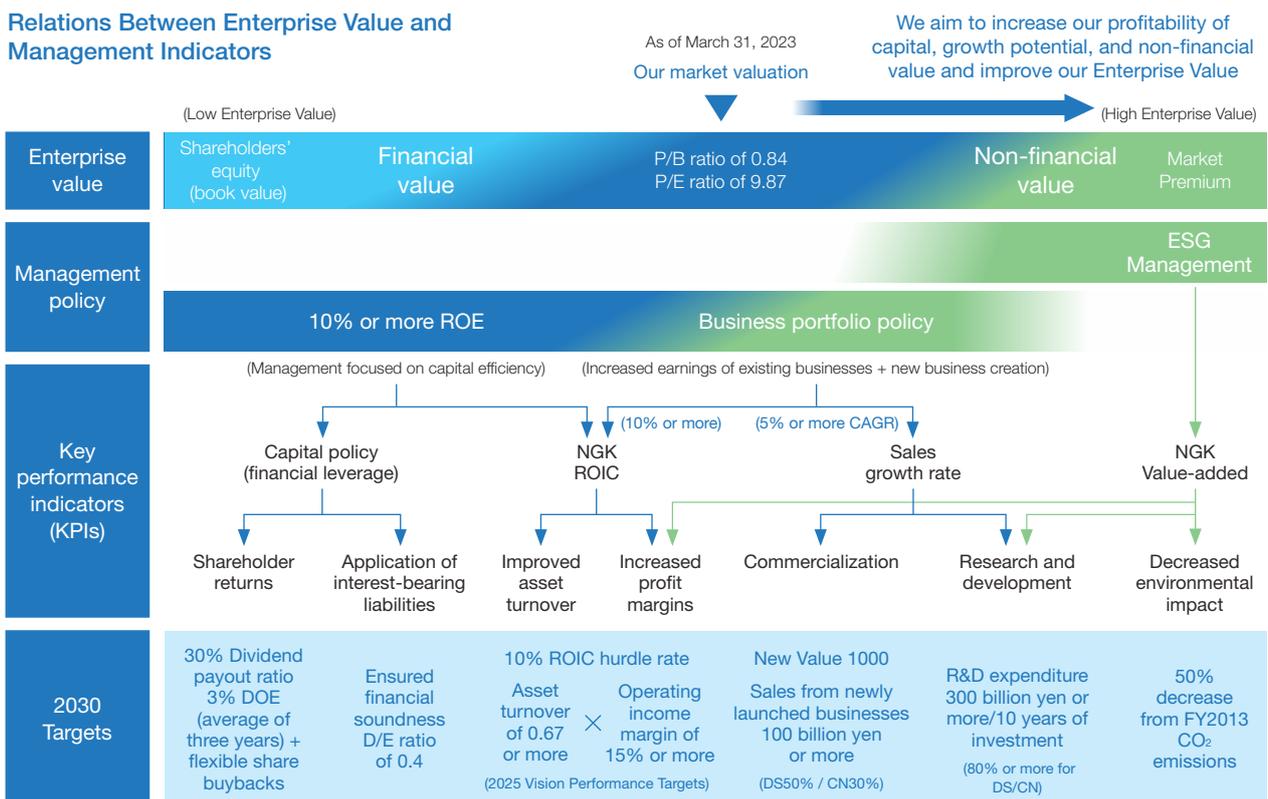
In recent years, intangible capital, such as intellectual capital and human capital, is becoming increasingly important as a yardstick to measure Enterprise Value. In other words, we must factor in non-financial value in addition to financial value. Our management is centered on ESG to achieve sustainable growth and fully transform into a business contributing to carbon neutrality and a digital society as laid out in the NGK Group Vision. The

NGK Group fulfills many social responsibilities to reduce its environmental impact and to improve its human capital by enhancing its non-financial value, which will ultimately lead to the enhancement of its enterprise value. As a tangible initiative, we are incorporating NGK version of added value (NGK Value-added) into our management indicators to comprehensively evaluate the compatibility of pursuit of profit and investment in human capital and intellectual capital, which are sources for future growth. NGK Value-added takes into account CO<sub>2</sub> emissions costs, labor costs, R&D expenditure, and the attainment of ESG targets for each rating agency in the operating income. In addition to financial value for short-term profitability and medium- to long-term growth potential, we will increase non-financial value that does not appear on a financial statement thereby enhancing our enterprise value.

#### Implementing capital policy after assessing the cost of capital

While we secured 12.9% for ROE in the fiscal year ended March 31, 2022 exceeding the shareholder's equity cost and 13.3% for NGK ROIC exceeding the 10% Weighted Average Cost of Capital (WACC) before taxes, these are both expected to temporarily fall below 10% in the fiscal year ended March 31, 2023 and fiscal year ending March

### Relations Between Enterprise Value and Management Indicators



31, 2024 due to a downturn in the market.

Regarding capital policy, we are focused on achieving profitability that exceeds the cost of capital while maintaining financial soundness and ensuring profit margins, capital turnover, and financial leverage at sound levels consistent with our business strategy based on an understanding of this situation. We aim to actively provide returns to shareholders including the application of interest-bearing liabilities and flexible share buybacks by reducing capital costs, driving revenue growth for existing businesses, transforming our business portfolio, and expanding new businesses. By doing so we aim to improve ROE, and increase our equity spread. In terms of funds availability, the D/E ratio should be set to 0.4 to maintain financial soundness based on financing with interest-bearing liabilities.

### Returning profits policy

We place an emphasis on the benefits for all shareholders and position the sustainable enhancement of Enterprise Value and returning profits as part of our most important policies for management. 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 66 yen per share for FY2022. In line with the standard dividend payout ratio and dividends on equity, we plan to implement a shareholder dividend of 50 yen per share in FY2023.

Moreover, we have been buying back shares to improve capital efficiency and enhance shareholder returns. In FY2022, we repurchased and canceled 5.5 million stocks (worth 9.6 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.

### Information disclosure and dialogue with investors and shareholders to enhance Enterprise Value

At the NGK Group, we recognize that the essence of IR is proactive information disclosure and dialogue with investors and shareholders, and thus we have enhanced



## We will accelerate the transformation of our business portfolio and enhance Enterprise Value through the proper allocation of management resources.

disclosure and communication with investors since the 1990s. Specifically, we hold financial results briefings biannually for institutional investors and provide forums for overseas investors hosted by the lead underwriters, overseas IR activities, individual investor IR activities, telephone interviews, and visits to individual institutional investors. In recent years, interactions have mainly been online due to the impact of the COVID-19 pandemic, but going forward we will revive opportunities for in-person dialogue since the COVID-19 crisis has settled down.

During these dialogues, we are keenly aware of the need to clearly communicate NGK Group's medium- to long-term direction and initiatives with unbiased current performance reports and to carefully explain the context, situation, and outlook when performance has deteriorated.

Feedback from stakeholders is extremely beneficial in improving the quality of management. We considered these shared opinions to be a vote of confidence in the NGK Group. We continuously strive to increase opportunities for dialogue with stakeholders, aiming to further enhance our Enterprise Value and shareholder value.

# Environment Business



Senior Vice President  
Group Executive, Environment Business Group

**Jun Mori**

Focusing on automotive-related parts, the Environment Business Group develops a wide range of businesses that contribute to the environment. While serving as a profit center for supporting revenues, we are also focusing on the development of next-generation products and technologies for carbon neutrality-related markets, which are expected to expand globally.

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

- ▶ Fulfill the role as a profit center to promote investment toward expanding sales in CN/DS-related markets
- ▶ Develop new CN-related products utilizing unique technologies and explore new markets in collaboration with the Corporate NV Creation

### 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

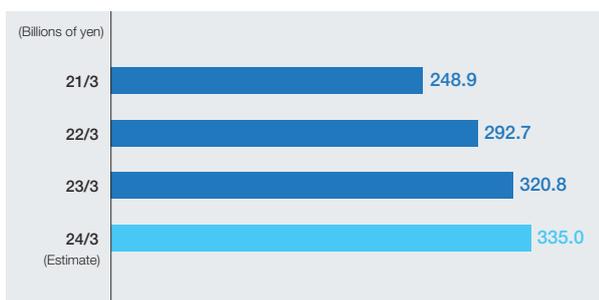
#### Opportunities

- Stricter global emission regulations
- Expansion of motorization
- Expansion of global decarbonization initiatives

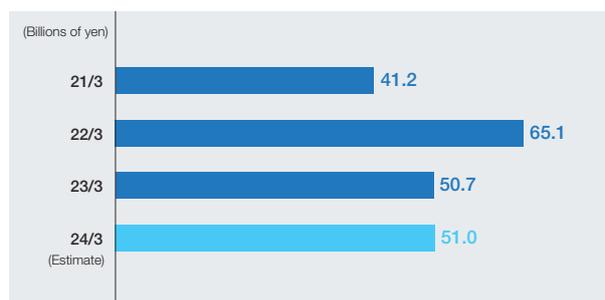
#### Risks

- Vehicle electrification
- Growing geopolitical risks

### Net sales



### Operating income



## Environment Business

### ▶ Review of the fiscal year ended March 31, 2023 and outlook for the fiscal year ending March 31, 2024

I feel that the fiscal year ended March 31, 2023 was a difficult year to steer in as the global economy became more uncertain due to the COVID-19 pandemic and the prolonged tense situation happening in Ukraine. Although business performance was affected by restricted economic activities in China and other factors, the Environment Business Group achieved an increase in net sales thanks to steady shipments of automotive-related products and effect of the weaker yen. However, profits fell due to factors such as increased labor costs and

soaring prices of raw material and fuel.

For the fiscal year ending March 31, 2024, we expect sales to increase due to a recovery in automobile production based on the easing of supply shortages of semiconductors and other parts, and an expected increase in demand for each product due to stricter emission regulations. On the other hand, profits are expected to increase only slightly due to continued increases in labor cost as well as raw material and fuel prices.

### ▶ Medium- to long-term growth strategies to realize the NGK Group Vision

The Environment Business Group must carry out two important missions to realize the NGK Group Vision. The first is to serve as a profit center for the NGK Group to support short-term profits. Although internal combustion engine-related markets are expected to contract in the future due to the ongoing vehicle electrification, demand will continue in the short term for products for emission control in response to stricter global emission regulations. Therefore, we expect to be able to maintain annual sales on the scale of 300 billion yen until around 2030, which will be source of funds for various growth strategies to be developed in the future. The European Commission has announced a draft to introduce new Euro 7 emission regulations starting in 2025. Since these regulations will require constant NOx concentration measurement for gasoline engines as well, demand for NOx sensors is expected to rise. To ensure that we can capture demand, we will accelerate development speed to launch high-performance products that comply with regulations while optimizing our production system.

The second is to take the lead in contributing to carbon neutrality, aiming to become a carbon-neutral company by 2050. Focusing on 2030, the year when demand for new carbon neutrality-related products is expected to increase, the Environment Business Group has a policy designed to transform itself into a sustainable business that contributes to carbon neutrality. Therefore, we will maintain our earning power to support the foundation of the NGK Group and promote the development as well as the commercialization of new products in the carbon-neutral field, focusing on a new era. It is important to quickly incorporate the needs of the market and customers and respond to those needs by collaborating with Corporate NV Creation, the Group's specialized marketing organization. Some products are already under development, such as honeycomb products for direct air capture (DAC) of CO<sub>2</sub> in the air, and we aim to establish a system as a new source of revenue soon.

### ▶ Value propositions for resolving social issues

As its name suggests, activities of the Environment Business Group are directly connected with solving various environmental issues. As we are in the midst of a period of change, until around 2030, when demand for vehicles with internal combustion engines is expected to persist, we will contribute to reducing the environmental impact that they cause by developing and providing products and services that help prevent environmental pollution, including ceramic substrates for catalytic converters for automotive for emission control and NOx sensors that measure nitrogen oxide concentration in automobile exhaust. From there on, by developing and providing products and services with our unique ceramic technologies at the core, we will continue to push for the realization of a carbon-neutral society. Our unique

automotive-related part technologies make it possible to develop carbon neutrality-related products, such as ceramic membranes, industrial heating systems, filters, and reactors, that respond to various needs. In addition to our technological capabilities, we also have the strength of experienced human resources cultivated through global business activities. Providing value by utilizing these strengths, we contribute to a sustainable society.

Amid the trend of vehicle electrification, although we are experiencing turbulent times, "changes" also means "opportunities" under these conditions. We will continue to enjoy changes that have never been seen before and motivate ourselves to take on new challenges. Please look forward to the future of the Environment Business Group.

# Digital Society Business



Senior Vice President  
Group Executive, Digital Society Business Group

**Hiroto Matsuda**

The Digital Society Business Group consolidates digital society-related businesses that are expected to grow in the future. Based on a three-business division structure consisting of the Hi-Performance Ceramics Business, Electronic Devices Business, and Specialty Metals & Molds, we contribute to solving the problems of our digital society, which is evolving remarkably, with our extensive range of products.

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

- ▶ We will create synergy by consolidating product groups that contribute to a digital society, 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

### Strengths

- Developing business with our unique materials technology and manufacturing process technology in fields where our competitors can hardly follow
- Developing high value-added products by close communication with customers

### Recognition of External Environment

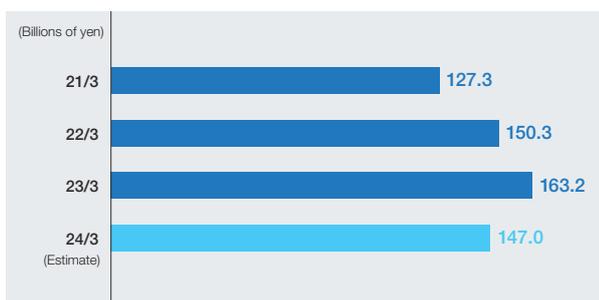
#### Opportunities

- Global increase in data traffic
- Increased speeds of mobile communications
- Increased investments in semiconductors to resolve semiconductor shortages

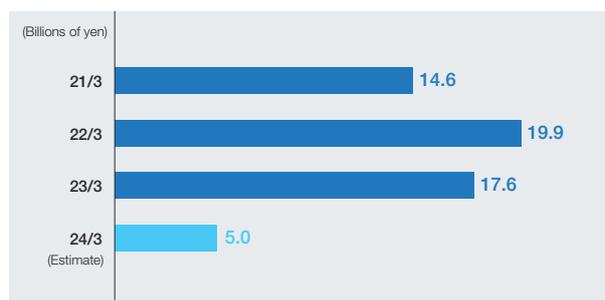
#### Risks

- Misplacing our development roadmap
- Trade friction and difficulty in procuring raw materials
- Emergence of local manufacturers

### Net sales



### Operating income



## Digital Society Business

### ▶ Review of the fiscal year ended March 31, 2023 and outlook for the fiscal year ending March 31, 2024

In the fiscal year ended March 31, 2023, in addition to sluggish sales of smartphones and computers, the curtailment and reduction of semiconductor and data center investments became apparent in the second half of the year, resulting in a decline in shipments of mainstay products for semiconductor production equipment and electronic components such as piezoelectric micro-actuators for HDDs. As a result, although net sales increased year-on-year due to the positive effect of the weak yen, operating income fell year-on-year due to decrease in volumes as well as an increase in depreciation expenses.

As for the fiscal year ending March 31, 2024, although the impact of declining demand is expected to continue and then gradually recover from the third quarter onward, the business conditions that we are facing are undeniably severe. To improve profitability in each business as soon as possible, we will review our production system, reduce costs, promote Digital Transformation (DX), and prepare to build a smart production system when demand recovers. Meanwhile, we will promote the development of next-generation products, which is currently underway, and steadily work toward creating the opportunity to take the next leap forward.

### ▶ Medium- to long-term growth strategies to realize the NGK Group Vision

The most important mission of the Digital Society Business Group is to grow into the second core business after the automotive business. As for business conditions, although we are currently experiencing an inventory adjustment phase in response to deteriorating market conditions, we expect demand to grow in the medium to long term for semiconductor-related and electronic component-related products due to factors including development of IoT, AI, and 6G communications. In the NGK Group Vision, New Value (NV) 1000 is set as the 2030 target to achieve at least 100 billion yen in sales of newly launched products, with the aim of CN and DS products accounting for 80% of sales by 2050. In order to drive us forward to achieve these goals, the Digital Society Business Group has set a target of doubling sales by 2030, focusing on mainstay products for semiconductor production equipment, and is working to expand its business with a sense of urgency.

Products that are expected to experience sales growth in NV1000 consist of DS-related products (including bonded wafers used in optical communications and mobility sensors and CMOS packages, which are expected to grow in the video and communications fields) and CN-related products (including SN\* DCB and AMB substrates that are increasingly adopted for power modules in EVs). In addition, our collaborative efforts with the Corporate NV Creation, which is responsible for marketing, is a key factor in developing new products. In fields such as mobility, wearables, and new energy where growth is expected, we will not only develop products but also propose solutions to meet customers' needs through business tie-ups and cross-industry collaboration.

\*Silicon Nitride (Si<sub>3</sub>N<sub>4</sub>)

### ▶ Value propositions for resolving social issues

Since the evolution of digital society will bring about peoples' enriched lifestyles and social sustainability, we hope to play a part by providing products and services that utilize our unique ceramic technologies. Our mainstay products for semiconductor manufacturing equipment support the further sophistication of semiconductors. In addition, we already have products that make a smart society more pleasant, such as high-performance wafer products that contribute to next-generation high-speed, large-capacity communications and piezoelectric micro-actuators for HDDs that support the increasing amount of information in the world. We will contribute to solving the challenges of a digital society that continues to develop at a remarkable pace by further creating new products and services in the future.

Furthermore, the Digital Society Business Group also contributes to the carbon-neutral field. For example, the advancement of digital technology that has resulted from

the emergence of higher performance semiconductors has led to a reduction in power consumption by products, contributing to carbon neutrality. DCB and AMB substrates and similar products for which demand is expected to grow since they are used in EV power modules are products that push us forward toward carbon neutrality. We are also looking into the development of hydrogen infrastructure components and other products to help realize a hydrogen society in the future.

Since the Digital Society Business Group engages in an extensive range of businesses, we are aware that we have many opportunities due to our connections with customers in a variety of industries. For a prosperous and better future, we will deepen partnerships with our customers and take on the challenge of creating new value while closely monitoring market needs and technological trends.

# Energy & Industry Business



Senior Vice President  
Group Executive, Energy & Industry Business Group

**Shuhei Ishikawa**

The Energy & Industry Business Group consists of three business divisions: the Energy Storage Business, Insulator Business, and Industrial Process Business. By providing a wide range of products and services for the electric power and industrial equipment-related fields, the Energy & Industry Business Group aims to widely support social infrastructure business needed to realize a carbon-neutral society.

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

- ▶ Establish a comprehensive energy business with sights on all aspects of energy
- ▶ Capturing the trend of growing CN-related markets, provide new social value in the electric power and industrial fields to increase earnings

### 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

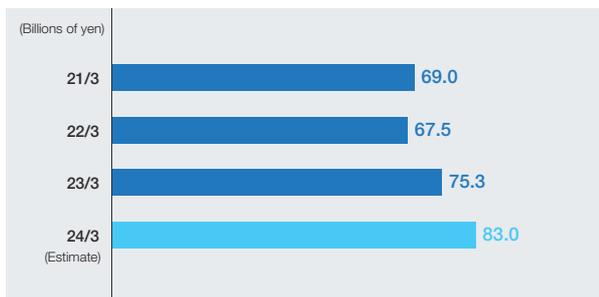
#### Opportunities

- Global trend toward carbon neutrality
- Growth in renewable energy
- Promotion of digital infrastructure

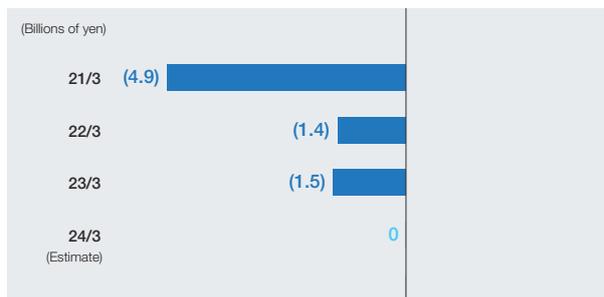
#### Risks

- Economic slowdown due to monetary tightening
- Changes in energy policies of countries around the world
- Technological innovation of competitors

### Net sales



### Operating income



## Energy & Industry Business

### ▶ Review of the fiscal year ended March 31, 2023 and outlook for the fiscal year ending March 31, 2024

In the fiscal year ended March 31, 2023, amid soaring energy and resource prices and supply chain problems caused by the conflict between the United States and China, we achieved a year-on-year increase in net sales due to higher demand for firing furnaces for lithium-ion battery cathode materials, price revisions for insulator-related products, brisk demand in North American and Australian markets, increased shipments of NAS<sup>®</sup> batteries to Japan, and the effect of the weak yen. Major topics during the past year included the establishment of a medium- to long-term business strategy

for the Energy Storage Business and restructuring of the Insulator Business.

Although the economic outlook remains uncertain, we expect an increase in overall sales during the fiscal year ending March 31, 2024 and an improvement in profitability due to increased demand for firing furnaces for lithium-ion battery cathode materials, price revisions for insulators and NAS batteries, and passing on rising costs of raw materials and other factors.

### ▶ Medium- to long-term growth strategies to realize the NGK Group Vision

In order to realize the NGK Group Vision, each member of the Energy & Industry Business Group will adopt the mindset of “taking on the challenge of continuing and accelerating reforms without fear of failure to continue providing new social value in the energy and industry fields” to move forward toward the type of business we want to be in 2050. The pillar of our growth strategy is our NAS battery, a key product in our Energy Storage business. Now that the issue of climate change is recognized as a global issue that we all face, the global adoption of renewable energy is sure to increase, which will result in a demand for long-lasting storage systems that is expected to further increase in the future. Since potential demand for NAS batteries, which are characterized by large capacity and long life, is expected to increase based on that scenario, we will focus on building a business model that contributes to the expansion of renewable energy introduction in Japan and on acquiring overseas projects, aiming to improve the presence of NAS batteries in the market and steadily increase NAS battery market share. In addition, we will work together with BASF, a German chemical manufacturer, and other business partners to reduce costs, an important factor in supporting the electric power infrastructure. The Insulator Business achieved increases in both net sales and operating income year-on-year in the

fiscal year ended March 31, 2023, thanks to an increase in overseas projects and price revisions.

Despite these results, the Company has decided to terminate the production and sales of insulators at our historic Chita Site within the next few years in line with a medium- to long-term business decision. From here on, we will continue our efforts to restructure our business structure, improve business efficiency, and build a stable business foundation that can flexibly respond to fluctuations in demand.

In the Industrial Process Business, we aim to achieve further growth by pursuing productivity improvements, differentiating technologies, and high functionality in corrosion-resistant equipment and refractory products that utilize our proprietary ceramic technologies, as well as membrane separating systems that are used in various fields, including pharmaceuticals, food, chemicals, semiconductors, and electronics. In addition, we will introduce products and equipment that can contribute to the environmental needs of society, such as CO<sub>2</sub> separation, hydrogen separation, and bioeconomy, and develop business areas for new carbon-neutral products. We will explore new value that has not yet been discovered, and aim to develop products that stand out above the rest that will serve as catalysts for new growth.

### ▶ Value propositions for resolving social issues

Although there have been multiple environmental and social changes in recent years, trends toward carbon neutrality and digitalization remain unchanged in the medium to long term. In such an era, we recognize that our mission as a business group that helps support the global social infrastructure is to contribute to solving two social issues by providing the various values we possess.

Our new business model that involves the utilization of NAS batteries will bring many benefits to society, including not only CO<sub>2</sub> reduction but also local production for local consumption of electricity and securing of power sources during emergencies. Furthermore, plans are underway to construct VPPs (virtual power plants) that make the most effective use of storage systems installed in a decentralized manner, thereby expanding the use of renewable energy without waste.

With the increased use of renewable energy, plans are

underway to enhance the national power grid in Japan for efficient power sharing, and insulators are an indispensable for enhancing the power grid.

We will continue to provide high-quality insulators and contribute to the stabilization of Japan's power supply system. Refractory products in the Industrial Process Business are important products that are indispensable in the manufacturing process of electronic components. It can be said that the Industrial Process Business contributes to the digital society in that it supports the infrastructure for the supply of electronic components.

Since our strength lies in our ability to provide a wide range of products from large to small, with the solutions necessary for social infrastructure, we will continue to expand our business by strengthening the concept of offering “services by providing solutions” in the future to achieve both corporate growth and social contribution.

## Dialogue

# Aiming to further enhance enterprise value by promoting ESG management

Chairman and Chair of  
the Board of Directors  
NGK Insulators, Ltd.

**Taku Oshima**



Executive Director,  
Research Institute of Capital Formation,  
Development Bank of Japan

**Keisuke Takegahara**



The NGK Group promotes ESG management in accordance with the NGK Group Vision.

What is the form of ESG management that the NGK Group envisions?

What do investors and society currently demand in regard to ESG management?

Mr. Keisuke Takegahara, an ESG investment expert from the Development Bank of Japan, was invited to discuss these and other NGK Group ESG management-related questions/topics with Mr. Taku Oshima, Chairman and Chair of the Board of Directors.

### The NGK Group Vision from an ESG Investment Perspective

**Takegahara:** Originally founded on the principle “We do this for the sake of society’s future, and not for own profit,” NGK has made a large contribution to building Japan’s electrical power infrastructure through the development and manufacture of insulators that are made in Japan.

Since that time, the company has been involved in automobile and semiconductor-related businesses, so it can be said that it has supported Japan’s core industries in ways that are not apparent. In other words, this unbroken history of contribution to resolving social issues through technological breakthroughs itself may be analogous to what we call ESG management today. This makes NGK vastly different from companies that want to start ESG management from scratch. Therefore, I think that the direction in which you will take what you have done so far at this turning point of the times is an important part of NGK’s ESG management.

At first, please tell us about the NGK Group Vision: Road to 2050, which was formulated in 2021.

**Oshima:** There are many uncertainties surrounding whether we can achieve our vision for 2050, which is to increase the carbon neutrality and digital society-related sales composition ratio to 80%. Still, we believe as a company that it is only natural to set proper goals. Since it is now an undeniable fact that CO<sub>2</sub>

emissions must be reduced globally, we must take all possible measures to do so. Therefore, we need to show that we will carry out these measures no matter what.

This vision assumes that renewable energy will be the main source of power and that vehicles powered by internal combustion engines, such as gasoline and diesel vehicles, will have been replaced by electric vehicles (EVs) in the society of 2050. As one of the Group’s main product categories is ceramics for purifying automobile exhaust, it may seem to employees, especially those working at Group plants overseas, that NGK’s goal is to eliminate their jobs. Of course this is not true. The vision does not communicate that jobs will be lost but rather communicates the message that we will create new products that will replace our existing products.

Even the form of the insulators business, which we have been involved with since our founding, has changed completely since that time. Likewise, our businesses must continue to change as necessary in response to changes in the world. However, there is no doubt that we are headed toward the materialization of a carbon-neutral society and digital society. We wanted to convey this message through our vision. In addition, we have established the Five Transformations to indicate the concrete actions that should be taken.

**Takegahara:** Looking at the NGK Group Vision, rather than expecting results from innovation outside the Group, I felt that the group has a very

realistic view on how to realize the vision by expanding its ceramic technologies, which is its strength, and reach its goals. I think this makes the NGK Group different from other companies and also attractive to investors.

As Chair of the Board of Directors, how do you view the Group Vision and ESG management from a Board of Directors perspective?

**Oshima:** Since ESG management does not immediately improve performance, the executive side tends to prioritize short-term performance. I am very grateful that the Board of Directors, including the outside directors and Audit & Supervisory Board members, provide harsh but accurate suggestions such as, “This approach might be too short-sighted,” or “We should hold discussions from a more future-oriented perspective.” I think that the essence of the management conducted by the Board of Directors itself is very different from how it was not so long ago.

**Takegahara:** While the executive team is aware of the long-term issues set forth in the vision, it has no choice but to focus on achieving short-term earnings targets. On the other hand, the Board of Directors provides solid support, including adjustments to timelines. I think the relationship between the executive team and the Board of Directors is very good, and I feel that the perspective of strengthening governance is very strong.

## Examining the NGK Group's ESG Management

**Takegahara:** Today, while looking to the future, ESG investors are looking for companies that can accurately grasp the challenges that society faces and link them to a company's strengths in order to convey the message that solving these issues will lead to a company's growth. Therefore, there is an expectation that if a company is able to accurately identify social issues that should be synchronized with its own growth, it should be able to maintain and strengthen its business model as a source of strength in the future. In that sense, as stated in the NGK Group Vision, it is very clear that NGK Group will use existing technologies to contribute to a society that is moving toward carbon neutrality and digitalization.

**Oshima:** Thank you very much for your positive words.

One of the first products we commercialized on a global level was the NAS<sup>®</sup> batteries, a megawatt-class power storage system. However, as this had been a losing venture for 20 years, investors sometimes criticized us, asking why we continued with the development, manufacture, and sale of this product if we were not making a profit. Despite those adverse conditions, we have continued to develop our NAS batteries since it will definitely be a useful product in the future. We are aware of the trend of securing profits from existing businesses by rationalizing supply chains and reviewing production systems and diverting those profits to research and development related to carbon neutrality.

**Takegahara:** As ESG management is listed by itself as one of the Five Transformations, based on what you have told me, in a broad sense, I think ESG management for the NGK Group can also be seen as encompassing the overall picture that



### We expect to clarify ESG management using easy-to-understand logic in order to further improve NGK Group's reputation among investors.

Keisuke Takegahara

you mentioned, such as the Group Vision, the Five Transformations, and governance structure.

**Oshima:** That might be right. In that sense, ESG management, which is one of our Five Transformations, can also be regarded as ESG management in a narrow sense. First of all, for "E" (Environmental), specific initiatives will be promoted while also providing clear numerical targets for CO<sub>2</sub> reduction. For "S" (Social), we will not only pursue profit but will also remain aware of the importance of contributing to people and society. Also, for "G" (Governance), we

envision doing what is right and proper in any case, including improving the quality of our products.

**Takegahara:** With regard to "S", it is also important to enhance human capital to support R&D and other activities. I believe that the NGK Group is also undertaking various initiatives based on its human capital strategy.

**Oshima:** That's right. When it comes to human resource development, I always say, "Let's improve the independence of our employees." If each individual employee becomes more independent, the company will definitely improve as a whole. I do not think anything will go well in a group where each employee does not act independently and feels that they are forced to do things.

Another important thing is for employees to take on challenges. I believe that work becomes interesting only after a person experiences many things, including failures, and sometimes hardships. Since many of our employees are rather serious and fear failure, I hope that we can reform our corporate culture so that it encourages employees to embrace a challenging spirit by constantly spreading the concept of taking on challenges.

**Takegahara:** Human capital is an important intangible asset for a company, and although there are aspects of human through the state of intellectual capital and research and development, it is also difficult to promote its value outside of the company. In the future, I hope that the NGK Group will shed light on depth of human capital and the ability to create it, and present it in a way that is easier to understand.

### The Meaning behind Identifying Materiality

**Takegahara:** In May 2023, NGK

identified and announced its Materiality. In the NGK Group Vision, the company has already clearly defined the realization of a carbon-neutral society and digital society as social issues for which it will use its unique technologies to solve, sending out the message that the focus of the single materiality is in these two areas. What was the intention behind the decision to identify Materiality at this time?

**Oshima:** Identifying Materiality does not change the way we manage our business nor does it solve any problems. However, by identifying and organizing Materiality, we clearly state what we are trying to do, visualize it in a clear form, and share it with internal and external stakeholders. This will have a great effect on employees, for example, who will be able to confirm that they are moving in the right direction. I believe that the Materiality will serve as important tools for each and every employee to again understand the connection between their work and social issues.

**Takegahara:** I heard that the company carefully listened to employees' thoughts and opinions when identifying Materiality.

**Oshima:** That's right. Employees also actively participated in identifying Materiality.

**Takegahara:** I think that's great.

In discussions at the International Sustainability Standards Board (ISSB), which sets unified standards for sustainability, the original single materiality approach, which can limit the disclosure of sustainability information to information directly related to corporate growth and enterprise value, had a double materiality approach added to it that also takes into account the impact of business activities on the environment and society. In identifying Materiality, the NGK Group covered both areas for business opportunities and growth factors, and

areas that must be properly managed as they can have a negative impact on society, which I think is in line with this new direction.

### Integrating Financial and Non-financial Values

**Takegahara:** I would like to say again that I think the NGK Group is sending out a very clear message in regard to ESG management, including what it has shared in the NGK Group Vision. Also, I felt that there were no

**In order to respond to the trust placed in us by our stakeholders, we will continue to practice ESG management and also work on how to clarify it.**

Taku Oshima



significant differences between what investors and society are looking for and actual board oversight, management conditions, and what they are implementing.

**Oshima:** Thank you very much for your positive words.

**Takegahara:** In addition, NGK has introduced its own calculation formula for performing value-added calculation as a company. As internal carbon pricing, etc., are properly included in the calculation formula, I thought it was great to see the idea that labor and R&D costs are not viewed as costs but as capital. Furthermore, I think that the company will send out a more effective message if it can show this not as stand-alone information but by combining financial data well with it. I think that we can expect that an increase in non-financial added value will lead to an improvement in financial indicators such as PBR (price-to-book ratio) and ROE (return on equity).

In any case, I believe that you already have sufficient elements of ESG management in place, so it will be important to combine these elements and communicate them well to the outside world with logic you discussed today.

**Oshima:** The NGK Group recognizes that how we present our company to the outside world and how we communicate what we do are major issues that we face. In the future, I would like to continue making improvements while receiving guidance from Mr. Takegahara. Thank you for your valuable feedback today.

## ESG Management

Positioning ESG as the core of management, the NGK Group will solve social issues through our businesses to enhance enterprise value and realize the sustainable growth of society.

### NGK Group Basic Sustainability Policy

Since our founding, the NGK Group has worked to solve social issues through our unique ceramic technologies. Based on the NGK Group Philosophy of “Enriching Human Life by Adding New Value to Society,” we aim to continue contributing to the achievement of a sustainable society and to earn the trust of society by meeting its expectations toward us. We have incorporated this thinking into the NGK Group Basic Sustainability Policy in April 2023.

#### NGK Group Basic Sustainability Policy

##### 〈 Basic approach 〉

By providing new value through our unique ceramic technologies under the NGK Group Philosophy of “Enriching Human Life by Adding New Value to Society,” NGK Insulators, Ltd. and its Group companies (hereinafter, the “NGK Group”) hope to contribute to the achievement of a sustainable society and earn the trust of society by meeting its expectations toward us. Setting this as the NGK Group’s basic approach to sustainability, and keeping Environment, Society, and Governance (ESG) and the Sustainable Development Goals (SDGs) at the forefront in realizing the NGK Group Philosophy, we aim to contribute to the achievement of carbon-neutrality and a digital society as we continuously enhance our corporate value.

##### 〈 Identification of material issues (Materiality) and promotion of initiatives 〉

For the realization of the NGK Group Philosophy and for the sustainable development of society and the NGK Group, we will identify material issues faced by the NGK Group and our stakeholders as Materiality, and will address these in accordance with the NGK Group Corporate Business Principles as a guideline for our actions.

##### 〈 Responsibilities of the Board of Directors 〉

The Board of Directors seeks to correctly recognize the ESG factors and other sustainability issues of the NGK Group and to connect these to the enhancement of our medium- to long-term corporate value by appropriately supervising and addressing initiatives aimed at sustainability issues. The Board of Directors also engages in appropriate disclosure of information and, based on insights gained through valuable dialogue with diverse stakeholders, strives to improve our management and to live up to the trust and expectations of society.

April 2023 Resolution of the NGK Insulators, Ltd. Board of Directors

## ESG Action System

ESG (Environmental, Social, Governance) is central to the management of the NGK Group.

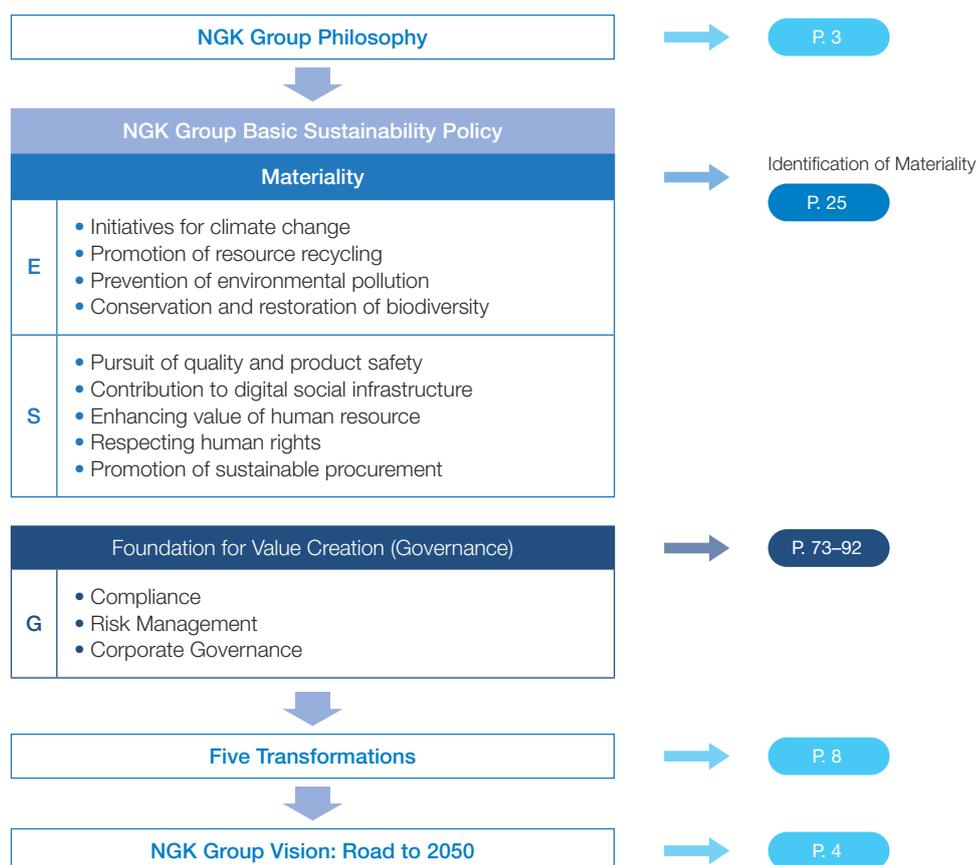
In 2019, the ESG Committee was established as a venue for sharing information, exchanging opinions, and discussing policies at the management. In 2021, the ESG Management Department was established to implement ESG-related activities and improve communication of information about these activities across the NGK Group. Furthermore, in April 2022, the ESG Committee was reorganized as the ESG Management Committee, which is chaired by the President, as a body reporting to the Board of Directors for strengthening initiatives on sustainability issues that incorporate elements of ESG and the SDGs.

### ESG Action System



## NGK Group ESG Management

The NGK Group positions ESG (Environmental, Social, Governance) as the core of management based on the NGK Group Philosophy of “Enriching Human Life by Adding New Value to Society.” Identifying Materiality in accordance with the NGK Group Basic Sustainability Policy, we increase the effectiveness of governance as a foundation for value creation while promoting efforts for environmental and social issues. By promoting these efforts, we aim to realize the NGK Group Vision.



## Supporting and Participating in Initiatives

Through its participation in related initiatives, the NGK Group aims to contribute to the realization of a sustainable society by making a conscious effort to create a cycle in which it has opportunities to engage in dialogue with leading companies and international organizations, learn from their knowledge and advanced practices, and link this to improvements in its own initiatives.



## Environmental Materiality

### Initiatives for Climate Change

By accelerating the development of carbon neutrality-related products, and by developing and providing products and services utilizing our unique ceramic technologies at the core, we will contribute to the realization of a carbon-neutral society by 2050.

## 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 toward resolving issues facing our Group operations, such as the risks and opportunities posed by climate change, and toward necessary information disclosure.



\*TCFD: The Task Force on Climate-Related Financial Disclosures was established by the Financial Stability Board (FSB). The G20 Osaka Summit in June 2019 provided the impetus for many Japanese companies to announce their endorsement of the TCFD recommendations. (As of April 28, 2023, 1,306 companies and organizations have announced endorsement.)

## Governance

The NGK Group drafted the NGK Group Environmental Vision as an extension of the NGK Group Vision. In this Environmental Vision and our Carbon Neutrality Strategic Roadmap, we outline achieving net zero CO<sub>2</sub> emissions for our business activities by 2050. Specific activities include setting management metrics and goals for each fiscal year of our 5-Year Environmental Action Plan. Our ESG Management Committee chaired by the president deliberates on these metrics and goals at least once a year, and issues reports to our Board of Directors. 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.

Members from relevant divisions participate in Environmental Action Subcommittee within the ESG Management Committee to evaluate measures for

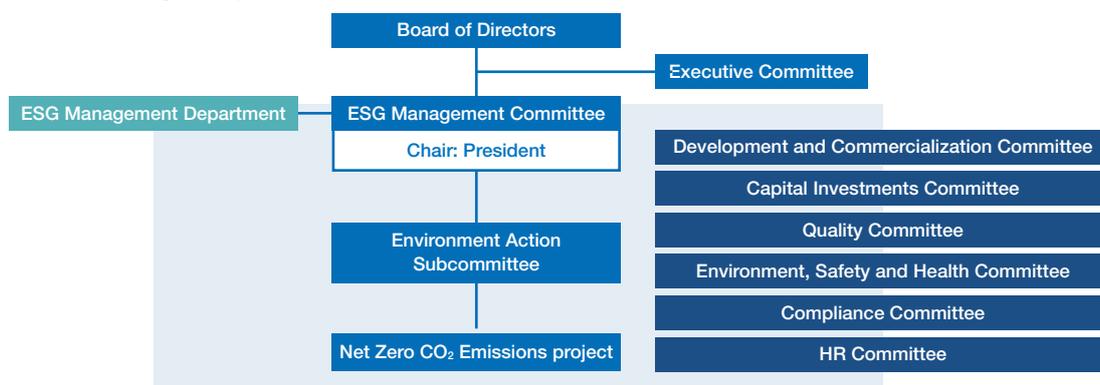
information disclosure based on TCFD recommendations. The subcommittee's results are then deliberated by the ESG Management Committee before being reported to the Board of Directors. This subcommittee is also focused on achieving carbon neutral business activities by no later than 2050, one of the goals outlined in our Action Plan. The subcommittee works towards this goal by also promoting measures such as energy saving and furnace fuel conversion from fossil fuels to carbon-free fuel.

For reference: NGK Group Vision → P.3-4

**LINK** NGK Group Environmental Vision  
<https://www.ngk-insulators.com/en/sustainability/environment-vision.html>



## Climate Change Response Framework



## Risk Management

The Risk Management Committee handles the NGK Group-wide risks, including risk related to climate change, by establishing policies, strategies, frameworks, measures, and annual plans for risk management. It also monitors the overall execution status of risk management and reports to the Board of Directors when appropriate. In addition, individual

risk items are the responsibility of the head of the department or committee that should manage and monitor them, and handled by the relevant department or committee.

For reference: Risk Management Framework → P.79

## Risk Management Process

In addition, for risks related to climate change, the Environment Action Subcommittee within the ESG Management Committee creates scenarios and conducts a scenario analysis to identify material risks. Through this process, we extract risks and opportunities, and draft

response strategies. These results are deliberated by the ESG Management Committee, then reported to the Board of Directors.

 For reference: Risk Identification Process → P.79

## Strategy

### Climate Change Risks and Opportunities

We have set time frames and scenarios to analyze the risks, opportunities, and magnitudes of the impact of climate change in relation to the NGK Group business.

Scenario analysis is a method for postulating multiple

future scenarios and ascertaining the impacts of the risks and opportunities posed by climate change on the NGK Group. The goal is to use the insights gained in considering future strategies and responses.

### Assumptions

#### (1) Timeframes

We set short-term, medium-term, and long-term timeframes for considering risks and opportunities.

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

We have set 1.5°C and 4°C scenarios under which the risks and opportunities of transitioning to carbon neutrality, and the physical risks and opportunities of climate change, are each maximized.

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.	<ul style="list-style-type: none"> <li>International Energy Association (IEA) Net Zero by 2050 scenario</li> <li>SSP1-2.6 scenario, etc.</li> </ul>
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.	<ul style="list-style-type: none"> <li>SSP5-8.5 scenario, etc.</li> </ul>

### Particularly Important Risks and Opportunities

We have identified risks and opportunities in line with the TCFD categories for each timeframe and scenario. We conducted qualitative assessment of the magnitude of financial impact of each risk and opportunity with reference to the risk assessment criteria of all Group companies. We also quantified the financial impacts for some items that were thought to have a certain impact and could be quantitatively assessed based on these scenarios.

Furthermore, this scenario analysis is not a forecast of NGK Group performance, but rather analyzes the impacts of the risks and opportunities posed by climate change on the NGK Group under each scenario. It is intended to be used in considering strategies and responses from here on out. The information used to calculate these financial impacts is the information available at the time of the examination, and contains uncertainties and assumptions.



Sub-nano ceramic membranes  
<https://www.ngk-insulators.com/en/rd/subnano/>



Gallium Nitride (GaN) Wafer  
<https://www.ngk-insulators.com/en/rd/gan-wafer/>



DCB and AMB Substrates  
<https://www.ngked.co.jp/en/product/dcb/>



Zinc Rechargeable Batteries  
<https://www.ngk-insulators.com/en/rd/>



Environmental Materiality

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

Category	Summary of assumed scenario	Business risks & opportunities	Details of 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 or our supply chain.</li> </ul> 2030: 130\$/t- CO <sub>2</sub> 2050: 250\$/t- CO <sub>2</sub>	Increased cost of responses to further reduce greenhouse gas emissions	<b>Risks</b> Incurring response costs related to equipment replacement and upgrades for energy saving, 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.
		Increased costs due to adoption of carbon pricing	<b>Risks</b> Costs increase due to adoption of carbon pricing on company emissions and emissions along the upstream of our supply chain
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.  Rapid growth in CO <sub>2</sub> capture volume in various sectors, including fuel production, power generation, and industry.	Risks and opportunities associated with battery technology innovation and the emergence /adoption of new technology	<b>Opportunities</b> <ul style="list-style-type: none"> <li>Increased competitiveness by advancing proprietary technology development</li> <li>Increased storage battery needs</li> </ul>
		Market growth driven by widespread adoption of CCU/CCS (CO <sub>2</sub> capture, utilization, and storage)	<b>Risks</b> Competitiveness of our technologies will decline as competitors advance proprietary technology development  <b>Opportunities</b> Growth in CCU/CCS market will increase business opportunities for our ceramic products (Sub-nano ceramic membranes, etc.)
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	<b>Opportunities</b> <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>
			<b>Risks</b> Demand for products for internal combustion engine vehicles will decline over the medium- to long-term
	The capacity of power storage batteries and demand for lithium-ion rechargeable batteries for EVs will rapidly expand.	Increased storage battery demand	<b>Opportunities</b> <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>
Demand for semiconductors will increase with electrification in various fields such as industry and transportation.	Growth in demand for semiconductor-related products	<b>Opportunities</b> Increased demand for parts for semiconductor manufacturing equipment and electronic parts/metals in the digital society business	
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<sup>*3</sup>.</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	<b>Opportunities</b> Assessments by stakeholders can be improved by proactively responding to climate change and providing products and services that contribute to carbon neutrality.
		Decline in trust from stakeholders due to delays in responding to climate change	<b>Risks</b> Delays in climate change measures will have a negative impact on brand, capital procurement, transactions, etc.

(2) Physical Risks and Opportunities Associated with Advancing Climate Change (mainly 4°C scenario)

Category	Summary of assumed scenario	Business risks & opportunities	Details of risks & opportunities
Acute	<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	<b>Risks</b> <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>
Chronic	Sea levels continue to rise.	Impact of storm surge on coastal factories	<b>Risks</b> <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>

\*1 We set certain assumptions and premises about things like future business expansion based on the parameters (carbon price, energy unit price, power source mix, etc.) of scenarios in the International Energy Agency (IEA) "Net Zero by 2050" report (2021 edition). Then we combined the costs of energy conversion and energy saving with carbon prices for greenhouse gases to calculate the amount of financial impact on profits.

\*2 We used certain assumptions and premises to estimate our market share based on changes in the automobile, CCU/CCS, and battery markets according to scenarios in the International Energy Agency (IEA) "Net Zero by 2050" report (2021 edition). We then estimated the impact on sales of some products compared to the present to determine financial impacts.

\*3 SBT: Abbreviation of Science-based Targets, which is an initiative that requires companies to set targets for reducing greenhouse gas emissions based on scientific evidence.

Timeframe	Response strategy	Financial impacts
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 saving, technological innovation, and initiatives toward 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 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>	Financial impacts of energy conversion/carbon pricing (increased expense) <sup>*1</sup> 2025: - ¥2.0 bil 2030: - ¥5.8 bil 2050: - ¥12.3 bil (Reference: Impacts of carbon pricing without reductions: - ¥5.9 bil to - ¥17.7 bil)
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>	We are currently carrying out qualitative studies due to the lack of quantitative indicators.
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>	Financial impacts of CCUS-related products <sup>*2</sup> 2025: + ¥0 bil 2030: + ¥14 bil 2050: + ¥270 bil
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>	Financial impacts of automotive-related products <sup>*2</sup> 2025: + ¥65 bil 2030: - ¥50 bil 2050: - ¥244 bil
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>	Financial impacts of battery-related products <sup>*2</sup> 2025: + ¥23 bil 2030: + ¥33 bil 2050: + ¥68 bil
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>	We are currently carrying out qualitative studies due to the lack of quantitative indicators.
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>	We are currently carrying out qualitative studies due to the lack of quantitative indicators.

Timeframe	Response strategy	Financial impacts
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>	Changes in our company's financial impacts (expected value) due to floods and storm surges affecting our plants and suppliers <sup>*4</sup> 2025: - ¥70 mil 2030: - ¥100 mil 2050: - ¥540 mil
Medium- to long-term		

<sup>\*4</sup> Drawing on location information for our plants and major suppliers, we used a simulation that employed the Climate Score Global (CSG) model developed by Jupiter Intelligence in the United States to evaluate the inundation depths caused by flooded rivers and storm surges at a resolution of 90m. Based on this evaluation, we calculated the expected amount of financial impact on profits by tallying up the value of losses to our company due to asset losses at our plants and losses due to shutdown of our plants and major suppliers. This expected value is an index calculated from the amount of losses due to floods and the probability of flood occurrence in a given year. The loss amount is estimated based on a uniform damage rate according to depth of inundation and does not reflect the disaster preparedness measures in place in the areas where sites are located.

### Strategy Based on the Risks and Opportunities of Climate Change

We will pay close attention to both societal and market trends, while recognizing the degree of impact of each of the risks and opportunities we have identified through scenario analysis. And we will take action according to the response strategies we have established for each item.

Among the transition risks are risks accompanying CO<sub>2</sub> emissions. We will mitigate these risks by promoting initiatives aimed at net-zero CO<sub>2</sub> emissions according to our “Carbon Neutrality Strategic Roadmap.”

We are already implementing measures to deal with water-related disaster risks from the standpoint of business continuity planning (BCP). For instance, we are raising land in response to the frequent occurrence of heavy rainfall. With respect to further disasters, we are taking measures to prevent catastrophic damage, with protecting human life as our highest priority. We are aware of the future risks posed by climate change, including those posed by the worst-case scenario of a 4°C increase in temperature. To mitigate these risks, we will continue to evaluate risks while working to

strengthen countermeasures such as BCP.

The NGK Group Vision defines our vision as “a company to contribute to carbon neutrality and digital society with our unique ceramic technologies.” It also sets a target for products related to these fields to make up 80% of sales by 2050. We used this scenario analysis to calculate the quantitative financial impact on parts of our business that can be assumed at present. This allows us to determine the business opportunities presented by realization of a carbon neutral society. We will continue working to develop new products related to carbon neutrality and digital society to achieve the NGK Group Vision, and aim to provide new value to society as we strive for sustainable growth.



LINK

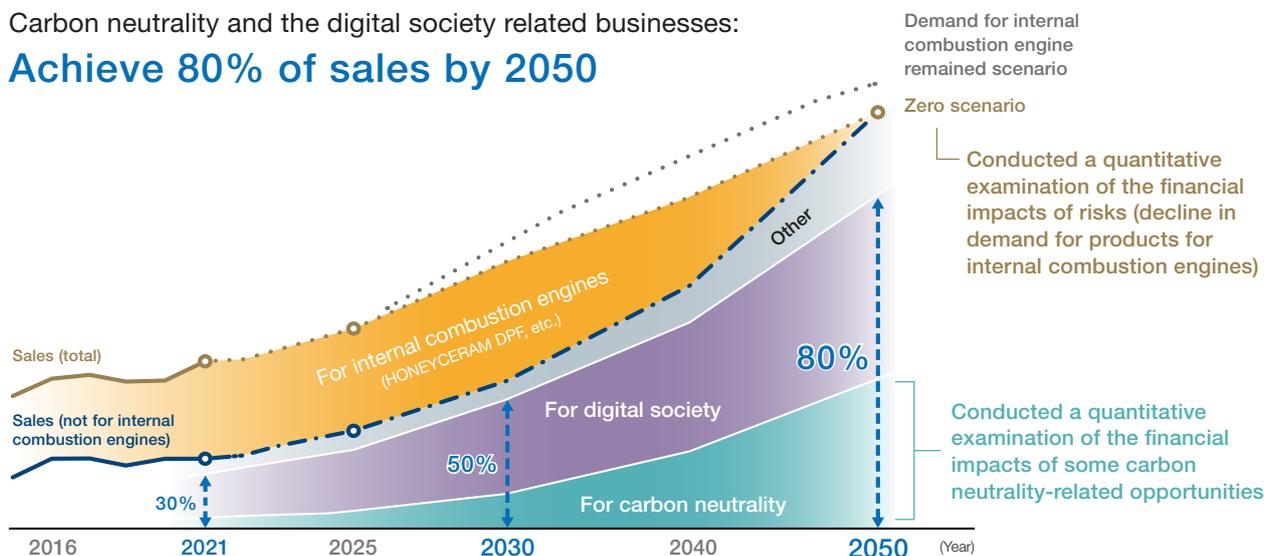
NGK’s Core Policy on the Environment and the NGK Group Environmental Vision  
<https://www.ngk-insulators.com/en/sustainability/environment-vision.html>



#### Our Aim

Carbon neutrality and the digital society related businesses:

## Achieve 80% of sales by 2050



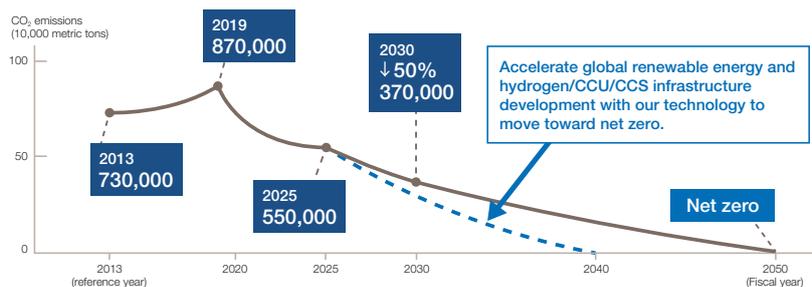
We intend to suitably enhance and deepen our scenario analysis by adding and updating various parameters and external reference scenarios depending on the state of new product development. And we will continue analyzing and considering responses to the impacts that the risks and opportunities posed by climate change can have on our business.

## Metrics and Targets

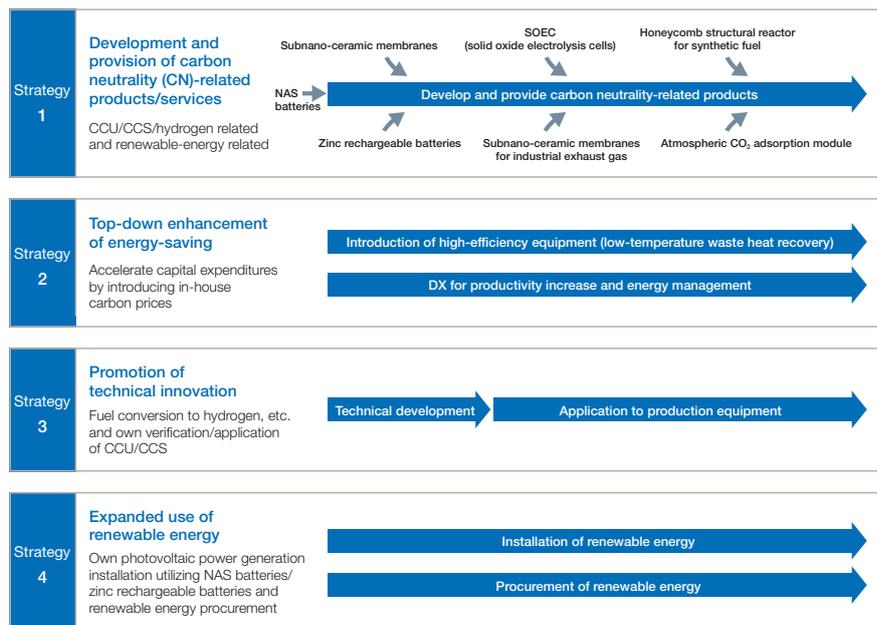
We drafted the Carbon Neutrality Strategic Roadmap to promote goal achievement that will enable us to realize the NGK Group Environmental Vision. We set milestone targets ahead of our 2050 goal of net zero CO<sub>2</sub> emissions for the

entire Group. These milestone targets call for a 550,000 ton reduction in missions by 2025 (25% reduction compared to 2013 [reference year]) and a 370,000 ton reduction by 2030 (50% reduction compared to 2013).

### Carbon Neutrality Strategic Roadmap



### Four Strategies of the Carbon Neutrality Strategic Roadmap



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



NGK's Core Policy on the Environment and the NGK Group Environmental Vision  
<https://www.ngk-insulators.com/en/sustainability/environment-vision.html>



CO<sub>2</sub> emissions (ESG data)  
<https://www.ngk-insulators.com/en/sustainability/data.html>



5-Year Environmental Action Plan  
<https://www.ngk-insulators.com/en/sustainability/environment-plan.html>



## Promotion of Resource Recycling

By developing and providing resource-efficient products and services through means including the sustainable use of natural resources and the recycling of wastes, we will contribute to the effective use of water resources as well as to the effective use of resources and promotion of resource recycling.

### Basic Approach

The importance of resource efficiency and sustainable management of natural resources has continued to grow in recent years. Resource Efficiency: Potential and Economic Implications (Summary for Policy-Makers) published from the UNEP International Resource Panel reports that since the world's population quadrupled, and the amount of materials extracted and used increased eightfold between 1900 and 2005, it is critical to increase resource efficiency in order to meet the Sustainable Development Goals (SDGs) and climate change targets cost-effectively.

The NGK Group conducts businesses using natural resources, and a considerable amount of waste is generated during the manufacturing processes, such as when ceramic raw materials are procured or when water is used during manufacturing.

Therefore, we believe that increasing resource efficiency by properly managing resource usage and waste will contribute to the reduction of burdens on the global environment.

We also believe that increasing resource efficiency and appropriately responding to the transition to a recycling-oriented society by reducing costs through reducing the amount of resources used as well as by reducing dependence on specific resources to reduce the risk of supply chain disruption due to export restrictions, geopolitical turmoil, and disasters will lead to the enhancement of our competitiveness.

Based on this understanding, the NGK Group regards the promotion of resource recycling as an important issue in the environmental field, and will advance initiatives.

### Management Approach

The NGK Group announced the NGK Group Vision: Road to 2050 in 2021 and formulated the NGK Group Environmental Vision in April of the same year. In this vision, we set forth contributing to the realization of a recycling-oriented society as one of our pillars.

To realize this environmental vision, we have formulated the Fifth 5-Year Environmental Action Plan as our environmental activity targets for FY2025, and based on this plan, we are advancing initiatives through internal and external collaboration.

 For reference:  
NGK Group Vision → P.3-4  
Supporting and Participating in Initiatives → P.52

 **LINK**  
NGK's Core Policy on the Environment and the NGK Group Environmental Vision  
<https://www.ngk-insulators.com/en/sustainability/environment-vision.html>



 **LINK**  
5-Year Environmental Action Plan  
<https://www.ngk-insulators.com/en/sustainability/environment-plan.html>



### Efforts for the Future

The NGK Group is striving to enhance yield through improving its manufacturing processes and curtail waste generation through efforts such as the reuse of raw materials, while focusing on reducing final disposal volumes through recycling, in order to promote resource recycling.

In FY2022, we achieved a reduction rate of 55% per unit sold for the amount of reduction of waste generation compared to FY2013, achieving the target of 46% as well as our FY2025 target of a 50% reduction.

We will continue to investigate trends related to circular economy, and respond appropriately. We will also sort out and disclose examples of resource recycling within Group businesses, and examine policies aimed at achieving the recycling-oriented society set out in our NGK Group Environmental Vision by 2050.

Please visit the following links for information on the NGK Group's major initiatives for promoting resource recycling and Group environmental performance.

 **LINK**  
Initiatives toward a Recycling-Oriented Society  
<https://www.ngk-insulators.com/en/sustainability/environment-recycle.html>



 **LINK**  
Environmental Performance (ESG data)  
<https://www.ngk-insulators.com/en/sustainability/data.html>



## Prevention of Environmental Pollution

By developing and providing pollution prevention-related products and services using our unique ceramic technologies while enforcing proper management of chemicals and pollution prevention in our manufacturing processes, we will contribute to a safe and secure society.

### Basic Approach

Along with an increase in the world's population and economic development driven by business growth, an increasing amount of pollutants have been emitted to the atmosphere, water and soil. In particular, it is reported that hazardous chemical substances emitted into the environment have not only a negative impact on the environment, but also an adverse impact on human health. According to Making Peace with Nature, 2021 published from the United Nations Environment Programme (UNEP), pollution is estimated to cause some 9 million premature deaths annually, and keeping the planet healthy is key to providing health and well-being for all.

The NGK Group, which uses chemical substances in manufacturing processes, recognizes that it is one of their

social responsibilities to properly control chemical substances during the life cycle of products. We recognize that since failing to properly control chemical substances can lead to a compliance risk, a reputational risk, and a shutdown risk, it is necessary to control risks at international standards. On the other hand, tightening of environment-related regulations can lead to the expansion of the market for products to purify harmful waste, which can open the way for us to seize an opportunity to respond to pollution problems through providing environmental products and services.

With such recognition, the NGK Group defines the prevention of environmental pollution as one of the important issues, and promote initiatives.

### Management Approach

The NGK Group announced the NGK Group Vision: Road to 2050 in 2021, formulated the NGK Group Environmental Vision in April of the same year, and revised the NGK's Core Policy on the Environment based on our environmental vision.

Based on the guidelines for environmental action, regarding the handling of chemical substances by our Company, we strive to reduce the use of harmful substances and properly control those substances in compliance with related laws or regulations. In addition, regarding chemical substance contained in products, we share the NGK Group's Supply-Chain CSR Guideline and the NGK Group's Green Procurement Standard with our suppliers, and request them to observe the same control criterion in order to control such chemical substances throughout the entire life cycle of products. Furthermore, through utilizing our proprietary

micropore creation and control technologies in a wide range of applications such as one for the treatment of exhaust gas or radioactive wastes, we work on the prevention of environmental pollution through our products and services.

 For reference: NGK Group Vision → P.3-4



LINK

NGK's Core Policy on the Environment and the NGK Group Environmental Vision  
<https://www.ngk-insulators.com/en/sustainability/environment-vision.html>



NGK Group's Supply-Chain CSR Guidelines  
<https://www.ngk-insulators.com/en/info/procure/>



### Efforts for the Future

The NGK Group is working to control emissions into the atmosphere and water discharge while properly maintaining and improving the level of chemical substance control in compliance with regulations, including laws and guidelines. In FY2022, there was no serious violation of environment-related laws. We will continue to maintain this appropriate control structure in FY2023. Additionally, in product development, we have created products contributing the reduction of environmental pollution including HONEYCERAM®, which can purify harmful contents in the exhaust of automobiles. We will continue to develop, manufacture and sell products that contribute to the protection of the environment by utilizing our unique ceramic

technologies in FY2023.

Please visit the following links for information on the NGK Group's major initiatives for the prevention of environmental pollution.



LINK

Prevention of Environmental Pollution  
<https://www.ngk-insulators.com/en/sustainability/materiality-environmentalpollution.html>



Environmental/Social Contributions Through Our Products and Services  
<https://www.ngk-insulators.com/en/sustainability/environment-product.html>



## Conservation and Restoration of Biodiversity

With all employees maintaining a mindset of environmental conservation, we will contribute to the conservation and restoration of biodiversity through the development and provision of products that contribute to environmental protection while minimizing impacts on the ecosystem in our value chain.

### Basic Approach

Many of activities in our daily lives and socioeconomic activities depend on the various benefits that biodiversity produces, which is called ecosystem services. However, according to Global Assessment Report on Biodiversity and Ecosystem Services published from the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES) in 2019, biodiversity and ecosystem services have been significantly lost over the past 50 years, which suggests that it is impossible to sustain economic growth by using traditional methods. In 2022, the Kunming-Montreal Global Biodiversity Framework was adopted as an international framework for biodiversity. This framework sets

forth goals for 2050, and targets for 2030 that are consistent with the SDGs. We are acutely aware that it is vital to for the corporate sector to transform in order to achieve these goals.

However, since efforts for such transformation are likely to have an impact on our business activities themselves in the long run, it is important for us, the NGK Group, to understand how each business depends on and affects the natural environment in our value chain.

Considering this international trend and the NGK Group's relationship with nature, we define the conservation and restoration of biodiversity as an important issue, and promote initiatives.

### Management Approach

The NGK Group announced the NGK Group Vision: Road to 2050 in 2021, and formulated the NGK Group Environmental Vision in April of the same year. In this environmental vision, we set forth contributing to the realization of harmony with nature as one of our pillars. To realize this environmental vision, we have formulated the Fifth 5-Year Environmental

Action Plan as our environmental activity targets for FY2025, and based on this plan, we are advancing initiatives through internal and external collaboration.

Furthermore, going forward, we will draw up strategies and a road map toward 2050 in the light of external trends.

 For reference: NGK Group Vision → P.3-4

 LINK NGK's Core Policy on the Environment and the NGK Group Environmental Vision  
<https://www.ngk-insulators.com/en/sustainability/environment-vision.html>



### Efforts for the Future

At the NGK Group, we view addressing the conservation of biodiversity as one of the important issues in the pursuit of realizing a sustainable society. In FY2022, we proceeded with an investigation on what companies are requested and expected to do in association with biodiversity and natural capital as well as on external trends, reported the findings to ESG Management Committee and shared the importance of the issue. In the future, for example, we will consider launching the assessment of risks and opportunities in line with the LEAP (Locate, Evaluate, Assess, and Prepare) approach advocated within the framework of the Task force for Nature-related Financial Disclosures (TNFD). We will also

draw up strategies and a road map toward 2050.

Please visit the following links for information on the NGK Group's major initiatives for conservation and restoration of biodiversity and Group environmental performance.

 LINK Initiatives toward Harmony with Nature  
<https://www.ngk-insulators.com/en/sustainability/environment-nature.html>



Environmental Performance (ESG data)  
<https://www.ngk-insulators.com/en/sustainability/data.html>



## Social Materiality

### Pursuit of Quality and Product Safety

By pursuing trusted quality from the standpoint of our customers and by stably supplying safe and reliable products and services that exceed expectations, we will contribute to the creation of a better society.

#### Basic Approach

Quality and product safety have an influence on our customers and consumers staying beyond them. According to the Guidelines for Multinational Enterprises formulated by the Organisation for Economic Co-operation and Development (OECD) and ISO 26000, an international guidance on social responsibilities, consumers are defined as important stakeholders. Most of the NGK Group's customers are corporations; however, we are hoping to provide new values to consumers and eventually to society through products and services.

Our Group has, since its establishment, placed a high

value on providing the quality and product safety exceeding customers' expectations. Pursuing quality and product safety will lead to strengthening the relationship with customers that we have built up, and developing and broadening the relationship with new customers, and eventually to embodying the NGK Group Philosophy of "Enriching Human Life by Adding New Value to Society."

With this recognition, the NGK Group defines the pursuit of quality and product safety as an important issue, and will promote initiatives Group-wide.

#### Management Approach

The NGK Group regards providing products and services contributing to the creation of a better social environment as one of our most important missions, and will put ourselves in the shoes of customers and endeavor to create quality trusted by the society.

We hold up our quality policy of "NGK is dedicated to quality and committed to providing valuable products and services that are trusted by our customers and respected by society" based on the NGK Group Corporate Business Principles. Based on this quality policy, we set objectives every year and endeavor to create quality by putting ourselves in the customer's shoes.



LINK

NGK Group Corporate Business Principles  
<https://www.ngk-insulators.com/en/info/coc/>



#### 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 FY2023

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

#### Efforts for the Future

As in the past, the NGK Group will continue to promote activities to integrally pursue product quality and safety within the framework of the current quality activity system under the quality policy based on the NGK Group Corporate Business Principles through taking an approach of continuous improvement.

We have established the "conformance with six quality items" including product safety, and have endeavored to improve product quality and safety as part of our Quality Risk Elimination-Process (QRE-P) activities.

In addition, as a result of further promoting the improvement of quality of operations that we have been working on since 2018, the understanding and dissemination of quality compliance has progressed in our workplaces as well as among our Group companies, in which an organizational culture is being created where problems can be shared openly.

In FY2023, we are planning to have each business

division look into issues related to product safety and enhance our activities including risk assessment. In addition, we will work for preventative and recurrence-prevention measures by improving the work process reflecting the results of cause analysis of quality issues, and then we will further enhance working to the autonomy of improving the quality of operation.

Please visit the following links for information on the NGK Group's major initiatives for the pursuit of quality and product safety.



LINK

Pursuing of Quality  
<https://www.ngk-insulators.com/en/sustainability/society-quality.html>



Pursuing of Product Safety  
<https://www.ngk-insulators.com/en/sustainability/society-pro-safety.html>



## Quality Risk Management

### Four Rules for Quality Activities

The NGK Group promotes restructuring of its quality activities to respond more precisely to increasing and diversifying quality demands from customers in different target markets.

We have formulated these quality activity rules particularly to enhance the elimination of quality risks in the market, and are promoting their adoption and improved effectiveness.

Rule	Description
Quality confirmation rule	Establish milestones, from development to start of production, and confirm conformance with six quality items when production processes change.
Design Review (DR) function strengthening rule	Register DR plans with quality risks of medium or high level as important DR subjects with participation of company-wide DR reviewers. The Quality Management Department head holds company-wide DRs for cases with a particularly high risk level.
Quality monitoring rule	Monitor and share information company-wide with respect to quality status changes or problems concerning products or markets. Manufacturing defects and customer complaints are shared company-wide every month through reports to the Quality Management Department, and the appropriateness of countermeasures is discussed.
Rule for handling major customer complaints	In the event of a serious customer complaint, including a potential complaint, the situation is promptly reported to the Quality Committee Chair to formulate company-wide countermeasures.

### Product Quality Risk Elimination-Process (QRE-P) Activities

From 2017, the NGK Group started promoting Quality Risk Elimination-Process (QRE-P) activities that can identify procedural innovations in order to eliminate quality risk. Regarding quality defects, we made rules in which departments themselves analyze “what parts of the work process were lacking” and improves their work processes by themselves instead of merely implementing technical

countermeasures to prevent recurrence. In FY2023, with the aim of more effectively and efficiently eliminating quality risks in development projects, we will join departments in considering quality risks in accordance with QRE-P from an early stage in development as we work to improve reliability at commercialization.

### QuiC Activities—Quality Improvement Activities Featuring Full Employee Participation

Since 2003, the NGK Group has held QuiC (Quality up innovation Challenge) quality improvement activities in which all employees participate. These activities consist of quality improvement activities by small groups or individuals and suggestions that strive to enhance the quality of production; best practices are then shared by the entire NGK Group. In July 2022, we held the Company-wide QuiC Activities

Contest both in person and online.

In October 2022, we held the “NGK-BOX/Surprising Challenges!,” a company-wide forum for laterally sharing reform examples and model initiatives in order to boost employee motivation and invigorate the workplace.

We plan to hold similar events in FY2023.



Company-wide QuiC Activities Contest



NGK-BOX/Surprising Challenges! best practices presentation held online



## Contribution to Digital Social Infrastructure

The NGK Group contributes to the safety, security, and comfort of society by establishing strong information security and providing products and services using our unique ceramic technologies for the increasingly sophisticated digital society.

### Basic Approach

Along with the transition to a digital society, companies are collecting and analyzing an unprecedented amount of data and utilize them in business situations. This trend has positive impacts on society and the economy, such as the development of marketing tailored to each consumer's situation, and the increased efficiency of the manufacturing floors and the logistics industries; on the other hand, however, data privacy and security are becoming important issues.

This indicates that the NGK Group have both expanding business opportunities and the risks of handling data. In terms of opportunities, demand is expected to increase in

markets related to the transition to a digital society, including semiconductor manufacturing equipment and electronic devices. However, considering that there is a growing risk of information leakage caused by cyber-attacks from outside, we acknowledge it is important to respond such risk appropriately in order to contribute to the realization of a digital society in the future.

Based on this recognition, we have determined that contributing to the digital social infrastructure is one of the most important tasks for the NGK Group, and we will promote our efforts.

### Management Approach

We are going to advance development toward the creation of new products in our business related to semiconductors and electronic components supporting the development of the fields of IoT, AI, and communications. To that end, we will endeavor to understand market needs and technological trends by making use of relationships with customers from various industries and consulting external advisers more than before. In addition, by collaborating with external partners and promoting open innovation, we will work with speed to solve issues of the ever-developing digital society.

In addition, regarding the utilization of our Group's data, the NGK Group will appropriately manage information based on the Basic NGK Group Information Security Policy.

 For reference: New Value 1000 → P.29-34

 **LINK** Basic NGK Group Information Security Policy  
<https://www.ngk-insulators.com/en/info/policies/#groupindex.html>



### Efforts for the Future

By utilizing ceramic materials and process technologies, we will create new products focusing on the development of various types of wafers, new ceramic packages, materials for semiconductor manufacturing equipment as for the fields related to future broadband communications services,

next-generation mobility services and semiconductors.

Please visit the following links for information on the NGK Group's major initiatives for contributing to digital social infrastructure.

 For reference:  
Digital Society Business → P.43-44  
Information Security → P.80  
Internal Roundtable: Research, Development, and Commercialization → P.29-34

## Enhancing Value of Human Resource

We will add new value to society by developing an enriched and lively workplace environment where personnel with diverse experiences and values can play active roles, and each personnel autonomously embraces challenges and elevate each other.

### Basic Approach

Human resources are becoming more and more important for companies. Their importance is increasing not only because of their importance as a source of competitive advantage in business activities, but also in that a company views its employees, who are members of society, as one of the stakeholders and provides them with opportunities for challenges, to play active roles, and to grow.

The NGK Group has approximately 20,000 employees globally. We believe that if all the employees embrace challenges and encourage each other to grow, it will lead to the realization of the NGK Group Vision. To this end, it is indispensable to provide ample opportunities that allow

employees with various values and backgrounds to give full play to their abilities; otherwise, it will become impossible to hire and retain excellent human resources, resulting in a risk of the loss of competitiveness. We also recognize that ensuring the safety and health of our employees is the foundation of our work environment, and to that end, it is necessary to create an environment that allow them to work with peace of mind as well as to comply with laws and regulations.

Based on this understanding, the NGK Group defines the improvement of the value of human resource as an important issue, and promotes initiatives Group-wide.

### Management Approach

The NGK Group formulated the NGK Group Human Capital Management Policy in June 2023. In this human capital management policy, we establish two policies, that is, the Human Resource Development Policy and the Workplace Development Policy.

We will improve the value of human resources of the Group through promoting measures based on these policies.



For reference:  
NGK Group Human Capital Management Policy → P.67



LINK

NGK Group Human Capital Management Policy  
<https://www.ngk-insulators.com/en/info/policies/>



### Efforts for the Future

We have promoted measures that contribute to the improvement of value of human resources through the Human Resources Department and the HR Committee, a cross-sectoral organization, with the aim of promoting Five Transformations toward the realization of the NGK Group Vision. Going forward, we will endeavor to steadily improve

the effectiveness of Five Transformations through setting forth targets and measures based on the NGK Group Human Capital Management Policy and manage their progress.

Please visit the following links for information on the NGK Group's major initiatives for enhancing value of human resources.



LINK

Human Resource Management  
<https://www.ngk-insulators.com/en/sustainability/society-hr-management.html>



Work-life Balance  
<https://www.ngk-insulators.com/en/sustainability/society-wlb.html>



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



Human Resource Development  
<https://www.ngk-insulators.com/en/sustainability/society-skills.html>



Occupational Safety and Health  
<https://www.ngk-insulators.com/en/sustainability/society-safety.html>



Health Management  
<https://www.ngk-insulators.com/en/sustainability/society-health.html>



Message from Director in charge of  
the Human Resources Department

## Achieve the Five Transformations through NGK Group Human Capital Management

Director and Senior Vice President  
In charge of the Human Resources Department

Tadaaki Yamada

People are the core of corporate management, human resources are considered to be capital, not a cost. In June 2023, the NGK Group in an unprecedented stage of transformation formulated the NGK Group Human Capital Management Policy in conjunction with the NGK Group Philosophy and the NGK Group Vision, recognizing the importance of human capital management for future growth.



### With changes of the times, our ideal image of human resources has also changed

In 2019, the NGK Group made changes to the NGK Group Philosophy, and in 2021, the Group announced the NGK Group Vision, which sets out the direction in which we should proceed to realize the philosophy. In order to achieve the Five Transformations, which we are promoting to contribute to carbon neutrality and digital society, we believe that it is essential to value human resources as “capital” and link them to medium- to long-term enterprise value enhancement. In other words, we believe it is essential to actively engage in human capital management and the NGK Group Human Capital Management Policy serves as our guidepost.

Since its founding, the NGK Group has achieved steady growth by leveraging its unique and diverse ceramic technologies. However, with the changing times, the Group is now undergoing a major transformation. With the ongoing evolution to electric vehicles, it is clear that our core business for internal combustion engines will shrink in the future. Therefore, we must create new businesses and products for the next generation in order to achieve sustainable growth. In response to such changes in the business environment, and the ideal image of human resources we seek is also changing naturally. Therefore, we have clarified the direction of the human resources strategy that the NGK Group aims to

achieve so that each and every employee can take these changes as his or her own matter and promote a change in awareness.

### Our Human Capital Management Policy directly leads to the realization of the Five Transformations

The NGK Group Human Capital Management Policy was formulated after a number of discussions under the guidance of the HR Committee. The purpose of the policy is to secure and develop human resources who can realize the Five Transformations. In addition, “developing a rich and lively workplace” and “developing an open workplace that encourages challenges” are included as necessary elements for realizing the Five Transformations. Although the interpretation of “developing a rich and lively workplace” varies from person to person, the words were chosen with the intention of creating a variety of values, including satisfaction, fair compensation, ease of work, trusting relationships, and health. In addition, while taking on challenges is in the DNA of the NGK Group inherited from our founding ancestors, we also have a prudent corporate culture. Therefore, in order to bring about change, we felt that it was necessary to foster a corporate culture that encourages challenges and values

Social Materiality

motivation and process, even when these fail.

There are three traits of the ideal human resources that we seek: people who cultivate advanced knowledge, skills, abilities, and proactively approach problems, people who demonstrate teamwork and persistently lead to results, and people who autonomously grow and continuously change themselves and the company. The NGK Group, which has pioneered the pathless road with its advanced technological capabilities and outstanding expertise, has nurtured excellent human resources, and the employees support the earning power in their respective fields. In the future, while maintaining the current earning power, we will promote the creation of a system that can expand the areas of challenge through an add-on approach and support each individual so that they can realize their potential.

In particular, we will focus on securing and developing DX bridge talents and global management talents. As a measure to achieve this, we have started initiatives such as the in-house DX Study Exchange where employees can learn data analysis and digital technology intensively away from the departments to which they are assigned

without having to work concurrently at their main jobs, and encouraging employees to acquire IT passport qualifications with the aim of improving IT literacy. DX bridge talents are those who serve as a bridge between digital human resources with digital expertise and specialized skills and their respective businesses. We want them to play an active role as key people in promoting DX, which is included in the Five Transformations, such as planning and solving issues based on an understanding of both DX and business.

Global management talents refer to people who bridge local management with the NGK Group Philosophy, the NGK Group Vision, and Group strategies. We promote the recruitment and development of human resources who can bring together organizations with various languages, customs, and values at our overseas bases, and will secure and develop human resources who have the ability to make decisions and take actions, and cross-cultural communication skills. We have been conducting global seminars such as language training, communication and management training based on cross-cultural understanding, and area studies of various

➤ **NGK Group Human Capital Management Policy**

NGK Group defines “People who embrace challenges and teamwork” as one of Our Values of NGK Group Philosophy, and we are committed to realize Our Mission: Enriching Human Life by Adding New Value to Society. NGK Group is committed to drive the Five Transformations to realize the NGK Group Vision, and we believe that the active engagement of each personnel is crucial for accomplishing the Five Transformations. We define the core of the Group’s human capital management as hiring and developing personnel to enrich team members dedicated to the Five Transformations, and establishing an environment where each personnel can perform at full potential. Building upon this core belief, we establish the “Human Resource Development Policy” and “Workplace Development Policy” as follows.

➤ **Human Resource Development Policy**

NGK Group develops personnel with the following abilities and mindset required to realize the Five Transformations.

- Cultivate advanced knowledges, skills, abilities or their combination, and proactively approach to problems
- Demonstrate teamwork and persistently lead to results
- Autonomously grow and continuously change oneself and the company

➤ **Workplace Development Policy**

NGK Group develops the following workplace environment where each personnel can perform at full potential.

- **Diverse and Inclusive Workplace**  
A workplace where everyone is acknowledged and respected, regardless of external attributes such as race, nationality, gender, and age, as well as internal attributes such as religion, beliefs, experiences, and values.
- **Enriched and Lively Workplace**  
A workplace where diverse personnel can feel rewarded, stay healthy both physically and mentally, have colleagues we respect and enjoy working with, and maintain a good work-life balance.
- **Open Workplace that encourages challenges**  
A workplace with open communication and psychological safety, that embraces courageous challenges for growth.

countries, and we plan to further enhance our educational programs in the future. In addition, we also plan to eventually restart our overseas practical training program which was stopped due to the COVID-19 pandemic.

### HR Development Policy and Workplace Development Policy to ensure diversity

In line with the human resource requirements outlined in the Human Capital Management Policy, we have revised our HR Development Policy and formulated a new Workplace Development Policy. Based on these two policies, we will actively promote diversity and inclusion, and strive to create systems as well as an environment and corporate culture that allow diverse human resources to choose work styles according to their individuality and life stage so that they can demonstrate their abilities and play an active role. Specifically, in addition to the aforementioned efforts to develop DX bridge talents and global management talents, we will develop a variety of human resource development measures, such as position-based education and career autonomy support, to support individual growth. At the same time, we are also revising our personnel system, including the introduction of a job rotation system that allows employees to transfer across department, and we will focus on efforts to foster individual diversity within each and every employee.

With regard to securing human resources, we are actively recruiting human resources with specialized knowledge and skills in various fields with a view to future business development and expansion of our business domains. The effect of the “breath of fresh air” has been significant, bringing perspectives, ideas, and networks that were not available within the company. As a result, we are beginning to see results, such as the birth of new businesses.

### Promoting the spread concepts outlined in the NGK Group Human Capital Management Policy throughout the entire Group

In the NGK Group, approximately 12,500 personnel are engaged in operations at overseas bases, and one of the immediate challenges is to ensure that this Human Capital Management Policy is thoroughly instilled in each Group company. It goes without saying that conditions surrounding human resources in Japan differ from those overseas. Furthermore, when we say “overseas,” we need to be aware that each country and region has a different environment, customs, culture, etc., and sensitivities and values regarding working styles are different. Of course, the challenges we face also differ. In light of this background, we believe it is necessary to understand the issues faced by each Group company, strengthen cooperation among overseas bases, and



## We aim to achieve sustainable growth by implementing human resource approaches linked to our business strategy and maximizing the value of our human resources.

develop flexible human resources strategies that are tailored to local business conditions.

### To become a company chosen by workers

In recent years, the fluidity of human resources has been increasing partly due to the decrease in the working population of young people and work style reforms that allow workers to choose flexible work styles. Amid the current trends of the times and changes in society, we must continue to be an attractive company chosen by workers in order to secure excellent human resources who will lead the future of the NGK Group. In accordance with the NGK Group Human Capital Management Policy, the NGK Group will implement a human resources strategy that is linked to its business strategy and aim for sustainable growth by maximizing the value of human resources. As the realization of the NGK Group Vision lies ahead, we will continue to persistently take on challenges by turning the power of individuals into the power of the Group.

## Respecting Human Rights

We are committed to create a society that is free from violation of the human rights of all people impacted by our business activities by extending initiatives throughout our Company and value chain to respect human rights.

### Basic Approach

With the increased impact of corporate activities on society, there has been a growing public interest in not only their positive influences such as the improvement of the quality of people's lives, and the creation of job opportunities, but also their negative influences. Public interest in respect for human rights in corporate activities is one of those examples showing such a trend. The Guiding Principles on Business and Human Rights endorsed by the UN Human Rights Council in 2011 stipulates that one of the three pillars of the guiding principles is respect for human rights by a company,

exhibiting international norms about how a company should respect human rights.

The NGK Group recognizes that it conducts business globally while having a relationship with many stakeholders, and as such, there are people who are affected by the NGK Group's business, not only within the Company, but throughout the entire value chain. Based on the belief that it is our Group's responsibility to respect their human rights, we define ensuring respect for human rights as one of our important issues and promote initiatives.

### Management Approach

The NGK Group upholds respect for human rights in the NGK Group Corporate Business Principles, which declares: "We will strictly comply with international standards of human rights and respect diversity." In addition, we established the NGK Group Human Rights Policy in April 2021 based on the United Nations Guiding Principles on Business and Human Rights in order to ensure that the human rights of all people affected by the NGK Group's business activities will not be violated. Based on this policy, we will endeavor to reduce human rights risks throughout the value chain.

#### NGK Group Human Rights Policy

(Only policy headings shown)

1. Basic Approach to Human Rights
2. Applicable Laws and Regulations
3. Scope of Application
4. Education and Training
5. Main Focus of the Group's Commitment to Human Rights
6. Human Rights Due Diligence
7. Remedy
8. Dialogues and Discussions
9. Information Disclosure
10. Responsible Persons



LINK

The NGK Group Corporate Business Principles  
<https://www.ngk-insulators.com/en/info/coc/>



NGK Group Human Rights Policy  
<https://www.ngk-insulators.com/en/info/policies/#humanrights>



### Efforts for the Future

As part of our initiatives for the due diligence process to identify and assess human rights risks in our Group companies and supply chain, we utilize self-assessment questionnaires to grasp the actual status. In addition, regarding latent human rights risks, we strive to grasp the actual situation through using a mechanism for consultation and whistle-blowing. In FY2023, we will appropriately address human rights risks by increasing the number of subjects of the assessment and improving its content.

Please visit the following link for information on the NGK Group's major initiatives for respecting human rights.



LINK

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



## Due Diligence Process, Assessments, and Corrective Steps

The NGK Group pursues a variety of efforts to identify, prevent, and mitigate practices within the Group's business operations that negatively impact human rights. Responses were reviewed by the HR Committee and reported to the Board of Directors.

### 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 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 responsibilities for safe working environments, worker protection, and environmental impact.

### Risks to Employees' Human Rights

To respond to risks to employees' human rights, reports and consultations on human rights are received through the whistleblowing system and information is compiled. NGK receives reports from Group companies once every 6 months through the Human Rights Grievance Survey. In FY2022, we received 28 reports related to human rights (harassment,

labor-related, etc.) from the entire NGK Group through the above procedure. We are handling these through fact-finding investigations as well as by providing guidance and reminders for corrective action. We also conduct a Corporate Risk Survey (CRS) once every two years to ascertain potential risks.

### Risks to Human Rights in the Supply Chain

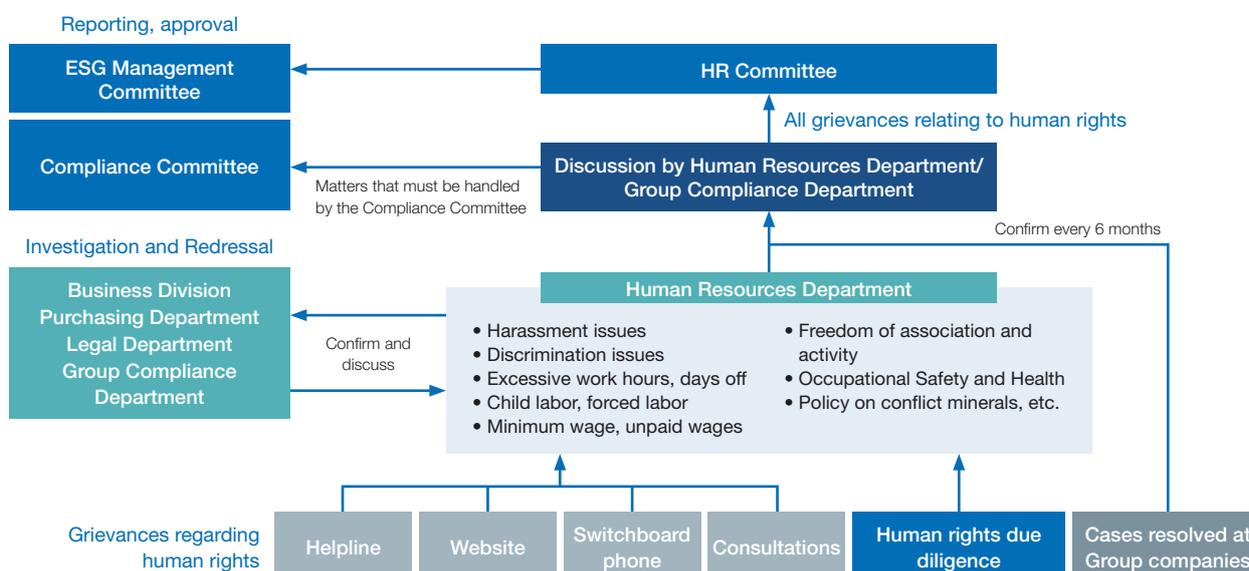
Every year, we request our suppliers, including companies that are new to our supply chain, to sign an agreement to comply with NGK Group's Supply-Chain CSR Guideline. Moreover, in FY2022 we newly conducted a self-assessment survey to ascertain the level of understanding of, and status of activities related to, CSR procurement at approximately 630 suppliers that NGK Group companies in Japan do business with.



NGK Group's Supply-Chain CSR Guideline  
<https://www.ngk-insulators.com/en/info/procure/>



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



## Promotion of Sustainable Procurement

Based on our basic purchasing policy, we work with procurement partners that make up the supply chain to promote procurement that takes human rights, the environment, and fair business practices into account, thereby contributing to the happiness and sustainable development of society.

### Basic Approach

In recent years, along with the globalization of corporate supply chains, there is a growing concern over various social and environmental problems. In addition to problems related to long working hours and false description of goods occurring in Japan, there are problems that can cause human rights violations, environmental destruction, and climate change in the supply chain, such as forced labor and child labor, which are affecting the entire world.

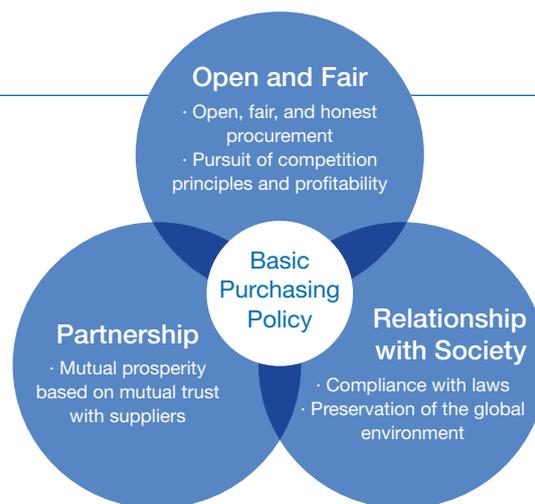
In addition, due to the growing consumers' awareness toward child labor, discrimination, forced labor, biodiversity, etc., there are cases in which a company is judged to be failing to fulfill its social responsibilities adequately, resulting in losing credibility, boycotts, and suffering a severe impact on its business activities.

We recognize that even in the procurement of products, materials, raw materials, services, etc., a company needs to make efforts to address and prevent problems related to human rights and the environment, in addition to making conventional efforts for quality, performance, pricing and time to delivery. We also believe working together with suppliers to address these issues to increase the resilience of the supply chain will lead to providing products and services that customers can use with peace of mind in all aspects.

With such recognition, the NGK Group regards continuing to realize environmentally, socially, and economically sustainable procurement throughout the entire supply chain as one of our most important tasks, and will promote initiatives together with our suppliers.

### Management Approach

The NGK Group has established its Basic Purchasing Policy centered on the three fundamental axes for purchasing activities, that is, "Open and Fair," "Partnership," and "Relationship with Society." We also request our suppliers to comply with the NGK Group's Supply-Chain CSR Guideline, which is based on the NGK Group Corporate Business Principles, various NGK Group policies, and various norms. When challenges arise, we will work with our suppliers to make necessary corrections in order to reduce sustainability risks in the supply chain.



LINK

The NGK Group Corporate Business Principles  
<https://www.ngk-insulators.com/en/info/coc/>



NGK Group Human Rights Policy  
<https://www.ngk-insulators.com/en/info/policies/#humanrights>



NGK Group's Supply-Chain CSR Guideline  
<https://www.ngk-insulators.com/en/info/procure/>



### Efforts for the Future

As part of our efforts to promote and expand our CSR procurement activities, we have conducted surveys to grasp the actual status of CSR activities and ESG aspects of our major suppliers by using self-assessment questionnaires since FY2021, and according to their response, we provide follow-up support to individual suppliers to enhance their procurement capabilities.

We will continue to clarify and improve our ESG issues in the entire supply chain, and make concerted efforts to

reduce GHG Scope 3 emissions with the aim of realizing sustainable procurement.



LINK

Supply Chain Management  
<https://www.ngk-insulators.com/en/sustainability/society-scm.html>



## Supplier Assessment

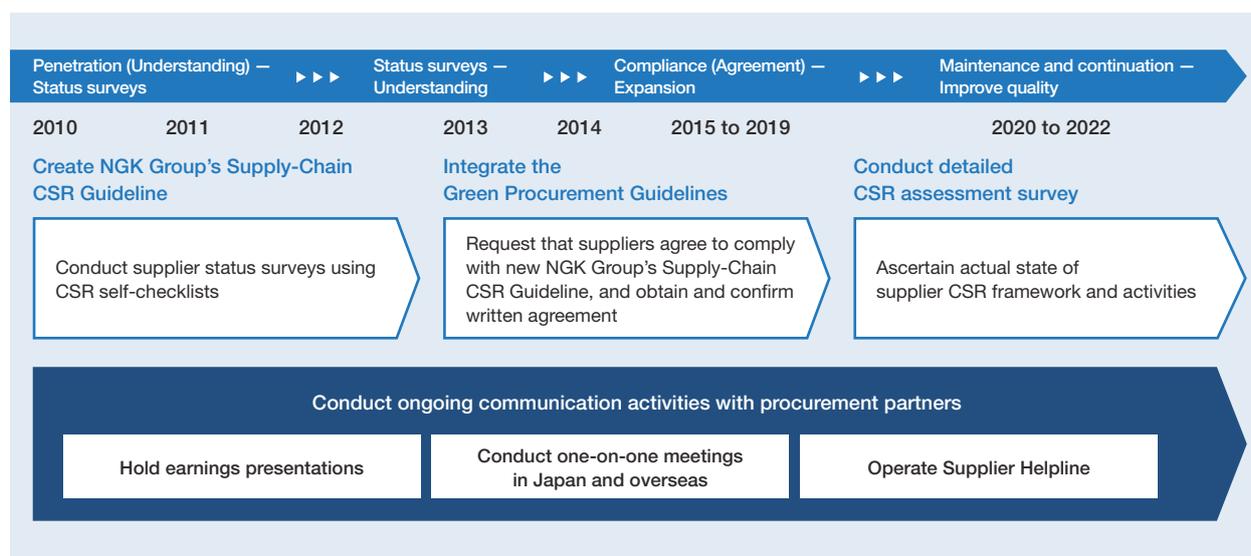
Within NGK, raw materials and molding molds for main production items\*1 are considered critical items, and of the suppliers who supply these items to NGK, 38 companies (22 Tier 1 companies, 16 Tier 2 companies) are considered critical suppliers from the standpoint of transaction volume (accounting for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

Furthermore, to promote CSR procurement, the NGK Group is engaged in activities to promote understanding,

including individual supplier visits and fact-finding surveys. In addition to submitting a written agreement to comply with the existing NGK Group's Supply-Chain CSR Guideline, the Group started conducting a fact-finding survey questionnaire in 2021 to conduct a detailed CSR evaluation of each supplier (total of 114 questions in nine categories, including human rights, labor, and the environment). From a business impact standpoint, the scope of the survey will be expanded in stages, starting with NGK's direct materials suppliers, followed by major suppliers of Group companies in Japan, and ending to include major suppliers of Group companies outside Japan in FY2023.

\*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

## Ongoing Promotion of CSR Procurement



LINK

Communication with Procurement Partners

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



## Procuring Resources and Raw Materials Responsibly

The NGK Group considers the impact on local communities of the use of raw materials (for example, conflict minerals: the four minerals of 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 forces in the area) that may cause social problems such as human

rights abuses and poverty, and takes measures to avoid the use of the above-mentioned materials in its procurement activities. Additionally, in response to requests from customers, we investigate suppliers regarding their responsible procurement of resources and raw materials.

A Talk with Our Outside Directors

# Enhancing discussions on sustainable growth and reliably fulfilling a supervisory function

Advice backed up by the objective viewpoints and the wealth of experience of outside directors is indispensable in order for the NGK Group to sustainably grow to achieve the NGK Group Vision. The Outside Directors spoke about the roles that the Board of Directors should fulfill and future challenges and expectations.

(Chairperson)  
General Manager of ESG  
Promotion Department in the ESG  
Management Department

**Keigo Nojiri**

Discussion

Outside Director

**Kazuo  
Furukawa**



Outside Director

**Emiko  
Hamada**



Outside Director

**Hiroyuki  
Kamano**

Reflecting on FY2022

**Nojiri:** Could you please tell us your impressions when reflecting back on this last year?

**Kamano:** FY2022 was a fiscal year marked with a rapidly changing environment for our society. This was not only impacted by the prolonged COVID-19 pandemic, but also by soaring material and energy costs due to the tense situation happening in

Ukraine, the rapid depreciation of the yen, and currency volatility. As these can be called VUCA\* times, it continues to be difficult to predict what will happen next. In the midst of this, I have the impression that the NGK Group has been steadily moving forward while balancing both reactive and proactive actions in line with the NGK Group Vision Policy.

\* V=Volatility, U=Uncertainty, C=Complexity,  
A=Ambiguity: A situation with an uncertain outlook making future projection difficult.

**Hamada:** I think this was a year that was hard for all organizations to

navigate with the repeated waves of COVID-19 and rising costs. However, I believe that the NGK Group had a point of focus with the clear future direction of the NGK Group Vision and has pushed forward adhering to this focal point with a sense of unity.

**Furukawa:** I feel this was a year that we practiced patience and preparedness in this rapidly changing environment. We changed our organizational structure from one with four Business Group to one with three in an effort to streamline the organization and speed up decision making, and made a fresh start with New Value 1000 (NV1000) aiming to achieve 100 billion yen in sales for new commercialized products by 2030. Although creating new business will not be easy, I feel that by focusing on Corporate NV Creation we can rely on deepening our relationship with external organizations and taking on challenges without fear of failure.

**Nojiri:** How is the external environment changing in terms of governance?





**Kamano:** This spring, the Tokyo Stock Exchange requested that listed companies disclose their measures to practice management that factors in the cost of capital and stock prices, the implementation of dialogue with stockholders, and anything else of pertinence. The Board of Directors is working to improve capital efficiency through the application of ROIC at NGK. Going forward, it is necessary to conduct an in-depth analysis and assessment of the current situation of the company's capital costs and profitability of capital and discuss remedial measures based on that assessment.

**Furukawa:** I think we provide more comprehensive disclosure information on the website and can adequately respond at this time. Moreover, while over the last few years there were fewer opportunities for direct dialogue with shareholders due to the impact of the COVID-19 pandemic, going forward these opportunities should gradually increase.

**Hamada:** Initiatives for human capital management have become critical since disclosure of human capital was made obligatory from the fiscal year ended March 31, 2023. We recently formulated the new NGK Group Human Capital Management Policy in response to this change. Currently, we are in the midst of further concrete discussions about human resource development and improving the corporate environment. My advice is to promote diversity, particularly for women's participation and advancement in the workplace.

Board of Directors functioning  
as a place for free and  
constructive discussion

**Nojiri:** I'd like to ask about the Board of Directors which can be said to increase the effectiveness of governance. Could you tell us about the discussions had at the Board of Directors meeting and their general tone?

**Kamano:** There were 71 resolutions at the FY2022 Board of Directors meetings, and we deliberated on a significant number of topics, including management strategies, budget, and governance. Overall, it's a friendly atmosphere, but when it comes to talks about management strategies and the business plan, sometimes everyone's aspirations to help the company grow clash and the discussions can be tough.

**Hamada:** What I always appreciate is the opportunities for us Outside Directors to be briefed on the agenda items before the Board of Directors meeting. Since we always take enough time to carefully explain the items, we can attend the Board of Directors meeting already knowing the context and current situation. Also, I feel that a recent trend of the Board of Directors meetings, is to have fruitful discussions from the entire group's point of view.

**Furukawa:** Along with reducing the size of the Board of Directors, the interactions between us Outside

A Talk with Our Outside Directors

Directors and the Internal Directors have been intensifying in recent years, and the supervisory function has been also improving. I'm from the manufacturing sector and I strive to deepen my understanding of how projects are progressing and their development. I try to communicate my opinions and advice based on my own experience from a distant external point of view.

**Nojiri:** Out of the many deliberations throughout the year, what proposals or resolutions have left a lasting impression?

**Hamada:** One that we spent a lot of time on was the deliberation about the NAS<sup>®</sup> battery, a megawatt-class energy storage system, and the discussions became heated each time. We went on a NAS battery factory tour and were given a detailed explanation about the technical underpinnings, cases and results of its practical application, and future outlook. I understand this is an important technology to support the future and a project that is socially significant. However, I expect that we need to tweak one or two things when it comes to profit.

**Furukawa:** I think that as decarbonization becomes more important, there are high expectations for energy storage system and seizing



the current moment to work on the systematization of a capacity battery is significant. There are many issues regarding the possible business scenario to provide an energy solution to the world with the NAS battery, but I believe that NGK can accomplish this thanks to its 100-year history.

**Kamano:** The resolution to cease manufacturing insulators at the Chita location left a lasting impression on me. The reduction of our original business for insulators was a major decision, but I believe that looking ahead to the future it was a necessary step forward for the NGK Group toward business portfolio optimization, considering the current sluggish demand for insulators and the shift in consumption from products to services and experiences.

Overcoming challenges and achieving NV1000

**Nojiri:** In this rapidly changing business environment, the NGK Group is facing a host of challenges that must be overcome. Could you please tell us your thoughts about these issues?

**Kamano:** Regardless of the steadily accumulated achievements over the last few years, I can't say the market evaluation for the NGK Group is always favorable, since there are concerns about the reduction of the main business due to the ongoing shift to electric vehicles. Under these circumstances, we drafted the NGK Group Vision indicating what type of business we want to be in 2050, and we began NV1000 as a checkpoint aiming to achieve 100 billion yen in sales in 2030 for new commercialized products. Achieving NV1000 is a top priority, and I believe the Board of Directors must thoroughly and repeatedly discuss the strategies and processes for creation and expansion of new businesses, and the further refinement of these ideas.

**Furukawa:** Speed is also important. If we can't project that this will boost

profits somewhere within 2 to 3 years, I'm concerned that it may be difficult to achieve. The impact of the shift to electric vehicles on the main business is unavoidable. At the same time, we should be at the new business stage in which we can actively participate in the shift to electric vehicles using NGK Group technology. I want the NGK Group to create something that is second to none with a new approach incorporating cutting edge technology and tools. For instance, materials informatics (MI), which are starting to be implemented, are expected to contribute to the highly efficient development of new materials.

**Hamada:** The point is how we can adjust NGK Group high-level proprietary technology to market demand and provide it as a solution. I'd like to create a flow where the Board of Directors send out a positive message about turning the changes in the external environment into opportunities and developing the next story with this sort of vision so that our employees can confidently proceed with their tasks.

Progress and issues of governance reform

**Nojiri:** How is governance reform going? the NGK Group is continuously working on governance reform, but I believe there are still shortcomings. Could you please tell us your candid opinions on this?

**Kamano:** I think governance is progressing in terms of effectiveness, transparency, fairness and all other aspects. The ratio of Outside Directors on the Board of Directors is 1/3, and the monitoring capabilities are becoming more robust through diverse discussions. Also, the chairperson of the Nomination and Compensation Advisory Committee has joined the Outside Directors, which guarantees objective and transparent decisions on compensation. Furthermore, they also show the medium- to long-term plan for the succession plan as well.

**Hamada:** I have served for six years, so I am keenly aware that initiatives to strengthen governance have been underway within that time period. On the other hand, the fact that the P/B ratio (price-to-book ratio) hasn't reached 1 means the enterprise value of the NGK Group has not been properly conveyed to the world. It seems necessary to make the future management strategy focused on NV1000 enticing to those outside the company. Moreover, securing talent and human resource development are the keys to future growth. People in Japan and throughout the world have focused more on how companies should consider human resources and what measures should be taken. Presenting how the NGK Group currently shares its ideas on human capital at this timing could be evaluated through the NGK Group Human Capital Management Policy.

**Furukawa:** One of the indispensable elements to promote human capital management is diversity. The percentage of women in managerial roles at NGK was 3.8% in 2022, which is a rather low number. Our goal is to achieve 10% by 2030 and 20% or more by 2050, so we need to proactively recruit mid-career female managers.

**Hamada:** Women's participation and advancement in the workplace is, of course, important for women, and in fact, there's a point of interest for men as well. The extent of women's participation and advancement will be a yardstick to determine whether a breath of fresh air is blowing throughout the company and whether change is proactively pursued.

**Furukawa:** Globalization including diversity could be said to be an issue. The NGK Group is a global company with overseas sales accounting for over 70% of the company sales. However, it seems the company still hasn't quite achieved globalization in the true meaning of that word. There is English language training and study abroad programs, and we're making an effort to develop personnel who can be active overseas. However, I think



there should be a framework that welcomes talented foreign individuals to Japan rather than one where only Japanese staff go abroad. The R&D Department seems particularly promising for opening up opportunities for these personnel exchanges.

#### Identification of Materiality

**Nojiri:** This year, the NGK Group identified nine materiality issues to resolve social issues and sustainably enhance enterprise value. Could you please tell us your opinions on the process of identifying these issues?

**Hamada:** Since drafting the NGK Group Vision in 2019, we deepened the accumulated discussions, and after repeated workshops for the Materiality Identification Project over the year, we managed to identify these issues. This was certainly convincing and an extremely good method.

**Kamano:** This fiscal year, we will push forward the establishment of the action plan and KPIs (key performance indicators) focusing on priorities including the identified Materiality especially initiatives for climate change, the promotion of resource recycling, and the protection of human rights. Continued discussions are necessary including ones about how to modify monitoring indicators and how to manage progress.

**Nojiri:** To conclude, would you mind sharing a message with all of the NGK stakeholders from your perspective as

an Outside Director?

**Hamada:** Taking on challenges is in the DNA of the NGK Group, which has a 100-year history, with its unparalleled technology and wonderful staff. The foundation for growth has been laid, so I hope you look forward to seeing it grow in the future. I'd like to always be conscientious of my role to provide inspiration drawing on my external viewpoint and expertise as an Outside Director.

**Kamano:** I would like to fully support the NGK Group from the slightly detached perspective of an Outside Director in its aim to enhance enterprise value by contributing to the resolution of social issues based on the two objectives of carbon neutrality and digital society. In addition, I am committed to further strengthening and enhancing the governance structure to achieve more sound corporate management and higher employee motivation.

**Furukawa:** I recognize that the important tasks of an Outside Director with an independent standpoint is to frankly point out the problems that would be difficult for Internal Directors to point out and to express opinions paying attention to the direction in which the company overall is heading. We will continue to push for taking on challenges and making reforms, while bearing in mind the two goals of enhancing enterprise value focused on shareholders and providing an environment where all employees feel satisfied with their work in their positions.

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.

Since FY2021, we have asked Group companies to select compliance administrators and compliance officers and have begun 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. We have participants fill out questionnaires after they complete the training to gauge their level of understanding and consider improvements for the next round of training. 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

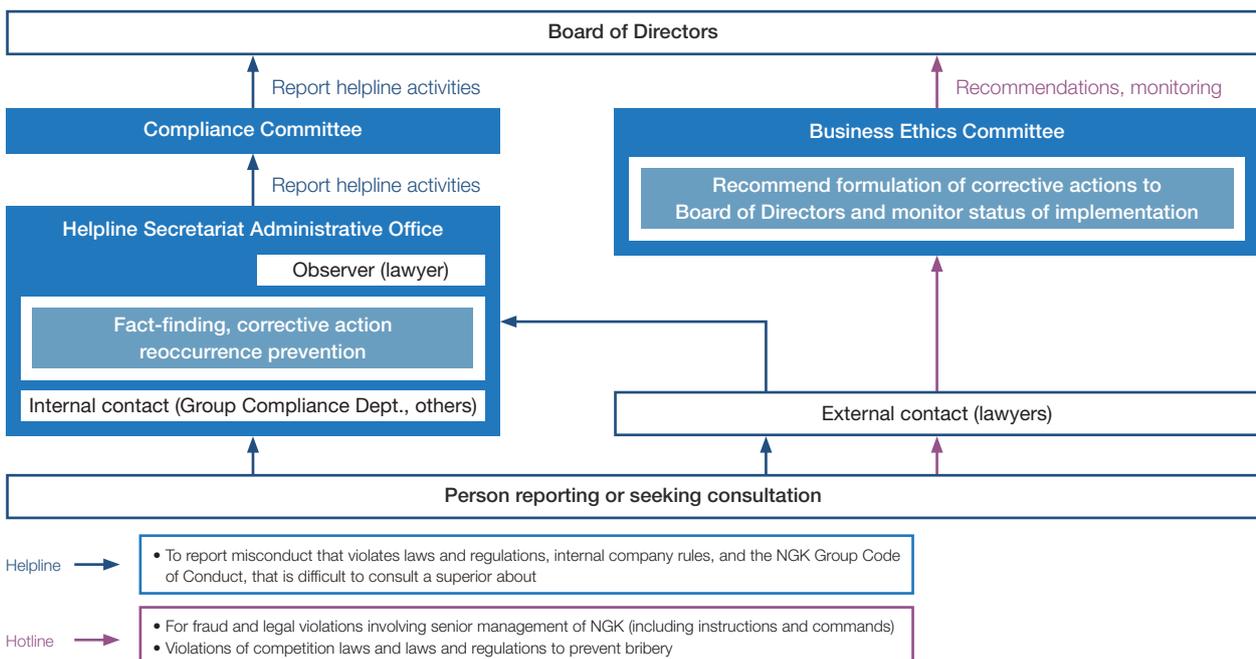


Whistleblowing System

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. We can handle consultations and reports via telephone or email in either

Japanese or English. In principle, these should be directed to a designated agent, 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 Corporate Business Principles and to facilitate quick resolution when issues occur. Each Group company outside Japan has its own helpline. In FY2022, these helplines received requests for consultation on a variety of issues, including harassment,

personnel system, rules and regulations.

### Number of Helpline Consultation Cases (NGK)

FY2020	FY2021	FY2022
28	43	38

## 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.

## Observing Competition Laws on an International Level

In addition to mandating compliance with competition laws in the NGK Group Corporate Business Principles, 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.

## Third-party Review of Competition Law Compliance Program

Since FY2015, NGK has contracted PwC Advisory LLC (PwC) as a compliance specialist to review the operation of our competition law compliance program based on the Competition Law Compliance Rules, as well as NGK Group's unified supervision and reporting system for domestic and international group companies, from an objective point of

view. Since FY2017, PwC has been conducting interviews with executives of our business groups in order to assess their attitude toward compliance with competition laws, and to further raise their awareness of such compliance efforts. The results of these reviews are used to operate and improve our competition law compliance program.

## Corruption Prevention Structure

The NGK Group endorses the UN Global Compact (UNGC) and abides by the principle that businesses should work against corruption in all its forms, including extortion and bribery.

The NGK Group conducts fair and transparent transactions, in accordance with our pledge to undertake business activities with common sense and based on strict compliance and ethics, as stipulated in the NGK Group Corporate Business Principles.

The NGK Group carries out risk management for major

compliance risks, including corruption, by considering them from a management-level perspective. We then sort those deemed important risks into the categories of business environment, strategy, and internal factors, and continually review them. The Compliance Committee and other committees and responsible departments take a leading role in working to avoid and prevent risks in each business by conducting risk analysis through surveys and the evaluation of special risks in internal control processes.

## 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.

## Risk Management

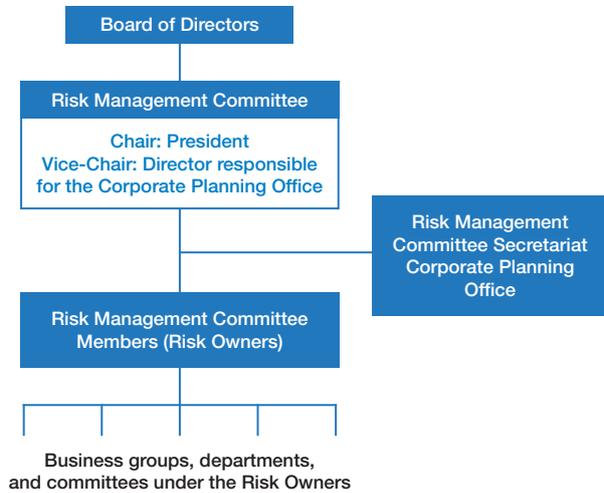
### Basic Approach

The NGK Group addresses the issue of serious risk by empowering various committees to facilitate risk avoidance and prevention, in accordance with the Basic Rules of Crisis Management. Additionally, in the event of some particularly significant risk, the Vice President responsible for 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, we have established a system whereby the Compliance Committee, Environment, Safety & Health Committee, Quality Committee, HR Committee, and Disaster Prevention and Control Headquarters constantly manage risks while also enabling prompt actions under top management when risks escalate.

In FY2022, we examined building a company-wide risk management system. Starting from FY2023, we have newly established the Risk Management Committee to comprehensively handle the Group's risk issues. We have also stipulated that the Risk Management Committee should report on its activities to the Board of Directors at least once a year.

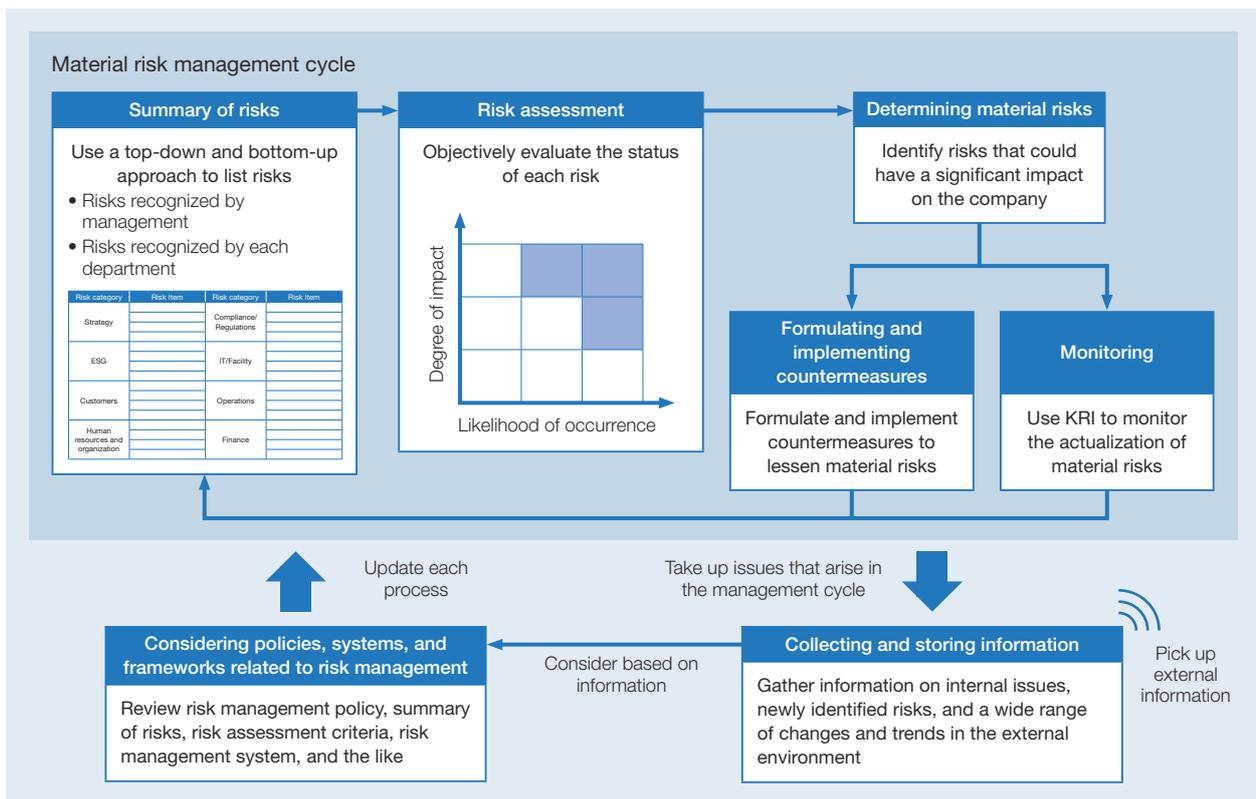
### Risk Management Framework



### 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 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 Group as a whole.

In FY2023, we will strengthen the sustainability of our overall management with the risk management process. This includes conducting risk analysis and assessment based on changes in the internal and external environment, identifying material risks to be managed, and implementing measures and monitoring the progress in addressing these risks under the Risk Management Committee.



**Governance**

**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 departments 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 trained in the proper use of their devices, as well as made aware of the need to contact the General Affairs Department and ICT Department if the devices are lost, infected with a computer virus, or otherwise compromised. Also, under the rules of employment, employees are subject to disciplinary action if their improper use of information devices results in

the leaking of confidential information or some other result that significantly impacts the company. Meanwhile, personnel from NGK's ICT Department visit several Group companies each year to conduct on-site checks into the status of IT security measures and to provide guidance on their implementation. In FY2022, due to the impact of the global COVID-19 pandemic, these visits to overseas Group companies were not carried out except in a few cases. However, we held online IT Global Meetings several times for all overseas Group companies in the regions of North and Central America, Europe and Africa, China, and Asia Pacific. Group companies in each region discussed IT security operations and conducted training on how to handle security incidents.

**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. In FY2022 we reviewed the sections pertaining to backup methods and

vulnerability management. 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	139	100%
Training for newly promoted supervisors	139	100%
Training for newly promoted managers	80	100%
E-learning	6,369	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 FY2022 we conducted practical training exercises for officers on cybersecurity incidents. We asked an external consulting firm to review our security measures and conduct

study sessions. This served not only to reaffirm with management the importance of security to our business continuity, but to strengthen response and recovery from incidents. Meanwhile, we carried out training for all members of our headquarters and domestic Group companies concerning email spoofing. By getting them to recognize the threats close at hand, we hope to improve their awareness of security.

**Personal Information Management**

We have established Personal Information Management Regulations as the NGK Group, in addition to maintaining privacy policies and regulations in accordance with the laws

and regulations of each country regarding personal information. We take painstaking care in our protection, management, and handling of customer information.



Privacy Policy  
<https://www.ngk-global.com/privacypolicy/>



LINK

## Corporate Governance

### Basic Approach

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, ESG Management Committee, Risk Management 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 an 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 Corporate Business Principles and 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.

### 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 Corporate Business Principles
April	2003	Revised guidelines into the NGK Group Corporate Business Principles
June	2005	Introduced an executive officer system
		Introduced a stock option
		Introduced an outside officer system
July	2005	Established the CSR Committee
April	2007	Established the CSR Office
June	2010	Appointed independent directors
July	2011	Revised the NGK Group Corporate Business Principles
April	2015	Signed on to the UN Global Compact
June	2015	Established the Global Compliance Office
December	2015	Established the Nomination and Compensation Advisory Committee, Corporate Council, Conference of Outside Directors and Outside Audit & Supervisory Board Members, and Business Ethics Committee
June	2017	Appointed one additional outside director
October	2018	Appointed a chief compliance officer
January	2019	Revised the NGK Group Corporate Business Principles
April	2019	Established the ESG Committee

February	2020	Endorsement of recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)
April	2020	Established the Compliance Committee
		Established the HR Committee
April	2021	Formulated the NGK Group Vision
		Formulated the NGK Group Human Rights Policy
		Established the NGK Group Basic Guidelines for Compliance Activities
		Established the ESG Management Department
June	2021	Outside directors increased to 1/3rd of Board of Directors
		An outside director made the chair of the Nomination and Compensation Advisory Committee
April	2022	Established the ESG Management Committee
June	2022	Introduced a Restricted Share Compensation Plan
April	2023	Established the Risk Management Committee
May	2023	Formulated the NGK Group Basic Sustainability Policy
July	2023	Revised the NGK Group Corporate Business Principles and established the NGK Group Code of Conduct



LINK

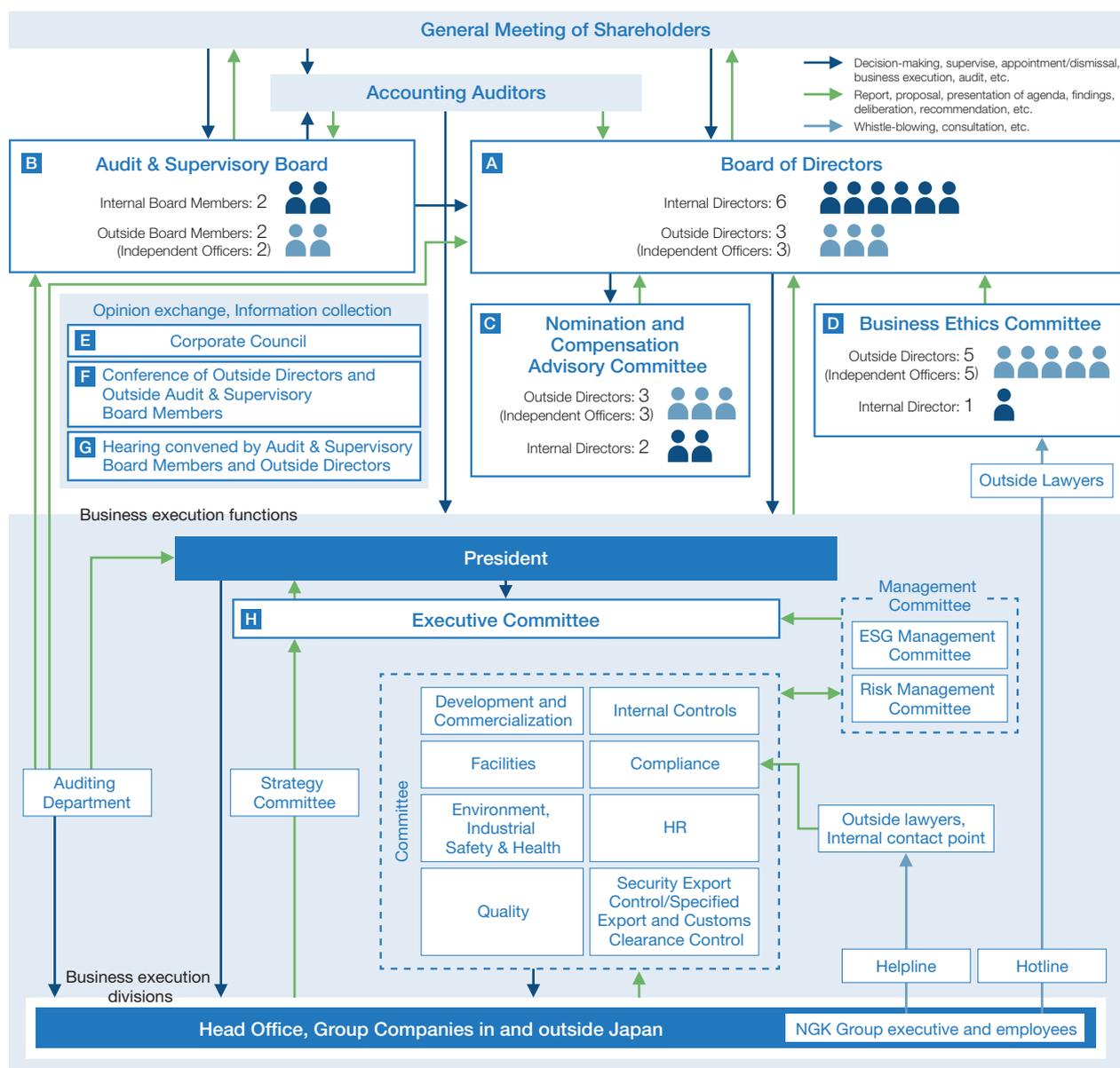
Corporate Governance Report

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



## 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

Number of members: 9 (eight males, one female)

Number of meetings in FY2022: 14

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.

#### Key Focuses of the Board of Directors in FY2022

- Budget and financial results
- Investment in production facilities, R&D, etc.
- Formulation of the NGK Group Digital Vision
- Initiatives for creation of new business (Progress report on New Value 1000)
- Formulation of statement regarding the UK Modern Slavery Act
- Progress report on the 5th Five-Year Environmental Action Plan
- Initiatives for business portfolio
- Progress report on Manufacturing ∞ (Chain) Innovation
- Revision of succession plan for NGK Group Chief Executive Officer
- Dissolution and liquidation of Group companies and investment in joint ventures
- Establishment of the Risk Management Committee
- Report on major committee activities, intellectual property activities, IR activities, etc.

#### B Audit & Supervisory Board

Number of members: 4 (all male)

Number of meetings in FY2022: 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

Number of members: 5 (four males, one female)

Number of meetings in FY2022: 2

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

Number of members: 6 (five males, one female)

Number of meetings in FY2022: 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

Number of members: 11 (10 males, one female)

Number of meetings in FY2022: 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

Number of members: 5 (four males, one female)

Number of meetings in FY2022: 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

Number of members: 7 (six males, one female)

Number of meetings in FY2022: 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

Number of members: 16 (15 males, one female)

Number of meetings in FY2022: 21

This committee consists of the president, executive vice presidents, executives 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.

## Director Attributes and Committee Membership (As of June 30, 2023)

Name	Age	Period in Office	Stocks held etc.		Meeting attendance record			
			Number of shares of the Company held	Number of stock acquisition rights owned (Equivalent number of shares)	Board of Directors	Nomination and Compensation Advisory Committee	Business Ethics Committee	
Taku Oshima	66	9	20,000	66,000	◎100% (14/14)	100% (2/2)		
Shigeru Kobayashi	62	3	20,126	21,000	100% (14/14)	100% (2/2)		
Chiaki Niwa	63	8	17,000	27,000	100% (14/14)			
Ryohei Iwasaki	63	14	17,000	36,000	100% (14/14)			
Tadaaki Yamada	62	1	10,000	16,000	100% (11/11)		100% (4/4)	
Hideaki Shindo	58	2	9,000	10,000	93% (13/14)			
Hiroyuki Kamano	Independent Outside	77	12	1,000	0	100% (14/14)	◎100% (2/2)	◎100% (5/5)
Emiko Hamada	Independent Outside	64	6	5,000	0	100% (14/14)	100% (2/2)	100% (5/5)
Kazuo Furukawa	Independent Outside	76	4	5,000	0	100% (14/14)	100% (2/2)	100% (5/5)

◎ : Chair

## Expertise of Directors

Name	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
Taku Oshima	○	○		○		○	○		○
Shigeru Kobayashi	○	○	○						○
Chiaki Niwa	○			○		○		○	○
Ryohei Iwasaki	○	○	○				○	○	
Tadaaki Yamada			○			○	○		
Hideaki Shindo	○	○			○		○		
Hiroyuki Kamano	○	○				○			
Emiko Hamada	○	○		○				○	○
Kazuo Furukawa	○	○		○			○	○	○

## Audit &amp; Supervisory Board Member Attributes and Committee Membership (As of June 30, 2023)

Name	Age	Period in Office	Stocks held etc.		Meeting attendance record				
			Number of shares of the Company held	Number of stock acquisition rights owned (Equivalent number of shares)	Board of Directors	Audit & Supervisory Board meeting	Nomination and Compensation Advisory Committee	Business Ethics Committee	
Nobumitsu Saji	64	2	5,000	7,000	100% (14/14)	100% (14/14)			
Naoya Yagi	58	Newly	4,243	0	—	—			
Masayoshi Sakaguchi	Independent Outside	65	4	0	0	100% (14/14)	100% (14/14)	Observer	100% (5/5)
Takashi Kimura	Independent Outside	68	1	0	0	100% (11/11)	100% (10/10)		100% (4/4)

## 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.

### Status of Response to Issues Identified in the Effectiveness Evaluation Covering FY2021

- (1) Deepen discussions at the Board of Directors meetings
  - The Board of Directors held free debates on the review of business portfolio and personnel system, in addition to making company-wide risk management an agenda after making a sharp distinction among the agenda items.
  - In addition, the energy storage business strategy was discussed intensively at the expansion strategy meeting, which was attended also by outside officers.
- (2) Strengthen progress reports on the NGK Group Vision
  - In addition to enhancing the content of reports on the progress of the Vision at various committee meetings and company-wide projects, we have also established multiple reporting periods for each of them as scheduled annual agenda items.

### Methods of Effectiveness Evaluation for FY2022

- (1) A survey comprising a total of 50 questions and a free-response entry was conducted on all directors (9 members) and all Audit & Supervisory Board members (4 members) at the beginning of April 2023, and the analysis and evaluation of the responses were entrusted to an external organization.
- (2) In addition, as part of the effectiveness evaluation of the Board of Directors, the Nomination and Compensation Advisory Committee has conducted a questionnaire to its members (chairperson, members, and observers) since FY2022, and entrusted the analysis and evaluation of the responses to an external organization.

### Summary of Evaluation Results for FY2022

- (1) A summary of the evaluation results was reported to the Board of Directors at its meeting on June 6, 2023.
- (2) Based on the results of the questionnaire, the external evaluation of the effectiveness of the Board of Directors (including the Nomination and Compensation Advisory Committee) was high overall, and stated that the Board of Directors is operating appropriately.
- (3) Overall comments from external organizations are as follows.
  - 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. Based on the results of last year's effectiveness evaluation, we believe that the Board of Directors has taken actions such as holding focused discussions on themes to be supervised intensively, leading to a continuous high evaluation of its effectiveness.
  - On the other hand, there seems to be an awareness of issues related to risk management based on the external environment, which is considered important for the realization of the long-term vision in the future; discussion and monitoring of human resource strategy and human capital, which are drawing attention as public trends; and the way information is shared with respect to communicating with investors and other stakeholders. In order to appropriately address these issues, it is expected that continuous efforts will be made in terms of management, such as the sharp distinction of agendas and operating time.
  - With regard to the Nomination and Compensation Advisory Committee, the committee itself was evaluated as operating effectively, but there were some comments on how information is shared with the committee and how information is shared from the committee to the Board of Directors, suggesting that the expected level of information sharing needs to be confirmed.

### Policy for Initiatives for FY2023 to Further Improve Effectiveness

Based on the results of the evaluation in FY2022 and the exchange of opinions with outside officers, we have formulated the following policies for initiatives for FY2023.

We will strive to strengthen the effectiveness of the Board of Directors and the Nomination and Compensation Advisory Committee through continuous efforts.

(1) Policies for initiatives of the Board of Directors

- To realize the NGK Group Vision, the following items shall be regularly reported to and monitored by the Board of Directors.
  - ✓ Status of the business portfolio revision
  - ✓ Progress of the New Value 1000 (aiming for sales of 100 billion yen from new commercialized products by 2030)
  - ✓ Progress of various committee activities and company-wide projects
  - ✓ Progress of human resources strategy
  - ✓ Status of company-wide risk management
- More in-depth discussion on business strategy
- Enhance opportunities for dialog between senior management and outside officers
- Emphasize dialog with shareholders and investors through IR activities

(2) Policies for initiatives of the Nomination and Compensation Advisory Committee

- Further share the status of discussions from the committee to the Board of Directors
- Enhancement of information provided to the committee on compensation and nomination

### Policies for Determining Compensation of Directors

The compensation system for directors (excluding outside directors) and executive officers has been established for the purpose of contributing to the Group’s sustainable growth and the enhancement of its medium-to-long-term enterprise value by practicing the NGK Group Philosophy and realizing the NGK Group Vision.

Compensation of directors (excluding outside directors) and executive 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.

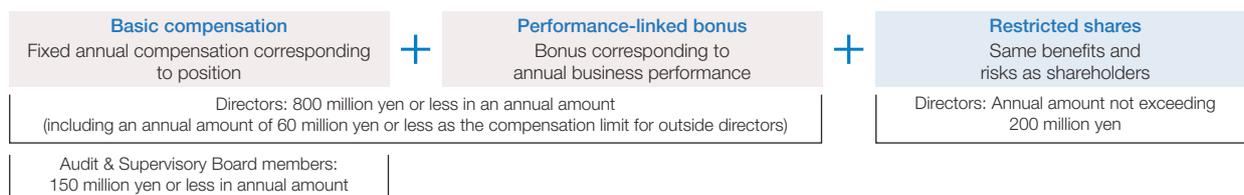
The relative proportions of variable compensation and fixed annual compensation are determined from the perspective of focusing on stability and improvement in performance over the medium and long term. Total variable compensation consists of a performance-linked bonus and the cash conversion value of 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 executive 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 executive officers after sufficient consideration of the recommendations received from the Nomination and Compensation Advisory Committee, as described above.

### Composition of Compensation for Directors, Audit & Supervisory Board Members and Executive Officers



### Performance-Linked Bonus Calculation Method (FY2023)

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 FY2023: 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 FY2023: 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.

### Distribution Ratio of Performance-linked Bonuses by Item and Performance Evaluation Index (excluding personal evaluations)

Item	Distribution Ratio	Evaluation Factor Change Ratio	Performance Evaluation Index
Short-term indicators	40%	-100% to +100%	Consolidated performance (net sales, operating income and net income): · Results in the previous fiscal year · Results in the current fiscal year
		-100% to +100%	Return on invested capital: · Initial targets · Results in the current fiscal year
Medium- to long-term indicators	60%	-100% to +100%	Medium- to long-term performance targets (operating income): · Targets by years passed toward the 2025 target · Results in the current fiscal year
		-100% to +100%	Level of achievement for key issues (creation of new products and businesses—Keep Up 30 and CO <sub>2</sub> emission reduction initiatives, etc.)

### Non-monetary Compensation, etc.

#### ● Non-monetary compensation

NGK grants restricted share compensation to directors (excluding outside directors) and executive officers (excluding executive officers who are overseas residents on a non-temporary basis) in order to increase their sensitivity to stock price, to further share with shareholders the benefits and risks associated with stock price fluctuations, and to motivate them to improve enterprise value over the medium to long term. Since stock price fluctuations are directly related to its value, the amount of restricted shares is not fixed, but the number of

shares granted is fixed in accordance with the position. NGK revised the officer compensation system at a meeting of the Board of Directors held on April 28, 2022. At the 156th Ordinary General Meeting of Shareholders held on June 27, 2022, it was resolved to abolish the stock compensation-type stock option plan, except for those already granted, and to introduce a restricted share compensation plan in its place. An overview of the restricted share compensation we granted in FY2023 is as below.

Overview of Restricted Share Compensation	
Class and number of shares to be issued	The Company's common stock: 127,000 shares
Issue price	1,714 yen per share
Aggregate issue amount	217,678,000 yen
Persons eligible for the allotment of the shares and the number thereof, as well as the number of shares to be allotted	The Company's directors (excluding outside directors): 6 persons, 43,000 shares executive officers who do not concurrently serve as the Company's directors: 24 persons, 84,000 shares (excluding executive officers who are overseas residents on a non-temporary basis)

\*Period of the transfer restriction stipulated in the restricted share allotment agreement (hereinafter "the Allotment Agreement"):  
The allottees must not transfer, establish as security interests or otherwise dispose of the Company's ordinary shares allotted to them according to the Allotment Agreement from the date on which they receive their allotment according to the Allotment Agreement to the point in time directly after retiring from the position determined in advance by the Company's Board of Directors from among the positions of the Company's officers and employees.

#### ● Claw back clause

NGK has a provision to acquire all of the accumulated allotted stocks without compensation in the event that the allottee of the restricted shares violates laws and regulations

during the period of the transfer restriction, or in the event that certain other conditions stipulated in the allotment agreement are met.

### ● Stock holding guideline for Directors and Executive Officers

In order to foster a sense of shared value between directors and executive officers and shareholders, and to contribute to the sustainable growth of the NGK Group and the enhancement of its enterprise value over the medium to long term, NGK has established guidelines for holding its own

stock, etc.\*<sup>1</sup> and in principle, within three years of assuming office, directors and executive officers shall endeavor to hold company stock, etc. equivalent to the following values.

\*<sup>1</sup>: Includes stock compensation-type stock options that have not yet reached the exercise commencement date.

Persons Eligible	
Directors (Chairman and President)	150% or more of basic compensation (annual amount)
Directors* <sup>2</sup> and Executive Officers* <sup>3</sup>	100% or more of basic compensation (annual amount)

\*<sup>2</sup>: Excluding Chairman, President, and outside directors

\*<sup>3</sup>: Excluding executive officers who are overseas residents on a non-temporary basis

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

### Compensation for Directors and Auditor & Supervisory Board Members (FY2022)

Director category	Total compensation (million yen)	Total compensation by type (million yen)				Applicable officers (people)
		Fixed Compensation	Performance-linked compensation	Restricted share compensation	Stock compensation-type stock options	
Directors (excluding outside directors)	539	301	161	58	18	7
Outside Directors	42	42	—	—	—	3
Audit & Supervisory Board Members (excluding Outside Audit & Supervisory Board Members)	69	69	—	—	—	2
Outside Audit & Supervisory Board Member	28	28	—	—	—	3

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 one director who resigned from his position on June 27, 2022 and the amount of compensation he received.

2. The total amount of compensation for outside Audit & Supervisory Board members, the total amount of compensation by type, and the number of applicable officers noted above include one outside Audit & Supervisory Board member who resigned from his position on June 27, 2022 and the amount of compensation he received.

3. At the 156th Ordinary General Meeting of Shareholders held on June 27, 2022, it was resolved to abolish the stock compensation-type stock option plan, except for those already granted, and to introduce a restricted share compensation plan in its place. Accordingly, we did not grant new stock options in FY2022. However, we have stated the amount of compensation recorded as expenses in FY2022 for those stock options we granted in the past fiscal year.

### Officers Receiving Total Compensation of ¥100 Million or More (FY2022)

Name	Officers category	Company category	Total compensation by type (million yen)				Total compensation (million yen)
			Fixed compensation	Performance-linked compensation	Restricted share compensation	Stock compensation-type stock options	
Taku Oshima	Director	Submitting company	67	40	13	4	125
Shigeru Kobayashi	Director	Submitting company	67	40	13	4	125

## Management Succession Planning

The revised NGK Group Chief Executive Officer Succession Plan was approved by resolution of the Board of Directors in April 2023. 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, and other aspects of corporate governance and compliance
2. For outside officers: Mainly providing separate explanations from the department 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 department. 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.

We revised the NGK Group Corporate Business Principles which 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 while pursuing economic efficiency. In addition, we

established the NGK Group Code of Conduct in July 2023 as specific matters which our officers and employees should put into practice. The departments and committees which handle the related matters are responsible for ensuring that the code and principles are thoroughly applied in the Group. The ESG Management Committee coordinates the overall process. 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 July 2023 board meeting.

## Audit Structure

---

At NGK, we conduct separate Audit & Supervisory Board audits, accounting audits, and internal audits.

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 16 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 2023, 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 enterprise 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.

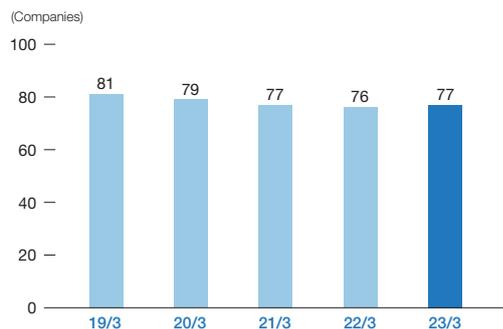
The Board of Directors regularly reviews NGK's capital policy and whether it is appropriate to continue holding

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 version ROIC) for each business.

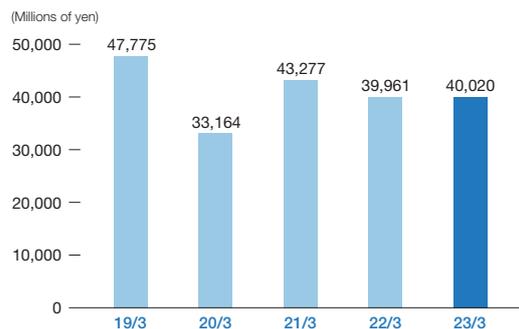
When exercising voting rights on cross-shareholdings, we focus on whether the business is being managed with an emphasis on enhancement of enterprise value, shareholder return, in addition to evaluation from the perspective of the content of resolutions and whether they will adversely affect shareholder return. We appropriately disclose the business relationships we have with the companies behind the stocks we hold in our annual securities report.

## Status of Cross-Shareholding

### Number of Cross-Shareholding Companies



### Reported Cross-Shareholdings Balance



Directors, Audit & Supervisory Board Members, and Executive Officers (As of June 26, 2023)

Directors



**Taku Oshima**  
Representative Director  
and Chairman

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



**Shigeru Kobayashi**  
Representative Director  
and President

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



**Chiaki Niwa**  
Representative Director  
and Executive Vice  
President

March 1984 Joins NGK  
June 2013 Appointed as vice president  
June 2015 Appointed as director and vice president  
June 2016 Appointed as director and senior vice president  
June 2018 Appointed as director and senior vice president  
June 2020 Appointed as representative director and executive vice president (incumbent)



**Ryohei Iwasaki**  
Representative Director  
and Executive Vice  
President

March 1982 Joins NGK  
June 2008 Appointed as vice president  
June 2009 Appointed as director and vice president  
June 2012 Appointed as director and senior vice president  
June 2016 Appointed as director and senior vice president  
June 2022 Appointed as representative director and executive vice president (incumbent)



**Tadaaki Yamada**  
Director and  
Senior Vice President

March 1984 Joins NGK  
June 2015 Appointed as vice president  
June 2019 Appointed as senior vice president  
June 2022 Appointed as director and senior vice president (incumbent)



**Hideaki Shindo**  
Director and  
Senior Vice President

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



**Independent Officer**  
**Hiroyuki Kamano**  
Outside Director

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



**Independent Officer**  
**Emiko Hamada**  
Outside Director

April 1984 Joins Taiyo Yuden Co., Ltd.  
December 2001 Appointed as general manager, Quality Assurance Control R Technology Div., Engineering Group, Taiyo Yuden  
September 2003 Appointed as chief engineer, Basic Research Div., General Research Laboratory, Engineering Group, Taiyo Yuden  
November 2008 Appointed as associate professor, Center for Social Contribution and Collaboration, Nagoya Institute of Technology (NITech)  
April 2011 Appointed as professor, Center for Social Contribution and Collaboration, NITech, and professor for Master of Techno-Business Administration, NITech Graduate School  
April 2012 Appointed as professor, Center for Research on Assistive Technology for Building a New Community, NITech  
May 2015 Appointed as third-area program officer, A-STEP (Adaptable and Seamless Technology Transfer Program through Target-driven R&D), Japan Science and Technology Agency  
July 2016 Appointed as part-time lecturer, NITech  
August 2016 Appointed as visiting professor, Nagoya University (currently Nagoya University, Tokai National Higher Education and Research System)  
June 2017 Appointed as director, NGK (incumbent)  
June 2019 Appointed as outside director, Taiyo Yuden (incumbent)



**Independent Officer**  
**Kazuo Furukawa**  
Outside Director

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

## Audit & Supervisory Board Members



**Nobumitsu Saji**  
Audit & Supervisory  
Board Member

March 1984 Joins NGK  
June 2013 Appointed as vice president  
June 2014 Appointed as director and vice president  
June 2015 Appointed as director and senior vice president  
June 2019 Appointed as director and senior vice president  
June 2021 Appointed as Audit & Supervisory Board member (incumbent)



**Naoya Yagi**  
Audit & Supervisory  
Board Member

April 1989 Joins the Industrial Bank of Japan (currently Mizuho Bank, Ltd.)  
July 1999 Joins NGK  
June 2023 Appointed as Audit & Supervisory Board member (incumbent)



**Independent Officer**  
**Masayoshi Sakaguchi**  
Audit & Supervisory  
Board Member, Outside

April 1980 Joins the National Police Agency  
February 1999 Appointed as chief of First Area Headquarters, Metropolitan Police Department  
September 2001 Appointed as chief of Akita Prefectural Police Headquarters  
January 2003 Appointed as chief of Criminal Investigations, Osaka Prefectural Police Headquarters  
October 2011 Appointed as chief of Osaka Prefectural Police Headquarters  
January 2013 Appointed as chief of commissioner-general's secretariat, National Police Agency  
January 2015 Appointed as deputy commissioner-general, National Police Agency  
August 2016 Appointed as commissioner-general, National Police Agency  
May 2018 Appointed as senior advisor, Nippon Life Insurance Company  
June 2019 Appointed as Audit & Supervisory Board member, NGK (incumbent)  
June 2019 Appointed as vice president, Japan Automobile Federation  
June 2022 Appointed as president, Japan Automobile Federation (incumbent)



**Independent Officer**  
**Takashi Kimura**  
Audit & Supervisory  
Board Member, Outside

April 1977 Joins The Mitsubishi Bank, Ltd. (currently MUFG Bank, Ltd.)  
June 2004 Appointed as executive officer, The Bank of Tokyo-Mitsubishi, Ltd. (currently MUFG Bank, Ltd.)  
Appointed as executive officer, Mitsubishi Tokyo Financial Group, Inc. (currently Mitsubishi UFJ Financial Group, Inc.)  
October 2005 Appointed as executive officer, Mitsubishi UFJ Financial Group, Inc.  
January 2006 Appointed as executive officer, The Bank of Tokyo-Mitsubishi UFJ, Ltd. (currently MUFG Bank, Ltd.)  
May 2007 Appointed as managing executive officer, The Bank of Tokyo-Mitsubishi UFJ, Ltd. (currently MUFG Bank, Ltd.)  
October 2009 Appointed as president, representative director and CEO, Mitsubishi Research Institute DCS Co., Ltd.  
June 2014 Appointed as outside audit & supervisory board member (full-time), MITSUBISHI GAS CHEMICAL COMPANY, INC.  
June 2022 Appointed as Audit & Supervisory Board member, NGK (incumbent)

## Executive Officers

Shigeru Kobayashi*	President	Overall Corporate Management, Executive Committee Chair, Strategy Committee Chair, ESG Management Committee Chair, Risk Management Committee Chair
Chiaki Niwa*	Executive Vice President	Top Executive R&D, Manufacturing Engineering, Responsible for Corporate R&D, Manufacturing Engineering, Digital Transformation and Innovation Dept., Corporate Quality Management Dept., and Environment, Industrial Safety & Health Dept., Development and Commercialization Committee Chair, Quality Committee Chair, Environment, Industrial Safety & Health Committee Chair
Ryohei Iwasaki*	Executive Vice President	Responsible for Business Groups, Group Executive, Corporate NV Creation, Development and Commercialization Vice Committee Chair
Tadaaki Yamada*	Senior Vice President	Responsible for Auditing Dept., Human Resources Dept., Group Compliance Dept., Legal Dept., Intellectual Property Dept., and General Affairs Dept., Chief Compliance Officer, Compliance Committee Chair, Internal Controls Committee Chair, HR Committee Chair
Shuhei Ishikawa	Senior Vice President	Group Executive, Energy & Industry Business Group, General Manager, Osaka Branch
Tsutomu Nanataki	Senior Vice President	Group Executive, Corporate R&D
Hiroto Matsuda	Senior Vice President	Group Executive, Digital Society Business Group
Hideaki Shindo*	Senior Vice President	Responsible for ESG Management Dept., Corporate Planning Office, Secretarial Office, Finance & Accounting Dept., and Purchasing Dept. Senior Officer in charge of Group Companies, Risk Management Vice Committee Chair
Jun Mori	Senior Vice President	Group Executive, Environment Business Group, General Manager, Nagoya Site
Hiroshi Kurachi	Senior Vice President	General Manager, Sensor Div., Environment Business Group
Masanobu Inoue	Senior Vice President	Technical Director, Energy & Industry Business Group
Hiroharu Kato	Senior Vice President	General Manager, Global Sales & Marketing Div., Environment Business Group

(\*Serve concurrently as directors)

Atsushi Miyajima	Senior Vice President	Group Executive, Corporate Manufacturing Engineering, Facilities Committee Chair
Hiroyuki Shinohara	Senior Vice President	Group Vice Executive, Energy & Industry Business Group, General Manager, Energy Storage Div.
Iwao Ohwada	Vice President	In Charge of Global Business Creation, Corporate NV Creation
Tatsumi Ichioka	Vice President	In Charge of Digital Transformation and Innovation Dept., Quality Management Dept., and Environment, Industrial Safety & Health Dept.
Ryo Ishihara	Vice President	In Charge of ESG Management Dept. and Secretarial Office, General Manager, ESG Management Dept., General Manager, Tokyo Main Office
Mayumi Inagaki	Vice President	In Charge of Auditing Dept., Group Compliance Dept., Legal Dept., and Intellectual Property Dept., Compliance Vice Committee Chair
Hirofumi Sakamoto	Vice President	General Manager, Engineering Div., Environment Business Group
Hideki Shimizu	Vice President	President, NGK ELECTRONICS DEVICES, INC., General Manager, Power Electronics Ceramics Dept., Digital Society Business Group
Kazushi Tada	Vice President	General Manager, Insulator Div., Energy & Industry Business Group
Ryugo Takeda	Vice President	President, NGK EUROPE GMBH
David Miller	Vice President	President, FM INDUSTRIES, INC.
Takao Onishi	Vice President	General Manager, Electronic Devices Div., Digital Society Business Group, General Manager, Sales Dept., General Manager, Komaki Site
Takashi Yoshino	Vice President	General Manager, DS Development Div., 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
Masato Nozaki	Vice President	General Manager, Human Resources Dept., General Manager, Health Management & Promotion Office
Yasuyoshi Imai	Vice President	General Manager, HPC Div., Digital Society Business Group
Hiroki Fujita	Vice President	General Manager, Corporate Planning Office

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

## Financial Indicators

	2013/3	2014/3	2015/3	2016/3
Net sales	252,789	308,671	378,665	435,797
Cost of sales	178,052	208,052	254,386	289,266
Selling, general, and administrative expenses	54,041	56,366	62,700	65,633
Operating income	20,695	44,252	61,577	80,898
Net income attributable to owners of the parent	11,422	27,045	41,504	53,316
Capital expenditures	31,216	28,434	30,366	45,437
Research and development expenses	11,315	12,060	13,942	17,410
Net cash provided by operating activities	3,681	32,647	73,002	59,445
Net cash used in investing activities	(582)	(21,185)	(39,495)	(47,772)
Net cash provided by financing activities	12,448	2,026	(26,000)	(373)
Total assets	563,030	614,219	702,234	711,897
Interest-bearing debt	155,816	167,295	156,203	163,973
Net assets	303,073	344,453	404,001	417,972
Profit per share (yen)	34.98	82.82	127.11	163.28
Cash dividends per share (yen)	20	22	28	38
Ratio dividends to net worth (%)	57.2	26.6	22.0	23.3
Return on equity (ROE) (%)	4.2	8.6	11.4	13.3
Equity ratio (%)	52.0	54.3	55.8	57.1
Price-earnings ratio (PER)	29.0	26.0	20.2	12.7
Price-book value ratio (PBR)	1.1	2.1	2.1	1.7
Closing stock (yen)	1,013	2,150	2,565	2,079
Number of employees, end of year (persons)	13,159	13,210	16,217	16,657

## Non-Financial Indicators

	2013/3	2014/3	2015/3	2016/3
GHG emissions (Scope 1: Energy-origin CO <sub>2</sub> ) (10,000 metric tons, NGK Group)	29.6	30.2	29.0	31.1
GHG emissions (Scope 2: Energy-origin CO <sub>2</sub> ) (10,000 metric tons, NGK Group)	36.7	43.0	39.4	44.9
GHG emissions (Scope 3) (10,000 metric tons, NGK Group)	—	—	—	—
Total water usage (10,000 m <sup>3</sup> , NGK Group)	327.3	318.2	276	285
VOC emissions (metric tons, NGK Group)	4.8	5.3	6.3	6.8
PRTR substance emissions (metric tons, NGK Group)	14.8	14.3	15.4	14.0
Total water discharge (10,000 m <sup>3</sup> , NGK Group)	215	223	196	197
Waste emissions (10,000 metric tons, NGK Group)	3.9	4.2	5.7	5.9
Number of employees (persons, non-consolidated)	3,426	3,531	3,569	3,700
Employee breakdown (female) (%), non-consolidated)	13.4	13.3	12.9	12.6
Percentage of women among managers (%), non-consolidated)	1.0	1.5	1.8	1.8
Percentage of women among managers (%, overseas NGK Group companies)	—	—	—	16.6
Number/percentage of disabled employees (persons/%, non-consolidated)	49 (1.91)	53 (2.07)	56 (2.23)	56 (2.18)
Lost time incident rate (non-consolidated)* <sup>2</sup>	0.27	0.42	0.00	0.29
Social contribution expenditure (100 million yen, non-consolidated)	3.46	3.48	3.31	3.46
Number of directors (persons, non-consolidated)	11	12	12	12
Number of outside directors (persons, non-consolidated)	2	2	2	2
Total compensation of directors (million yen, non-consolidated)	668	624	581	723
Number of patents held (Japan) (non-consolidated)	2,454	2,685	2,719	2,907
Number of patents held (overseas) (non-consolidated)	4,087	3,990	3,911	4,042

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)

	2017/3	2018/3	2019/3	2020/3	2021/3	2022/3	2023/03
	401,266	451,125	463,504	441,956	452,043	510,439	559,240
	272,434	312,107	323,224	313,458	329,061	347,748	405,463
	65,619	68,991	75,574	73,496	72,158	79,163	87,015
	63,212	70,026	64,705	55,000	50,823	83,527	66,761
	36,379	45,814	35,506	27,135	38,496	70,851	55,048
	60,101	71,713	105,336	93,997	50,831	38,130	43,694
	18,653	21,100	23,271	22,928	22,448	23,551	26,157
	80,172	50,554	61,224	53,200	85,641	94,831	97,949
	(56,452)	(49,413)	(109,743)	(60,830)	(51,724)	(46,291)	(52,006)
	(13,013)	22,546	3,564	(18,796)	12,250	(45,263)	(34,568)
	759,434	826,243	863,636	833,085	908,967	982,833	1,029,168
	174,150	211,573	229,423	234,400	264,244	252,350	253,356
	427,593	472,863	489,245	469,118	517,892	589,594	642,446
	112.71	142.42	110.35	84.73	121.61	226.56	177.47
	40	44	50	50	30	63	66
	35.5	30.9	45.3	59.0	24.7	27.8	37.2
	8.8	10.4	7.6	5.8	7.9	12.9	9.0
	54.9	55.8	55.3	55.0	56.3	59.3	61.7
	22.4	12.9	14.6	16.7	16.6	7.7	9.9
	1.9	1.3	1.1	1.0	1.3	0.9	0.8
	2,520	1,834	1,608	1,417	2,024	1,753	1,752
	17,517	18,783	20,115	20,000	19,695	20,099	20,077

	2017/3	2018/3	2019/3	2020/3	2021/3	2022/3	2023/3
	31.7	32.0	32.3	30.9	26.4	29.0*1	25.2*1
	48.7	52.0	54.5	56.4	49.2	32.5	30.6
	—	(87.7)*3	(104.7)*3	(97.7)*3	(89.3)*3	344.9	351.9
	409	432	453	433	378	433.6	414.3
	155.4	145.3	145.2	68.4	82.9	77.0	106.5
	163.1	154.2	127.5	76.3	89.4	83.5	110.3
	279	287	281	314	253	274	268
	5.9	5.9	5.8	5.4	4.6	5.4	4.7
	3,937	4,142	4,119	4,224	4,316	4,382	4,547
	12.7	12.5	12.6	12.8	13.0	12.9	12.7
	1.9	2.0	2.2	2.9	3.0	3.4	3.8
	15.3	21.0	16.0	20.2	22.7	23.1	19.4
	55 (2.03)	57 (1.90)	62 (1.92)	135 (2.20)	145 (2.35)	155 (2.46)	160 (2.43)
	0.34	0.11	0.40	0.00	0.10	0.19	0.28
	3.15	3.00	3.02	2.73	2.96	5.33	7.54
	13	12	12	13	11	9	9
	2	3	3	3	3	3	3
	803	799	698	660	715	820	678
	3,038	3,191	3,352	3,513	3,521	3,374	3,448
	4,134	4,186	4,346	4,485	4,452	4,444	4,589

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

\*2 Aggregate for calendar years

\*3 Non-consolidated upstream

## Corporate Outline/Stock Information/External Evaluation (As of March 31, 2023)

## Corporate Outline

Company name	NGK Insulators, Ltd.	Consolidated subsidiaries	47
Address	2-56 Suda-cho, Mizuho, Nagoya 467-8530, Japan Telephone + (81) 52-872-7181	Equity-method affiliates	2
Established	May 5, 1919	Employees	NGK 4,547 Consolidated 20,077
Paid-in capital	70.0 billion yen	Stock exchange code	5333
Net sales	559.2 billion yen (consolidated, for FY2022)		

## NGK Group Locations

## NGK Headquarters, Sites, Branches, and Sales Offices

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

## NGK Group

## 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.  
NR-Power Lab 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 (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.

## Stock Information

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

**Total number of shares issued**  
311,829,996 shares  
(Including 5,539,120 shares of treasury stock)

**Total number of shareholders**  
55,718 persons

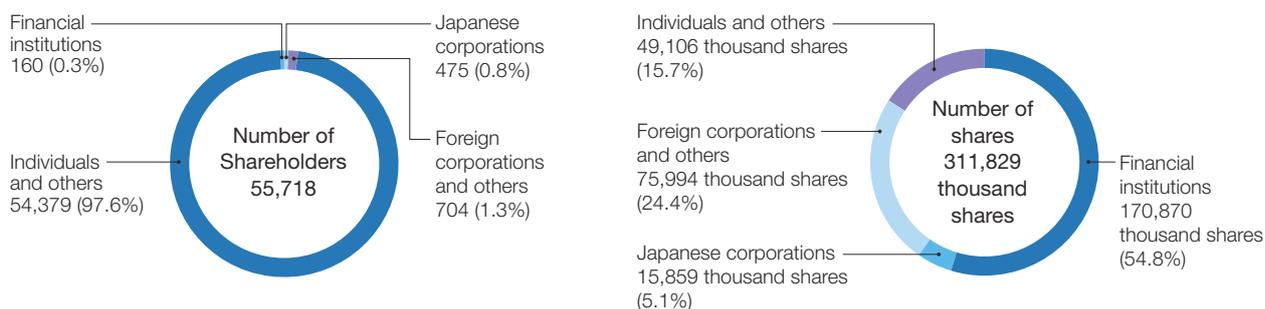
**Listed stock exchanges**  
Tokyo Stock Exchange,  
Nagoya Stock Exchange

### Major Shareholders

Names of shareholders	Number of shares held (1,000 shares)	Ratio to total (%)
The Master Trust Bank of Japan, Ltd. (Trust account)	53,199	17.36
Meiji Yasuda Life Insurance Company	21,695	7.08
The Dai-ichi Life Insurance Company, Limited	21,457	7.00
Custody Bank of Japan, Ltd. (Trust account)	21,054	6.87
MUFG Bank, Ltd.	7,204	2.35
National Mutual Insurance Federation of Agricultural Cooperatives	7,029	2.29
Aioi Nissay Dowa Insurance Co., Ltd.	4,387	1.43
State Street Bank West Client – Treaty 505234	4,074	1.33
JP Morgan Chase Bank 385781	3,391	1.10
The Aichi Bank, Ltd.	3,108	1.01

Note: The Company retains 5,539,120 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



## External Evaluation

In December 2022, we were listed to the Dow Jones Sustainability Asia Pacific Index among the Dow Jones Sustainability Indices, which is one of the leading ESG investment indexes, for the seventh consecutive year. In June 2022, we were selected as a FTSE4Good Index Series<sup>\*1</sup> company, 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<sup>\*2</sup>, and the MSCI Japan Empowering Women Index (WIN), which are managed by the Government Pension Investment Fund (GPIF).

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



2023 CONSTITUENT MSCI JAPAN  
EMPOWERING WOMEN INDEX (WIN)

THE INCLUSION OF NGK INSULATORS IN ANY MSCI INDEX, AND THE USE OF MSCI LOGOS, TRADEMARKS, SERVICE MARKS OR INDEX NAMES HEREIN, DO NOT CONSTITUTE A SPONSORSHIP, ENDORSEMENT OR PROMOTION OF NGK INSULATORS BY MSCI OR ANY OF ITS AFFILIATES. THE MSCI INDEXES ARE THE EXCLUSIVE PROPERTY OF MSCI. MSCI AND THE MSCI INDEX NAMES AND LOGOS ARE TRADEMARKS OR SERVICE MARKS OF MSCI OR ITS AFFILIATES.

\*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.**

Integrated report  
**NGK Report 2023**

■ 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)

NAS, HONEYCERAM and EnerCera are trademarks of NGK INSULATORS, LTD., registered in the U.S.

Published in October 2023