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This is our **Communication on Progress** in implementing the principles of the **United Nations Global Compact** and supporting broader UN goals.

We welcome feedback on its contents.

IGNITE YOUR SPIRIT

NGK SPARK PLUG CO., LTD.

Integrated Report **2019**

Year ended March 31, 2019

About NGK SPARK PLUG

- 03 Corporate Message
- 04 Corporate Philosophy / The Nittoku Way
- 05 Our History
- 07 Strengths Gained through the Years
- 09 Glossary of Terms for Our Products
- 11 Performance Data

Stories for Value Creation

- 15 Value Creation Process
- 17 Risks and Opportunities
- 19 Enhancement of Competitiveness across the Value Chain
- 21 Interview with the Chairman and the President
- 27 NITTOKU SHINKARON
- 29 Seventh Medium-Term Management Plan
- 31 Message from the Finance Officer

Business Strategy 1

Strengthening current businesses

- 33 Automotive Components Group Plug business
- 35 Automotive Components Group Sensor business
- 37 Technical Ceramics Group Semiconductor business
- 39 Technical Ceramics Group Ceramics business

Business Strategy 2

Establishing new business pillars

- 41 Pioneering New Fields by the Versatile Power of Technologies
- 43 Nurturing Corporate Culture that Propels the Birth of New Businesses
- 45 NGK SPARK PLUG × Energy and Environment
- 47 NGK SPARK PLUG × Next-Generation Vehicles
- 48 NGK SPARK PLUG × Medical Treatment

Business Strategy 3

Establishing strong business infrastructure

- 49 Establishing Strong Infrastructure to Support Businesses
- 50 Enhancement of Human Resources
- 53 Enhancement of Organizations
- 55 Establishment of Systems
- 57 Environment
- 61 Corporate Governance
- 71 Messages from Outside Directors
- 73 CSR Management

Information

- 77 Financial Results Highlights for the Past 11 Years
- 79 Consolidated Balance Sheets
- 81 Consolidated Statements of Income
- 82 Consolidated Statements of Comprehensive Income
- 83 Consolidated Statements of Changes in Net Assets
- 84 Consolidated Statements of Cash Flows
- 85 Notes to Consolidated Financial Statements
- 100 Independent Auditors Report
- 101 Global Network
- 103 Corporate Profile and Stock Information
- 104 Independent Verification Report

Editorial Policy

NGK SPARK PLUG has been issuing an annual integrated report since 2017 with a view to helping all stakeholders deepen their understanding of its medium- to long-term value creation efforts. We have edited this third integrated report with a focus on outlining the progress with and outlook for the achievement of the goals set in the medium-term management plan toward FY2020 as well as in the long-term management plan, "NITTOKU SHINKARON," and on introducing the measures currently implemented by the company for the medium- to long-term reform of its business portfolio.

In our business and IR activities conducted throughout the year, we have received various opinions and inquiries from stakeholders, and this integrated report is intended to serve as a tool to respond to these inputs. We hope that the report will help readers understand the company as it is and look forward to receiving your frank opinions.

Scope and Period Covered

Period covered : FY2018 (From April 1, 2018 to March 31, 2019)

This report also includes some information about our FY2019 activities.

Scope covered : NGK SPARK PLUG Group

Also includes some non-consolidated information about NGK SPARK PLUG.

Guidelines for Reference

"The International Integrated Reporting Framework," the International Integrated Reporting Council (IIRC)

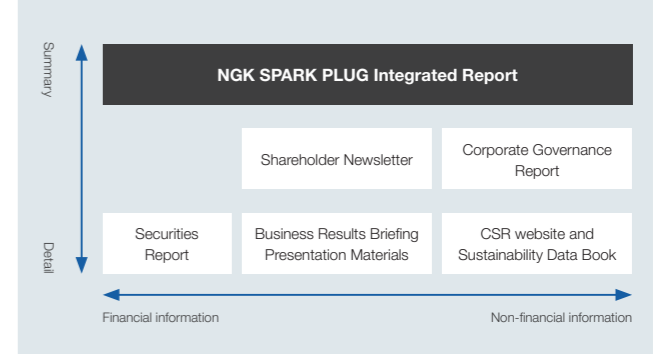
"Guidance for Integrated Corporate Disclosure and Company-Investor Dialogues for Collaborative Value Creation," the Ministry of Economy, Trade and Industry

This report focuses on the information that is essential for the enhancement of our corporate value. For details of our technologies, products and financial affairs, please visit our website. For detailed information about our corporate social responsibility (CSR), please refer to the webpages on our CSR activities as well as to our CSR reports and the Sustainability Databook, which we have newly created this fiscal year.

▶ <https://www.ngkntk.co.jp/english/>



NGK SPARK PLUG Communication



Corporate Message

IGNITE YOUR SPIRIT

IGNITE YOUR drive, dreams and SPIRIT

NGK SPARK PLUG has been a leader in manufacturing for 80 years.

Our desire is to live in a healthier and more beautiful world where all our dreams can come true.

Everyday, we continue to ignite the passion in our hearts and spark new ideas in our minds to focus on achieving our goals for the future.

Our mission is to continue to make the world a better place.

We will pursue future opportunities and improve NGK SPARK PLUG's unique and advanced technologies.

Our diverse workforce will ignite our company to create new products and to be a leader in innovation.

We will enhance our competitive advantage by understanding and adapting to global changes.

Fueled and motivated by our own drive, NGK SPARK PLUG will continue to IGNITE YOUR SPIRIT, instill passion in your hearts, and deliver cutting edge solutions as a leading manufacturer in the world.

Corporate Philosophy

At NGK SPARK PLUG, we aim to contribute to people all over the world by linking people to technologies and delivering new values. As a truly global corporation, we want to build stronger ties not only with customers and communities, but the local and global environments. We are always working to make our corporate philosophy and our commitments a reality.

Three elements constitute our corporate philosophy.



The Nittoku Way

The Nittoku Way refers to a set of philosophies that includes values that are shared by the entire NGK SPARK PLUG Group, and the actions based on these philosophies, as well as the manner in which those actions are carried out.

The Four Shared Values of the Nittoku Way

Shisei-Shinjitsu

Sincerely, do our very best.

Dokuritsu-Jiei

Believe in one's own ability, and take actions by oneself.

Shikai-Keitei

Unite efforts with the people of the world, and utilize each other's differences.

Soshi-Kantetsu

Have cherished desire, and carry it through till the end.



Our History

Over the course of its history, NGK SPARK PLUG has made progress by consistently taking on the challenge of solving social issues. Its roots can be traced to Morimura Gumi, which was founded by Ichizaemon Morimura and his brother in 1876. "On-time delivery of quality products at affordable prices"—inheriting this commitment to quality from Morimura Gumi as our corporate DNA, we are continuously working to meet the challenge of creating new value.



1876

Founding of Morimura Gumi

Morimura Gumi was founded by two brothers, Ichizaemon and Toyo Morimura, who embraced the challenge of foreign trade, being determined to reclaim the wealth that was then flowing out of the country. Their honest and passionate attitude was highly appreciated overseas, helping them substantially develop their trading business, which they launched independently without support from the government.



1936

Founding of NGK SPARK PLUG

NGK SPARK PLUG was established by spinning off NGK Insulators' Spark Plug Division. The production of spark plugs was started at the initiative of Magoemon Ezoe, the first president of the spinoff, who had decided to produce plugs using ceramics, a specialty item of Japan. The company has gone on to become the top manufacturer of spark plugs in the world.

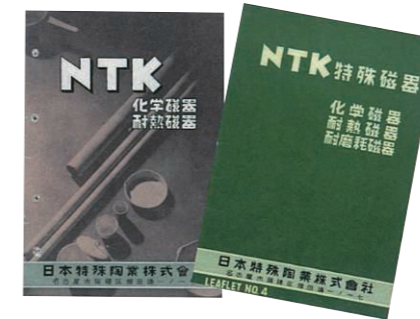
1937

Started the production of NGK Spark Plugs

We began developing spark plugs when the number of domestically produced automobiles was just 49. In 1930 we put NG Spark Plugs on sale as the first spark plug produced in Japan, and began producing NGK Spark Plugs in 1937, thereby making Ezoe's dream of "supplying domestically produced plugs to Japan's promising automobile industry" a reality.



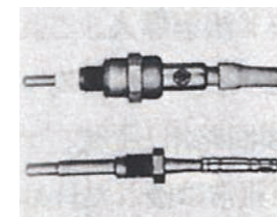
NGK Spark Plug



1949

Started the production of NTK Technical Ceramics

After the post-war confusion had settled down and the production of plugs was stabilized, we began applying ceramics to develop technologies and products for the diversification of our business. This marked the birth of the NTK brand. We gradually expanded our product range to include industrial and environmental products in addition to ceramic products.



Temperature sensors for automobiles



Oxygen sensors for automobiles

1982

Started the production of oxygen sensors for automobiles

In Japan in the 1960s, alongside the full-scale motorization of society, environmental pollution such as air pollution became a social issue. In response, the exhaust gas regulations were made stricter, and we began developing various sensors to help ensure compliance with the regulations, including exhaust gas sensors, such as zirconia oxygen sensors and wide-range oxygen sensors.



Ceramica e Velas de Ignicao NGK do Brasil

1959

Overseas business expansion

Exports increased as Japan entered the high economic growth period. In response, we established in Brazil, our first overseas base, Ceramica e Velas de Ignicao NGK do Brasil in 1959 and proactively expanded our business overseas ahead of competitors to build a strong overseas network.



Solid oxide fuel cell (SOFC)



Hydrogen leak detection sensor

2016

Put hydrogen leak detection sensors on sale

For the solution of environmental and energy issues, we accelerated the development of high-performance plugs and sensors and our efforts for a hydrogen energy-based society. The automobile industry began developing fuel cell vehicles (FCVs) and in response we developed hydrogen leak detection sensors and put them on sale in 2016. We are also engaged in the development of SOFCs and R&D in the medical field. We are thus taking on the challenge of applying the ceramics technologies, which comprise our core technologies, to all possible fields.

1876
Founding of Morimura Gumi

1936
Founding of NGK SPARK PLUG

1946
Achieved net sales of 100 million yen

1956
Achieved net sales of 1 billion yen

1969
Achieved net sales of 10 billion yen

1990
Achieved net sales of 100 billion yen

2000
Achieved net sales of 200 billion yen

2006
Achieved net sales of 300 billion yen

2018
Net sales of 425 billion yen

Startup period (from 1876)

Growth period (from 1940)

Establishment period (from 1960)

Development period (from 1990)

Strengths Gained through the Years

Reliable Technologies and Quality

By using the ceramic molding, printing, bonding and sintering technologies, which comprise our core technologies, and by combining ceramic materials with other materials, we are creating products in fields in which high reliability and durability are required. We also work to increase quality regarding every aspect of our business, including the value that we deliver to customers through our products and services, customer expectations and evaluations, and related people, goods and processes. We will continue our growth by proactively performing tasks with an innovative mindset, being committed to always providing customers with the best value and supporting them in terms of quality.



Global Human Resources

As proven by the fact that our overseas sales account for 84% of the total, we are operating across the world and deem it a top management priority to develop human resources that have international mindsets, and are quick to act. To this end, fair treatment of personnel is essential. By attributing importance to “global,” “speedy” and “fair” treatment of personnel, and by respecting the diversity of our workforce and the personalities of individual members, we are developing human resources with an eye to becoming a truly global organization.

Embracing Challenges in New Fields

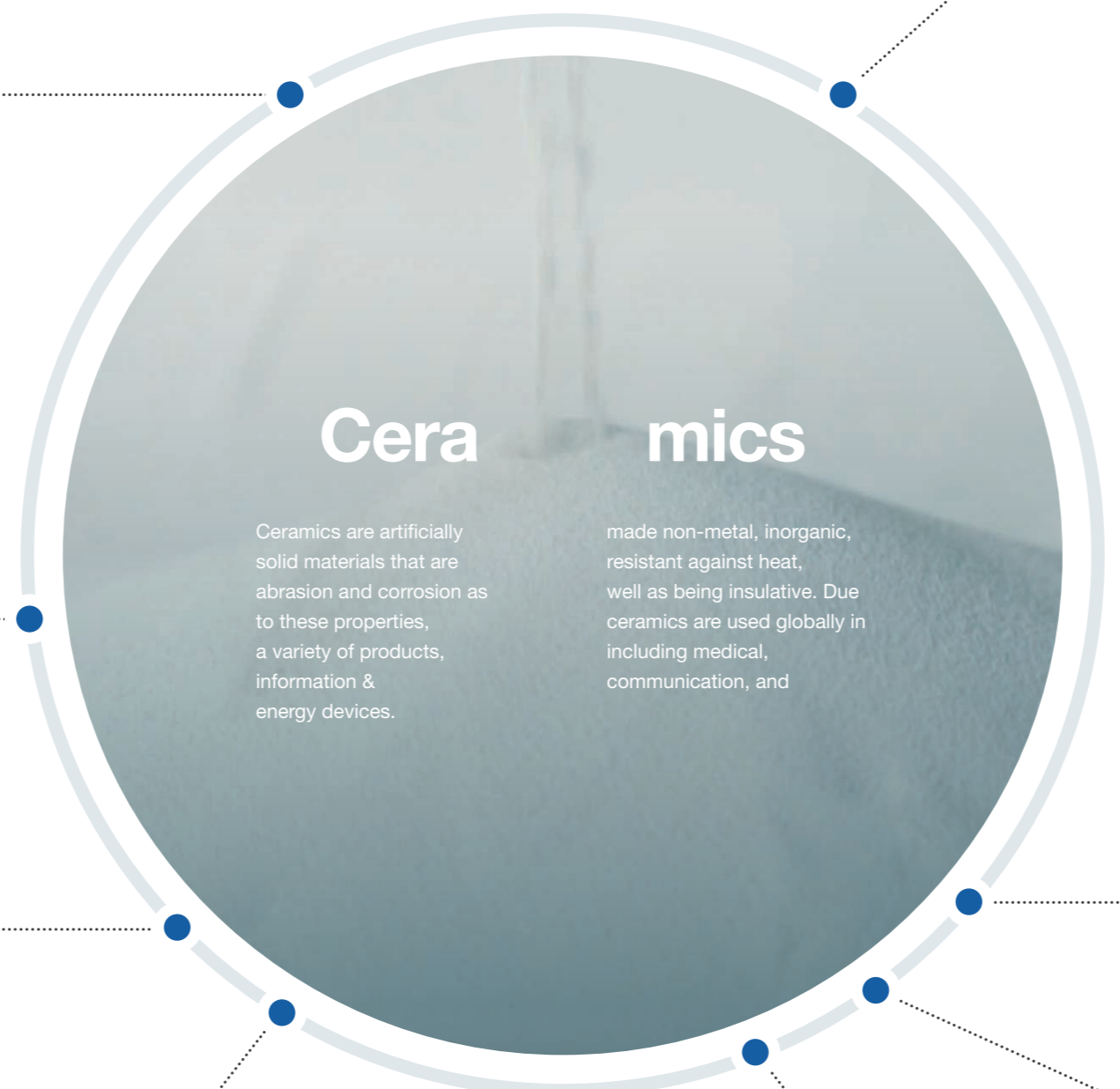
We are pioneering new fields, mainly the fields of environment and energy, next-generation vehicles and medical treatment. For the issues that we cannot solve on our own, we will create new value with partners through open innovation.

We aim to make use of our advanced technologies and underlying corporate DNA in new domains, beyond the framework of the automotive components business.



Glossary of Terms for Our Products

We create products in fields where high reliability and durability are required by combining ceramic materials with other materials based on our ceramics technologies, which comprise our core technologies.



Ceramics

Ceramics are artificially solid materials that are abrasion and corrosion as to these properties, a variety of products, information & energy devices.

made non-metal, inorganic, resistant against heat, well as being insulative. Due ceramics are used globally in including medical, communication, and

Plugs

Spark plug

In an internal combustion engine, acts as a "lighter" to ignite the mixture of gasoline and air.



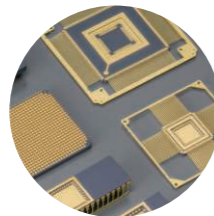
Glow plug

Assists with the startup of a diesel engine.



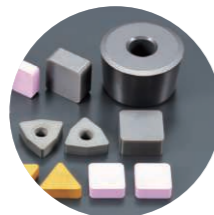
Semiconductor packages and substrates

We offer IC packages suitable for electronic and smart devices as well as substrates used in probe cards for semiconductor wafer inspection.



Cutting tools

Indispensable for the processing of automotive, industrial, aircraft and other components. We offer a wide lineup of products, including ceramic tools and those made of new materials.



Components for semiconductor production equipment

Electrostatic chucks

We offer electrostatic chucks, an indispensable item for semiconductor manufacturing, by making use of the electrostatic property of ceramics.



Ceramic products for industrial use

Piezoelectric ceramic components

Ceramics generate electricity when force is applied to them, while expanding/contracting when voltage is applied. By making use of this property, we manufacture and supply piezoelectric elements for use in sounders and fluid sensors.



Sensors

We offer a variety of sensing technologies, which help comply with stricter exhaust gas regulations.

Zirconia oxygen sensor

Used to measure the exhaust-gas oxygen concentration for air-fuel ratio control.



Wide-range oxygen sensor

Paired with a dedicated interface, used for wide-range air-fuel ratio control to maximize output according to the exhaust-gas oxygen concentration level.



NOx sensor

Used to precisely measure the concentration of NOx gas, a regulated substance, to ensure compliance with the NOx regulations, which have recently been tightened. Can be used to concurrently measure the concentration of oxygen.



Temperature sensor

Used to monitor the exhaust gas temperature for the protection of exhaust system components and for the optimal control of the exhaust gas aftertreatment system, thereby contributing to cleaner exhaust gas and higher fuel efficiency.



Medical products

By making use of our ceramic materials, we manufacture medical products, such as bone prostheses and oxygen concentrators for medical use.



Solid Oxide Fuel Cell (SOFC)

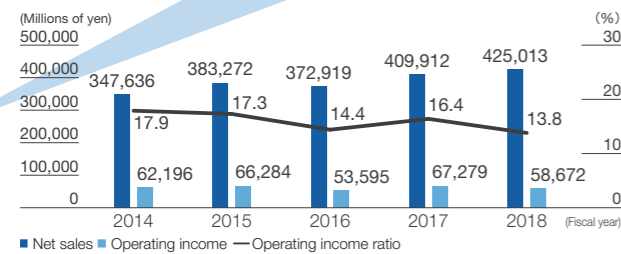
Generates electricity and heat through electrochemical reaction. We are developing an SOFC stack for power generation. SOFCs are highly energy-efficient fuel cells and are expected to be downsized and provided at lower cost.



Performance Data

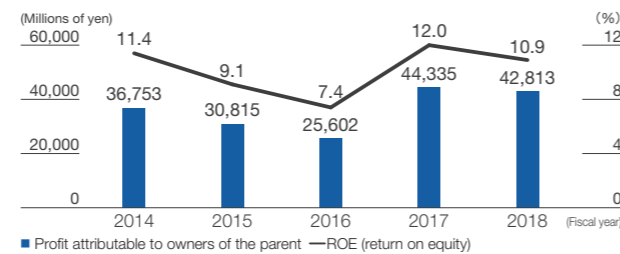
Financial Highlights

Net sales/Operating income/Operating income ratio



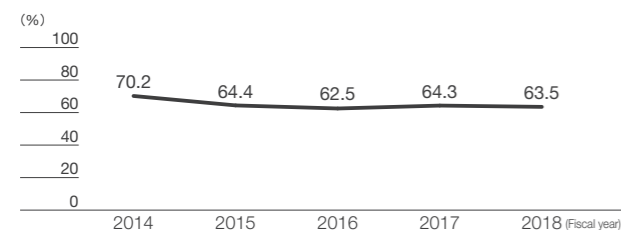
We recorded an increase in revenue year on year due to increased sales of plugs and sensors, etc., while we recorded a decline in profits year on year due to an increase in packing and delivery expenses as well as selling, general and administrative expenses including new business-related expenses.

Profit attributable to owners of the parent/ROE (Return on equity)



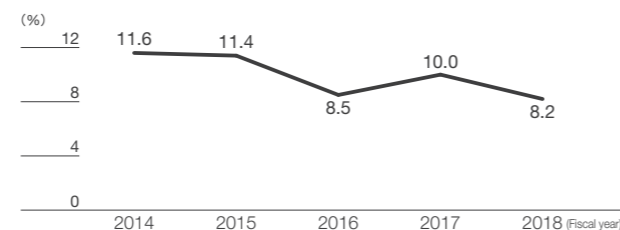
In FY2018, ROE decreased by 1.1% year on year due to the decrease in the profit attributable to owners of the parent and the effect of purchase and retirement of treasury stock in FY2017.

Equity ratio



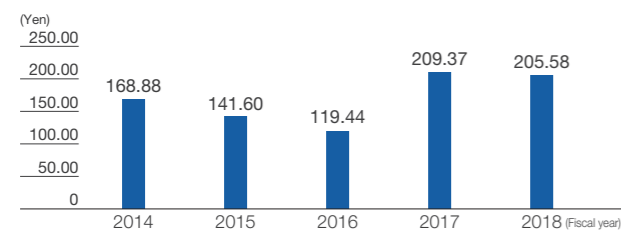
Although equity capital increased year on year, the equity ratio decreased year on year because total assets also increased significantly year on year due to an increase in inventories and an increase in tangible fixed assets through capital investment.

Return on invested capital (ROIC) ROIC: Operating income after tax/Invested capital



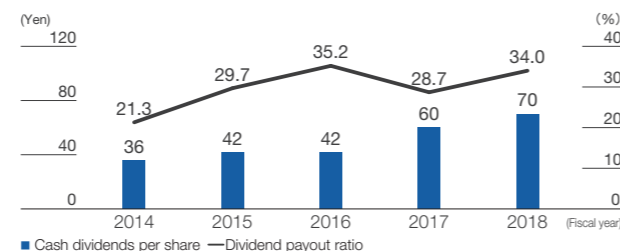
We have adopted ROIC as a management indicator since April 2016, and set our goal in FY2020 at 13%. In FY2018, ROIC decreased by 1.8% year on year due to a decrease in operating income.

Earnings per share



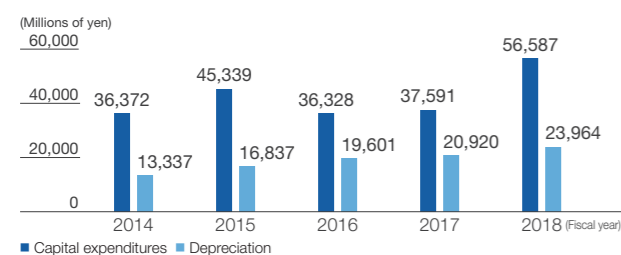
Earnings per share decreased year on year due to a decrease in the profit attributable to owners of the parent.

Cash dividends per share/Dividend payout ratio



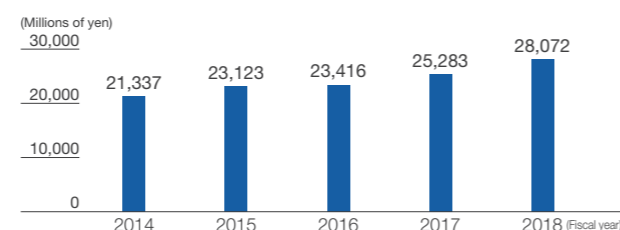
We are aiming at providing stable dividends, with the goal of a payout ratio of 30% or more. In FY2018, the interim cash dividend was 35 yen per share and the year-end cash dividend was 35 yen per share; therefore, the full-year cash dividend was 70 yen per share.

Capital expenditures/Depreciation



Capital expenditures increased significantly year on year due to an increase in investment in facilities for increased production at overseas bases in plugs and sensors, etc.

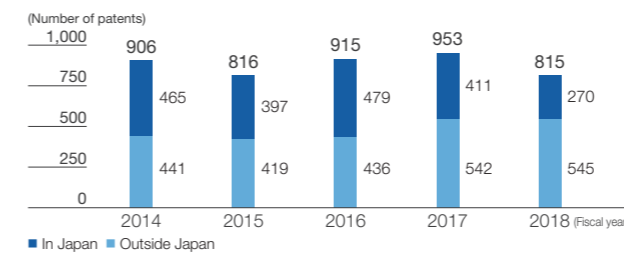
R&D expenses



Although our ratio of R&D expenses to sales had traditionally been approximately 5% to 6%, it reached 6.6% in FY2018.

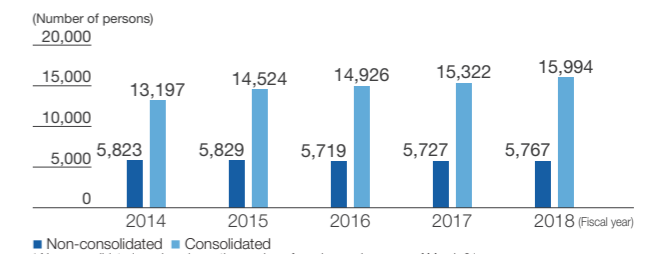
Non-financial Highlights

Number of new patents published



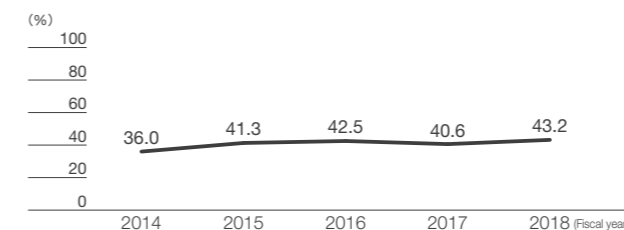
Reflecting our R&D initiatives in new fields, the number of patents published in Japan showed an increasing trend. In addition, since patents filed outside Japan are published sequentially, the number of patents published outside Japan stayed at a specific level.

Number of employees at work



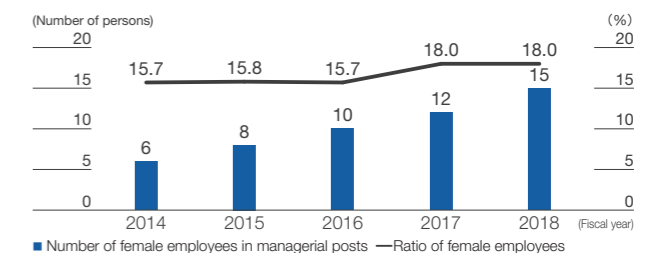
Against the background of M&As in and outside Japan, etc., the consolidated number of employees tended to increase.

Ratio of overseas employees



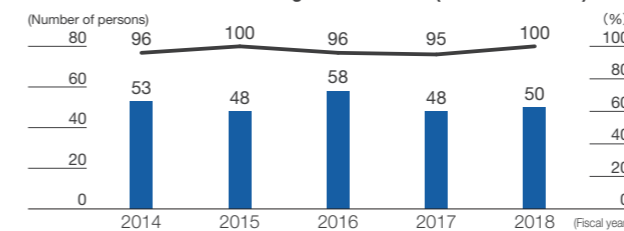
The ratio of overseas employees showed an increasing tendency as a consequence of overseas M&As, etc.

Ratio of female employees/Number of female employees in managerial posts (non-consolidated)



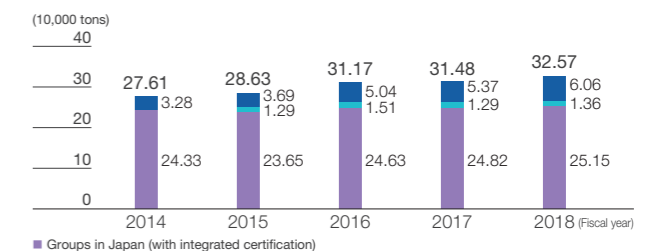
We launched the DIAMOND Project designed to promote women's empowerment in 2013, and achieved the goal that was set at project outset. We will continue to promote the development of female employees.

Number of employees who took childcare leave; Percentage of employees who returned to work after taking childcare leave (non-consolidated)



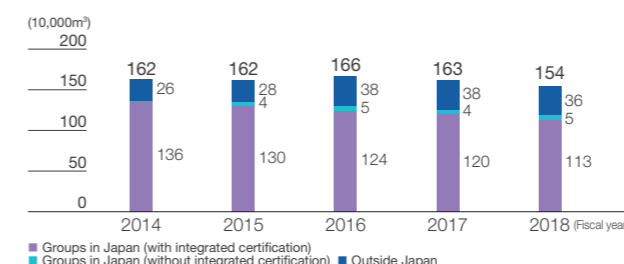
The percentage of employees who returned to work after taking childcare leave had stayed at a high rate, reaching 100% in FY2018.

Fluctuations in CO₂ emissions from energy use



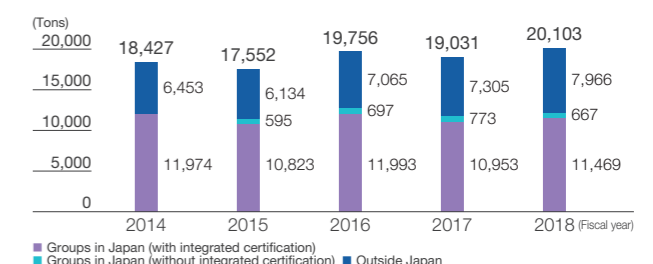
CO₂ emissions increased by 3.5% compared to the previous fiscal year in FY2018. This was due to increased energy usage as a result of several factors, including the preparation for new equipment.

Fluctuations in tap water/well water usage



In FY2018, tap water/well water usage decreased by 5.6% compared to the previous fiscal year due to the effect of consolidation of production bases, etc.

Waste output



Waste output increased by 5.6% compared to the previous fiscal year in FY2018. We will continue to strive to improve production processes and promote resource recycling to reduce waste.

Stories for Value Creation

We are speeding up the measures to attain the goal of the seventh medium-term management plan, which corresponds to the third phase of the long-term management plan, "NITTOKU SHINKARON."

We will steadily implement the management plan to deliver Real Value to all stakeholders in FY2020.



CONTENTS

15	Value Creation Process
17	Risks and Opportunities
19	Enhancement of Competitiveness across the Value Chain
21	Interview with the Chairman and the President
27	NITTOKU SHINKARON
29	Seventh Medium-Term Management Plan
31	Message from the Finance Officer

Business Strategy 1

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33	Automotive Components Group Plug business
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Business Strategy 2

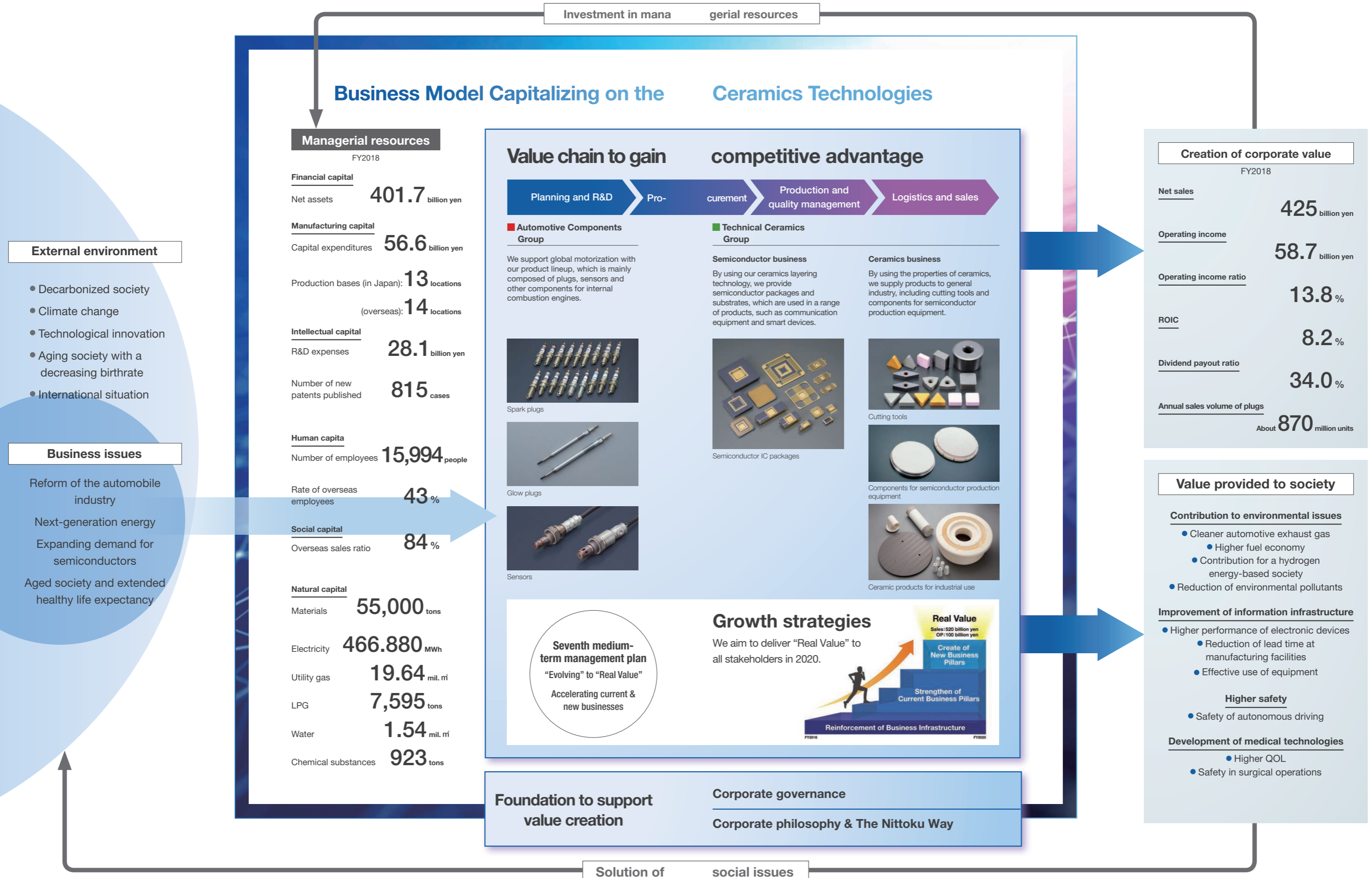
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53	Enhancement of Organizations
55	Establishment of Systems
57	Environment
61	Corporate Governance
71	Messages from Outside Directors
73	CSR Management







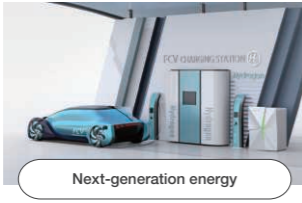

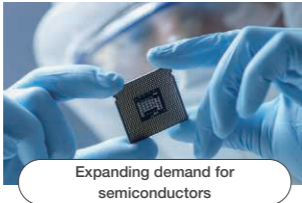





The markets surrounding NGK SPARK PLUG are entering a transitional phase, and our businesses are directly facing significant changes.

We aim to identify short- to medium-term, and long-term risks and opportunities, and maximize profit in existing businesses, while also turning risks into chances and boldly embarking on the challenge of creating new businesses that look to the future.

External environment

- Decarbonized society
- Climate change
- Technological innovation
- Aging society with a decreasing birthrate
- International situation

Business issues	Risks and opportunities	Short-term	Medium-term	Long-term	Measures
 <p>Reform of the automobile industry</p>	<ul style="list-style-type: none"> • Decline in the number of internal combustion engine vehicles Risk • Peaking of demand for automobiles in developed countries Risk 			 	<p>Demand for automobiles is expected to increase on a short- to medium-term basis. Accordingly, we are further enhancing the automotive components business. We will continue making profit through drastic process management for higher productivity and by building infrastructures for more efficient supply chain management and boosting our overseas production rate to mitigate the impact of FX fluctuations. We will also improve our profitability by taking advantage of our superiority in technological development. Moreover, we will make maximum use of our global sales network to promote the sales and distribution of automotive components other than spark plugs. We will thereby enhance the business while striving to develop new businesses, such as fuel cell and medical businesses, to achieve net sales of 30 billion yen in FY2020.</p>
	<ul style="list-style-type: none"> • Downsizing of engines Opportunity Risk 				<p>As the trend toward engine downsizing advances, the number of cylinders and spark plugs per vehicle will decline. On the other hand, as conditions within engines become increasingly restricted, spark plugs are required that have a high level of added value in terms of ignitability, voltage resistance, etc., but there are a limited number of companies that can develop such spark plugs. We view this as an opportunity and aim to further increase profits by responding to the "increasing use of spark plugs with advanced functionality."</p>
	<ul style="list-style-type: none"> • Stricter environmental regulations Opportunity 				<p>Environmental regulations are becoming stricter in Europe and other countries. In response, we are developing and offering a range of automotive sensors, including those to monitor rises in engine temperature and exhaust gas-related sensors. In developed countries we will increase market share and promote a shift to high value-added products by using our technological capabilities, while in developing countries we will make steady profits by taking advantage of the demand for sensors, which is expanding driven by the enhancement of environmental regulations, such as an increase in the number of sensors to be installed per vehicle.</p>
	<ul style="list-style-type: none"> • Expanding demand for automobiles in emerging economies Opportunity 				<p>At present, we are working to expand our market share mainly in China and India and are implementing sales strategies tailored to each region. In China we are favorably increasing the sales of high value-added products as well as low-priced spark plugs, which we released into the local market at the end of 2017. We will continue to enhance the local sales network by establishing a network of distributors in inland regional cities and by building relationships with local manufacturers.</p>
	 <p>Next-generation energy</p>	<ul style="list-style-type: none"> • Advent of a hydrogen energy-based society Opportunity 			
 <p>Expanding demand for semiconductors</p>	<ul style="list-style-type: none"> • Expansion of demand for 5G-, AI- and IoT-related products Opportunity 				<p>By leveraging synergies with NTK CERATEC (former NIHON CERATEC, all shares of which we acquired in 2015) and in anticipation of the recovery of semiconductor demand in and after 2020, we are expanding the applications and customer base of electrostatic chucks and other components for semiconductor production equipment. In the semiconductor business we are developing semiconductor packages and substrates to be used in 5G systems, laser diode packages, etc.</p>
 <p>Aging society and prolonged healthy life expectation</p>	<ul style="list-style-type: none"> • Labor shortage Risk 				<p>We have been enhancing the functions of the Strategic Human Resources Dept. since April 2018 in our effort to secure necessary human resources by global employment and utilization. We are also working to provide employees with comfortable workplaces by implementing employee loyalty improvement systems. Moreover, we launched the Platinum Project for employees in their late 50s and 60s, whom we call the "platinum generation," to assign them to appropriate workplaces in consideration of their skills and career. We will also work to save labor by fostering outsourcing, production process automation, use of IT and improvement of operational efficiency.</p>

— Enhancement of Competitiveness across the Value Chain —

Capitalizing on its unique strength, NGK SPARK PLUG is improving its corporate value by providing society with high value-added products and services across the value chain, from planning and R&D, procurement, and production and quality management through to logistics and sales.

Value chain

Planning and R&D

Procurement

Production and quality management

Logistics and sales



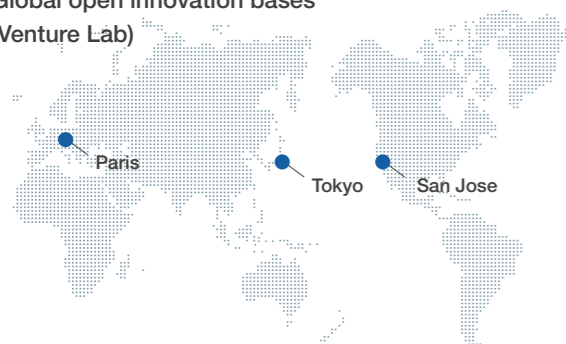
- Identify the needs of customers (automakers) as early as in their engine development planning stage, thereby developing products necessary for them.
- Foster R&D, including research into element technologies, development of new materials and process technologies, and advanced engineering for commercialization.
- Develop new businesses through open innovation.

- Based on the quality products principle, enhance cooperation with suppliers for globally optimal procurement.
- Foster the appropriate purchasing of materials, parts, etc. for CSR-oriented procurement.
- Conduct surveys on conflict minerals, going upstream in the supply chain.
- Reduce the procurement cost by increasing the local procurement rate.
- Support suppliers in developing human resources and gaining corporate strength.
- Conduct follow-up activities after the regular evaluation of suppliers.

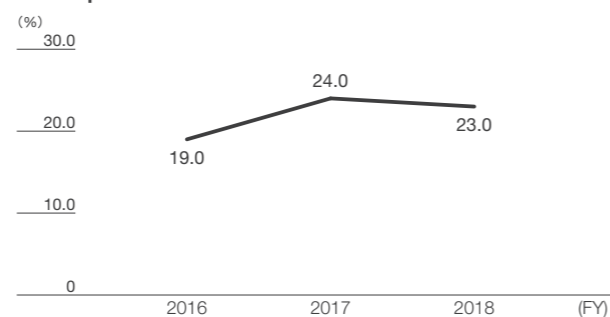
- Meet customers' demands promptly with production bases at 13 locations in Japan and 14 overseas.
- Increase the overseas production rate by transferring the assembly process to outside Japan.
- Offer high-quality products by the concerted effort of engineering, production and quality management staff.
- Hold quality campaigns throughout the year.
- Conduct "Standardize, do, check and act" (SDCA) activities to support total quality management (TQM).

- Reduce the logistics cost by promoting modal shift to marine transportation.
- Shorten the lead time from product receipt, removal from warehouses upon shipment instruction and inspection through to shipment.
- Global network of official distributors
- Gain more market share based on the trust enjoyed by the NGK/NTK brands.

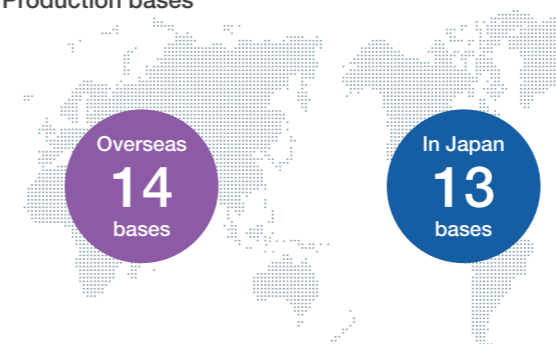
Global open innovation bases (Venture Lab)



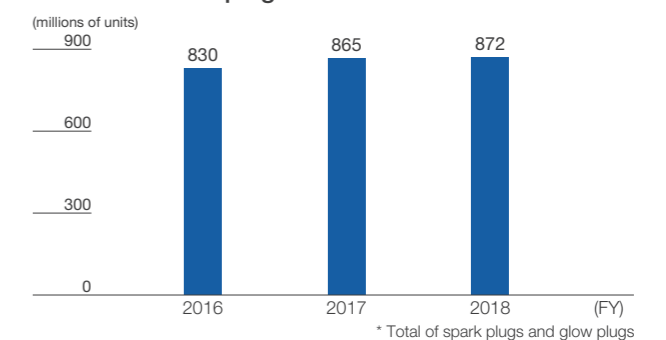
Local procurement rate



Production bases



Sales volume of plugs



Toward achieving the goal of the long-term management plan, we will address managerial issues under a new system.

Since April 1, 2019, Shinichi Odo, Representative Director & Chairman of the Board, and Takeshi Kawai, President & Chief Operating Officer, have been leading the company under a new system. Specifically, the Chairman and the President are addressing challenging business issues as the top-level leaders for management and execution of business, respectively, with a view to providing stakeholders with “Real Value.”

Please outline the purpose of launching the new system in April 2019 and the roles you are respectively playing under the system.

Odo NGK SPARK PLUG has expanded its business in line with economic development and the progress of motorization in and outside Japan. We have continued our growth based on the sales of spark plugs and sensors, which are automotive components for internal combustion engines, and have been maintaining our position as a highly profitable company by continuing to increase sales and profit. However, the automobile industry is approaching a major turning point due to factors including the emergence of next-generation vehicles such as electric vehicles (EVs). We now deem it one of our management priorities to reduce our dependence on automotive components for internal combustion engines, which accounts for more than 80% of our net sales, and take steps forward to create new businesses.

Upon becoming president of the company eight years ago in 2011, I led the execution of business toward

achieving the goal of the long-term management plan, “NITTOKU SHINKARON.” I also led the formulation in April 2016 of the seventh medium-term management plan toward FY2020. I have thus taken charge of both management and execution of business over the years.

As for social movements in recent years, the trends of technological innovation and global competition among companies have been accelerated. To these changes we must respond quickly and make achievements urgently. In addition, we must make managerial decisions carefully in consideration of long-term business risks, such as the peaking of demand for non-hybrid internal combustion engine vehicles and a decrease in demand for plugs due to the downsizing of engines.

Under these circumstances, we need to make managerial decisions and execute business for total optimization by considering both short-term and long-term issues and understanding the whole picture of the business environment. To this end, I began to think that we needed to separate management from execution of business, which would help us attain the goal of NITTOKU



Shinichi
Odo

Representative Director & Chairman of the Board



Takeshi
Kawai

President & Chief Operating Officer



SHINKARON (“Deliver Real Value to all stakeholders in FY2020”) and subsequently achieve sustainable growth.

I therefore decided to resign from the position of president and COO focus on making managerial decisions and developing human resources as chairman of the Board, thereby having managers in charge of business execution devote themselves to the achievement of the company’s short- and medium-term targets. While I had started my career as a salesperson, Mr. Kawai had been engaged in the fields of technology and production since joining the company, including leading the development of wide-range oxygen sensors. In consideration of this fact, Mr. Kawai was chosen to be the new president, the partner with whom I would share the goal and lead the company to a new stage, discussing the issues with each other from our different positions and viewpoints.

Kawai As Mr. Odo said, our company has been taking the top spot in the market of spark plugs and oxygen sensors, backed by our great “assets,” namely, the technologies that we have independently developed in the ceramics field, our brand power, and our relationships of

trust with customers. However, we should not be satisfied with the status quo if we want to achieve further development as a “Monozukuri company.” As such, in order to ensure our growth we need to speed up managerial decision-making in line with the reforms implemented by Mr. Odo. To this end we have fostered delayering for corporate officers and introduced a system to promote young employees to the position of corporate officers. We also need to identify signs of coming changes and turn them into business opportunities. Under the new system, we will work to make existing and new businesses compatible while fostering the establishment of systems to raise all employees’ awareness, including improving the personnel/evaluation systems.

You are thus opening the door to a new stage. Please now look back on and summarize the eight years during which the company was operated under the leadership of President Odo.

Odo Let me outline the following three points on which I have focused since I first became president: (1)

Strengthening existing businesses; (2) Making unprofitable businesses profitable; and (3) Establishing new business pillars. For (1), in the automotive components business, we were able to increase sales favorably, driven by the world economic boom. In 2015, however, we postponed capital investment by one year due to the economic slowdown in China, and as a result of this too meticulous decision-making we had back orders in FY2018. I think this is an issue to be addressed for the future. As for (2), in the semiconductor business, which had been unprofitable, we were able to reduce the deficit by consolidating the production bases, fostering the “selection and concentration” of products, and promoting the assignment of the right people to the right positions. In FY2018 we worked to make profit for a single month and as a result made profit quarterly in the second quarter. In order to make profit for the full year for FY2019, we will gradually shift from “survival” measures to “winning” measures. For (3), we have sown seeds in the three fields of next-generation vehicles, environment and energy, and medical treatment, and are seeing the seeds slowly sprout.

Kawai In particular, in the field of environment and energy, the movement toward the commercialization of solid oxide fuel cell (SOFC) has been accelerated. SOFCs are attracting attention as a small and highly efficient power generation system, and we aim to participate in the market as soon as possible. For the growth of the seeds sown by Mr. Odo, we will foster R&D investments while deepening ties with our partner companies (p.45).



The seventh medium-term management plan is entering the last stage toward completion in FY2020. For the plan, please describe the specific measures, achievements and outlook, including the latest business performance. First, what is the outlook for the automotive components business, which accounts for more than 80% of net sales, and for investment in the business?

Kawai While demand for non-hybrid internal combustion engine vehicles will peak in developed countries, demand for such vehicles will be brisk in developing countries including India and Thailand. Accordingly, the number of these vehicles sold and owned will continue to increase.

However, in China in 2018, the number of new cars sold decreased year on year for the first time in 28 years and we need to monitor the supply-demand balance in the country carefully. For spark plugs, demand for high-performance products, such as precious-metal plugs, has been expanding not only in developed countries but also in emerging economies. There are few players other than us in the market

of high-performance spark plugs, and we therefore assume the social responsibility to ensure the supply of these plugs as the world's top supplier in the market. In order to fulfill this heavy responsibility, we will continue to focus on high-performance products. In the Western markets, we have already been focusing on high-end products, and in emerging economies we will also build a system to deliver highly competitive products to the local high-end product markets by identifying the performance, quality and pricing needed by local customers. In the low-end product market, we will maintain an appropriate supply level in cooperation with other manufacturers, in consideration of the need to foster “concentration and selection” of measures and investments. As for our global production system, we aim to achieve the production of about 1 billion plugs per year in FY2020. For the production system after FY2020, we will make careful investment decisions in consideration of future demand for automobiles in China and other countries.

Also, for sensors, we are expanding the production of wide-range oxygen sensors and NOx sensors, aiming to further increase profitability by promoting a shift to high-performance products. In China, where the emission gas

regulations known as “China 6” will start in 2020, we have started the mass production of wide-range oxygen sensors and plan to introduce a new production line while paying attention to demand for the sensors.

Most of the sensors are to be installed in new cars, and demand for this product item will depend

upon the trends of the entire automobile industry, including the popularization of EVs. In order to increase our productivity under these circumstances, we need to make use of IoT and other technologies and implement measures with a focus on the balance between investments and returns.

In the automotive components business, we pressed forward with large-scale capital investment in FY2018, including repairing the production facilities and building supply chains and logistics systems. For example, in Europe, we introduced robots and fostered automation for logistics operations. In response to a global rise in personnel and other costs, we deem the improvement of efficiency in manufacturing and logistics operations to be an important management issue and will continue to focus on infrastructure improvement.

Presently, overseas sales account for more than 80% of the company's net sales. As a global company, what kinds of relationships are desirable between the head office and regional bases for the company to respond to external changes and make decisions promptly? Also, what is your policy on M&A?

Odo We have the “Global Headquarters (GHQ) and

Regional Headquarters (RHQ) system” in place. It is no longer possible for the head office to have control over all businesses conducted in Japan and abroad, and I think it is important to clarify the local bases’ “authorities and responsibilities” to empower them in an appropriate manner.

Now the related departments are cooperatively discussing how to enhance risk control as the entire group while building an independent, decentralized system and a local governance system in each region, including how to establish clear rules and control systems.

As for M&A, we made automotive component manufacturer Wells a subsidiary in the US in 2015 to enhance our local repair business. In the same year we also made NIHON CERATEC (presently NTK CERATEC), a Japanese supplier of components for semiconductor production equipment, one of our subsidiaries. I think M&A is an important management method to increase our corporate value in a speedy manner. However, for Wells, the post-merger integration (PMI) process has been delayed and it will take more time for us to fully enjoy the synergy effects of the integration.

In 2018, we acquired three companies from the US Chart Group with a view to enhancing the medical business as one of our new businesses. They are: CAIRE Inc., which deals with oxygen concentrators in the US, and one other company in each of the UK and China. CAIRE has a roughly 10% share in the world's oxygen concentrator market and will help our Group boost sales in the medical business.

For M&A, we need to take a long-term view to decide on the desirable business size of our company for the future. It would be difficult to create a new business comparable to our plug and sensor businesses, each of which posts net sales of 100 billion yen, and so we might develop an aggregate of businesses with net sales of 5 billion to 10 billion yen. We also have the option to purchase a company with net sales of about 100 billion yen. To do this, however, we need to increase our market value and stock price while redefining our corporate culture and long-term vision. We are now making examinations for our next long-term management plan, in which we will set a more specific goal and create a more detailed roadmap for the goal, while searching for promising business partners.

In order to establish a new business, we must conduct R&D and make capital investment on a long-term basis. In the current unclear business environment, it might be effective to start making investments in a small to medium amount and then increase investments in promising businesses by carefully keeping the balance between investments and returns.



What do you think about building a system to collaborate with startup companies?

Kawai For collaboration with startups, we established a Venture Lab in Silicon Valley in the US in April 2018 as our first base for overseas venture investments (p. 44). Through collaboration with startups, we will foster the exchange of human resources and introduce external viewpoints and a sense of urgency for reforms to our company. There are two collaboration methods. First, we could collaborate with startups in fields in which the partnership will lead to the effective use of our technologies, generation of synergy effects and enhancement of our businesses. Second, we could cooperate with startups that will provide us with the technologies that we lack and need to have for the achievement of the targets set in our plans. We have been consistently committed to developing technologies independently, but we can no longer keep doing this and will therefore foster collaboration with startups, thereby developing new businesses at speed.

In order to take on new challenges, you need to enhance the management foundation and human resources that comprise the organization. Chairman Odo, you have been fostering the reform of the personnel system since you were appointed president, insisting on the importance of taking risks. Under the new system, you are also focusing on developing human resources, as you have said. Please describe the specific measures and your ideas.

Odo The business model that we have established over long years in the automotive components business provides us with an important foundation for stable business management. However, it cannot be denied that this business model has also been preventing us from embracing new challenges, keeping us trapped in past ideas and successes.

In response, in order to make changes by ridding ourselves of old ideas, we started to implement the DIAMOND Project in FY2012 to provide women with workplaces where they could display more of their abilities. Specifically, we reformed the personnel system to provide women with more diverse job options and provided all managers with training toward the improvement of their own workplace culture. As a result, employees, mainly female employees, made more and more proposals for operational improvements, and our company received an external commendation for the achievements. The number of female managers increased from a few at the start of the

project to 15 at the end of March 2019 and our company was selected to be a Nadeshiko Brand company in March 2019. We will continue to promote women to higher positions in a proactive manner.

Moreover, in FY2016, we started a program to find and develop the next generation of global managerial human resources, targeting all Group companies. This program was named the "HAGI Program" after Hagi City in Yamaguchi Prefecture, where the Shoka Sonjuku school developed diverse human resources at the end of the Edo period. Under this educational program to develop future business leaders, we employ and promote personnel regardless of their nationality and provide individual employees with opportunities and environments for each of them to display their abilities. Although the program was launched only about two years ago, we have already seen signs of changes, including the more proactive exchange of opinions by participants in various meetings. We are also enhancing the employment of new graduates with foreign nationality. Among the 128 new graduates who joined the company in April 2019, five are foreign nationals, including one who obtained a doctoral degree by conducting research into all-solid batteries.

In addition, since FY2018 we have been making a personnel reform targeting older workers under the Platinum Project. In this project we support employees in their late 50s and 60s ("platinum generation") in improving their skills and taking on challenges in new businesses.

The global situation and the composition of Japan's population indicate the need to foster diversity and use a range of human resources as one of our management priorities, and to meet this requirement we need to reform our personnel system and establish a fair evaluation system. For example, we must clearly show the criteria and rules for the selection of participants in the HAGI Program and other programs, thereby helping employees increase their motivation. To this end we launched the Strategic Human Resources Dept. in April 2017, through which we foster the global visualization and central management of human resources, including the management of employment, education and assignment.

Kawai Mr. Odo has been implementing various measures while promoting reforms with a constant focus on "global," "speedy" and "fair" reforms. I feel that the internal atmosphere has indeed changed as a result of the reforms. However, as for our mindset, sense of crisis and ability to act without avoiding challenging issues, we need to do more to step up to the targeted stage.

I therefore think it is necessary for us, as top executives, to show the right direction in the next long-term management plan and other plans and build a fair evaluation system, thereby helping employees, especially young ones, be aware of what they lack and the gaps between what they are and what they should be. We also need a system that encourages employees to think about

the future using the so-called backcasting method rather than simply performing their immediate tasks, and a system that gives support to members who are "sticking out."

You have set the net sales target of 520 billion yen and operating income target of 100 billion yen for FY2020, the final year of the medium-term management plan. What measures will you implement to attain these targets?

Kawai It is of course important to achieve the numerical targets without fail, but we have found ourselves in a period in which we should also attribute importance to the specific details of the measures to attain the targets.

For example, how should we strengthen our existing businesses while making investments appropriately in new businesses to expand our field of business in line with our basic policy, "Accelerating Current & New Businesses"? In the process of finding an answer to this difficult question, I think we will receive both encouraging comments and reprimands from investors. We introduced a new system to make managerial decisions and execute business appropriately to achieve our short-, medium- and long-term targets in consideration of related risks. For the long-term management plan to be newly formulated, we will review both qualitative and quantitative targets to carefully keep a good balance in both our business portfolio and investments.

For existing businesses, we will foster "selection and concentration" to increase profitability while for the new businesses that will support the future of our company, we will input resources mainly in the three fields of environment and energy, medical treatment and next-generation vehicles. We are focusing on fuel cells in the field of environment and energy, the respiratory system in the medical field, including the development of oxygen concentrators and asthma diagnostic equipment, and on the lighting business and hydrogen leak detection sensors for next-generation vehicles. In addition, we are making examinations for 5G-related products, lead-free piezoelectric ceramics and all-solid batteries to make use of our ceramics technologies for the expansion of our business scope.

Odo During the past eight years we worked to build the foundation to move to a new stage; and in the future, as our organization expands into a company with net sales exceeding 500 billion yen, the speed at which we respond to changes will become slower and we will be faced with more risks. It will become important for us to improve the organization, achieve the net sales and operating income targets, and make investments for the future in consideration of long-term risks—all concurrently. During the period in which demand for internal combustion engines is still expanding favorably, we must take actions

meticulously to move to the next business stage, with all employees having a sense of crisis.

Our business sustainability depends on the sustainable development of society. As a global company, NGK SPARK PLUG became a signatory to the UN Global Compact in November 2016, supporting the 10 principles set in four fields. We will continue to conduct a range of activities to contribute to society at large as a good corporate citizen under the corporate slogan, "With established trust and confidence inside and outside the company, we aim to contribute to the peoples of the world by creating and putting at their disposal new values for the future."

Please describe your ideas about shareholder returns.

Kawai We will continue paying dividends in a stable manner and maintain the dividend payout ratio of at least 30% in line with the policy set in the seventh medium-term management plan. We will also acquire treasury stock in a timely fashion in consideration of the stock price movements and capital requirements to eventually achieve a total return ratio of about 50%.

Finally, please reveal your aspirations for the company in 10 years' time, including your messages to shareholders.

Odo For plugs and sensors used as automotive components, we mainly conduct business as a Tier 1 (primary) supplier, which delivers components directly to automakers. However, for our future "survival" and "winning," I think it is necessary for us to make NGK SPARK PLUG a super-Tier 1 and super-Tier 2 company, which has products that only the company can develop and manufacture. We need to become a B-to-B company

that has the robust managerial foundation needed to supply products with stable and high quality on a continual basis as both a Tier 1 and Tier 2 supplier, thereby contributing to the sustainable development of society and making our company significant to society.

To this end, it is essential for all members of the company to share a strong commitment to stepping up to a higher level and the decision to change the company. I believe it is critical to nurture a corporate culture that rewards those who have taken actions and encourage all members to take on challenges. The management team will make strenuous efforts in this direction.

Kawai The company upholds "Dokuritsu-Jiei (Believe in one's own ability, and take actions by oneself)" in the Four Shared Values of the Nittoku Way. I will work to further reform our corporate culture, believing that we can establish the core of a new business if each employee has and demonstrates the Dokuritsu-Jiei spirit.

The automobile industry is said to be facing once-in-a-century changes, and we can no longer depend on our past successes and conventional thinking. We need to identify changes in the market and the industry, clarify what direction we should move in, and contribute to the solution of social issues, thereby establishing "Something New" through the concerted efforts of all employees. And then we can soar to new heights as a corporate group that can contribute to a better future. To this end I will work hard as the top leader for the execution of business.

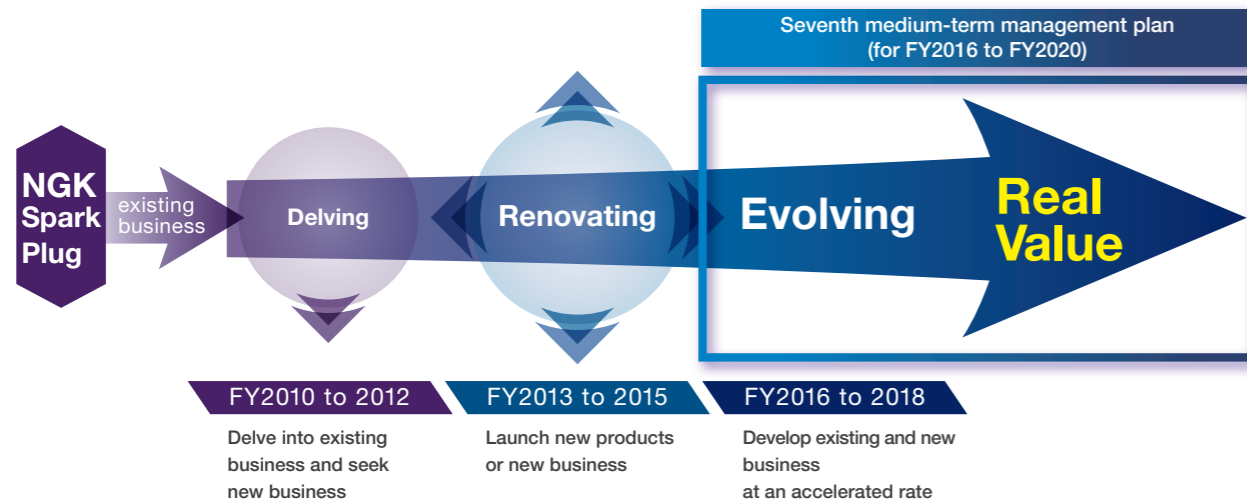
We hope that all stakeholders including shareholders will monitor the future evolution of NGK SPARK PLUG with high expectations and from a long-term point of view, and would ask for your continued advice and support.



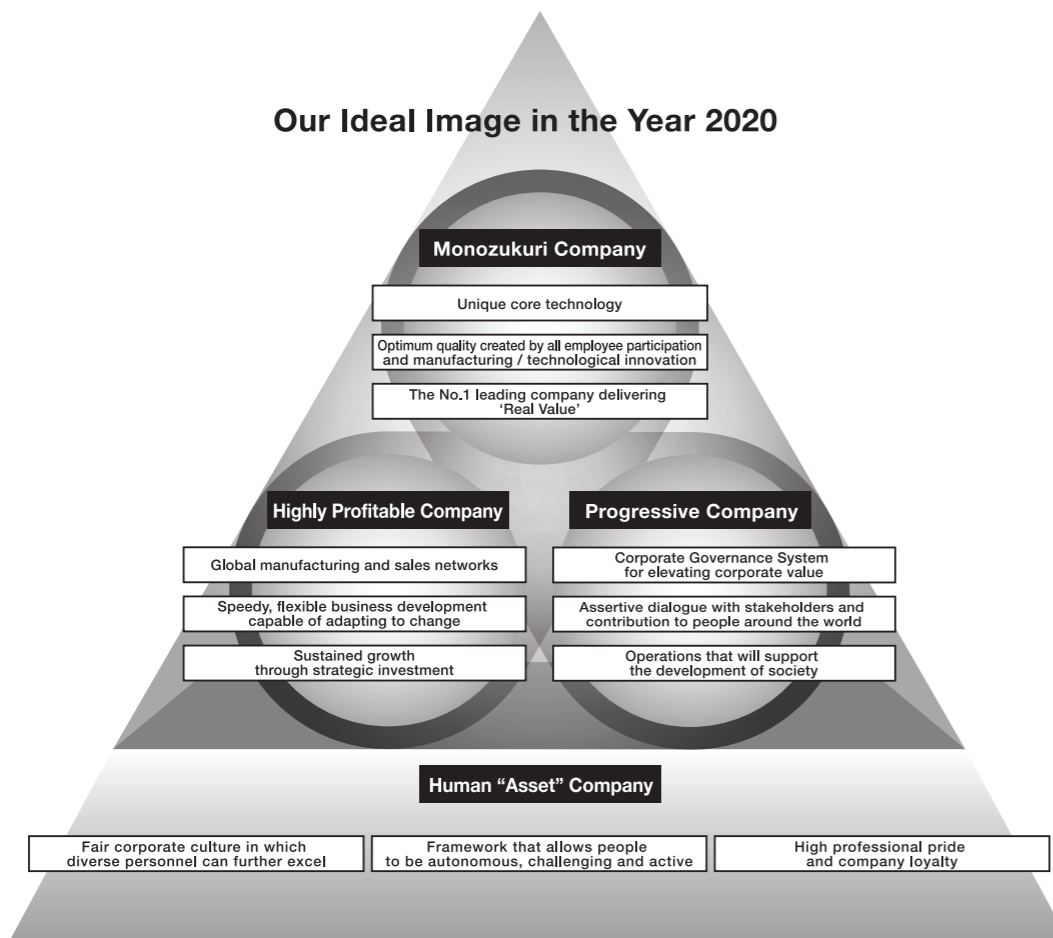
Looking back on the management plan

The "NITTOKU SHINKARON" is NGK SPARK PLUG's long-term management plan. Through the 3-year phases of "Delving," "Renovating," and "Evolving," we will seek to become the No. 1 leading "Monozukuri" company that delivers real value to customers across the world, a highly profitable company, a progressive company, and a human "asset" company. By 2020, we will strive to be a company that can offer "Real Value" to all our stakeholders.

Long-term Management Plan: NITTOKU SHINKARON



Our Ideal Image in the Year 2020

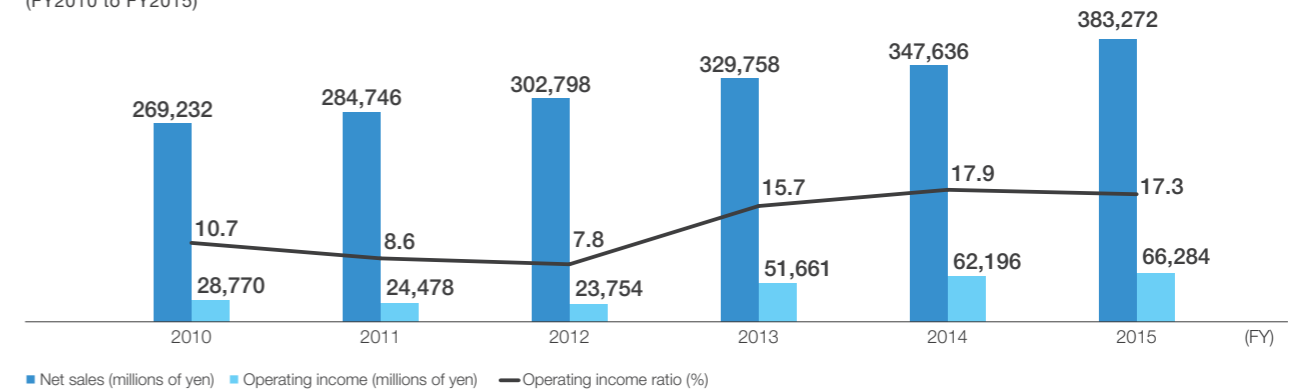


NITTOKU SHINKARON Looking back on the management plan

NGK SPARK PLUG has been implementing the management plan to create new value, while solving managerial issues identified in the past implementation process. On this page we look back on the three years devoted to the "Delving" phase and another three years spent on the "Renovating" phase.



Net sales, operating income and operating income ratio (FY2010 to FY2015)



	Delving	Renovating
Concept	Delve into existing businesses and seek new business	Launch new products or new business
Basic policy	Establish footing for a strong business foundation and further development	"Maximize use of management resources, implementing bold challenges in new business areas and sectors ahead of 'Evolution'"
Issues to focus on	(1) Restructure and solidify current businesses via stronger "Monozukuri" abilities (2) Develop new products for the next generation via new R&D structure (3) Strengthen organizational abilities via strategic use of personnel resources	(1) Provide new value in promising new areas via strategic marketing activities (2) Not only strengthen current core competencies, but also implement development of new core competencies (3) Recognize that human "assets" are what will "Renovate" the company and accelerate the renovation of the company via designating and achieving our own commitments
Achievements	To enhance our "Monozukuri" abilities, we established a Monozukuri center to make profound use of our competitive strength in plugs across all our businesses. We also separated technological development and new business development functions to take speedier actions under the direct control of the president, while reforming the personnel system on a global basis. We also reduced the number of directors to enhance the governance and transparency of management and to speed up managerial decisions.	Before launching new businesses, we discontinued the production of the organic package, transferred the dielectric business and made an asset transfer in the business of ceramic tubes for vacuum circuit breakers for the "selection and concentration" of our businesses. Meanwhile, we acquired all shares of NIHON CERATEC (presently NTK CERATEC), put on BIDE MICS on the market as a new cutting tool, established a division for fuel cells and released hydrogen leak detection sensors. We thus created a range of new businesses and products.
ESG measures	2010 ● Founded the CSR Committee 2011 ● Established the CSR Policy 2012 ● Decreased the upper limit of the number of directors from 25 to 13 ● Introduced the corporate officer system	2013 ● Appointed an outside director ● Launched DIAMOND (Women Empowerment) Project ● Began holding global personnel conferences 2014 ● Increased number of outside directors to two 2015 ● Formulated the criteria for the appointment of independent directors ● Began assessing the effectiveness of the Board of Directors ● Established the working style reform committee
Remaining issues	● Examination of the direction for the structural reform of the semiconductor business ● Strengthen technical ceramics divisions ● Strengthen control functions and globalization of headquarters divisions ● Thorough CSR ● Improve organization abilities	● Break away from reliance of over 80% on internal combustion engines ● Sharing and strengthening internal technologies; establishment of commercialization promotion structure ● Create new businesses ● Strengthen management foundations toward business growth ● Improve organization abilities

“Evolving” to “Real Value”

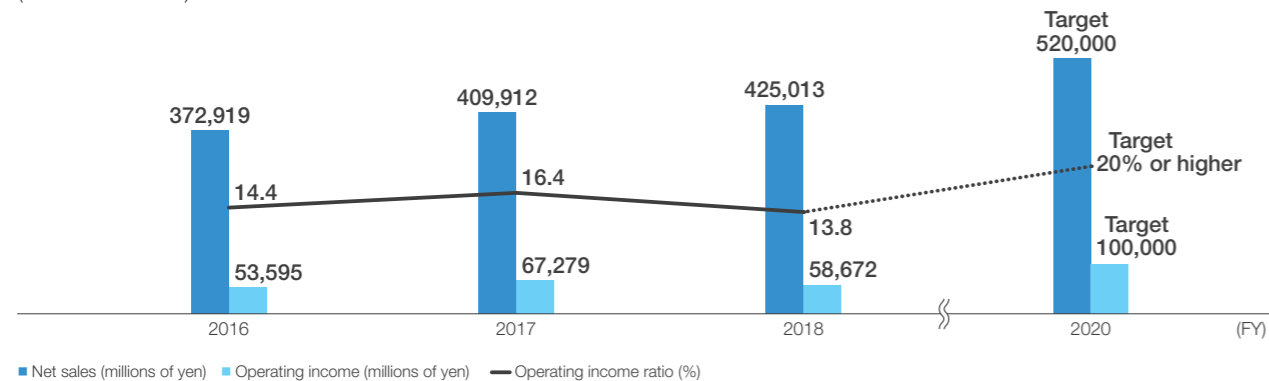
Presently we are implementing the seventh medium-term (five-year) management plan, which includes the three-year “Evolving” phase of NITTOKU SHINKARON, the final phase, directed toward the coming future.

“Evolving” ▶ “Real Value”

FY2016 to FY2020

Net sales, operating income and operating income ratio

(FY2016 to FY2020)



■ Net sales (millions of yen) ■ Operating income (millions of yen) — Operating income ratio (%)

Foreign exchange rates (for 1 dollar/1 euro)

FY2016 (108 yen/119 yen) FY2017 (111 yen/130 yen) FY2018 (111 yen/128 yen) FY2020 (115 yen/120 yen)

* Rates as of April 2016, when the announcement was made

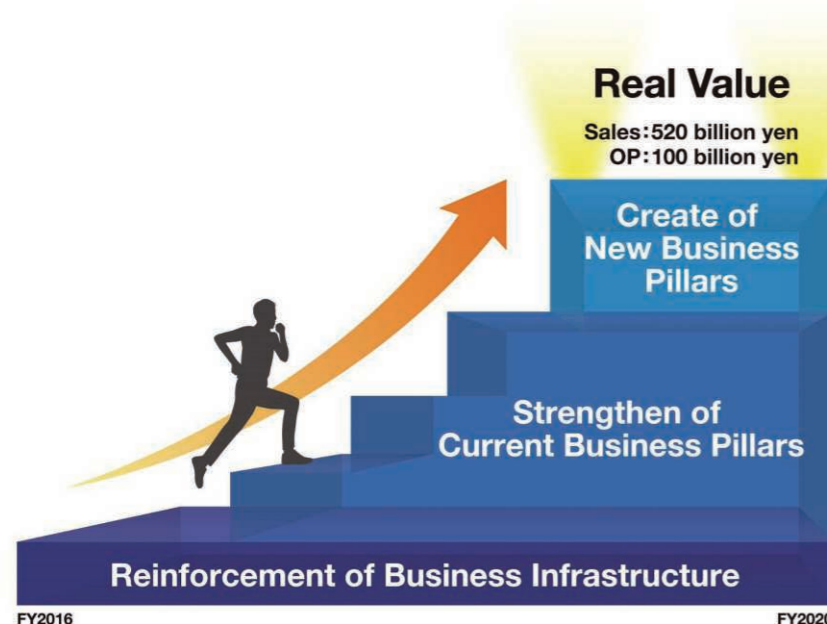
Slogan

Accelerating Current & New Businesses

Basic Policy

Delivering “Real Value” to all stakeholders in FY2020.

In the seventh medium-term management plan, we set (1) Strengthening current businesses; (2) Establishing new business pillars; and (3) Establishing strong business infrastructure as the basic initiatives. Under the plan, we are accelerating our measures to deliver Real Value to all stakeholders in 2020.



Achievements and issues in the three-year Evolving phase

	FY2016	FY2017	FY2018
Achievements	Substantially increased shipment for both plugs and sensors and boosted profit by streamlining production and reducing the cost (but profit decreased year on year due to stronger yen). Made progress with the structural reform of the semiconductor business, “selection and concentration” of products and with rationalization including personnel reduction, thereby far increasing revenue in the business. To solidify the management foundation, launched new organizations and programs with a focus on human resources.	Successfully implemented the strategy for the Chinese market, as upheld in the seventh plan, thereby expanding sales and profit. Increased operating income by rationalization and cost reduction for productivity improvement. In the structural reform of the semiconductor business, completed the consolidation of production bases for higher productivity. Also improved the product mix by expanding the shipment of packages for smartphones. For speedier decision-making, fostered the GHQ-RHQ plan and localization.	Increased shipment for plugs and sensors as well as the ratio of high value-added products, thereby improving the product mix. However, unable to cover increases in the expenses incurred outside the scope of existing businesses, such as the packaging & transportation cost, new business-related cost and SG&A expenses for infrastructure improvement. Fostered the building of a system to establish a global supply chain as a core issue identified in the three-year Evolving stage, and began conducting tests for the system in Europe.
ESG measures	<ul style="list-style-type: none"> Increased the number of outside directors to three Joined the UN Global Compact Began a program to develop the next generation of global business leaders Founded the Working Styles Reforming Office Formulated “the Global Eco Vision 2020” 	<ul style="list-style-type: none"> Established the Nomination and Remuneration Committees Introduced the performance-linked stock remuneration system Turned overseas bases into regional headquarters (RHQ) Designated as ESG investment stock Certified as Bronze Class at the Sustainability Award 2017 Certified as one of the Excellent Enterprises of Health and Productivity Management 2018 (“White 500”) Certified as one of the New Diversity Management Selection 100 companies Established the Diversity Promotion Section 	<ul style="list-style-type: none"> Full compliance with the revised Corporate Governance Code Included in the DJSI Asia Pacific Index for two consecutive years Certified as a Nadeshiko Brand company Concluded with Komaki City a cooperation agreement to assist people who need special medical care for home oxygen therapy Certified as one of the Excellent Enterprises of Health and Productivity Management 2019 (“White 500”)
Remaining issues	<ul style="list-style-type: none"> Response to contraction in the use of internal combustion engines and movement toward EVs and electrification: We are conducting examinations about products for EVs in cooperation with external partners, though demand for ICE engines is still growing. Development of new businesses: We have sown the seeds, which now have to be grown. Fair corporate culture that allows for diverse individuals to reach their potential: While the number of female managers increased and a foreign national was appointed to the position of corporate officer in the Evolving phase, the rates should be further increased, and it will take more time for the establishment of such a corporate culture. Enrichment of corporate governance: While measures were taken to ensure compliance with the revised Corporate Governance Code, there remain issues regarding the implementation of rules at the GHQ and RHQ. 		

Targets for FY2020: Net sales of 520 billion yen and operating income of 100 billion yen.

	For further growth, utilize the cash obtained from the FY2016 to FY2020 business activities			
Concept	Cash inflow		Cash outflow	
	Net income : 280 billion yen Depreciation cost : 170 billion yen 450 billion yen	In and before FY2018: Total cash inflow over 3 years: 143.4 billion yen	Expenditure	Operating capital : 100 billion yen Growth investment : 250 billion yen Shareholder returns : 100 billion yen 450 billion yen
ROIC management	Management of each business	Net operating income after tax ÷ Invested capital (on an assets basis: Accounts receivable + Inventory assets – Accounts payable)		
	Management of the entire company	Net operating income after tax ÷ Invested capital (on a liabilities basis: Interest-bearing debt + shareholders’ equity)		
	Increase ROIC and decrease WACC in the aspects of business and finance, respectively		ROIC and WACC for FY2018	
	ROIC > WACC (About 6%)		ROIC 8.2% WACC About 6%	
Fundraising	(1) Fundraising plan made in consideration of the D/E ratio (2) Rating that contributes to low-cost fundraising Take long-term measures for the two issues in a balanced manner.			
Growth investment	(1) Existing businesses: Make investments so as not to miss any opportunities provided by brisk demand, thereby maximizing profit (2) New businesses: Invest proactively in new and growth businesses to restructure the business portfolio			
Shareholder returns	(1) Stable dividend payment (2) Dividend payout ratio of 30% (3) Acquisition of treasury stock → Lowered capital adequacy ratio Higher total return ratio			

Introducing new management accounting method and related systems for real-time monitoring and quick actions

Kenji Isobe

Member of the Board
Executive Officer
Corporate Administration Group

Aspirations as a finance officer

We at the finance department need to play both “defense” and “offense”: we work to ensure the implementation of the financial strategies and others, while making approaches to the divisions and management to communicate with them in reference to the financial figures. In FY2018 we had excessive inventory in a specific process due to a mismatch between our supply ability and demand. As a finance officer, I attribute importance to inventory management. In order to deal with the issue of mismatches, I thought it necessary to substantially change our idea about management accounting to visualize more of the financial and accounting aspects for the divisions.

In the past we mainly concentrated on the management of revenue with a focus on businesses in our management accounting process. This, however, does not help us recognize and control supply-demand gaps. This June, we therefore introduced a new system, deciding to change our approach to management accounting substantially. The system offers us two benefits: (1) it enables us to focus on customers, business trends, regions and other aspects in addition to products and businesses and (2) it helps us manage financial figures in real time. Under the conventional system, the financial figures for each month were made available to us three to five business days after the monthly financial settlement was made at the end of the month, making it difficult to implement necessary measures quickly. The introduction of the new system has enabled us to check the financial results in real time and make simulations for the future. We can now take actions more quickly by predicting problems. I hope that the new system will also help us find the issues that were invisible under the old system in addition to assisting us with appropriate inventory management.

ROIC management

We began implementing the seventh medium-term management plan three years ago. Before starting ROIC

management, we had been managing working capital and fixed assets based on five important asset-oriented indicators, including inventory turnover, fixed asset turnover and return on assets. ROIC is an indicator that integrates these elements. Our company has been maintaining high profitability and we have long attributed importance to profit and loss as part of our corporate culture, believing that “we can remain profitable by continuing to make profit.” We adopted the ROIC management, wanting to change this way of thinking gradually.

We will enter the final year of the medium-term plan in two years and have yet to raise awareness of and interest in ROIC management among all employees across the company. It is necessary to make all employees understand what we want to achieve by ROIC management during the remaining two years and onward. As we expand ROIC management across the board, waste will decrease in terms of invested capital. However, as more capital is invested for the creation of future operating income, the amount of invested capital and that of operating income might temporarily become imbalanced. I think this is inevitable to some extent, but we need to explain the reason for the imbalance to shareholders. I think it is my role as finance officer to raise employees’ awareness of ROIC management for more effective use of our assets.

Evaluation of FY2018 results

Net sales were below the predicted level, being more affected than expected by the decreased sales of diesel-powered vehicles in Europe. We also missed business opportunities due to a mismatch between our supply ability and demand, which caused us to have back orders. In the semiconductor production equipment business, we were faced with the rapid downturn of the market. We were generally unable to make appropriate responses to changes in the world economy. At the end of the second quarter of the term, we saw some signs of economic slowdown and set our subsequent targets in view of the

fact. However, the results were worse than expected.

The ratio of SG&A expenses to net sales eventually exceeded 20% and contributed to a decrease in profit. Amid the rapid changes of the business environment, the cost of making R&D investment and upfront investment in the expansion of the existing businesses as well as the administration cost to enhance the management foundation are also increasing.

In the latter half of the term, capital investment increased by more than the level assumed after the financial results for the second quarter were finalized. This is mainly because of the gap between our plant capacity and demand. In order to meet the demand for high valued-added products, which was larger than expected, we have worked to enhance the capacity.

Future investment plan and investment management

We had been adopting the business model of limiting the amount of investment to the amount of funds gained through business. However, in the greatly changing business environment, the scale of our investment cash flows has been exceeding that of our operating cash flows in recent years. As a result, our capital adequacy ratio has dropped to around 60% and in the future might be below 60% to meet the capital requirements. Evaluation of this “60%” would differ by stakeholder, but at any rate we want to keep our reputation as a “company with a robust financial structure” as a matter of principle. However, we do need to invest in our future growth and will press forward with investment projects that meet the criteria for return on investment. In addition to this capital cost-oriented investment criteria, we will also give consideration to our business strategies, thereby making both quantitative and qualitative decisions on investment.

Shareholder returns

We will maintain the dividend payout ratio of 30% while making growth investments. As for the acquisition of treasury stock, we will make decisions in consideration of the stock price movements and capital requirements. We would like to return profit to all stakeholders in a fair and balanced manner.

Conclusion

NGK SPARK PLUG is a highly profitable company in the automotive components industry and will remain to be such. We will keep high profitability in the industry until the demand for internal combustion engines peaks and then maximize the benefit of the remaining players. We will take advantage of our technological superiority and global sales channels to maintain high profitability.

During the two years left for the seventh medium-term management plan, we will strive to achieve net sales of 520 billion yen and operating income of 100 billion yen, as targeted in the plan.

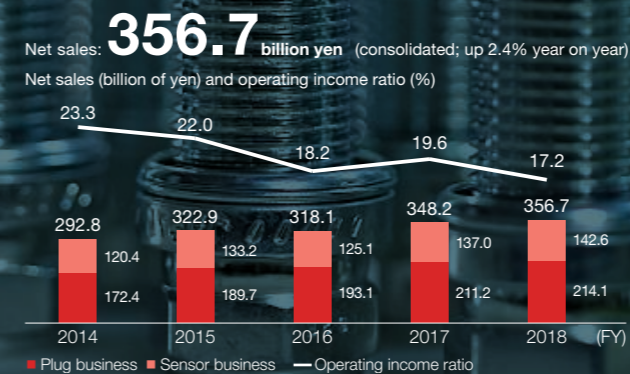


Automotive Components Group

Plug business

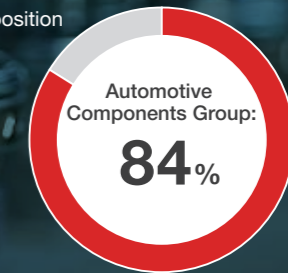
A spark plug is installed in the combustion chamber of an engine to serve as a “lighter” for the electrical ignition of the fuel-air mixture. This component is required to have high thermal conductivity, mechanical strength and insulation resistance in a harsh environment where it undergoes drastic temperature/pressure changes and is subject to high voltage. Glow plugs assist the autoignition of diesel engines.

FY2018 Automotive Components Group



Operating income: **61.2 billion yen**
 (consolidated; down 10.1% year on year)

Net sales composition



Our strengths

The automobile industry aims to achieve higher fuel efficiency and lower emissions for the environment while also offering roomier cars, for which the downsizing of engines has become a trend. Accordingly, spark plugs need to be thinner and longer. The insulative parts of spark plugs are made of ceramics, which cannot be made thinner without advanced technologies and without time spent on development. Because we are involved in the entire process of ceramics production right from the development of materials, we can make detailed responses to requests for higher performance and specifications. Also, because we deal with almost all automakers, we can identify the latest technological trends

and develop technologies to meet market needs. Recently, the adoption of precious-metal plugs has been increasing because of their high ignitability, durability and fuel efficiency.

Spark plugs are consumables and need to be replaced regularly. We have production and sales bases in 21 countries and have built our own sales channels. We are giving technological support locally while meeting the needs of the global repair market. Capitalizing on our advanced technologies and trust earned from customers, we are taking the top spot in the world's spark plug market.

Business environment and challenges

The automobile industry is going through a once-in-a-century period of changes. Against the backdrop of globally stricter environmental regulations, automakers are developing electric vehicles (EVs). The impact of EVs will be minor on a medium-term basis (over five to 10 years), but the ratio of non-hybrid internal combustion engine

vehicles to the total number of vehicles will decrease, which we regard as an issue. On the other hand, plug-in hybrid and hybrid vehicles equipped with internal combustion engines will continue to sell well, and demand for spark plugs is indeed expanding. By sales volume, about 75% of our spark plugs sold are for the repair

market, but the number of vehicles equipped with internal combustion engines will continue to increase. Accordingly, as the responsibility of a manufacturer boasting the top share in the world's spark plug market, we need to ensure stable supply toward the future. As the environmental regulations are becoming stricter year by year, demand for high-performance precious-metal plugs is expanding and

the performance is required to be even higher. We will foster technological development to supply higher-performance plugs to meet the future demand and make strategic investments to offer high value-added products, thereby continuing to meet market needs as a leading company.

Strategy set in the seventh medium-term management plan, progress with the plan, and outlook and challenges for the future

Strategy

Provide competitive products in emerging economies by identifying the local performance, quality and cost requirements

- Expand market share in emerging economies (China and India)
- Find new applications based on business achievements in the repair market

Progress with the medium-term management plan

Our market share in emerging economies was small before the formulation of the management plan but has expanded at an unexpectedly high pace.

In China we have favorably increased the number of “authorized parts shops” even in small cities. In particular, partnering with dealers who had wide-area sales channels helped us make progress toward growth. Moreover, we developed and put on sale highly cost-competitive plugs under a new brand name for use in low-priced cars made by local automakers. As a result, we boosted our sales volume in the Chinese repair market by about 30% year on year.

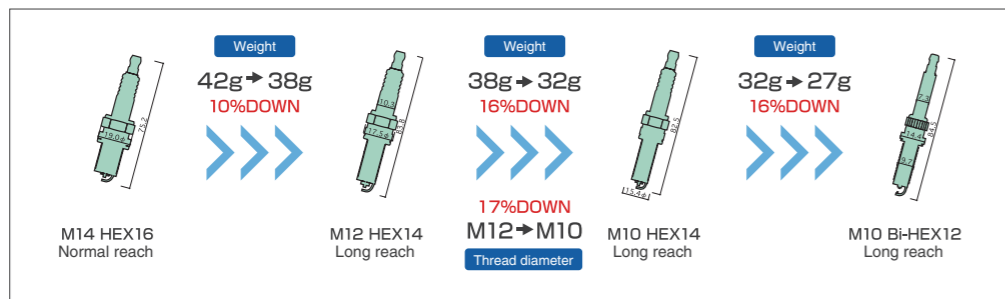
For the manufacture of spark plugs, we also fostered the transfer of the metal fittings production and parts assembly processes from Japan to elsewhere in Asia, thereby lowering the processing cost for rationalization. Presently our overseas production rate exceeds 50% and we are ready to meet the expanding demand in emerging markets.

Outlook for the future

We aim to build a system to increase the annual production of spark plugs by about 20% over the five years from FY2015 to FY2020. We are implementing a plan to achieve the target by making timely investments to expand production and improve productivity while carefully monitoring demand.

The adoption of precious-metal plugs has been expanding among our customers, which is leading to a shift to plugs made of precious metals across the new car market and repair market at an unexpectedly fast pace. We will focus more on the provision of these high value-added products to continue our growth.

In consideration of the possibility that demand for internal combustion engines will peak, we will make investment decisions carefully to keep appropriate inventory and cash flow and avoid missing any profit-making opportunities over the short to medium term.



Downsizing of spark plugs

* Authorized parts shops: Authorized merchants operating under primary dealers. They select and certify the merchants who will sell components to the targeted automobile repair factories as their main business.

Strengthening current businesses

Automotive Components Group

Sensor business

In order to make automobile exhaust gas cleaner, it is important to check the driving conditions, including exhaust-gas oxygen concentration and temperature, and then control the conditions based on the findings. We are developing a range of sensors by using the properties of ceramics, thereby contributing to cleaner exhaust gas.

Our strengths

Developed countries, including Europe and the United States, started to introduce exhaust gas regulations in the 1990s and in recent years emerging economies have also enhanced their regulations, making regulating exhaust gas a global trend. Moreover, the target of regulations has expanded to include motorcycles in addition to automobiles, which is bolstering demand for exhaust gas control sensors. Performance improvement of these sensors is also required to ensure compliance with the regulations. Demand for sensors that are more technologically advanced than the currently mainstream oxygen sensors is also expanding, including the demand for wide-range sensors to measure exhaust-gas oxygen concentration more precisely and for NOx sensors to measure

nitrogen oxide.

We have superiority in the technological development of ceramics to be used as detector elements, and our sensors are highly rated by automakers in recognition of their quick activation. Oxygen sensors need to be activated quickly after the engine starts up, and we help customers comply with strict exhaust gas regulations by shortening the time required for activation to as little as around five seconds.

One of our strengths is that we can develop and promptly release to market products that meet customers' performance requirements.

Business environment and challenges

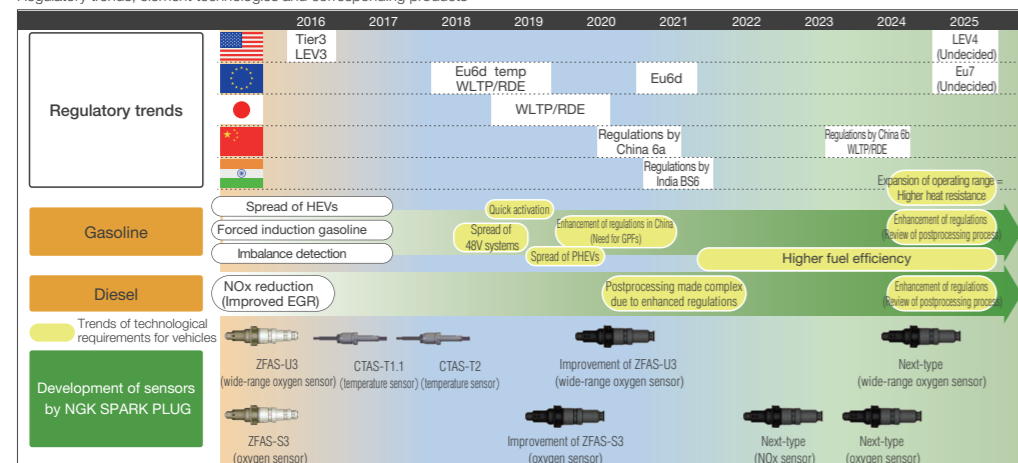
As the exhaust gas regulations are becoming stricter globally, demand for wide-range sensors, NOx sensors and oxygen sensors for motorcycles will increase in the future. Accordingly, we need to enhance our business for these sensors.

The exhaust gas regulations will continue to be tightened, which we will respond to by using our technologies. However,

our sensor development activities might be affected by automakers' responses to the regulations. We have been highly evaluated by automakers due to our advanced technologies, but in 10 to 20 years' time, the number of pure EVs will increase and cause a drop in the sales volume of sensors for automobiles. We therefore need to create new businesses also in the sensor business. While carefully monitoring the trends of

exhaust gas regulations, we will foster the selection and concentration of technologies to be ready to develop new businesses.

Regulatory trends, element technologies and corresponding products



Strategy set in the seventh medium-term management plan, progress with the plan, and outlook and challenges for the future

Strategy

Establish technological superiority, enhance collaboration with system manufacturers and expand the application of sensors for compliance with regulations

- Promote sales of existing products to maintain profit
- Promote sales of high value-added products and increase profit margin
- Search for next-generation seeds for new products and new domains

Progress with the medium-term management plan

In FY2018, we were unable to achieve the numerical targets set in the plan for oxygen sensors and wide-range oxygen sensors due to the delayed implementation of WLTP-related measures by European automakers and to the slowdown of the diesel car market. However, the enhancement of exhaust gas regulations has promoted a shift from oxygen sensors to wide-range oxygen sensors among customers, and our presence has further increased among automakers.

As for PM sensors to detect soot and other matter contained in exhaust gas, we suspended the development of products other than the sensor for the NCEM compact emissions meter due to technological difficulties and in consideration of the supply-demand balance.

Outlook for the future

We are producing wide-area oxygen sensors, which are a high value-added item, mainly in Japan and the United States. We also began producing these sensors in Changshu, China in February 2019. Moreover, we plan to launch production in Thailand within FY2019. We plan to increase the production of wide-range oxygen sensors by about 57% year on year in FY2019. For oxygen sensors for motorcycles, we are expanding the manufacturing facilities, which will start operation within 2019 before the enforcement of the BS6 exhaust gas regulations in April 2020.

We are also proactively transferring production overseas and will stop producing knock sensors in Japan within 2021. For these sensors we have completed the transfer to China and will also start preparations for production in Mexico in 2020 to establish a two-base production system for knock sensors, thereby increasing our price competitiveness for the item. For temperature sensors we are planning to enhance the production capacity in Thailand.

Capitalizing on the trust we have earned based on our technological capabilities, we will continue increasing the sales volume and market share of our products that contribute to compliance with exhaust gas regulations, while also inputting resources to create new businesses.

Sales volume of sensors



Technical Ceramics Group

Semiconductor businesses

Since starting the manufacture of ceramic IC packages and substrates in 1967, we have been supporting the advancement of the semiconductor industry for over half a century as one of the world's most experienced semiconductor package and substrate manufacturers. By employing our technologies backed by our abundant experience, we provide customers with products that meet their needs including both standardized and customized packages.

FY2018 Technical Ceramics Group Semiconductor business



Our strengths

We provide high-quality products by using our advanced and precise manufacturing technologies and applying our strict quality management. We can meet the needs for complex 3D structure, cavity structure and single- to multi-layered structures, provide a range of plating options such as electrolytic, electroless, gold, silver

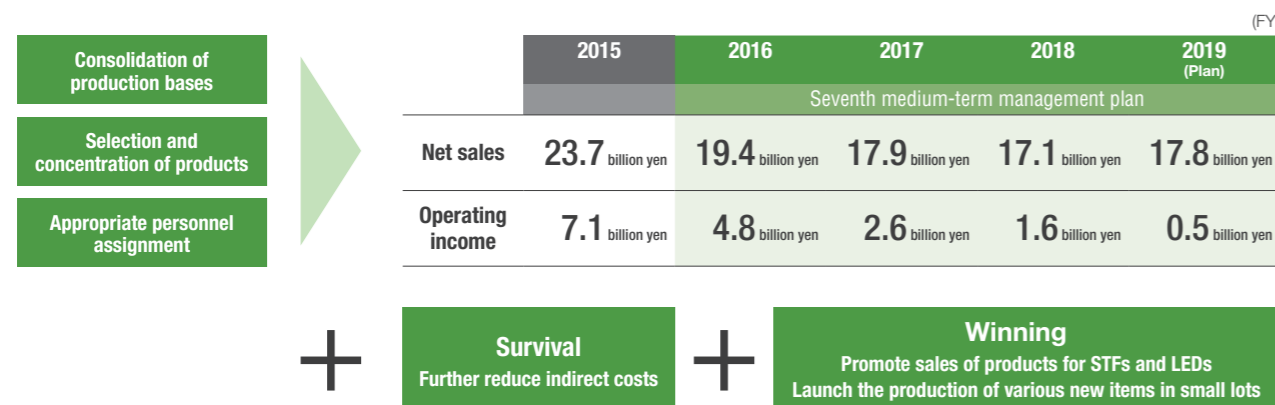
and copper plating, and can deliver small-lot products with a short delivery time. After designing IC chips, we can also make tailored proposals on the structure and design of ceramic packages based on each customer's application and basic requirements.

Business environment and challenges

We launched the ceramic package business in the 1960s and expanded it to a business with operating income of several billion yen by FY2006. However, we have continued to post chronic deficits in the business since the collapse of Lehman Brothers.

In October 2009, we established NTK CERAMIC CO., LTD. by merging our three wholly owned subsidiaries and spinning off the ceramic IC package business division, with the spinoff taking over the business of the three. NTK CERAMIC manufactured products for us by using the materials and parts that we had supplied to it, and we purchased the completed products from NTK CERAMIC to sell them to customers. However, due to the emergence of Chinese and other semiconductor package manufacturers boasting high cost

competitiveness, we were faced with tougher price competition and were unable to demonstrate our strength in the business, in which we continued to post deficits as a result. In FY2016, the first year of the seventh medium-term management plan, we upheld the following four items as the strategy to revitalize the ceramic package business, and have since been promoting the revitalization plan with a strong commitment: turn NTK CERAMIC into a subsidiary independently engaged in the semiconductor package business; invite external business leaders to participate in the management; foster the selection and concentration of products; and review the production bases.



Strategy set in the seventh medium-term management plan, progress with the plan, and outlook and challenges for the future

Strategy

Revitalize the business by undertaking structural reform, implementing the growth strategy and making use of external resources

- Turn NTK CERAMIC into a subsidiary independently engaged in the semiconductor package business
- Foster the selection and concentration of products
- Review the production bases
- Invite external business leaders to participate in the management

Progress with the medium-term management plan

In October 2016 we embarked on business restructuring to "turn NTK CERAMIC into a subsidiary independently engaged in the semiconductor business," and then visualized the business and sped up the reform with unwavering resolve.

As for "Invite external business leaders to participate in the management," we asked Mr. Sakuta (presently CEO of NTK CERAMIC), who had proven his ability to rebuild business at Renesas Electronics, to lead the reform of our corporate culture. Under his leadership we have raised employees' awareness, increased the speed of managerial decision-making, and clarified the responsibilities and authorities of the business units set for each product, thereby steadily improving the bottom line.

For the "selection and concentration of products," we completed the withdrawal from the business of crystal packages at the end of March 2018, as planned, as we had become unable to compete on price in this business following the commoditization of the item. On the other hand, we have been striving to be an active player in the market of high value-added semiconductor packages used in automobiles, medical equipment and high-speed communication devices.

As for "Review the production bases," we consolidated the four bases into three, thereby reducing the fixed cost while promoting appropriate personnel assignment in line with our shift of focus to high value-added products.

Outlook for the future

In FY2018 we posted profit on a quarterly basis in the second quarter and implemented the revitalization plan with a focus on

cost reduction toward the goal of posting profit for FY2019. We expect that we will record profit on a yearly basis for FY2019 as planned, but we cannot be optimistic about our business environment as we see unexpectedly large changes being made to the world's economy and semiconductor market. We will work with all our might for the success of the revitalization plan by further reducing indirect costs.

We will also shift our focus gradually from "survival" measures, including cost reduction, to "winning" measures to expand top-line sales and increase the share that products for STFs and LEDs occupy among our total sales, with a view to building a business structure that does not depend on semiconductor packages for smartphones.

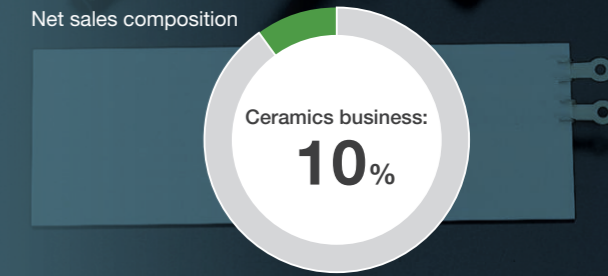
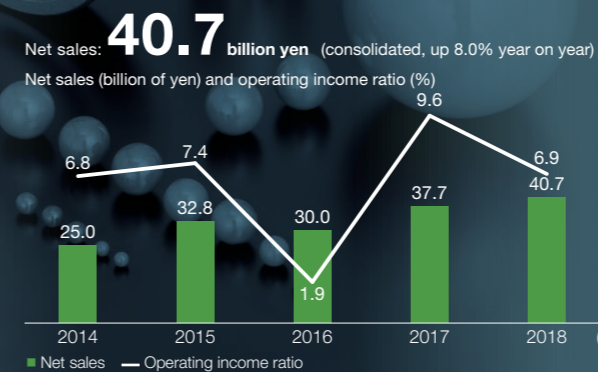
For STFs, there has been a shift from organic to ceramic materials as a technological trend. In response we have started to manufacture products for contact image sensors (CIS) by shifting our focus from memory applications, and sales are gradually increasing. For LEDs, our focus is shifting from LEDs used in consumer products to those used in automobiles. For other packages we are receiving more orders, mainly for use in CIS solar cells for industrial use.

As described above, we are seeing the seeds that we have sown sprouting for the development of new projects and a new customer base, which could lead to the creation of new pillars in the semiconductor business. In and after FY2020 we will further accelerate development and sales promotion for stable profit-making in the business.

Ceramics business

By making use of the properties of ceramics, including being heat- and corrosion-resistant and electrically insulative, we are developing products that help enrich industry and everyday life. We will continue to make use of our long-accumulated materials and process technologies to deliver high value-added products necessary for the coming age.

FY2018 Technical Ceramics Group Ceramics business



Our strengths

In the cutting tool business, we supply tools for metal processing and have been holding on to a large market share for many years. Our BIDE MICS cutting tool is optimal for the processing of aircraft engines and has many users because of its high productivity. In the industrial ceramics business, we are engaged in an integrated process from the development of materials to the manufacture of products and can make detailed responses to requests from customers, including those for piezoelectric elements and oscillators. In the semiconductor

production equipment (SPE) business, we offer electrostatic chucks and other components indispensable for the equipment. As demand for semiconductors expands in line with the increasing need for higher-performance electronic components, we need to develop higher value-added components for the equipment and are customizing products to meet the requirements of individual customers.

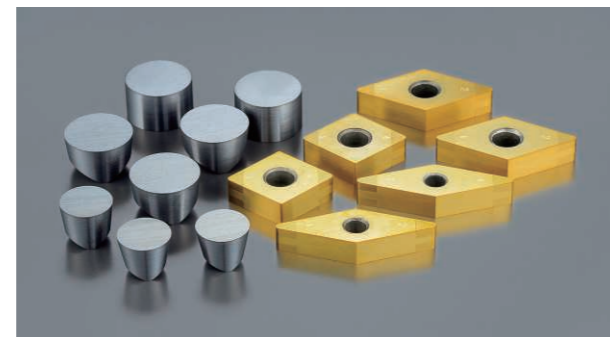
Business environment and challenges

Cutting tools are indispensable for the processing of components used in automobiles, industrial equipment and aircraft. Recently, against the backdrop of expanding demand for passenger aircraft, we developed and put on sale BIDE MICS as a tool for stable and speedier cutting. BIDE MICS contributes to higher productivity by cutting heat-resistant alloys smoothly in the aircraft component cutting process. In recent years manufacturers have been increasingly required to shorten the processing time as the public environmental awareness grows and work style reforms are further promoted. In response, we need to develop a new BIDE MICS model with higher processing performance as soon as possible.

In the industrial ceramics business, we are making a range of proposals to foster the use of piezoelectric ceramics in medical devices and in semiconductor and automobile components. We will also work to expand the application of piezoelectric ceramics and the application of silicon nitride ceramic balls in machine tools, EVs and wind turbine bearings.

In the SPE business, we will be faced with difficulties in FY2019, being affected by the sluggish market for memory and logic semiconductors. In and after 2020 the market will recover due to increased demand for semiconductors driven by the spread of 5G, AI and IoT systems, and the profitability of our electrostatic chucks will be improved accordingly. In anticipation of an increase in demand for semiconductors, we have been enhancing our

production capacity of electrostatic chucks, which will cause a drop in profit due to increased depreciation cost while net sales have decreased year on year. For the SPE business we regard FY2019 as a year in which we should make efforts patiently. In this year we will “enhance quality and stabilize the production system,” and “foster development to meet new demand and receive more orders,” so that we will not miss any opportunities that will arise due to future brisk demand.



BIDE MICS

Strategy set in the seventh medium-term management plan, progress with the plan, and outlook and challenges for the future

Strategy

- Steadily implement the growth strategies set for each area and each product, accelerate production reforms and improve our plant productivity.
- Make maximum use of synergies with NTK CERATEC (former NIHON CERATEC) to be the top player in the field of ceramic components for semiconductor production equipment.

Progress with the medium-term management plan

In the cutting tool business, we are earning a greater share in the US and European markets, but still need to increase our sales as our biggest challenge. We will continue working toward the achievement of the plan.

In the industrial ceramics business, we have been increasing sales of piezoelectric ceramics favorably, and will continue to foster the selection and concentration of products to make more profit.

In the SPE business we acquired NIHON CERATEC (presently NTK CERATEC) in 2015 in recognition of its advanced processing technologies and cost competitiveness in the small-lot production of various items. We will make maximum use of synergies between our overseas sales network and NTK CERATEC so that we will become the top player in the field of ceramic components for semiconductor production equipment. We restructured our organization in April 2018 to establish the SPE Division in order to speed up business operations. We will find new customers for our electrostatic chucks and shorten the lead time for higher profitability.

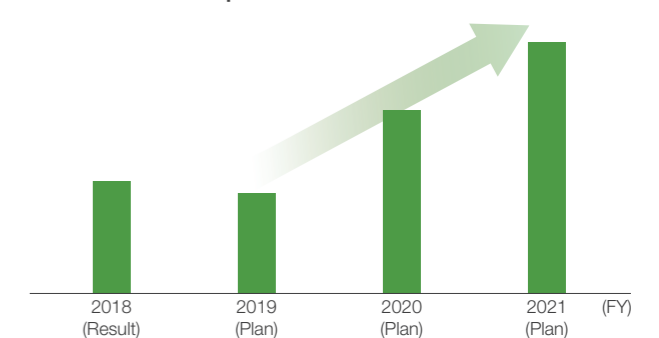
Outlook for the future

In the cutting tool business, we will foster the development of new cutting tool models that will contribute to higher productivity and to the reduction of production cost. We will also press forward with automation and the consolidation of processes to improve our cash flow and profitability.

In the industrial ceramics business, we will promote sales of piezoelectric products for semiconductor production equipment and other applications, foster the use of silicon nitrogen ceramic balls in EVs and wind turbines for power generation, and enhance our production capacity for the products.

In the SPE business we will need to meet the requirement of “uniform surface temperature” and “low particle generation” for electrostatic chucks, which we are manufacturing by using the sheet layering technology that we have developed in the semiconductor business. This technology will be very important in the manufacture of semiconductor devices with narrow wiring pitches, and we will approach semiconductor production equipment manufacturers by taking advantage of this technology.

Amount of sales planned for electrostatic chucks

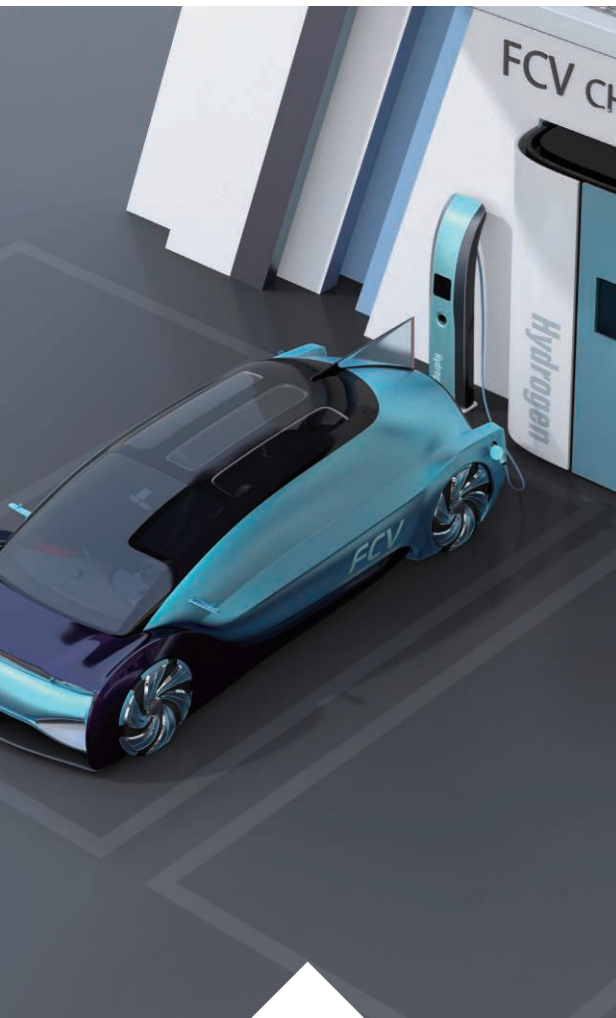


Establishing new business pillars

Pioneering New Fields by the Versatile Power of Technologies

NGK SPARK PLUG has been contributing to the solution of social issues by applying its ceramics technologies accumulated through the development and production of spark plugs to the development and manufacture of sensors, cutting tools and semiconductor packages.

We are making use of technologies that we have developed to meet the needs of customers in this era of changes, which include the spread of next-generation vehicles, extended healthy life expectancy and the advent of a sustainable energy-based society.



Contribution in the field of environment and energy



Spark plugs, oxygen sensors and other automotive components account for 80% or more of our sales. We therefore regard it as one of our management priorities to create new businesses for the long-term diversification of our business portfolio. For the direction of new businesses, we have been conducting examinations to identify fields where we can grasp business opportunities by taking advantage of our strength and can eventually contribute to the solution of future social issues. As a result, we have identified the following three as such fields: environment and energy, next-generation vehicles and medical treatment.

We have also been fostering collaboration with other companies and academia and promoting open innovation to create new businesses, including founding a Venture Lab

in Silicon Valley in the US in April 2018. We started investing in startup companies through this base for innovation, aiming to collaborate closely with these startups to speed up the launch of new businesses.

We will develop new businesses while steadily making profits in the existing businesses that will continue to grow for at least a couple of years. We are implementing this strategy by the concerted effort of all members of our workforce. We aim to achieve sales of 30 billion yen for new businesses in FY2020 as a medium- to long-term target.

New business pillars

Environment and energy

→ P.45 - 46

Next-generation vehicles

→ P.47

Medical treatment

→ P.48

Utilization of venture capital

Investing in venture capital funds specializing in supporting hardware companies

Matching in fields that have great affinities with our businesses

Industrial analysis
Evaluation of venture companies
Accumulation of know-how

Challenges posed by next-generation vehicles



Development in the medical field



Nurturing Corporate Culture that Propels the

We regard “Establishing new business pillars” as a top priority to be addressed across the company. We are developing new businesses by taking a four-pronged approach: Search for technological seeds; Collaborate toward business creation; Conceive a scenario; and Identify promising investment projects. We are looking for new projects by attributing importance to “Creating customer value” and “Why NGK SPARK PLUG? (What benefit can be derived

Birth of New Businesses

and what new value can be provided from the company’s involvement in the project?)” We will ask “Why NGK SPARK PLUG?” when identifying a promising project, with an eye to creating new businesses that will eventually give us a competitive edge.

Why NGK SPARK PLUG?

What benefit can be derived from the company’s involvement in the project?

We will ask ourselves, “What new value can we offer to society and customers by drawing on not only our technologies but also our global sales network, corporate DNA, and the values and abilities of our people?”

For new businesses, we target the three fields of environment and energy, next-generation vehicles and medical treatment, as described above. However, we do not limit the target to these and are searching for all possibilities. We are still in the stage of groping for new possibilities, but for fuel cells we are starting to follow a path toward commercialization. In the medical field we will also proactively foster M&A and collaboration to create a new business pillar.



New possibility discovered by NGK SPARK PLUG (1)

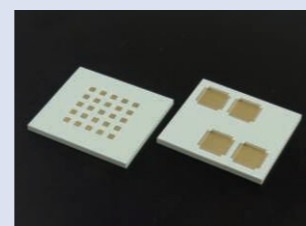
Functional components for 5G systems

The fifth-generation (5G) mobile communication systems offer large capacity, multiple simultaneous connectivity and low latency as their features and are expected to be applied in the fields of IoT and autonomous driving, among others. For the communication of large volumes of data, the use of “millimeter waves,” which are in a high frequency band including 28GHz, is being considered and is expected to be a new means to make effective use of frequency resources. On the plus side, millimeter waves can transmit voluminous data. But on the downside they go in a straight line and are much attenuated (absorbed by obstacles and do not flow smoothly).

In response, we developed a wide-band, high-gain antenna by using our own LTCC material and unique structure. By applying our multilayer substrate technology to this, we were also able to help reduce the substrate’s transmission loss.

The development of components for 5G systems will rapidly progress toward the full-scale adoption of the systems. By taking advantage of the fact that we can independently develop materials technologies, we will foster R&D to be an active player in this new field.

* LTCC stands for low-temperature co-fired ceramics.



Multilayer LTCC for high-frequency applications



Antenna

New possibility discovered by NGK SPARK PLUG (2)

Venture Lab

We established a Venture Lab in Silicon Valley (San Jose) in the United States in April 2018 as a partnership development and investment base for new businesses, deeming it important to bypass our independent development policy in order to develop new businesses with speed. Accordingly, we set rules to allow our representatives to make decisions on investments without the need to have them approved by the Board of Directors, provided the amount to be invested does not exceed 500 million yen. The rules on investments include two items that are to be considered for each investment project: “Whether it is interesting or not” and “Why NGK SPARK PLUG?” We cannot tell how many of the projects in which we have invested will lead to the development of new businesses, but we will continue to find seeds for new businesses through these projects, and decide whether to make additional investments in them. We will continue to form capital/business partnerships with ventures through the Venture Lab and two other similar facilities opened in Paris and Tokyo in 2019.



Katagiri Architecture+Design / Kakizoe Architects

Investment projects implemented by the venture lab in San Jose, US

Nanoramic Laboratories:

- It develops high-performance, highly heat-resistant capacitors.
- We can collaborate with the company by using our packaging technology.

Neural Analytics:

- It develops diagnostic equipment that measures cerebral blood flow to diagnose brain diseases.
- We can provide the company with our ultrasonic sensors.

Establishing new business pillars

NGK SPARK PLUG × Energy and Environment

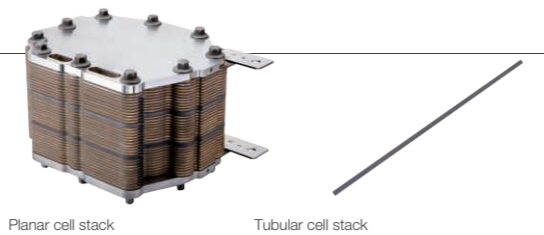
We are taking on challenges in the energy and environment field by applying our ceramics technologies. We will provide society with a better living environment by the power of ceramics.

Solid Oxide Fuel Cell (SOFC)

We have accumulated technologies for ceramic materials in the development of oxygen sensors for automobiles. We have also developed manufacturing (multilayering and metal-ceramics bonding) technologies for semiconductor packages and spark plugs. By making use of all these technologies and the know-how we have gained over the course of years, we have been developing SOFCs since 1999. SOFCs derive hydrogen from utility gas and force a reaction with atmospheric oxygen to produce electricity and water. SOFCs are more energy efficient than other fuel cells and contribute to reducing CO₂ and other greenhouse gas emissions. The cells are therefore expected to be used as one of a range of clean energy sources. The heat generated in the chemical reaction process can also be used for the supply of hot water. Although the market size for hydrogen fuel cells is still small, it is expected to substantially expand toward 2030. In particular, the market of stationary fuel cells, which we are developing, is predicted to grow at a stable rate.

We are developing both planar and tubular SOFCs. These cells are highly energy efficient and might also be downsized and provided at lower cost.

For planar SOFCs, we are developing products for use in commercial and industrial systems in addition to products for household use and are supplying planar fuel cell stacks to Hitachi Zosen Corporation for use in its 20 kW-class system demonstration tests. Through these externally conducted demonstration tests, we will have more proven records for the full launch of our products for commercial and industrial use, while participating in the market of SOFCs used in household

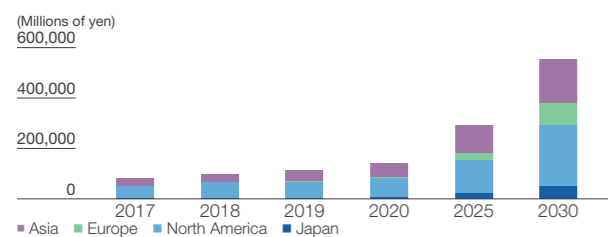


cogeneration systems, thereby expanding our business in the field. In March 2019, four Morimura Group companies (NORITAKE CO., LTD., TOTO, NGK INSULATORS and NGK SPARK PLUG) concluded a basic agreement on the establishment of an SOFC-related joint venture and started conducting specific examinations. The four companies will closely cooperate to make more profits through the venture and thereby maximize their corporate value.

For tubular SOFCs, we installed a tubular SOFC-micro gas turbine combined pressurized hybrid power generation system (made by Mitsubishi Hitachi Power Systems [MHPS]) within the Komaki Plant in April 2017 and have been operating it in demonstration tests. We will collaborate with MHPS to launch a mass production line for the SOFCs and participate in a range of markets whose customers include industrial users and power plants. In July 2019 we concluded an agreement with MHPS about the establishment and operation of a joint venture to manufacture and sell fuel cell stacks.

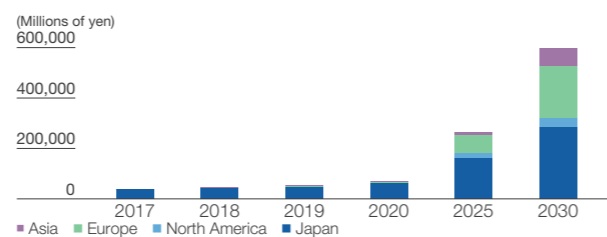
We will make further progress for the practical use and spread of SOFCs, thereby contributing to the improvement of energy and environmental issues.

Market forecast for commercial- and industrial-use fuel cells



Source: Future Outlook for Fuel Cell Related Technologies and Market 2018 by Fuji Keizai
* Figures for 2018 are estimates and figures for 2019 and onward are forecasts.

Market forecast for household-use fuel cells



Source: Future Outlook for Fuel Cell Related Technologies and Market 2018 by Fuji Keizai
* Figures for 2018 are estimates and figures for 2019 and onward are forecasts.

Solid-state batteries

We have been developing all-solid-state batteries since 2010. For these batteries, solid electrolytes are used, as opposed to the liquid electrolytes used in lithium-ion batteries. Because the inside of ordinary lithium-ion batteries is filled with this solution, these batteries are liable to catch fire due to temperature changes, the liquid might leak out, or the battery pack could swell. In contrast, solid-state batteries, for which solid electrolytes are used, are very safe and free from these problems.

For solid-state batteries, we are working on the development of oxide-based products, in contrast to sulfide-based products, the development of which has been advanced by the industry as a whole. A sulfide-based solid-state battery has the potential to generate hydrogen sulfide if it accidentally contacts the air, but an oxide-based one does not pose this risk. Moreover, we can manufacture oxide-based solid-state batteries without the sintering process, whereas ordinary oxide-based solid-state batteries require this process for the bonding of solid electrolytes with cathode and anode materials. Battery materials are warped by sintering, and high-capacity electrode materials, which react to solid electrolytes in the sintering process, cannot be used. It is therefore technologically difficult to manufacture large-sized,

high-capacity oxide-based solid-state batteries. However, we are developing oxide-based solid-state batteries that can be manufactured without sintering, in order to make large products more easily while also developing multilayered products in anticipation of their future use in EVs and electric motorcycles.

We will initially develop these batteries for use in the first half of the 2020s in devices operated at low temperatures, such as in cold regions, and in refrigerators/freezers as well as for use in electronic and medical devices that need to be assembled at temperatures of 100°C or higher. We also assume their use in factory infrastructure monitoring devices. For batteries used in oscillating environments, we aim to participate in niche markets, targeting use in underground excavators and use in automobiles. We will press forward with the development with the expectation that the batteries will be used in electric vehicles and electric motorcycles as well as in household stationary energy storage systems in and after the second half of the 2020s.

Performing the world's first technological demonstration test of solid-state batteries on the moon

In February 2019 we announced that we would participate in the world's first commercial lunar exploration program in order to carry out the world's first technological demonstration test of solid-state batteries on the moon in 2021. Called "HAKUTO-R," the program will be implemented by ispace. On the moon, the temperature drops to 150°C below zero or lower at night and in the shaded areas of the polar zones, while it rises to 100°C or higher during the daytime. Conventional lithium-ion batteries cannot be used on the moon without an auxiliary system to keep the battery temperature within operational range. We will perform the technological demonstration test of our solid-state batteries now under development on the moon as part of our response to demand for batteries that can supply electricity safely and stably even in harsh environments such as space. Through the HAKUTO-R project, we hope to contribute to humankind's exploration of space as well as further expand the applications of solid-state batteries.



Lead-free piezoelectric ceramics

Piezoelectric ceramics generate voltage when external force is applied to them and are used widely in a range of fields, including in familiar home appliances and industrial equipment. However, conventional piezoelectric ceramics contain lead at a high concentration, and the commercialization of lead-free environment-friendly piezoelectric ceramic materials has long been coveted. In response, we made use of our unique technologies to

develop lead-free piezoelectric ceramics and are now working to commercialize the products and devices made of the ceramics.



Establishing new business pillars

NGK SPARK PLUG × Next-Generation Vehicles

We successfully developed the industry's first automotive thermal conductivity hydrogen sensor by using our technologies for automotive oxygen sensors. We will continue meeting the challenges posed by the new age of motorization, mobilizing all our technologies and ideas.

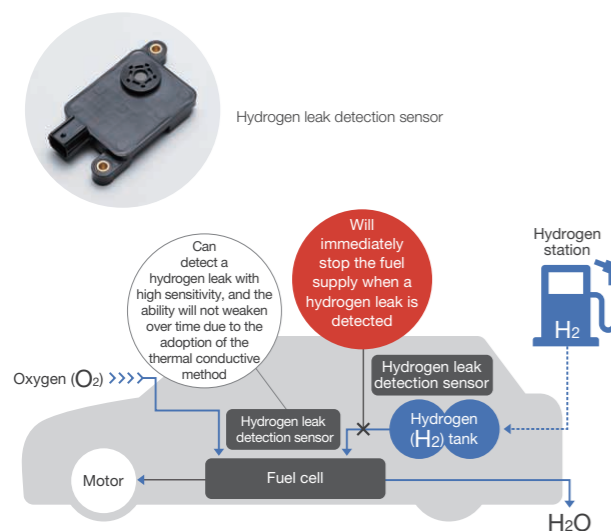
In Japan, ahead of other countries, a fuel cell vehicle (FCV) was developed for mass production toward the creation of a hydrogen energy-based society. FCVs are powered by electricity generated by the chemical reaction between hydrogen and atmospheric oxygen, and with no CO₂ emissions are called the "ultimate eco-cars." However, hydrogen is flammable and gets more explosive when its concentration exceeds 4%. For FCVs to run on public roads as passenger cars, their safety must be completely assured. By taking advantage of our technologies developed for sensors including those for automobiles, we successfully developed a hydrogen leak detection sensor for FCVs. We began selling the product, which could detect even a minor leak of hydrogen, in 2016.

Hydrogen leak detection sensors are used to detect any minor leak of hydrogen from the hydrogen tanks, stacks and other fuel cell system components, to warn drivers against the risk of explosion, and to stop the supply of hydrogen to the fuel cells. Our hydrogen leak detection sensors are not easily deteriorated over time because they do not rely on chemical reactions to detect leaks. We have adopted the "thermal conductive" detection method to make the sensors start up and respond quickly and to

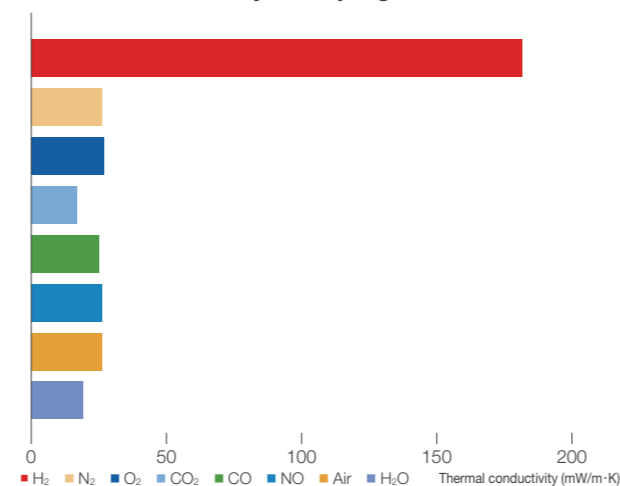
provide them with high resistance to vibrations and shocks. Specifically, the sensors measure the amount of heat taken by hydrogen from the heater (detection elements), thereby checking for the existence of hydrogen gas very precisely.

Recently, hydrogen energy has proactively been utilized to address the issues of global warming and depletion of fossil fuels, and this global trend is pushing automakers to develop and popularize clean energy-powered cars. However, for the spread of FCVs, more technologies need to be developed, infrastructure established, and the cost of FCVs reduced. Accordingly, we must lower the prices of our hydrogen leak detection sensors to be used as a small component for automobiles. We will develop cost-competitive sensors, while making use of the advantages provided by the "thermal conductive" method.

We will further improve our hydrogen leak detection sensors in anticipation of the mass production of FCVs, thereby contributing to the creation of a hydrogen-based society.



Thermal conductivity of major gases



NGK SPARK PLUG × Medical Treatment

We are applying our ceramics technologies to conduct the implant and oxygen concentrator businesses in the medical field.

Implant business

In the implant business we have developed bioceramics since the latter half of the 1970s. We began the manufacture and sale of the bone prosthesis Ceratite® in the 1990s. Presently we also manufacture and sell the paste bone prosthesis Cerapaste® as well as the absorbable and replaceable artificial bone Cerarebone®. They contain calcium phosphate as the main ingredient and have great affinity with bones.

In April 2016 we concluded a capital and business partnership agreement with Japan MDM, Inc., which has a subsidiary in the US, with an eye to expanding our business globally.

We will expand our product lineup in the medical domain to include orthopedic implant products in addition to artificial bones, thereby achieving further growth in the business field.

Oxygen concentrator business

In Japan in 1999, we began manufacturing and selling oxygen concentrators for patients with chronic respiratory diseases who were receiving oxygen therapy.

In December 2018 we acquired the shares of CAIRE, which deals with oxygen concentrators as a Chart Group company in the US. We have manufactured and sold stationary oxygen concentrators, whereas CAIRE has a full product lineup, including portable, movable and stationary types. The acquisition of this company will thus help us expand our product portfolio. In particular, there are great needs for movable and portable types among medical facilities and patients, and the market is expected to grow further. We aim to build a global value chain, from development and production through to sales, by using CAIRE. We will also apply the technologies developed for our products sold in

Japan to the development of new products by CAIRE, thereby providing patients across the world with high-quality oxygen concentrators.

In the future we will develop new products by using our sensing technology and expand the business of products for the treatment of respiratory systems, including not only oxygen concentrators but also asthma detection systems.

Providing a full lineup of oxygen concentrators to enhance the product portfolio



Apply our technologies to the development of new products by CAIRE, thereby improving the product quality

Establishing Strong Infrastructure to Support Businesses

In order to “strengthen current businesses” and “establish new business pillars,” it is critical to “establish strong business infrastructure.” To this end, we will execute business with a sense of urgency and from the viewpoint of global total optimization, utilize human resources in a fair and global manner, clarify responsibilities and authorities, and restructure the organization to enhance the business supervisory functions across the board.



- Develop the next generation of global managerial human resources
- Formulate a professional education system and training programs
- Define the competencies that contribute to the implementation of strategies and incorporate the definitions into the personnel evaluation criteria
- Assign human resources for total optimization

- Restructure global organizations (to establish regional headquarters)
- Break up the business headquarters into nine divisions for speedier management
- Establish a corporate strategy headquarters to enhance the corporate functions as well as a “Working Styles Reforming Office” to foster operational reforms

- Enhance the abilities to propose strategies and manage portfolios
- Build a global SCM system and make it function
- Enhance the technological abilities for skillful, speedy and low-cost manufacturing

Enhancement of Human Resources

Targets for FY2020

- Develop the next generation of global managerial human resources
- Formulate a professional education system and training programs
- Define the competencies that contribute to the implementation of strategies and incorporate the definitions into the personnel evaluation criteria
- Assign human resources for total optimization

Activities in FY2018

- Promotion of foreign nationals to the position of corporate officer
- Development of global business leaders through the HAGI Program
- Organization of meetings of the Human Resources Committee
- Launch of an internal application system

Basic philosophy on human resources

We uphold a human resource policy that states: “We acknowledge that employees are the most important management resource. In light of this, we respect the diversity and individuality of our employees and promote the cultivation of physically and mentally healthy

human beings, striving to promote the further development of our Group as a whole.” Moreover, we set down our aspiration to be a human “asset” company in “Our Ideal Image in the Year 2020.”

Development of human resources

Shift from administrative human resource management to strategic human resource management

Our human resource department engaged in “administrative human resource management” for 80 years, during which time the company conducted existing businesses in a robust manner. However, in view of the need to deal with recent changes in the external environment and with the internal need to expand the existing businesses and create new businesses, “administrative human resource management” hit its limits, and we decided to shift to “strategic human resource management.” Accordingly, we launched the Strategic Human Resources Dept. in April 2017 as an organization to lead strategic human resource management, mainly through the personnel system. Since April 2018, the department has been shifting to “strategic human resource management” in terms of all its functions, including employment, development, assignment and treatment of human resources.

To achieve “Our Ideal Image,” we need to foster a “fair corporate culture that allows diverse personnel to shine,” “frameworks to enable autonomy, challenge and growth” and “high professionalism and love for the company.” Accordingly, we regard “personnel development and organizational invigoration to maximize performance” as a mission of the Strategic Human Resources Dept. under the human resource policy. This department is promoting measures in line with the basic policy of “Observe, develop and motivate human resources,” aiming to become an HR specialist organization that can implement the human resource strategies in an integrated manner with the management and business strategies.

Establishing strong business infrastructure

Effort to “observe human resources”: Human Resources Committee

In order to “observe and motivate human resources,” we are working on the visualization of our personnel. For candidates for future business leaders, we have established a database (called “human asset bank”) of information about their career, skills, attitude to work and willpower, thereby deepening our grasp of our human resources.

Moreover, since FY2018 the Human Resources Committee has been holding a monthly meeting to discuss the assignment of employees to core positions with directors. We are thereby motivating human resources for total optimization.

360-degree survey

In FY2018 we conducted a 360-degree survey targeting both executives and general managers. The survey has revealed the need for these leaders to enhance their progressiveness, but the level of their engagement in the company is high and they are strongly committed to Monozukuri according to the survey results. The results were fed back to the leaders to encourage them to “observe human resources,” including themselves.

Interviews with young employees

For young employees, in FY2018 the Strategic Human Resources Dept. began interviewing a total of 253 employees in their first to third year at the company. This is part of our efforts to “observe human resources,” and the interviews indeed help us understand the issues faced by young employees after they join the company. The job turnover rate for young workers is generally high, and we aim to listen to the frank opinions of young employees through the third-party interview, conducted not by their managers but by the Strategic Human Resources Dept. We will also establish a contact point to support their career development, through which we will continue to listen to their opinions and “observe” them.

Development of the next generation of global managerial human resources

In response to the global expansion of our business, we have been implementing a program to develop global managerial human resources (“HAGI Program”) for all Group companies since 2016. Through this program we work to employ and promote people regardless of their nationality and provide individual employees with opportunities and workplaces where they can demonstrate their abilities. For deep learning, Chairman Odo serves as the “headmaster” in the program and discusses the topic of desirable leadership with participants, who are candidates to become future business leaders.



Launch of regional human resource development programs

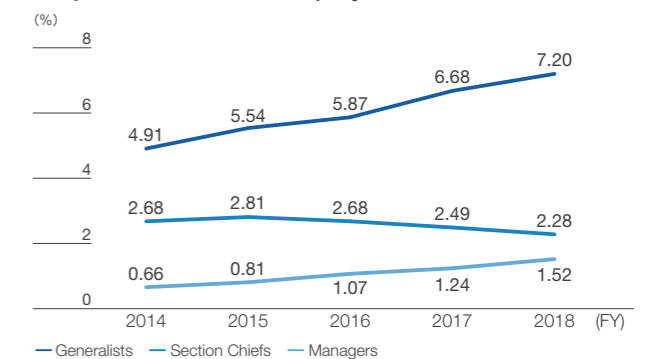
Toward the development of global human resources, we also began implementing human resource development programs in North America, Europe, Asia and other regions. These programs are held about four times a year to develop future business leaders. In FY2018, 16 people participated in the program launched in North America and 12 in the program held in Asia.

Diversity

Ongoing effort to promote empowerment of women

In 2013, as our first step toward diversity promotion, we embarked on creating workplaces across the company where women could display more of their abilities. Since then we have been working to change the mindset of both managers and female employees themselves, regarding the empowerment of women as a driver for the reform of our corporate culture. As part of this effort we implemented the DIAMOND Project in line with the action guidelines “change the culture,” “change the mindset” and “change the environment” and reached a milestone in the project in 2017 after implementing it for five years. The number of female managers was tripled over the period, and we were also selected to be a Nadeshiko Brand company for our excellence in the empowerment of women. Moreover, we proactively introduced systems for shorter working hours and working at home, which helped change the mindset of the entire company. We will continue to foster the empowerment of women under the leadership of the Diversity Promotion Section, which was newly established within the Strategic Human Resources Dept.

Proportion of female employees



External commendation for the empowerment of women

- Selected to be a Nadeshiko Brand company (for FY2018)
- Certified by Aichi Prefecture as an “Aichi Josei Kagayaki Company” (Company Supporting Aichi Women’s Career Success) (for FY2018)
- Included in “New Diversity Management Selection 100” by the Ministry of Economy, Trade and Industry (for FY2017)
- Granted the 2015 Japan Productivity Center Incentive Award, Empowerment Grand Prix for Activities by Women
- Received the 2014 Excellence Award, Nagoya City Accreditation and Commendation System for Companies that Promoted Increased Roles for Women



Launch of the Platinum Project

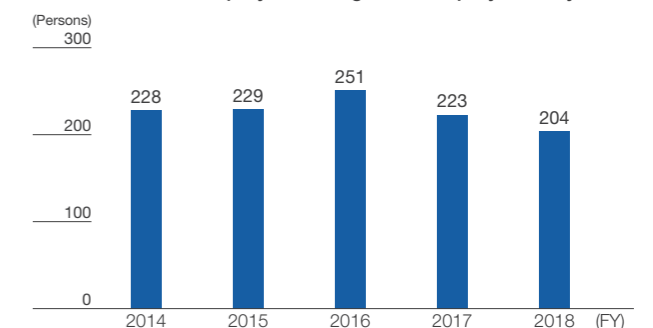
With the aging of society and falling birthrate, a labor shortage is predicted as the working population diminishes while the elderly population grows. There are also issues affecting older people, including the raising of the pension age and difficulties in securing employment. Deeming it important to help older workers continue to demonstrate their abilities by putting their long-accumulated knowledge, skills and know-how to use, we introduced a post-retirement reemployment system in 2001 to provide retirees with opportunities to work longer.

In FY2018 we also launched the Platinum Project as a new reform initiative, targeting employees in their late 50s and 60s as the “platinum generation.” Presently those aged 55 and older account for about 10% of the total number of our regular employees and the rate will rise to about 20% in 10 years. As our business structure reform is progressing, we think it is essential to help experienced employees hone their abilities and raise their motivation to contribute to the company’s new businesses.

Moreover, we are working to provide all employees, not limited to

the platinum generation, with workplaces where they can choose the right career for themselves, enhance their expertise and skills, and continue to make a meaningful contribution. Specifically, we are implementing measures to help them to develop a future vision, make use of their individual abilities, and continue to shine in their careers.

Total number of employees using the reemployment system



Establishing strong business infrastructure

Enhancement of Organizations

Targets for FY2020

- Restructure global organizations (to establish regional headquarters)
- Break up the business headquarters into nine divisions for speedier management
 - ➔Restructured earlier than planned on April 1, 2016
- Establish a corporate strategy headquarters to enhance the corporate functions as well as a "Working Styles Reforming Office" to foster operational reforms
 - ➔Since April 1, 2019, the Strategic Human Resources Dept. has been conducting work style reform activities.

Activities in FY2018

- More empowerment of the RHQ
- Promotion of work style reforms
- Permeation of shared values
- Improvement of management quality

More empowerment of the RHQ

In response to the globalization of our business environment, we worked to build regional headquarters (RHQ) in each of the Americas, EMEA and Asia to make managerial decisions for their regions at locations nearer to them in a precise and speedy manner.

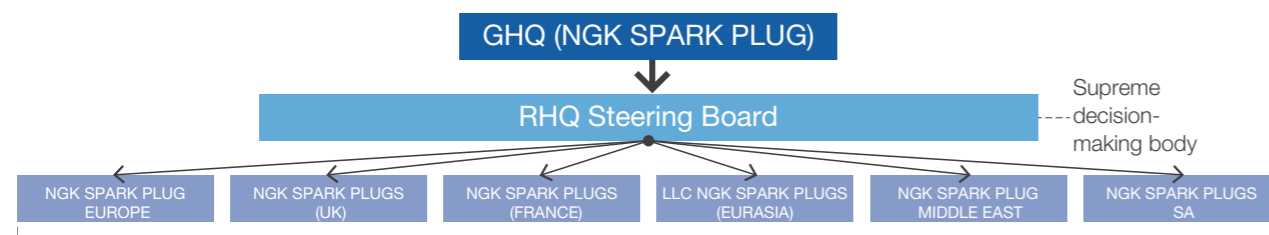
In the aftermarket business, in which we had already fostered localization, we clarified the authorities and responsibilities of the head office and regional bases following the adoption of the RHQ system. We are also transferring corporate authorities from the head office to the RHQ for speedier managerial decision-making.

In FY2018 we expanded the scope of authorities given to the RHQ to include authorities on investment and financial affairs, which had not previously been granted to them, thereby allowing the RHQ to

make decisions on investment and financial issues, except for those for which resolutions by the Board of Directors are needed.

For personnel affairs, we clarified the rules to allow the RHQ to employ people locally at their own discretion, excluding the employment of executives. Since April 1, 2019, two locally employed members have been serving as corporate officers to supervise business in each of the EMEA and PAMA regions and this is one outcome of the transfer of authorities to the RHQ. As the next step, we will enhance our global governance.

Decision-making structure for the GHQ, RHQ and local companies (example: EMEA region)



Local companies: Six Group companies located in the EMEA region

Permeation of shared values

We need to expand our business scope to new domains as our greatest challenge, and think it is necessary to share values across the Group toward this goal. In April 2017 we therefore set out "The Nittoku Way – The Nittoku Group's Shared Values," comprised of "Shisei-Shinjitsu," "Dokuritsu-Jiei," "Shikai-Keitei"

and "Soshi-Kantetsu." We are promoting the awareness and permeation of The Nittoku Way among members of the Group, including employees outside Japan, through measures including training for managers.

* For how The Nittoku Way is positioned by the company, please see p.4.

The Nittoku Way – The Nittoku Group's Shared Values

Shisei-Shinjitsu	Dokuritsu-Jiei	Shikai-Keitei	Soshi-Kantetsu
Sincerely, do our very best	Believe in one's own ability, and take actions by oneself	Unite efforts with the people of the world, and utilize each other's differences	Have cherished desire, and carry it through till the end

Promotion of work style reforms

We began implementing measures for work style reforms on a company-wide basis in 2015 and established the Working Styles Reforming Office in 2016.

The work style reform initiatives implemented in and before FY2018 include raising the productivity of back-office operations to add more value to them and fostering work at home and the use of rental offices across the company as a new effort. To increase the productivity of back-office operations, we introduced unique "work style reform indicators" to the related departments, which can now compare their own productivity with that of others based on indicators for changes in the amount of work concerning new tasks and rationalized operations. We aim to increase productivity by 20% in FY2020, the final year of the medium-term management plan, relative to FY2015, when the plan was made. This fiscal year, we integrated the Working Styles Reforming Office into the Strategic

Human Resources Dept. By making work style reforms more closely linked with the human resource strategies, we will foster human resource development and organizational revitalization.



Rental office named "WORK STYLING" provided by Mitsui Fudosan Co., Ltd.

For genuine work style reforms

Our work style reforms used to be operational reforms, and in FY2019 we began making examinations for "genuine work style reforms." At present we define "genuine work style reforms" as those that lead to higher productivity of individuals, for which we deem it necessary to enhance the three elements: willingness to work (motivation and comfortable workplaces); ability (knowledge and experience); and methodology (management by objectives and by time). To meet this requirement, we have begun conducting examinations.

Establishment of Systems

Targets for FY2020

- Enhance the abilities to propose strategies and manage portfolios
- Build a global SCM system and make it function
- Enhance technological abilities for high-quality and speedy manufacturing

Activities in FY2018

- Building of a global SCM system and appropriate management of logistic operations
- Building of an IT system optimal for the entire company
- Establishment of production technologies for high-quality and speedy manufacturing

Building of a global SCM system and appropriate management of logistic operations

Overseas sales account for more than 84% of our net sales, and our overseas production rate has also been increasing recently, driven by increased production in emerging markets. We now have 45 bases overseas, in 21 countries and regions. As production at our overseas bases increased, we were increasingly faced with the need to enhance our supply chain control functions. Accordingly, we established the SCM Div. in the first year of the medium-term management plan to build a global supply chain system toward profit maximization.

As the speed of globalization increases, the SCM Div. needs to play the important roles of (1) designing and overseeing the supply chain for total optimization; and (2) managing the entire supply chain. For the optimization of the entire supply chain, we are working to build a system to visualize and centrally manage our global inventory and striving to collect more detailed information about each base's production, sales plans and inventory in a timely manner. We are concurrently reviewing our inventory to reduce it to an appropriate level and increase our working capital efficiency. Both the SCM Div. and all business departments are cooperating to this end.

For the management of the entire supply chain, we will clarify the authorities and responsibilities of individual bases, including our overseas subsidiaries, thereby enhancing the supply chain functions of the entire NGK SPARK PLUG Group. We have also started to implement measures to reduce the logistics cost and to maintain

high-quality logistic operations to deliver items to the places where they are needed in a timely manner. In particular, we will standardize the shipment operations for our distribution warehouses located across regions, in order to ensure the safety, security and quality of the operations. We also send auditors from the head office to the distribution bases to check whether they are operated according to the designed standards and whether there is a room for higher efficiency. For the audit, we have set the KPIs for the execution of the PDCA cycle.

Toward higher operational efficiency and higher quality, we have begun preparations to introduce a logistics system equipped with leading-edge AI and IoT devices. We will enhance the functions of the SCM Div. to deal with existing businesses and to respond to changes in the business portfolio, with an eye to building more robust business infrastructure for the future of the Group.

Building of an IT system optimal for the entire company

The business environment surrounding companies is rapidly changing, due to the emergence of AI and IoT technologies and the rapid spread of robotic process automation (RPA) and other new ICT systems among companies. We regard it as one of our top priorities to make use of new digital technologies to create new value.

Under the current medium-term management plan, we are building IT systems optimal for the entire company under the leadership of the Information Systems Dept., which aims to "make proposals for the proactive use of information from the

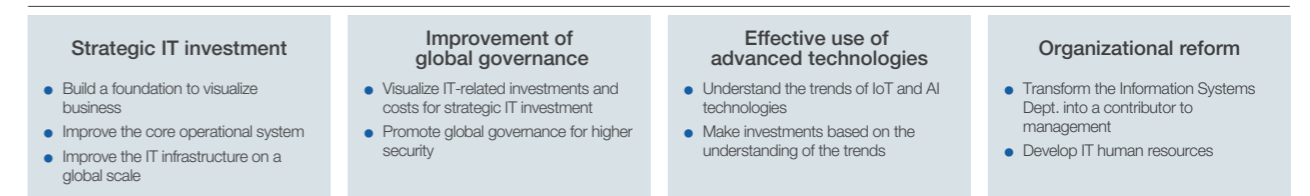
perspective of management and user departments and build and operate optimized IT platforms to support decision-making on management, business and functions, thereby contributing to the sustainable growth of the company."

The Information Systems Dept. will support the Group's effort to increase its corporate value in terms of IT, attributing importance to keeping a balance between "new" and "existing" domains and between "offensive" and "defensive" measures.

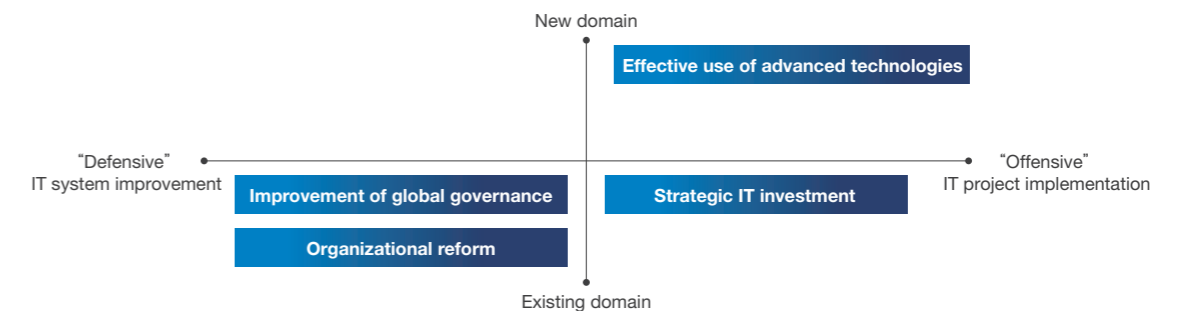
Activity targets for the final year of the medium-term plan

Build an IT system to proactively lead and contribute to the business of the company

Four actions to be taken to attain the targets



Interrelations of the four actions



Establishment of production technologies for high-quality and speedy manufacturing

In order to increase our business competitiveness, we list the sophistication of "production design" as one of the important strategic items in the medium-term management plan. To speed up manufacturing to meet the market demand, we try everything, including designing equipment layout and transportation routes as well as optimizing inter-process transportation and process outsourcing, with a focus on reducing our production lead time. Moreover, we are improving our planning and designing ability to minimize the life cycle cost of our plants and equipment for the enhancement of the facilities. We are also increasing our plant productivity by integrating the functions dispersed among different

departments for higher efficiency and better IT infrastructure, while also rationalizing the production processes and reassigning the saved resources in the personnel and production plans.

As a precondition to transfer production overseas, it is critical to establish a technical system for global production. To this end we will enhance governance both in Japan and abroad while employing and developing professionals who have expertise in production technologies and can take a broad view for the manufacture of high-quality products.

Environment



Basic Philosophy

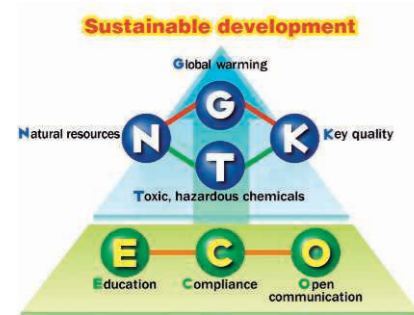
Environmental issues are a common challenge for all mankind. Every member of NGK SPARK PLUG Group will work towards reducing environmental burdens from our business activities as much as possible and developing and providing products and technologies that contribute to improving the environment. We will also endeavor to communicate in greater depth with our stakeholders including our local communities so that we may all work together to contribute to creating a sustainable society.

Global Eco Vision 2020

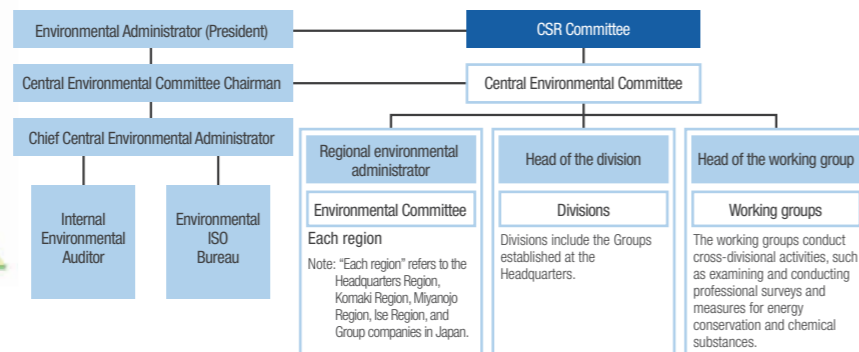
In our activities for environmental conservation, we set medium-term environmental targets. From the fiscal year ended March 31, 2017, we have drawn up a vision for our company and implemented activities under Global Eco Vision 2020.

We set four important environmental tasks, "Natural resources," "Global warming," "Toxic, hazardous chemicals" and "Key quality (development of

environment-friendly products)," under Global Eco Vision 2020. By tackling these tasks through our business activities and on a foundation of "Education (raising consciousness of the environment)," "Compliance," and "Open communication" we will work to enhance our manufacturing power, increase our brand value, and contribute to not only the sustainable development of our company, but of society, also.



Environmental activity promotion organizations



Environmental action plan

Major item	Minor item	Targets for FY2020	Results for FY2018
Global warming	Production	Reduce per-unit CO ₂ emissions by 15% relative to FY2015* * We upwardly revised the target on April 1, 2018.	Target: Reduce per-unit CO ₂ emissions by 11.0% relative to FY2015 Result: Reduced the emissions by 10.8% relative to FY2015 We continued to conduct cross-departmental activities under the leadership of the energy conservation working group.
	Logistics	Increase efficiency for logistics	Increased the efficiency of various logistics activities.
Depletion of resources	Waste	Reduce defective products to reduce waste Design products in consideration of waste reduction	• Decreased waste by reducing defective products in each process. • Supported product design by using simulation/evaluation technologies.
	Water	Use water more efficiently	Reduced the use of water by reviewing the variety of products to be manufactured.
	Raw materials	Design products in consideration of the saving of raw materials	• Saved the use of resources by improving the production processes. • Developed process technology to contribute to the reduction of environmental burdens.
Environmentally-friendly products	—	Build an environment-friendly product certification system and expand the lineup of such products	Implemented measures to increase environment-friendly products.
Hazardous chemical substances	—	Ensure compliance with ELV, RoHS, REACH and other regulations	Shared regulatory information across departments and took necessary measures for regulations under the leadership of the chemical substances management working group.
	—	Foster the replacement of substances of concern with substitutes	Replaced phthalic acid, which will be prohibited by RoHS in 2019, with a substitute.
	—	Totally discontinue the use of HCFCs	Continued the replacement of air conditioners in which fluorocarbon R22 was used as a refrigerant.

Material Balance

Environmental burdens from business activities (Fiscal year ended March 31, 2019)

	INPUT	Scope covered ^{*1}				OUTPUT	Scope covered ^{*1}		
		NGK SPARK PLUG	Group companies in Japan ^{*2}	Overseas companies ^{*3}			NGK SPARK PLUG	Group companies in Japan ^{*2}	Overseas companies ^{*3}
Raw materials	Ceramic and metal materials Ceramic and metal materials purchased 55,000 tons	○	○	○	Suppliers	Wastewater Released into sewerage systems and public waters; consumption volume of tap water and well water. 1,540,000 m³	○	○	○
	Electricity Used in offices and plants 466,878 MWh	○	○	○		Chemical substances (PRTR) Released into waters and notified by sites 0.6 tons	○	○	○
	City gas Used in offices and plants 19.64 million m³	○	○	○		Green house gas emissions Energy-based and non-energy-based Green House Gas Emissions 325,700 tons-CO₂	○	○	○ ^{*4}
Energy	LPG Used in offices and plants and for testing, travel and transportation 7,595 tons	○	○	○	Research, Design, Manufacturing, Sales	Chemical substances (PRTR) Released into air and notified by sites 133 tons	○	○	○
	Other fuels Used in offices and plants and for testing, travel and transportation 1,102 kL[crude oil equivalent]	○	○	○		Waste generated (and treated on commission) Total 20,103 tons			
	Renewable energy Generated by solar power generators and small hydroelectric generators 576 MWh	○	○	○		Effectively used (including waste sold) 18,262 tons	○	○	○
Water	Tap water, well water Tap water and groundwater used 1,540,000 m³	○	○	○	Products	Not effectively used 1,840 tons			
	Chemical substances Handled and notified by sites 923 tons	○	○	○		CO₂ emitted by external transporters CO ₂ emissions due to externally commissioned transportation 2,742 tons-CO₂	○	○	○
Logistics	Fuels used for transportation (outsourced) Fuels used for transportation by trucks, ships, and aircraft 1,031 kL[crude oil equivalent]	○	○	○	Logistics	Product shipment			
						Customers			

*1 The covered scope of each amount reported in INPUT and OUTPUT is indicated with ○.
 *2 Domestic group companies: (scope of consolidated certification) NITTOKU ALFA SERVICE CO., LTD., CERAMIC SENSOR CO., LTD., NTK CERAMIC CO., LTD., CERAMIC SENSOR NAKATSUGAWA CO., LTD., NANSEI CERAMIC CO., LTD., KAMIOKA CERAMIC CO., LTD., Spark Tec WKS CO., LTD., NICHIBA KIKI CO., LTD., Spark Tech TONO CO., LTD., (outside the scope of consolidated certification) NITTOKU Smile NITTOKU DENSHI CO., LTD., NTK CERATEC CO., LTD.
 *3 Overseas group companies: (manufacturing & sales organization) NGK SPARK PLUG [SHANGHAI] CO., LTD., CHANGSHU NGK SPARK PLUG CO., LTD., WOJUN INDUSTRY CO., LTD., NTK TECHNICAL CERAMICS KOREA CO., LTD., NGK SPARK PLUGS (THAILAND) CO., LTD., SIAM NGK SPARK PLUG CO., LTD., NGK SPARK PLUGS (ASIA) CO., LTD., NGK SPARK PLUGS MALAYSIA BERHAD, PT NGK BUSI INDONESIA, NGK SPARK PLUGS (INDIA) PVT. LTD., NGK SPARK PLUGS (U.S.A.), INC., Wells Vehicle Electronics, L.P., CERAMICA E VELAS DE IGNICAO NGK DO BRASIL LTDA., NGK SPARK PLUGS (FRANCE) S.A.S., NGK SPARK PLUGS SA (PTY) LTD. (sales organization) TAIWAN NGK SPARK PLUG CO., LTD., NGK SPARK PLUGS (VIETNAM) CO., LTD., NGK SPARK PLUGS (PHILIPPINES), INC., NGK SPARK PLUG (AUSTRALIA) PTY. LTD., NTK TECHNOLOGIES, INC., NGK SPARK PLUGS CANADA LIMITED., BUJIAS NGK DE MEXICO S.A. DE C.V., BUJIAS NGK DEL ECUADOR CIA LTDA., NGK SPARK PLUG EUROPE GmbH, NGK SPARK PLUGS (UK) LTD., LIMITED LIABILITY COMPANY NGK SPARK PLUGS (EURASIA), NGK SPARK PLUG MIDDLE EAST FZE
 *4 Overseas companies only collect results of CO₂ emissions

Reducing CO₂ Emissions

NGK SPARK PLUG Group set its per-unit CO₂ emissions target in its Global Eco Vision 2020 as part of its effort to contribute to the mitigation of climate change on a medium- to long-term basis. To attain this target, we have been working to reduce our energy use.

We were able to achieve the per-unit emissions target set for FY2020 in FY2017, earlier than planned, and so reset it as a more ambitious target, which is to reduce per-unit CO₂ emissions by 15% relative to FY2015 (1.10 tons per 1 million

yen).

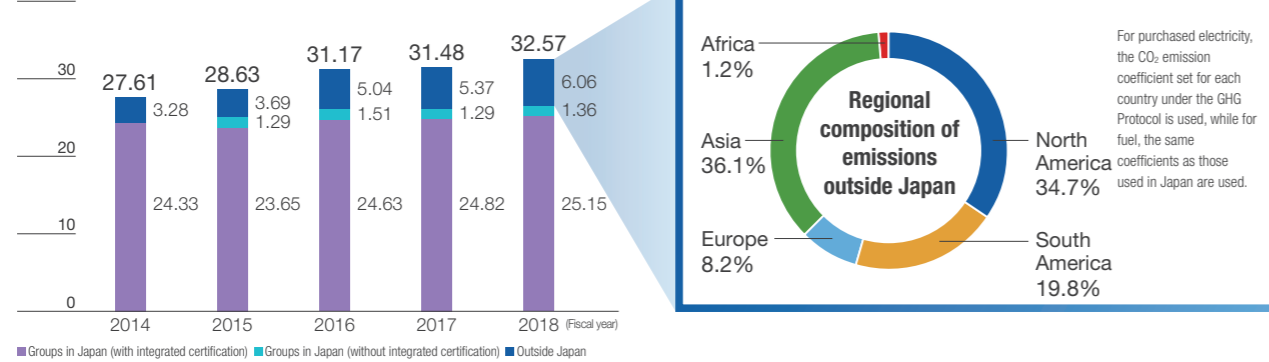
For FY2018, we were unable to attain the annual target, with our CO₂ emissions totaling 330,000 tons and per-unit CO₂ emissions amounting to 1.15 tons per 1 million yen, mainly because our energy use increased due to preparations made for the launch of new equipment.

We will continue our efforts to reduce our emissions and attain the targets set in Global Eco Vision 2020.

* Target for the calculation of per-unit CO₂ emissions: Group companies in Japan (for integrated certification)

CO₂ emissions from energy use

CO₂ emissions (10,000 tons-CO₂)



Promotion of Waste Reduction and Resulting Effects

NGK SPARK PLUG Group contributes to society by reducing the generation of waste by improving the manufacturing process and promoting the recycling of generated waste.

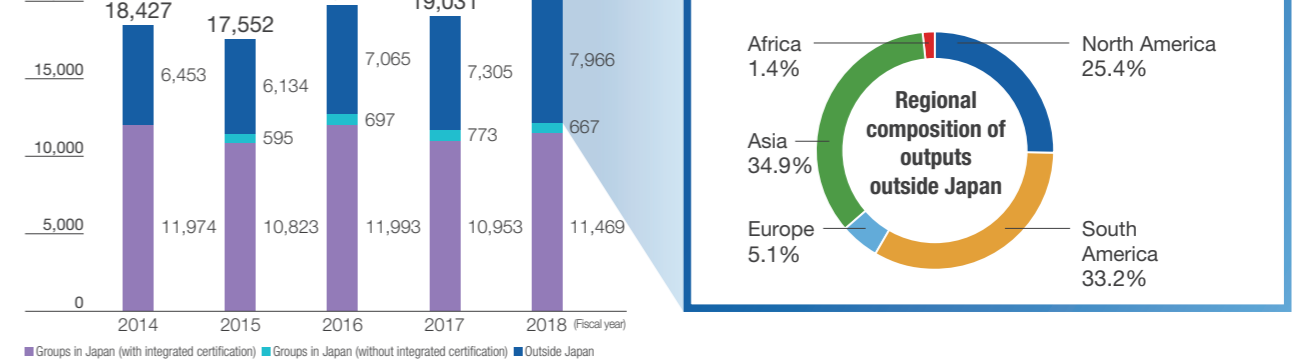
For FY2018, the amount of waste generated totaled 20,103 tons and per-unit waste generation came to 0.050 ton per 1 million yen, up 5.6% year on year due to an increase in the amount of waste generated in our manufacturing processes.

We will continue to make improvements on the processes while also implementing new initiatives such as reusing waste oil.

* Target for the calculation of per-unit waste generation: Group companies in Japan (for integrated certification)

Waste output

Output (tons)



Promotion of Efficient Use of Water and Resulting Effects

NGK SPARK PLUG Group is promoting the efficient use of water resources, such as tap water and well water, used for its business activities, thereby contributing to the solution of issues related to water resources.

For FY2018, the total volume of tap water and well water used by the Group came to 1.54 million m³ and per-unit water

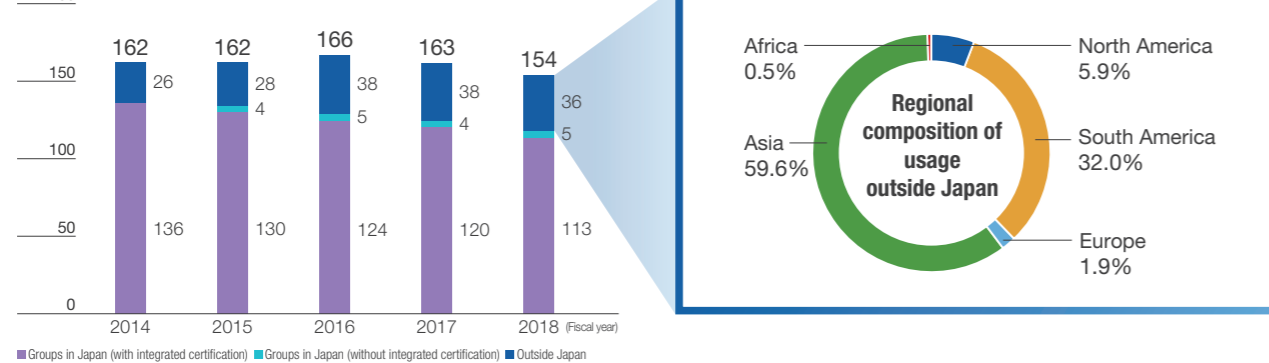
use was 5.19 m³ per 1 million yen. The use of water decreased by 5.6% year on year due to factors including the consolidation of production bases.

We will review our operations and take other measures to make more efficient use of water.

* Target for the calculation of per-unit water use: Group companies in Japan (for integrated certification)

Tap water/well water usage

Volume used (10,000m³)



Hazardous Chemical Substances

To ensure compliance with chemical substance regulations, which have been getting stricter every year on a global basis, we control the use of regulated substances in our products and manage the use of these substances at our plants.

We have classified hazardous chemical substances into different hazard ranks according to the strictness of the relevant regulations and the level of hazardousness and set the handling criteria for each of the ranks. We also list the hazardous chemical substances that should not be contained in our products in our green procurement guidelines for suppliers and ask them not to use them in their products to be delivered to us.

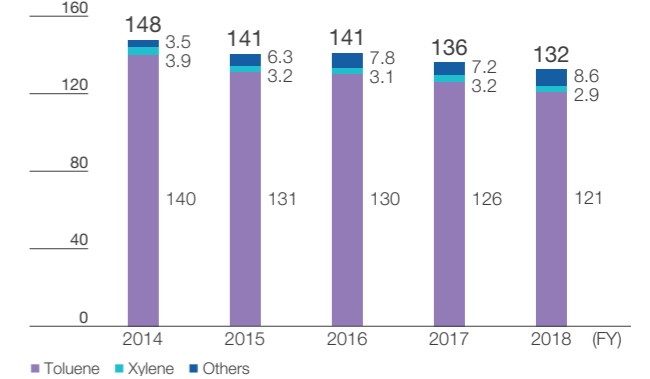
At our plants, we are working to ensure the appropriate management of chemical substances by identifying the amount treated, released and transferred for the substances regulated by the PRTR law.

We will promote the use of substitutes for hazardous chemical substances and enhance their management to ensure legal compliance and to meet the requirements of customers.

* Group companies in Japan (for integrated certification)

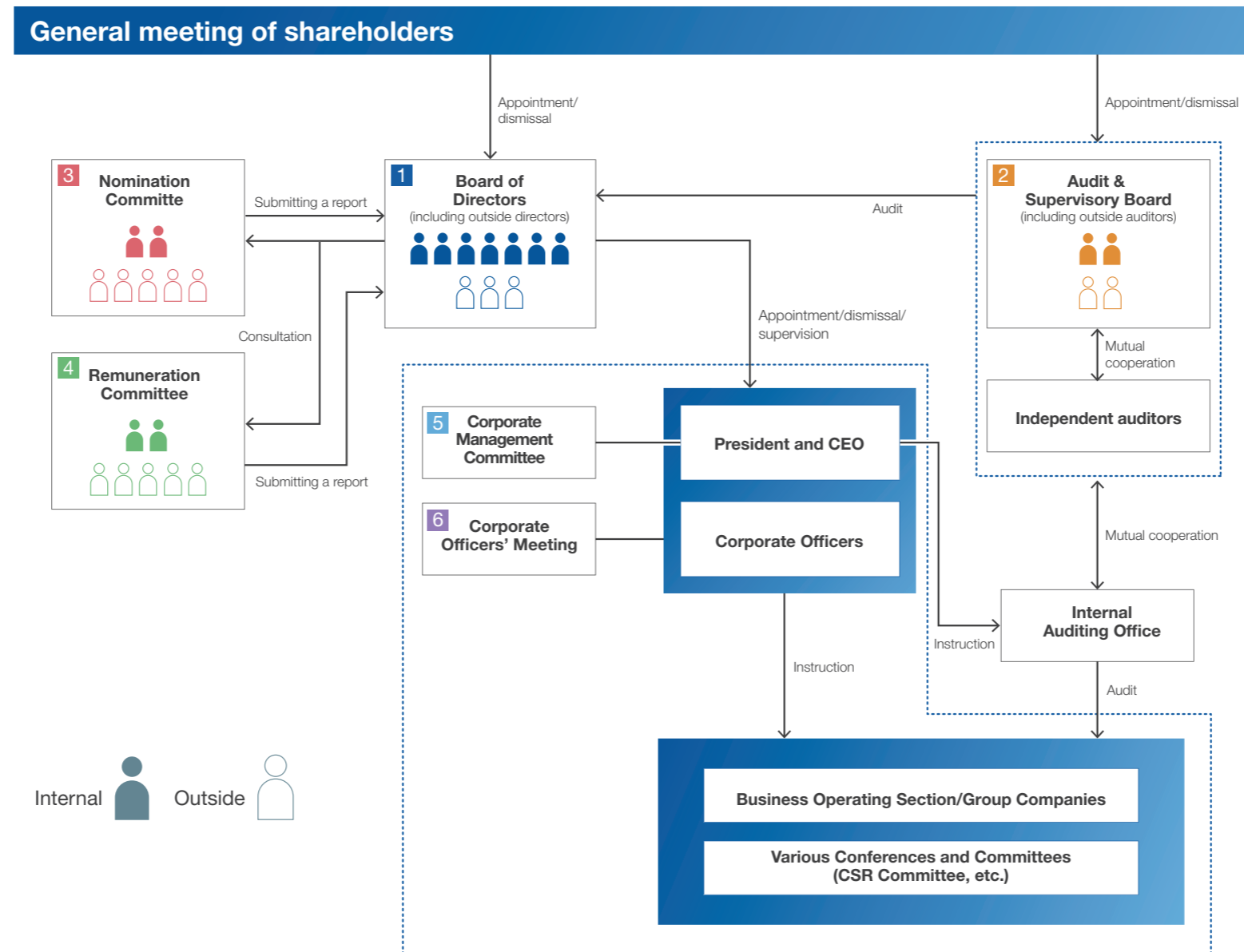
Release of substances regulated by the PRTR law

(Tons)



Corporate Governance System

Corporate Governance System Chart (as of June 25, 2019)



1 Board of Directors

The Board of Directors of the company is composed of 10 directors, 3 of whom are outside directors.

Meetings of the Board of Directors are held regularly once a month as well as whenever necessary for deliberation and determination with respect to issues as prescribed in applicable laws and regulations or articles of incorporation as well as other key managerial issues, and also for supervision of business execution status in response to reports from the directors.

2 Audit & Supervisory Board

Audit & Supervisory Board is composed of four auditors, two of which are outside auditors.

Two full-time auditors serve to audit execution of duties by the directors through attendance of meetings of Board of Directors, Management Meetings and other important meetings, through regular opinion exchange with Directors and Corporate Officers, and through auditing of major offices and subsidiaries. Meanwhile, the outside auditors mainly attend Board of Directors meetings and receive a report of the auditing results from the full-time auditors at Audit & Supervisory Board meetings. They also express their own audit opinions by providing views based on their expertise and useful information within and outside of the company.

3 Nomination Committee

In April 2017, we established the Nomination Committee as an advisory body of the Board of Directors, which mainly consists of independent external directors, with the purpose of ensuring the transparency and rationality in nominating director candidates.

Based on the consultation from the Board of Directors, the Nomination Committee deliberates on bills of appointment of directors and auditors that will be submitted to the general meeting of shareholders, and the evaluation of corporate performance and the evaluation of the management based on it, etc., and reports the results of deliberation to the Board of Directors.

4 Remuneration Committee

In April 2017, we established the Remuneration Committee as an advisory body of the Board of Directors, which mainly consists of independent external directors, with the purpose of ensuring the transparency and rationality in deciding directors' remuneration.

Based on the consultation from the Board of Directors, the Remuneration Committee deliberates on the rationality of the policy, procedures and system content for directors' remuneration as well as the rationality of each director's remuneration plan, and reports the deliberation results to the Board of Directors.

5 Corporate Management Committee

We hold Management Meetings composed of directors regularly once a month for discussion and pre-grasping about business challenges to be addressed, and any possible risk that involves our company for enhancing the system that can be flexible adoptable to change in the managerial environment.

6 Corporate Officers' Meeting

We have introduced Corporate Officer framework, and the Board of Directors nominates corporate officers under their resolution. Corporate Officers' Meetings are held once a month for sharing information and exchanging opinions in a cross-sectional way for enhancing the system that can grasp the situation quickly and respond to change in the environment.

Members of Nomination/Remuneration Committees

Directors	FY2019	
	Nomination Committee	Remuneration Committee
Shinichi Odo	●	○
Takeshi Kawai	●	○
Toru Matsui	●	○
Mikihiko Kato	●	○
Takio Kojima	●	○
Kenji Isobe	●	○
Hiroyuki Maeda	●	○
Morihiko Otaki	○	○
Kanemaru Yasui	○	○
Mackenzie Donald Clugston	○	○

Auditors	FY2019	
	Nomination Committee	Remuneration Committee
Yasuhiko Hotta	●	
Yoshihiro Matsubara	●	
Fumiko Nagatomi	○	○
Akihiko Minato	○	○

Basic information

As of June 25, 2019

Legal systems	Company with a board of corporate auditors
No. of directors	10
Of which, No. of outside directors	3
Term of directors	1 year
No. of auditors	4
Of which, No. of independent outside directors	2
Independent auditors	KPMG AZSA LLC

Management System

Directors (As of June 25, 2019)

Representative Director and Chairman of the Board

Shinichi Odo



April 1977 Joined our company
February 2003 General Manager, Overseas Aftermarket Dept., Sales & Marketing Div., Automotive Components Group
July 2005 President, NGK SPARK PLUGS (U.S.A), INC.
June 2007 Member of the Board, NGK SPARK PLUG CO., LTD.
June 2010 Managing Director, Member of the Board
June 2011 President
April 2012 President & CEO
April 2016 Representative Director and Chairman of the Board
April 2019 Chief Executive Officer
 Representative Director and Chairman of the Board (up to today)

President & Chief Operating Officer
 In charge of all Divisions

Takeshi Kawai



April 1987 Joined our company
February 2011 General Manager, Sensor Engineering Dept. II, Automotive Components Group Sensor Div.
April 2012 Corporate Officer
April 2015 Managing Officer
June 2015 Managing Officer, Member of the Board
April 2016 Member of the Board, Senior Managing Officer
April 2019 President & Chief Operating Officer (up to today)

Member of the Board,
 Executive Vice President
 Assistant to the President
 Automotive Components Sales & Marketing Division
 AEC Business New Business

Toru Matsui



April 1984 Joined our company
April 2011 President, NGK SPARK PLUG EUROPE GmbH
October 2013 General Manager, OEM Sales & Marketing Dept., Sales and Marketing Div., Automotive Components Group, NGK SPARK PLUG CO., LTD.
December 2014 President of NGK SPARK PLUG (SHANGHAI) CO., LTD.
April 2015 Corporate Officer, NGK SPARK PLUG CO., LTD.
July 2016 President, NGK SPARK PLUG (SHANGHAI) TRADING CO., LTD.
April 2018 Managing Officer, NGK SPARK PLUG CO., LTD.
June 2018 Member of the Board
April 2019 Member of the Board, Executive Vice President (up to today)

Member of the Board, Executive Officer
 Corporate Strategy Gr.
 General Manager, Tokyo Branch Office

Mikihiko Kato



April 1985 Joined our company
February 2012 General Manager, Corporate Planning Dept.
August 2012 President of CERAMICA E VELAS DE IGNICAO NGK DO BRASIL LTDA.
October 2015 General Manager, Corporate Planning Dept., NGK SPARK PLUG CO., LTD.
April 2016 Corporate Officer
June 2017 Member of the Board
April 2019 Member of the Board, Executive Officer (up to today)

Member of the Board, Executive Officer
 Engineering R&D Gr.
 Business Development Div.
 Medical Div.

Takio Kojima



April 1984 Joined our company
February 2011 General Manager, Next Generation Product Project, Product Planning Center, Engineering R&D Group
April 2012 General Manager, Next Generation Product Project, New Business Advancement Group
October 2013 General Manager of R&D Center, Engineering R&D Group
April 2014 Corporate Officer
April 2018 Managing Officer
June 2018 Member of the Board
April 2019 Member of the Board, Executive Officer (up to today)

Member of the Board, Executive Officer
 Corporate Administration Gr.
 Secretarial Office
 Plant Manager of Nagoya

Kenji Isobe



April 1986 Joined our company
July 2011 General Manager, Accounting & Finance Dept.
April 2013 General Manager, Corporate Planning Dept. and Public Relations Office
December 2015 General Manager, Accounting & Finance Dept., Corporate Administration Group and General Manager, Public Relations Office
April 2016 Corporate Officer
June 2018 Member of the Board, Corporate Officer
April 2019 Member of the Board, Executive Officer (up to today)

Member of the Board, Executive Officer
 In charge of Business Planning
 Management Division,
 Automotive Components Business,
 Cutting Tools Business

Hiroyuki Maeda



April 1986 Joined our company
February 2012 General Manager of Planning Control Dept., Sensor Div., Automotive Components Group
April 2012 General Manager of Sensor Engineering Dept. II, Sensor Div., Automotive Components Group
April 2013 General Manager of Procurement Dept., Procurement Div.
April 2014 Deputy General Manager of Procurement Div., General Manager of Supplier Relations & Development Office, General Manager of Procurement Dept.
April 2016 Corporate Officer
April 2019 Executive Officer
June 2019 Member of the Board, Executive Officer (up to today)

Outside Directors (As of June 25, 2019)

Member of the Board (Outside Director)

Morihiro Otaki



August 1996 President & CEO, JOHNSON & JOHNSON K.K. VISION CARE COMPANY
August 2011 Vice Chairman of the Board, PASONA INC.
June 2013 Member of the Board, NGK SPARK PLUG CO., LTD. (up to today)
June 2016 Director, Henry Schein Japan K.K. (up to today)
August 2016 Vice Chairman, PASONA INC.
June 2018 Outside Director, GIGA PRIZE CO., LTD. (up to today)

Member of the Board (Outside Director)

Kanemaru Yasui



March 1981 Registered as a Certified Public Accountant
April 1999 Representative Partner, Central Audit Corporation
August 2007 Representative Partner, KPMG AZSA LLC
June 2008 Representative Partner, Executive Director, Head of Nagoya Office, KPMG AZSA LLC
July 2013 Head of the Office, Yasui Certified Public Accountant (up to today)
June 2014 Member of the Board, NGK SPARK PLUG CO., LTD. (up to today)

Outside Director

Mackenzie Donald Clugston



June 1982 Joined Department of Foreign Affairs and International Trade of the Canadian Government
August 2000 Canadian Consul General in Osaka
August 2003 Minister, Embassy of Canada in Japan
August 2009 Ambassador of Canada to Indonesia, Timor-Leste and the ASEAN
November 2012 Ambassador of Canada to Japan
June 2016 Outside Director, KAMEDA SEIKA CO., LTD. (up to today)

September 2016 Professor, Kwansei Gakuin University (up to today)
June 2017 Outside Director, Idemitsu Kosan Co., Ltd. (up to today)
March 2018 Outside Director, Sapporo Holdings Limited (up to today)
June 2019 Member of the Board (Outside Director), NGK SPARK PLUG CO., LTD. (up to today)

Audit & Supervisory Board Members (As of June 25, 2019)

Audit & Supervisory Board Member,
 Standing

Yasuhiko Hotta



April 1980 Joined our company
February 2008 General Manager, Accounting & Finance Dept.
November 2008 General Manager, Semiconductor Components Div., Communication Media Components Gr.
June 2009 General Manager, Planning Dept., Communication Media Components Gr.
February 2011 General Manager, Information Systems Dept.
July 2011 Senior General Manager
April 2016 Senior General Manager, Working Styles Reforming Office, Corporate Strategy Gr.
June 2017 Audit & Supervisory Board Member, Standing (up to today)

Audit & Supervisory Board Member,
 Standing

Yoshihiro Matsubara



April 1983 Joined our company
February 2012 General Manager, Production Engineering Dept., Spark Plug Div., Automotive Components Group
April 2012 General Manager, Spark Plug Production Engineering Dept., Production Engineering Center, Production Engineering Group
February 2014 General Manager, Equipment Dept., Production Engineering Center, Production Engineering Group
April 2014 Corporate Officer
April 2019 Corporate Adviser, Standing
June 2019 Audit & Supervisory Board Member, Standing

Audit & Supervisory Board Member

Fumiko Nagatomi



April 1981 Registered as an attorney
April 1989 Opened Nagatomi Law Firm (up to today)
May 2006 Outside Auditor, UCS CO., LTD.
June 2006 Audit & Supervisory Board Member (Outside Corporate Auditor), CHUBU Electric Power Co. Inc. (up to today)
June 2017 Audit & Supervisory Board Member, NGK SPARK PLUG CO., LTD. (up to today)

Audit & Supervisory Board Member

Akihiko Minato



April 1976 Joined The Mitsubishi Bank, Ltd.
June 2003 Executive Officer, The Bank of Tokyo-Mitsubishi, Ltd.
May 2007 Managing Executive Officer, The Bank of Tokyo-Mitsubishi UFJ, Ltd. (currently, MUFG Bank, Ltd.)
June 2009 Managing Director, MARUNOUCHI YOROZU Co. Ltd.
June 2010 Outside Audit & Supervisory Board Member, The Nanto Bank, Ltd.
June 2010 Representative Director and Vice President, Mitsubishi UFJ Research and Consulting Co., Ltd.
June 2012 Outside Audit & Supervisory Board Member, Mitsubishi Materials Corporation
September 2016 Chairman, MST Insurance Service Co., Ltd. (up to today)
June 2018 Audit & Supervisory Board Member, NGK SPARK PLUG CO., LTD. (up to today)

Corporate Officers (As of July 1, 2019)

<p>Executive Officer Takahiro Suzuki</p> <p>Industrial Ceramics Div. Semiconductor Production Equipment Div. President of NTK CERATEC CO., LTD.</p>	<p>Executive Officer Yoshitaka Narita</p> <p>Internal Auditing Office RHQ Governance President of NGK SPARK PLUGS (U.S.A.) Holding, INC. President of NTK TECHNOLOGIES, INC.</p>	<p>Executive Officer Noboru Ishida</p> <p>Product Technology Div. Overall control of Facility Engineering Div. Corporate Quality Management Div. Fuel Cell Div. Komaki Factory Manager</p>
<p>Executive Officer Kozo Yamasaki</p> <p>President of NTK CERAMIC CO., LTD.</p>	<p>Executive Officer Masato Taniguchi</p> <p>Fuel Cell Business</p>	<p>Executive Officer Masaki Sumiya</p> <p>SCM Div. Procurement Div.</p>
<p>Executive Officer Hiroyuki Tanabe</p> <p>President of CERAMICA E VELAS DE IGNICAO NGK DO BRASIL LTDA.</p>	<p>Executive Officer Hiroyasu Ogura</p> <p>Regional President ASEAN & India President of SIAM NGK SPARK PLUG CO., LTD. President of NGK SPARK PLUGS (Asia) CO., LTD.</p>	<p>Executive Officer Akiyoshi Kato</p> <p>Spark Plug Business Glow Plug Business Plant Manager of Miyanojyo</p>
<p>Executive Officer Koji Suzuki</p> <p>Automotive Component Sale & Marketing Div.</p>	<p>Executive Officer Yoshiyuki Takayanagi</p> <p>Medical Div.</p>	<p>Corporate Officer Masakazu Ota</p> <p>Cutting Tools Business</p>
<p>Corporate Officer Takeshi Mitsuoka</p> <p>Business Development</p>	<p>Corporate Officer Osamu Shinkai</p> <p>Semiconductor Production Equipment Business</p>	<p>Corporate Officer Keiji Suzuki</p> <p>Sensor Business</p>
<p>Corporate Officer Kazunobu Hasegawa</p> <p>Regional President China President of NGK SPARK PLUG [SHANGHAI] TRADING CO. LTD. President of NGK SPARK PLUG [SHANGHAI] CO., LTD.</p>	<p>Corporate Officer Kazuyoshi Terashita</p> <p>Vice Division Manager, Corporate Administration Gr. General Manager, Accounting & Finance Dept.</p>	<p>Corporate Officer Damien Germès</p> <p>Regional President EMEA President of NGK SPARK PLUG EUROPE GmbH</p>
<p>Corporate Officer Michael Alan Schwab</p> <p>Regional President PAMA President of NGK SPARK PLUGS (U.S.A.), INC.</p>	<p>Corporate Officer Damien Germès</p> <p>Regional President EMEA President of NGK SPARK PLUG EUROPE GmbH</p>	

(Executive Officers and Corporate Officers who do not concurrently serve as Directors)

Introduction of the Employee Corporate Officer System (in April 2019)

In the conventional system, when employees were appointed as Corporate Officers, they resigned as employees and concluded a delegation agreement with the company every year to fulfill their duties as Corporate Officers. Under this system, it was difficult to appoint young employees because they needed to resign as employees, and when they could not fully exercise their abilities as Corporate Officers, the company was not able to take appropriate measures.

With the above as a backdrop, the Employee Corporate Officer System was introduced in April 2019, allowing the company to appoint employees as Corporate Officers even while they remain as employees. Accordingly, the company can boldly appoint employees as Corporate Officers and flexibly downgrade them from Corporate Officers if they are unable to fulfill their duties.

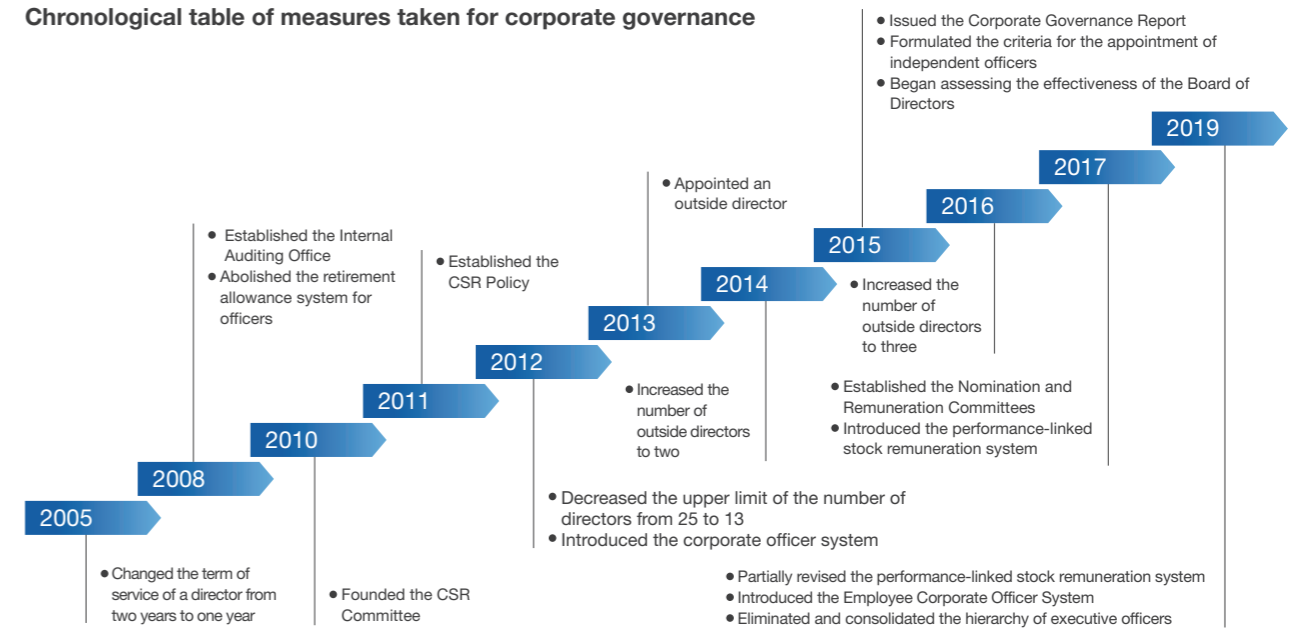
In addition, we appointed two foreign Corporate Officers in April 2019, which was the first case in which locally hired employees who are not employees on temporary assignment were appointed as Corporate Officers.

Corporate governance

Basic Philosophy

We believe that it is our foundational and important managerial task to establish and maintain a fair and efficient management system, while securing soundness and transparency in management, in order to enhance corporate value by fulfilling our corporate social responsibilities. We will enhance our corporate governance to ensure the efficiency and soundness of our corporate activities in line with our corporate philosophy, thereby fulfilling our responsibilities to our stakeholders.

Chronological table of measures taken for corporate governance



Independence of Outside Directors and Audit & Supervisory Board Members

Outside directors play supervisory roles in positions independent from business operations, including expressing their opinions by taking a broader view at important meetings, including the Board of Directors meetings. Outside audit & supervisory board members play auditing functions by drawing on their expertise to carry out audits from multifaceted viewpoints and express their opinions at important meetings including the Board of Directors meetings.

We appoint independent outside directors and audit & supervisory board members in line with our own selection criteria as well as the criteria set by the securities exchanges to ensure that candidates for independent positions have no special relationships with the management team or major shareholders and that they have no conflicts of interest with general shareholders.

Appointment reasons for outside directors and audit & supervisory board members (As of June 25, 2019)

Title	Name	Reason for appointment	Frequency of attendance
Outside director	Morihiko Otaki	He has a wealth of experience in global companies and expertise as an executive, and is expected to supervise management in an appropriate manner.	Attended all 12 Board of Directors meetings held during FY2018.
Outside director	Kanemaru Yasui	He is expected to make recommendations to management by using his expertise and experience gained over the course of his long career as a certified public accountant.	Attended all 12 Board of Directors meetings held during FY2018.
Outside director	Mackenzie Donald Clugston*	Since, as a diplomat, this person has a great deal of global experience and expertise in international affairs and trade, he is expected to supervise the execution of business by our management and provide advice to them.	—
Audit & supervisory board member	Fumiko Nagatomi	She is expected to use the expertise and knowledge that she has accumulated during her long career as an attorney for the company.	Attended 11 of the 12 Board of Directors meetings held during FY2018.
Audit & supervisory board member	Akihiko Minato	He has served in important posts at financial institutions and is expected to use his abundant expertise and knowledge regarding finance and corporate management for the benefit of the company.	Attended all 10 Board of Directors meetings held during FY2018 since his appointment to the position of outside audit & supervisory board member on June 26, 2018.

* Mr. Mackenzie Donald Clugston assumed his position as outside director on June 25, 2019.

Executive Remuneration System

Remuneration for executive officers is based on the basic policy of heightening their motivation to contribute to improving business results and expanding our corporate value over the medium- to long-term, as well as sharing the interests of shareholders through holding shares. The remuneration consists of the “fixed remuneration” paid by cash; the “bonus,” which is linked with the company’s single-year business performance, etc.; and the “performance-linked stock remuneration,” under which stocks are delivered in accordance with each officer’s position and the achievement of business performance goals that are set in the medium-term management plan, etc. For audit & supervisory board members and outside directors, only fixed remuneration is paid.

The authority to decide on the policy associated with the decision concerning the amount of remuneration for directors and the method of its calculation lies with Shinichi Odo, Representative Director and Chairman of the Board,

and Takeshi Kawai, President & Chief Operating Officer, who are delegated by the Board of Directors. They have the authority to decide on individual directors’ remuneration within the maximum limits that are resolved at the general meeting of shareholders by considering individual directors’ job responsibilities, achievements, etc. in the light of the management environment and the company’s business performance. Remuneration for audit & supervisory board members is decided through deliberations among them.

We have also established the Remuneration Committee as an advisory body to the Board of Directors. The committee deliberates the policies, procedures, content of the system for remuneration for directors and the appropriateness of the remuneration plan for each director, and submits the results to the Board of Directors to ensure the rationality and transparency of the decision regarding remuneration for directors. In FY2018, three Remuneration Committee meetings were held.

Evaluation of the Effectiveness of the Board of Directors

The company conducted an evaluation on the effectiveness of the Board of Directors. An overview of this evaluation for FY2018 is as follows.

1 Method of evaluation

Evaluation was conducted by the Board of Directors based on a survey of directors and audit & supervisory board members.

2 Overview of evaluation results

It was judged that the effectiveness of the Board of Directors of the company is sufficiently ensured. The reasons thereof are as follows:

- (1) The Board of Directors consists of appropriate members not only in terms of the knowledge and experience required to fulfill the Board’s roles and responsibilities, but also in terms of diversity, including gender.
- (2) The Board of Directors conducts deliberations on management and business strategies based on necessary and sufficient information securing enough time for deliberations. The Board also appropriately supervises the formulation of execution plans for these strategies.
- (3) The Board of Directors conducts deliberations regarding acquisitions, business collaborations, etc. from the perspective of enhancement of our corporate value and having awareness regarding accountability for stakeholders, including shareholders and institutional investors.
- (4) Performance reports from management to the Board of Directors are made based on the indexes associated with the major management indexes that are used as criteria for deciding on the company’s business strategies and judging corporate value.

Furthermore, promotion of the more advanced risk management system and other issues were identified as items wanting to be implemented in order to further enhance the effectiveness of the Board of Directors.

Audit & Supervisory Board Members and Measures to Strengthen Their Functions

The Audit & Supervisory Board of the Company is composed of 4 audit & supervisory board members, 2 of whom are outside audit & supervisory board members. Timely and appropriate opinions are expressed from outside perspectives. No outside audit & supervisory board members have interests such as engaging in transactions with the company and/or belong to any organizations that have such interests.

Furthermore, in accordance with a request from the audit

& supervisory board members, one staff member is appointed to support the operations of the Audit & Supervisory Board, and this staff member engages in internal communication, investigation, and other supporting operations. In addition, members of the Internal Auditing Office and the Accounting Auditor conduct investigations and make reports in response to requests from audit & supervisory board members, and the respective organizations strive to enhance the quality of audits and work together.

Internal Auditing System

Our Internal Auditing Office performs audits of NGK SPARK PLUG and its Group companies as an independent department, reports the results to management, and makes proposals to the audited companies on improvements regarding the identified problems. Departments that receive such proposals formulate and implement improvement plans, and the Internal Auditing Office monitors and checks the implementation status. To ensure the reliability of financial reporting, the Office

assesses the effectiveness of internal control over financial reporting based on the internal control reporting system set pursuant to the Financial Instruments and Exchange Act of Japan.

The Internal Auditing Office works to improve the effectiveness of internal audits by exchanging views on each of the audit plans and results with audit & supervisory board members and/or independent external auditors regularly or as required.

Risk Management

Basic Philosophy

We will build and operate a company-wide risk management system in order to strategically deal with risks against the background of a business environment that is becoming more complex and diversified. To this end, according to the following basic matters, we will implement measures continuously and an integrated manner in cooperation with our domestic and overseas Group companies.

- 1 Sharing of the idea/procedures of raising awareness of risks, risk evaluation, and formulation of risk control measures
- 2 Construction and operation of the risk management system adapted to individual group companies
- 3 Upskilling of risk assessment and risk control measures

Classification of risks

Human rights and labor practice	Harassment	Fair trade and ethics	Corruption
	Discrimination		Violation of laws
	Long hours of work		Infringe of intellectual property rights
	Labor dispute, strike, demonstration		Export management
Safety and health	Occupational accident	Product	Accounting problems
	Traffic accident		Procurement
	Mental health		Defective product
Environment	Environmental pollution	Accident	Product liability
	Violation of laws		Natural disaster
Information security and confidential information management	Information system failure		Infectious disease
	Cyber attack		Fire and explosion
	Leakage of confidential information and personal information		

Promotion system

We have appointed the President to “Chief Administrator” of risk management and the Director of Risk Management Department to “Promotion Manager.

Furthermore, at the CSR Committee consisting of all

directors and chairpersons of task force committees, the operation and achievements of risk management at the level of Group management are evaluated on a regular basis and improved to prevent risks from occurring and to deal with risks in an appropriate manner.

Promotion of BCM (Business Continuity Management)

In preparation for various types of damage caused by large-scale disasters including earthquakes, we have been implementing BCM activities. All Group companies have engaged in BCM activities as well as activities for

preventing and mitigating disasters in order to minimize any damage that may be incurred by large-scale disasters and to resume production as soon as possible after a disaster to maintain our customers' supply chains.

BCM activities

BCPs (Business Continuity Plans) are formulated for each department, and initial responses and restoration procedures are specified.

• IT Department

We are continuously working to minimize the damage to IT systems and improve recovery time when disaster occurs.

To minimize damage, we have been transferring the working environment for the internet base and workload system respectively to a highly isolated data center. To improve recovery time, we are utilizing cloud services for backups so that we can recover and restart systems in an undamaged environment.

For domestic Group companies, we will be combining systems into an integrated server base in order to ensure a common level of BCP measures through system integration. In addition, we are implementing more specific and practical education and training on a regular basis to strictly respond to the BCP in times of emergency.

• Procurement Department

We have promoted countermeasures that include multiple purchasing for key products including materials and parts. A diverse range of materials and parts are required for manufacturing our products. Therefore, we are trying to secure systems that respond to the BCP through sharing our objectives with each supplier and making efforts across the entire supply chain.

• Business Department

We set a time limit for recovering our main products in each business department's BCP and established a system for early recovery by formulating an action plan for the recovery team.

Compliance

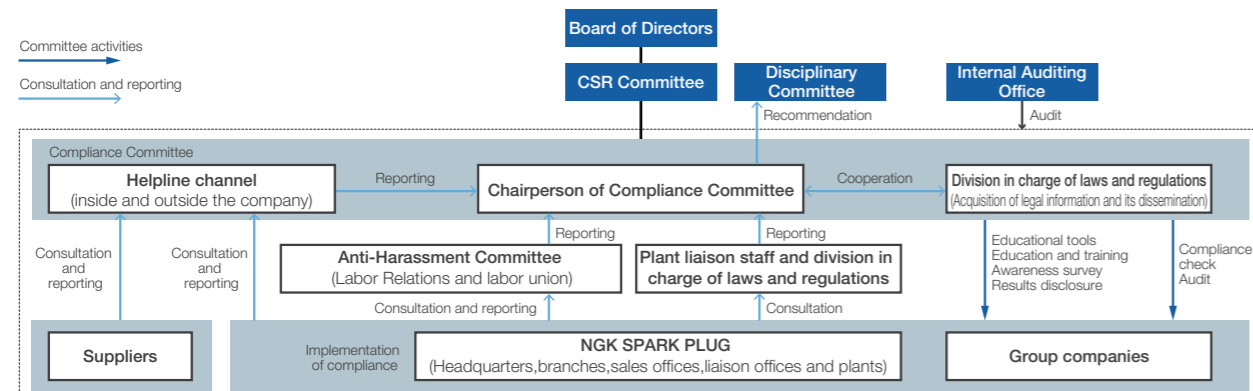
Basic Philosophy

We work to increase awareness among employees regarding compliance to act in a socially sensible manner, helping them to bear in mind that our enterprise is a member of society.

Promotion System

The Compliance Committee, headed by the Representative Director and made up of Chairpersons of the five other expert committees under the CSR Committee and the Chairperson of the Disciplinary Committee, holds meetings in a timely manner to monitor and make corrections on key issues and actions concerning them.

Compliance promotion system



Prevention of Corruption

NGK SPARK PLUG Group strives to prevent corruption, stating in our Corporate Code of Conduct "we shall promote fair, transparent, free competition and sound trade. We shall also ensure that our relationships and contacts with government agencies and political bodies are of a sound and proper nature."

In the Compliance Guidebook we issued in 2012, we set rules concerning the prevention of corruption, including the prohibition of involvement in political contributions or bribery, and subsequently educated employees about these. In 2013, we educated employees about our Conduct Guidelines Concerning the Giving and Receiving of Gifts and Entertainment and are raising awareness to eliminate any misconduct. Further, in 2016 we signed the United Nations Global Compact, openly reaffirming our commitment to undertaking the prevention of corruption.

While addressing the prevention of corruption in accordance with these and other guidelines, we respond to

any incident of violation primarily through our Compliance Committee. We also accept information provided through the Corporate Ethics Helpline. Our overseas group companies are also taking action to prevent corruption, especially preventing bribery towards civil servants, and conduct education for employees along with surveys of local laws. Through our CSR Procurement Guidelines, we further require that suppliers refrain from acts of bribery. In 2018, there were zero related violations committed by our Group.



Anti-corruption seminar at CERAMICA E VELAS DE IGNICAO NGK DO BRASIL LTDA.

Initiatives Concerning Competition Law

Responding with sincerity to violations of competition law (the Anti-Monopoly Act) uncovered in FY2014, NGK SPARK PLUG Group has established a system to promote compliance with competition law and ensures legal compliance both inside and outside of the company.

Domestically, we have formulated the Anti-Monopoly Act Compliance Manual to educate employees and hold various internal seminars including those for executive officers. Furthermore, we have introduced an in-house e-mail

inspection system for monitoring and prevention of recurring violations of the competition law.

Our overseas group companies are required to report the activity status regarding compliance with the competition law to the Headquarters in Japan on a regular basis. In addition, the domestic competition law and compliance measures team visits overseas group companies to conduct audits on compliance systems and their operational status, and to confirm that rules are thoroughly promulgated and enforced. We also hold seminars inviting experts.

Corporate Ethics Helpline

The Corporate Ethics Helpline is an internal reporting system available to employees and suppliers seeking consultation regarding compliance. We have worked to improve user convenience by establishing channels not only inside the company but also via an external expert service provider and enabling employees and suppliers to seek consultation and make reports also outside work hours and on holidays. This service can be also used under anonymity.

Regarding consultations and reports received, facts are investigated with discretion so that the reporting employee or

supplier is neither identified nor feels uncomfortable, and if problems are confirmed, they are dealt with promptly.

In FY2018, there were 73 consultations and reports, including consultations from group companies. They included matters related to labor and internal regulations, and if problems were confirmed, they were corrected immediately.

We continuously strive to make this service widely known by providing training, putting up posters, distributing carrying cards, etc.

Anti-Harassment Committee

The Anti-Harassment Committee closely examines and verifies reports and consultations that are reported to the harassment consultation desks set up in every factory, and provides necessary guidance for correction. The content of the committee's activities is reported to the Compliance Committee.



I will raise questions about the management of business from a different standpoint, thereby helping improve the quality of the company's decision-making.

Outside director
Morihiko Otaki

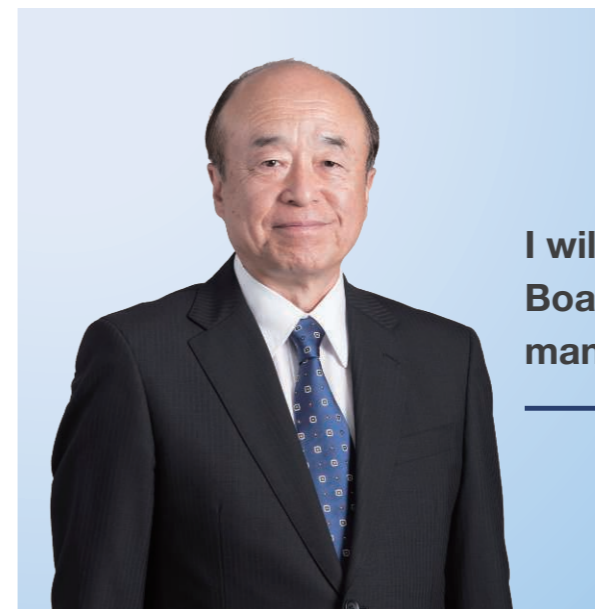
Presently NGK SPARK PLUG is working on two important medium- to long-term themes: make investment plans by predicting when demand for internal combustion engines will peak; and make more investments in new projects to establish new businesses, including those targeting automobiles. At Board of Directors meetings held during the year, we robustly exchanged opinions about these two themes. Particularly for investments in new projects, we are examining a range of options, including investing in ventures and implementing a large-scale M&A project. In FY2018, the company decided to acquire US company CAIRE as its first large-scale investment project in fields other than the automotive components business, a move that signals the company's proactive attitude toward new investment projects.

To create a new business, we can purchase a company by M&A or can launch a new business internally based on R&D activities. The company has made great progress in these two initiatives in recent years. Successful examples of "intrapreneurship" include the development of a new product by an R&D team and the proposal of ideas by employees under the internal application system. The company has also steadily moved forward for the M&A and venture investment projects, which were launched several years ago. The company needs to continue these measures and achieve success in new projects as the biggest challenge for the

future. It is impossible for the company to be successful in all new projects. Nevertheless, all of us, including myself, should make a concerted effort to lead as many investment projects as possible to success.

I became an outside director of the company six years ago. I feel that the company is now taking a strategic approach on a far different level compared with several years ago. The company is undergoing dramatic changes, and I believe that the most important role that I can fulfill for it is that of a "challenger," which means to raise questions about the plans formulated by the management team and about the progress made with the plans from a different standpoint. For example, I give opinions about local ideas from a global viewpoint and discuss technical issues from the viewpoint of an amateur for the improvement of the Board's decision-making quality.

Board meetings should provide us with opportunities to have strategic discussions on medium- to long-term managerial issues. Such discussions must be prioritized over the confirmation and reporting of the decisions made on short-term issues. Based on this belief, I hope to play my role as an outside director and fulfill the function of supervising the management team.



I will enhance the effectiveness of the Board for the achievement of management plans

Outside director
Kanemaru Yasui

The Board of Directors must fulfill the function of supervising the management team, specifically to oversee the progress made by the team with the management plans. To increase the corporate value, the company must be managed in line with the management plans, which set the medium- to long-term challenges to be met, and it is important for the Board to act appropriately to ensure the achievement of the plans.

We therefore must continue implementing initiatives to enhance the effectiveness of the Board with a focus on ensuring the attainment of the management plans. During the year, there has been a range of improvements made to Board meetings. For example, the business execution results are now reported so as to more clearly show the links with the current management plan, and more profound discussions are had on progress with the plan. For the remuneration scheme for the management team, which is important in relation to the Board of Director's supervisory function, a scheme that is well balanced in terms of short-term and long-term targets is being established. To further enhance the effectiveness of the Board, it is desirable to continue examinations on such issues as the sophistication of the risk management system. I am paying attention also to financial strategies. The company has long been attributing importance to financial soundness and has made investments in existing businesses in an amount that does not substantially exceed the amount of funds gained through

the automotive components business, which has been the main driver for its corporate growth. However, for future growth, we need to make investments proactively in new businesses as well as in existing businesses. We must take risks in new businesses while maintaining our financial soundness. In the diversification of fundraising options, financial strategies will become more important as a managerial issue. The company has adopted ROIC as a management indicator, which I think is one of its responses to the diversification of fundraising options. For fundraising, the Board now also discusses the equity ratio, shareholder return ratio and other balance sheet items as well as the fundraising method, which I appreciate as a good change made over recent years.

I am working to fulfill my role as an outside director with a focus on two issues: whether the Board is adequately discussing managerial issues and whether the transparency of the decision-making process is ensured. If I find any factor that is hindering the progress and achievement of the management plan, I will urge the Board to identify the factor and implement countermeasures as soon as possible.

Basic Philosophy - Our CSR -

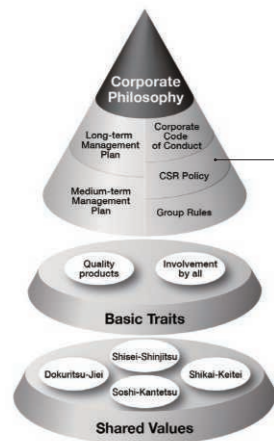
We view CSR not just as a responsibility but as an opportunity to be accountable through review of NGK SPARK PLUG Group's economic, environmental and social activities from a global perspective, to enhance corporate value, and to contribute to the sustainable development of society in accordance with our Corporate Philosophy.

Our CSR activities are wide-ranging and diverse, and to provide our Group's action guidelines for fulfilling CSR,

we established the CSR Policy in April 2011, which comprises 10 policies, such as the Compliance Policy and others. In line with the CSR Policy, we review and promote CSR based on a multifaceted approach.

Our CSR Philosophy and Policy

We act based on our Corporate Code of Conduct and our CSR Policy in order to realize our Corporate Philosophy.



- Risk Management Policy
- Compliance Policy
- Information Security Policy
- Corporate Quality Policy
- Information Disclosure Policy
- Procurement Policy
- Human Resource Policy
- Occupational Safety and Health Basic Policy
- Social Contribution Policy
- Environmental Policy

Participation in the United Nations Global Compact

NGK SPARK PLUG Group joined the UN Global Compact in November 2016. We will continue to support the 10 principles set in four fields of human rights, labor, environment and anti-corruption and will conduct various activities as a good corporate citizen, thereby contributing to the creation of a sustainable society.

UN Global Compact

Initiative proposed in 1999 by then Secretary-General of the United Nations Kofi Annan to address various issues facing the world, such as global warming, environmental problems and disparities in society. It was established formally at the UN headquarters in July 2000 as a set of voluntary action principles to be followed by companies.



Contribution to SDGs

NGK SPARK PLUG shall focus on achieving the Sustainable Development Goals (SDGs) adopted by the UN in 2015.

About Sustainable Development Goals (SDGs)

SDGs are a set of 17 goals and 169 targets for creating a sustainable world by 2030 that were adopted at the UN summit, and they aim to resolve shared global problems and issues, including poverty and inequality, and climate change, etc. with the objective that "not a single person on earth will be left behind."



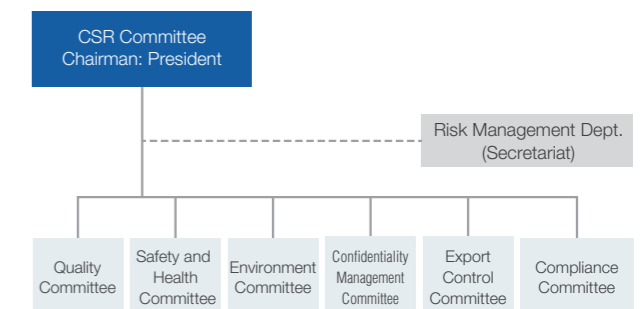
CSR Promotion System

The CSR Committee is chaired by the president and composed of all directors including outside directors as well as chairpersons of each task force committee. The Committee meets twice a year.

As well as determining each year's key tasks for the implementation of the CSR Policy, the Committee oversees and evaluates the CSR-related activities of each task force committee and division and makes proposals about these activities for the total optimization of CSR activities, thereby strengthening the business foundation.

Through close collaboration among the CSR Committee and task force committees, a company-wide CSR promotion system is put in place.

CSR promotion system



Communication with Stakeholders

To deepen mutual understanding, we are fostering dialogue with our stakeholders through various opportunities.

Stakeholder	Communication	Major activities in FY2018	Frequency & no. of participants per year
Shareholders and investors	We disclose information in compliance with the law and also disclose information promptly via the media and at our website.	<ul style="list-style-type: none"> • Organization of the ordinary general meeting of shareholders • Dialogue with institutional investors and securities analysts • Organization of briefings on our technologies for institutional investors and securities analysts • Organization of briefings on the company for personal investors • Publication of the newsletters for shareholders • Publication of an annual integrated report • Provision of information via the website 	Once 383 times Once Seven times(1,195 people) Twice Once From time to time
Customers	We offer information meaningful to customers at our website and through exhibitions so that they can purchase and use our products and services with peace of mind.	<ul style="list-style-type: none"> • Communication through sales activities • Provision of information via the website (on products, events, etc.) • Explanation about products and technologies at exhibitions • Communication at venues of events, such as racing events 	From time to time From time to time From time to time From time to time
Suppliers	We are working to build relationships of trust with suppliers as their sound partners and achieve growth together. To this end we conduct activities across the supply chain, such as holding briefing sessions on our corporate policies.	<ul style="list-style-type: none"> • Communication through daily procurement activities • Organization of briefings on the corporate principles • Organization of seminars on practical issues • Provision of a corporate ethics helpline for suppliers 	From time to time Once 35 seminars -
Local communities	We respect the local culture and customs at each of our bases located across the world and work for smooth communication with local communities. We also participate in various social contribution activities to help create a comfortable society as a corporate citizen.	<ul style="list-style-type: none"> • Communication through social meetings and events • Participation in local events such as festivals • Local cleanup activity • Communication through cultural and sport events • 2019 NGK SPARK PLUG Suzuka 2&4 Race • NGK SPARK PLUG FC Gifu football class for children • NGK SPARK PLUG-JAXA one-day science class in Kagoshima • Musical for families held in the NTK Hall • Marathon Festival Nagoya Aichi • Provision of information via the website (environmental information, etc.) 	From time to time From time to time From time to time at each plant Apr. June Oct. Dec. Mar. From time to time
Employees	To maintain safe and sound workplaces and help employees work with vigor, the management team proactively visits work sites to have dialogues with on-site employees.	<ul style="list-style-type: none"> • Communication through daily operations and at workplaces • Publication of an in-house magazine • Organization of various labor-management meetings • Utilization of the corporate ethics helpline (for employees) • Organization of various training sessions • Employee satisfaction survey 	From time to time Seven times From time to time 73 calls received A total of 10,220 participants All employees

Inclusion in SRI Indexes

NGK SPARK PLUG Group is a member of the following indexes related to SRI (socially responsible investing):



Information

NGK NTK
スパークプラグ
NTK
日本特殊陶業

CONTENTS

77	Financial Results Highlights for the Past 11 Years
79	Consolidated Balance Sheets
81	Consolidated Statements of Income
82	Consolidated Statements of Comprehensive Income
83	Consolidated Statements of Changes in Net Assets
84	Consolidated Statements of Cash Flows
85	Notes to Consolidated Financial Statements
100	Independent Auditors Report
101	Global Network
103	Corporate Profile and Stock Information
104	Independent Verification Report

Financial Results Highlights for the Past 11 Years

	(Fiscal year)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
(Millions of yen)												
Net sales		292,121	243,914	269,232	284,746	302,798	329,758	347,636	383,272	372,919	409,912	425,013
Operating income (loss)		(5,222)	10,683	28,770	24,478	23,754	51,661	62,196	66,284	53,595	67,279	58,672
Ordinary income (loss)		(7,528)	10,758	27,379	23,740	27,674	54,960	67,907	64,483	55,559	69,094	59,545
Profit (loss) attributable to owners of the parent		(71,669)	13,509	23,680	25,524	20,909	32,704	36,753	30,815	25,602	44,335	42,813
Capital expenditures		24,173	10,977	8,767	14,004	24,012	41,034	36,372	45,339	36,328	37,591	56,587
Depreciation		31,767	18,825	16,646	15,438	12,798	11,567	13,337	16,834	19,601	20,920	23,964
R&D expenses		17,575	13,907	15,763	16,036	17,100	19,400	21,337	23,123	23,416	25,283	28,072
Cash flows from operating activities		36,603	34,255	35,398	21,079	26,194	54,697	36,593	56,465	49,764	65,707	43,704
Cash flows from investing activities		(27,153)	(17,270)	(20,412)	(15,850)	(15,442)	(61,148)	(12,865)	(82,331)	(53,410)	(26,422)	(48,380)
Free cash flows		3,820	27,834	30,684	8,507	8,456	3,541	13,995	(25,866)	6,335	29,636	(21,356)
Dividend payout		5,883	1,198	3,594	4,789	4,788	5,223	7,181	8,487	9,055	10,823	13,610
Net assets		184,384	207,006	218,159	235,613	268,309	302,793	343,380	341,044	354,710	388,115	401,683
Total assets		275,995	331,476	337,318	340,295	366,489	458,148	485,497	526,103	563,801	599,972	628,970
Interest bearing debt		37,042	39,814	36,697	37,399	27,418	57,339	46,153	80,212	99,275	98,115	110,755
(Yen)												
Earnings (losses) per share		(328.90)	62.01	108.71	117.25	96.06	150.26	168.88	141.60	119.44	209.37	205.58
Net assets per share		838.11	942.41	994.36	1,075.24	1,223.41	1,381.38	1,566.80	1,557.16	1,660.06	1,837.46	1,917.89
Cash dividends per share		13.50	11.00	22.00	22.00	22.00	28.00	36.00	42.00	42.00	60.00	70.00
Operating income ratio (%)		(1.8)	4.4	10.7	8.6	7.8	15.7	17.9	17.3	14.4	16.4	13.8
Return on net sales (%)		(24.5)	5.5	8.8	9.0	6.9	9.9	10.6	8.0	6.9	10.8	10.1
Gross profit on sales (%)		13.8	21.0	27.4	25.1	24.2	32.6	35.8	35.6	33.0	34.6	33.9
ROE (Return on equity) (%)		(30.6)	7.0	11.2	11.3	8.4	11.5	11.4	9.1	7.4	12.0	10.9
ROA (Return on assets) (%)		(20.8)	4.4	7.1	7.5	5.9	7.9	7.8	6.1	4.7	7.6	6.9
ROIC (Return on invested capital) (%)		(1.3)	3.2	8.0	6.5	5.8	11.0	11.6	11.4	8.5	10.0	8.2
Equity ratio (%)		66.2	61.9	64.2	68.8	72.7	65.6	70.2	64.4	62.5	64.3	63.5
Total asset turnover (times)		0.8	0.8	0.8	0.8	0.9	0.8	0.7	0.8	0.7	0.7	0.7
Dividend payout ratio (%)		—	17.7	20.2	18.8	22.9	18.6	21.3	29.7	35.2	28.7	34.0

Consolidated Balance Sheets

NGK SPARK PLUG CO., LTD. and Consolidated Subsidiaries
March 31, 2019 and 2018

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Assets			
Current assets			
Cash and deposits (Notes 7 and 9)	¥ 48,639	¥ 56,235	\$ 438,189
Notes and accounts receivable - trade (Notes 3 and 9)	96,834	93,615	872,378
Short-term investment securities (Notes 9 and 10)	34,921	59,905	314,604
Inventories (Note 3)	113,124	94,953	1,019,135
Other	18,426	15,076	166,000
Allowance for doubtful accounts	(841)	(751)	(7,577)
Total current assets	311,103	319,035	2,802,730
Noncurrent assets			
Property, plant and equipment			
Buildings and structures, net	66,661	63,410	600,550
Machinery, equipment and vehicles, net	110,166	95,282	992,486
Land	21,382	21,279	192,631
Construction in progress	25,625	11,027	230,856
Other, net	4,885	4,101	44,009
Total property, plant and equipment (Note 3)	228,720	195,102	2,060,541
Intangible assets			
Goodwill (Note 16)	5,422	307	48,847
Software	5,722	4,567	51,550
Other	1,857	239	16,730
Total intangible assets	13,002	5,114	117,135
Investments and other assets			
Investment securities (Notes 3, 9 and 10)	63,310	71,680	570,360
Deferred tax assets (Note 13)	11,443	7,672	103,090
Other	1,508	1,487	13,586
Allowance for doubtful accounts	(119)	(119)	(1,072)
Total investments and other assets	76,143	80,720	685,973
Total noncurrent assets	317,866	280,936	2,863,658
Total assets	¥628,970	¥599,972	\$5,666,396

See accompanying Notes to Consolidated Financial Statements.

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Liabilities			
Current liabilities			
Accounts payable - trade (Note 9)	¥ 34,957	¥ 32,407	\$ 314,928
Short-term loans payable (Notes 9 and 20)	27,587	10,113	248,532
Current portion of bonds payable (Notes 9 and 20)	—	25,000	—
Current portion of long-term loans payable (Notes 9 and 20)	9,924	9,962	89,405
Lease obligations (Note 20)	52	43	468
Income taxes payable	9,126	13,040	82,216
Other	40,575	39,641	365,541
Total current liabilities	122,224	130,208	1,101,117
Noncurrent liabilities			
Bonds payable (Notes 9 and 20)	50,000	30,000	450,450
Long-term loans payable (Notes 9 and 20)	23,062	22,886	207,766
Lease obligations (Note 20)	129	111	1,162
Net defined benefit liability (Note 12)	30,254	27,443	272,559
Provision for stock benefits	201	92	1,811
Deferred tax liabilities (Note 13)	152	169	1,369
Other	1,262	945	11,369
Total noncurrent liabilities	105,062	81,648	946,505
Total liabilities	227,286	211,856	2,047,622
Net assets			
Shareholders' equity			
Common stock	47,869	47,869	431,252
Capital surplus	54,639	54,639	492,243
Retained earnings	297,930	278,374	2,684,054
Treasury stock	(1,741)	(6,422)	(15,685)
Total shareholders' equity	398,697	374,461	3,591,865
Accumulated other comprehensive income			
Valuation difference on available-for-sale securities	24,872	31,211	224,072
Foreign currency translation adjustments	(20,025)	(16,737)	(180,405)
Remeasurements of defined benefit plans (Note 12)	(4,293)	(3,273)	(38,676)
Total accumulated other comprehensive income	553	11,200	4,982
Noncontrolling interests	2,431	2,454	21,901
Total net assets	401,683	388,115	3,618,766
Total liabilities and net assets	¥628,970	¥599,972	\$5,666,396

Consolidated Statements of Income

NGK SPARK PLUG CO., LTD. and Consolidated Subsidiaries
For the Years Ended March 31, 2019 and 2018

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Net sales (Note 16)	¥425,013	¥409,912	\$3,828,946
Cost of sales (Note 4)	281,113	268,189	2,532,550
Gross profit	143,899	141,722	1,296,387
Selling, general and administrative expenses			
Selling expenses	36,457	33,377	328,441
General and administrative expenses	48,769	41,065	439,360
Total selling, general and administrative expenses (Notes 4 and 12)	85,226	74,442	767,802
Operating income (Note 16)	58,672	67,279	528,577
Nonoperating income			
Interest income	920	1,123	8,288
Dividend income	1,489	1,398	13,414
Equity in earnings of associates	139	510	1,252
Other	1,744	1,826	15,712
Total nonoperating income	4,294	4,858	38,685
Nonoperating expenses			
Interest expense	576	511	5,189
Foreign exchange loss	335	1,786	3,018
Product compensation expenses	1,072	117	9,658
Other	1,437	628	12,946
Total nonoperating expenses	3,421	3,043	30,820
Ordinary income	59,545	69,094	536,441
Extraordinary income			
Gain on sales of noncurrent assets (Note 4)	354	199	3,189
Gain on sales of investment securities	960	1,117	8,649
Total extraordinary income	1,314	1,316	11,838
Extraordinary loss			
Loss on sales or disposal of noncurrent assets (Note 4)	1,227	1,325	11,054
Loss on valuation of investment securities	1	5	9
Loss on sales of investment securities	0	—	0
Loss on violation of antitrust law	—	3,987	—
Settlement package	46	4,434	414
Environmental expenses (Note 4)	254	559	2,288
Total extraordinary loss	1,530	10,312	13,784
Profit before income taxes	59,329	60,098	534,495
Income taxes - current	16,613	18,499	149,667
Income taxes - deferred	(389)	(3,084)	(3,505)
Total income taxes (Note 13)	16,223	15,415	146,153
Profit	43,106	44,683	388,342
Profit attributable to:			
Noncontrolling interests	292	347	2,631
Owners of the parent	¥ 42,813	¥ 44,335	\$ 385,703

See accompanying Notes to Consolidated Financial Statements.

Consolidated Statements of Comprehensive Income

NGK SPARK PLUG CO., LTD. and Consolidated Subsidiaries
For the Years Ended March 31, 2019 and 2018

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Profit	¥ 43,106	¥44,683	\$388,342
Other comprehensive income:			
Valuation difference on available-for-sale securities	(6,321)	3,655	(56,946)
Foreign currency translation adjustments	(3,297)	16	(29,703)
Remeasurements of defined benefit plans (Note 12)	(1,025)	2,560	(9,234)
Share of other comprehensive income of associates accounted for using equity method	(80)	(161)	(721)
Total other comprehensive income (Note 5)	(10,725)	6,070	(96,622)
Comprehensive income	¥ 32,380	¥50,754	\$291,712
Comprehensive income attributable to:			
Owners of the parent	¥ 32,167	¥50,286	\$289,793
Noncontrolling interests	212	467	1,910

See accompanying Notes to Consolidated Financial Statements.

Consolidated Statements of Changes in Net Assets

NGK SPARK PLUG CO., LTD. and Consolidated Subsidiaries
For the Years Ended March 31, 2019 and 2018

	Shareholders' equity					Accumulated other comprehensive income					Total net assets
	Common stock	Capital surplus	Retained earnings	Treasury stock	Total shareholders' equity	Valuation difference on available-for-sale securities	Foreign currency translation adjustments	Remeasurements of defined benefit plans	Total accumulated other comprehensive income	Noncontrolling interests	
Balance at April 1, 2017	¥47,869	¥54,825	¥262,010	¥(17,649)	¥347,056	¥27,580	¥(16,527)	¥(5,804)	¥ 5,249	¥2,404	¥354,710
Changes during the fiscal year											
Dividends of surplus			(10,823)		(10,823)						(10,823)
Profit attributable to owners of the parent			44,335		44,335						44,335
Purchase of treasury stock				(5,922)	(5,922)						(5,922)
Disposal of treasury stock		0		0	0						0
Retirement of treasury stock		(0)	(17,148)	17,149	—						—
Change in ownership interest of parent due to transactions with noncontrolling interests		(184)			(184)						(184)
Net changes in items other than shareholders' equity						3,630	(210)	2,530	5,950	49	6,000
Total changes in items during the period	—	(185)	16,363	11,226	27,404	3,630	(210)	2,530	5,950	49	33,405
Balance at March 31, 2018	47,869	54,639	278,374	(6,422)	374,461	31,211	(16,737)	(3,273)	11,200	2,454	388,115
Changes during the fiscal year											
Dividends of surplus			(13,610)		(13,610)						(13,610)
Profit attributable to owners of the parent			42,813		42,813						42,813
Purchase of treasury stock				(5,002)	(5,002)						(5,002)
Disposal of treasury stock			(0)	35	35						35
Retirement of treasury stock			(9,647)	9,647	—						—
Net changes in items other than shareholders' equity						(6,338)	(3,288)	(1,019)	(10,646)	(22)	(10,668)
Total changes in items during the period	—	—	19,555	4,680	24,236	(6,338)	(3,288)	(1,019)	(10,646)	(22)	13,567
Balance at March 31, 2019	¥47,869	¥54,639	¥297,930	¥ (1,741)	¥398,697	¥24,872	¥(20,025)	¥(4,293)	¥ 553	¥2,431	¥401,683
	Thousands of U.S. dollars										
Balance at March 31, 2018	\$431,252	\$492,243	\$2,507,874	\$(57,856)	\$3,373,523	\$281,180	\$(150,784)	\$(29,486)	\$100,901	\$22,108	\$3,496,532
Changes during the fiscal year											
Dividends of surplus			(122,613)		(122,613)						(122,613)
Profit attributable to owners of the parent			385,703		385,703						385,703
Purchase of treasury stock				(45,063)	(45,063)						(45,063)
Disposal of treasury stock			(0)	315	315						315
Retirement of treasury stock			(86,910)	86,910	—						—
Net changes in items other than shareholders' equity						(57,099)	(29,622)	(9,180)	(95,910)	(198)	(96,108)
Total changes in items during the period	—	—	176,171	42,162	218,342	(57,099)	(29,622)	(9,180)	(95,910)	(198)	122,225
Balance at March 31, 2019	\$431,252	\$492,243	\$2,684,054	\$(15,685)	\$3,591,865	\$224,072	\$(180,405)	\$(38,676)	\$ 4,982	\$21,901	\$3,618,766

See accompanying Notes to Consolidated Financial Statements.

Consolidated Statements of Cash Flows

NGK SPARK PLUG CO., LTD. and Consolidated Subsidiaries
For the Years Ended March 31, 2019 and 2018

	Millions of yen		Thousands of U.S. dollars
	2019	2018	
Cash flows from operating activities			
Profit before income taxes	¥ 59,329	¥ 60,098	\$ 534,495
Depreciation and amortization	23,964	20,920	215,892
Increase in net defined benefit liability	1,396	1,870	12,577
Interest and dividend income	(2,410)	(2,521)	(21,712)
Interest expense	576	511	5,189
Equity in earnings of associates	(139)	(510)	(1,252)
Loss on disposal of noncurrent assets	873	1,126	7,865
Gain on sales of investment securities	(960)	(1,117)	(8,649)
Increase in notes and accounts receivable - trade	(1,211)	(1,876)	(10,910)
Increase in inventories	(16,054)	(8,095)	(144,631)
Increase in notes and accounts payable - trade	1,109	966	9,991
Other, net	(3,677)	6,058	(33,126)
Subtotal	62,796	77,430	565,730
Interest and dividends received	2,461	3,169	22,171
Interest paid	(571)	(501)	(5,144)
Income taxes paid	(20,982)	(14,390)	(189,027)
Net cash provided by operating activities	43,704	65,707	393,730
Cash flows from investing activities			
Net increase in time deposits	(301)	(1,121)	(2,712)
Net decrease in short-term investment securities	16,981	10,769	152,982
Purchase of property, plant and equipment	(50,823)	(37,222)	(457,865)
Proceeds from sale of property, plant and equipment	433	858	3,901
Purchase of intangible assets	(2,683)	(1,675)	(24,171)
Purchase of investment securities	(1,498)	(837)	(13,495)
Proceeds from sale and redemption of investment securities	3,424	1,927	30,847
Purchase of shares of subsidiaries resulting in change in scope of consolidation (Note 7)	(13,842)	—	(124,703)
Other, net	(69)	879	(622)
Net cash used in investing activities	(48,380)	(26,422)	(435,856)
Cash flows from financing activities			
Net increase (decrease) in short-term loans payable	15,722	(574)	141,640
Proceeds from long-term loans payable	10,100	—	90,991
Repayment of long-term loans payable	(9,962)	—	(89,748)
Proceeds from issuance of bonds	19,892	—	179,207
Redemption of bonds	(25,000)	—	(225,225)
Purchase of treasury stock	(5,002)	(5,922)	(45,063)
Cash dividends paid	(13,604)	(10,821)	(122,559)
Other, net	(270)	(725)	(2,432)
Net cash used in financing activities	(8,124)	(18,043)	(73,189)
Effect of exchange rate changes on cash and cash equivalents	(327)	318	(2,946)
Net (decrease) increase in cash and cash equivalents	(13,128)	21,558	(118,270)
Cash and cash equivalents at beginning of year	87,378	65,817	787,189
Increase in cash and cash equivalents resulting from newly consolidated subsidiary	—	2	—
Cash and cash equivalents at end of year (Note 7)	¥ 74,250	¥ 87,378	\$ 668,919

See accompanying Notes to Consolidated Financial Statements.

Notes to Consolidated Financial Statements

NGK SPARK PLUG CO., LTD. and Consolidated Subsidiaries

1. Basis of Consolidated Financial Statements

The accompanying consolidated financial statements of NGK SPARK PLUG CO., LTD. (the "Company") and its consolidated subsidiaries (together with the Company, the "NGK Spark Plug Group") have been prepared in accordance with the provisions set forth in the Financial Instrument and Exchange Law of Japan and its related accounting regulations and in conformity with accounting principles generally accepted in Japan ("Japanese GAAP"), which are different in certain respects as to application and disclosure requirements from International Financial Reporting Standards ("IFRS").

The accompanying consolidated financial statements are a translation, with some expanded descriptions, from the consolidated financial statements of the Company prepared in accordance with Japanese GAAP and filed with the appropriate Local Finance Bureau of the Ministry of Finance as required by the Financial Instrument and Exchange Law of Japan.

The amounts indicated in millions of yen are rounded down by omitting amounts less than one million. As a result, totals may not exactly equal the sum of the individual accounts. The translation of the Japanese yen amounts into U.S. dollar amounts is included solely for the convenience of readers outside Japan, using the approximate exchange rate prevailing at March 31, 2019, which was ¥111 to U.S. \$1.00. The translation should not be construed as a representation that the Japanese yen amounts have been, could have been or could in the future be converted into U.S. dollars at this or any other rate of exchange.

Certain comparative figures have been reclassified to conform to the current year's presentation.

2. Summary of Significant Accounting Policies

(a) Principles of consolidation

The accompanying consolidated financial statements include the accounts of the Company and its significant subsidiaries. Investments in significant unconsolidated subsidiaries and associates are accounted for by the equity method. Investments in unconsolidated subsidiaries and associates not accounted for by the equity method are stated at cost. All intercompany transactions and accounts have been eliminated. The difference between the cost of investments in subsidiaries and the underlying equity in their net assets, adjusted based on the fair value at the time of acquisition, is deferred principally as goodwill and amortized over the estimated useful life, generally 5-10 years, on a straight-line basis.

The number of consolidated subsidiaries and associates accounted for by the equity method for the years ended March 31, 2019 and 2018 was as follows:

	2019	2018
Consolidated subsidiaries:		
Domestic	12	12
Overseas	37	30
Associates accounted for by the equity method	3	3

During the year ended March 31, 2019, CAIRE Inc., CAIRE Medical Limited (former company name: Chart BioMedical Limited), CAIRE Medical Technology (Chengdu) Co., Ltd. (former company name: Chart BioMedical (Chengdu) Co., Ltd.) and their 5 subsidiaries were included in the scope of consolidation due to the acquisition of their stock.

During the year ended March 31, 2018, Nittoku Denshi Co., Ltd. was included in the scope of consolidation in order to improve the accuracy of the consolidated financial disclosure.

Investments in the remaining unconsolidated subsidiaries and associated companies are stated at cost. If the equity method of accounting had been applied to the investments in these companies, the effect on the accompanying consolidated financial statements would not have been material.

The major subsidiaries that were not consolidated for the year ended March 31, 2019 were PARTSFIT SDN. BHD., Nittoku Smile Co., Ltd. and Sharing FACTORY Co., Ltd. For the year ended March 31, 2018, Bujias NGK Del Ecuador Cia Ltda., Nittoku Smile Co., Ltd. and Sharing FACTORY Co., Ltd. were not consolidated.

There were no unconsolidated subsidiaries accounted for by the equity method for either the year ended March 31, 2019 or 2018.

For each of the years ended March 31, 2019 and 2018, the Company had three associates accounted for by the equity method, Woo Jin Industry Co., Ltd., Tokai Taima Kogu Co., Ltd. and Japan Medical Dynamic Marketing, INC.

The major unconsolidated subsidiaries that were not accounted for by the equity method for the year ended March 31, 2019 were PARTSFIT SDN. BHD., Nittoku Smile Co., Ltd. and Sharing FACTORY Co., Ltd. For the year ended March 31, 2018, Bujias NGK Del Ecuador Cia Ltda., Nittoku Smile Co., Ltd. and Sharing FACTORY Co., Ltd. were not accounted for by the equity method.

For each of the years ended March 31, 2019 and 2018, Hayakawa Seiki Co., Ltd. was not accounted for by the equity method.

These companies were excluded from the scope of the equity method because their net income (loss), retained earnings, accumulated other comprehensive income and others were immaterial, and the exclusion of these companies from the scope of companies accounted for by the equity method does not hinder a reasonable understanding of the Group's financial position and results of operations.

For the year ended March 31, 2019, the fiscal year-end date of NGK Spark Plug (Shanghai) Co., Ltd., Changshu NGK Spark Plug Co., Ltd., NGK Spark Plug (Shanghai) Trading Co., Ltd., Bujias NGK de Mexico S.A. de C.V., LLC NGK Spark Plugs (Eurasia), Woo Jin Industry Co., Ltd. and ten other companies was December 31. However, when preparing the consolidated financial statements, the Company used the financial statements of the 15 consolidated subsidiaries and one associate that were compiled by a temporary closing of their accounts as of March 31.

(Unification of accounting policies applied to foreign subsidiaries for consolidated financial statements)

The Company has adopted Practical Issues Task Force ("PITF") No. 18, "Practical Solution on Unification of Accounting Policies Applied to Foreign Subsidiaries for Consolidated Financial Statements," issued by the Accounting Standards Board of Japan ("ASBJ"). PITF No. 18 requires that accounting policies and procedures applied by a parent company and its subsidiaries to similar transactions and events under similar circumstances should, in principle, be unified for the preparation of the consolidated financial statements. PITF No. 18, however, as a tentative measure, allows a parent company to prepare consolidated financial statements using its foreign subsidiaries' financial statements prepared in accordance with either IFRS or U.S. generally accepted accounting principles ("U.S. GAAP"). In this case, adjustments for the following four items are required in the consolidation process so that their impact on profit attributable to the owners of the parent is accounted for in accordance with Japanese GAAP, unless the impact is not material.

- (a) Goodwill not subject to amortization
- (b) Actuarial gains and losses of defined benefit retirement plans recognized outside profit and loss
- (c) Capitalized expenditures for research and development activities
- (d) Fair value measurement of investment properties and revaluation of property, plant and equipment and intangible assets

(Unification of accounting policies applied to associates accounted for using the equity method)

The Company also has adopted ASBJ PITF No. 24, "Practical Solution on Unification of Accounting Policies Applied to Associates Accounted for Using the Equity Method." PITF No. 24 requires that accounting policies and procedures applied by an investment company and its associates to similar transactions and events under similar circumstances should, in principle, be unified for applying the equity method. PITF No. 24, however, as a tentative measure, allows an investment company to apply the equity method using its foreign associates' financial statements prepared in accordance with either IFRS or U.S. GAAP. In this case, adjustments for the same four items as PITF No. 18 are required in the consolidation process so that their impact on profit attributable to the owners of the parent is accounted for in accordance with Japanese GAAP, unless the impact is not material.

(b) Cash and cash equivalents

The NGK Spark Plug Group considers highly liquid debt instruments purchased with an original maturity of three months or less, which are readily convertible to known amounts of cash and therefore present an insignificant risk of change in value, to be cash equivalents.

(c) Investments and marketable securities

The NGK Spark Plug Group classifies certain investments in debt and equity securities as "held-to-maturity," "trading" or "available-for-sale." The classification determines the respective accounting method to be applied to the investments as stipulated by the accounting standards for financial instruments. The NGK Spark Plug Group has no securities categorized as trading or held-to-maturity securities. Available-for-sale securities are stated at fair value if such value is available, and net unrealized gain or loss on these securities is reported as a component of accumulated other comprehensive income, net of applicable income taxes. Gains and losses on the disposal of available-for-sale securities are computed by the moving average method. Available-for-sale securities without available fair values are carried at cost determined by the moving average method. Adjustments in the carrying values of individual investment securities are charged to income through write-downs when a decline in value is deemed other than temporary.

(d) Accounting for derivatives

Derivative instruments are valued at fair value if hedge accounting is not appropriate or when there is no hedging designation, and the gains and losses on the derivatives are recognized in current earnings. According to the special treatment permitted by the accounting standard for financial instruments, if interest rate and currency swap contracts are used as hedges and meet certain hedging criteria, the interest rate and currency swap contracts are not remeasured at market price, and the amount to be received under the interest rate and currency swap contracts is added to or deducted from the interest on the liabilities for which the swap contracts are executed, and the liabilities denominated in foreign currencies for which the interest rate and currency swap contracts

are executed are translated at the contracted rate. Measurement of hedge effectiveness is not considered necessary for interest rate and currency swap contracts that meet the requirements for the special treatment.

(e) Inventories

Inventories held for sale in the ordinary course of business are valued at the lower of cost, determined principally by the moving average method, or net realizable value. If net realizable value has fallen below cost as of the end of the period, the cost basis is reduced to net realizable value and regarded as decreased profitability of inventories.

(f) Allowance for doubtful accounts

Allowance for doubtful accounts has been provided for at the aggregate amount of estimated credit loss based on an individual review of certain doubtful or troubled receivables and a general reserve for other receivables based on the historical loss experience of a certain past period.

(g) Noncurrent assets and depreciation/amortization

Property, plant and equipment (except for lease assets), including significant renewals and additions, are stated at cost. Depreciation is calculated by the straight-line method based on the estimated useful life of the asset, principally ranging from 8 to 50 years for buildings and structures and from 4 to 10 years for machinery, equipment and vehicles.

Intangible assets (except for lease assets), including software for internal use, are amortized mainly using the straight-line method over the estimated useful life of the asset. The estimated useful life of software for internal use is mainly 5 years.

Expenditures on maintenance and repairs are charged to income as incurred. Upon disposal, the cost and accumulated depreciation are removed from the related accounts and any gain or loss is recorded as gain or loss.

(h) Leases

As a lessee, the Company and its domestic consolidated subsidiaries capitalize the assets used under finance leases except for certain immaterial or short-term finance leases which are accounted for as operating leases in accordance with the current accounting standard. Depreciation is calculated using the straight-line method over the lease term and assuming no residual value.

(i) Impairment of fixed assets

The Company and its domestic consolidated subsidiaries have adopted the "Accounting Standard for Impairment of Fixed Assets" and the related practical guidance. The standard requires that fixed assets be reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. An impairment loss is recognized in the income statement by reducing the carrying amount of the impaired asset or a group of assets to the recoverable amount, measured by the higher of the asset's net selling price or value in use. Fixed assets include land, plants, buildings and other forms of property, including intangible assets, and are to be grouped at the lowest level for which there are identifiable cash flows from other groups of assets. For the purpose of recognition and measurement of an impairment loss, fixed assets of the NGK Spark Plug Group, other than idle or unused property, are grouped into cash generating units based on managerial accounting classifications.

Notes to Consolidated Financial Statements

(j) Employee retirement benefits

The difference between the amount of retirement benefit obligations and the value of plan assets has been recognized as net defined benefit liability. To calculate the retirement benefit obligations, the benefit formula basis is used to allocate estimated retirement benefits to periods of service. Past service cost that is yet to be recognized is amortized on a straight-line basis over ten years, a period not exceeding the average remaining service period of the employees. Actuarial gains and losses that are yet to be recognized are amortized on a straight-line basis over ten years, a period not exceeding the average remaining service period of employees, from the year following the year in which they arise. Net defined benefit liability and retirement benefit costs of certain consolidated subsidiaries are calculated using the simplified method as permitted by the accounting standard for retirement benefits.

(k) Translation of foreign currency accounts

Receivables, payables and securities, other than stocks of subsidiaries and certain other securities, are translated into Japanese yen at exchange rates prevailing at the fiscal year-end. Transactions in foreign currencies are recorded based on the exchange rates prevailing on the transaction dates. Resulting translation gains and losses are included in current earnings.

For financial statement items of the overseas consolidated subsidiaries, all asset and liability accounts are translated into Japanese yen by applying the exchange rate in effect at the respective fiscal year-end. All income and expense accounts are translated at the average rate of exchange prevailing during the year. Translation differences, after allocating portions attributable to noncontrolling interests, are reported in foreign currency translation adjustments as a component of accumulated other comprehensive income in the accompanying consolidated balance sheets.

(l) Research and development expenses

Expenses related to research and development are charged to income as incurred. Research and development expenses arise from a wide range of the NGK Spark Plug Group's activities, including basic and applied research for material development, planning and designing of new products and processes and activities aimed at improving existing products and processes. For the years ended March 31, 2019 and 2018, research and development expenses aggregated ¥28,071 million (\$252,892 thousand) and ¥25,283 million, respectively. These amounts included research and development activities for basic and applied research and the development of new products and processes in the amount of ¥5,252 million (\$47,315 thousand) and ¥4,448 million at March 31, 2019 and 2018, respectively, and were recorded as general and administrative expenses. The remaining expenses were recorded for the respective years in the accompanying consolidated statements of income as manufacturing costs.

(m) Income taxes

Income taxes are accounted for by the asset-liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases and operating loss carryforwards. Deferred tax assets and liabilities are measured using the enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in the period that includes the enactment date.

(n) Enterprise taxes

The NGK Spark Plug Group records enterprise taxes calculated based on the "added value" and "capital" amounts when levied as size-based corporate taxes for local government enterprise taxes, which are included in selling, general and administrative expenses.

(o) Appropriation of retained earnings

Cash dividends are recorded in the fiscal year when a proposed appropriation of retained earnings is approved by the Board of Directors of the Company.

(p) Per share data

Basic earnings per share is computed by dividing income available to common shareholders by the weighted average number of shares of common stock outstanding during the year. Diluted earnings per share is not disclosed as the NGK Spark Plug Group had no dilutive common shares. Cash dividends per share shown for each fiscal year in the accompanying consolidated statements of income represent dividends declared by the Company as applicable to the respective year.

(q) Consumption Taxes

All figures are net of consumption taxes.

(r) Provision for stock benefits

The provision for stock benefits is provided at the estimated amount of stock benefits to directors and corporate officers at the fiscal year-end in accordance with the internal rules for stock delivery.

(s) New accounting standards issued but not yet adopted

(Standards and guidance not yet adopted)

The following standard and guidance were issued but not yet adopted.

- "Accounting Standard for Revenue Recognition" (ASBJ Statement No. 29, March 30, 2018)

- "Implementation Guidance on Accounting Standard for Revenue Recognition" (ASBJ Guidance No. 30, March 30, 2018)

(1) Overview

The above standard and guidance provide comprehensive principles for revenue recognition. Under the standard and guidance, revenue is recognized by applying following 5 steps:

- Step 1: Identify contract(s) with customers.
- Step 2: Identify the performance obligations in the contract.
- Step 3: Determine the transaction price.
- Step 4: Allocate the transaction price to the performance obligation in the contract.
- Step 5: Recognize revenue when (or as) the entity satisfies a performance obligation.

(2) Effective date

The effective date of these new standards is under consideration.

(3) Effects of application

The Company and its consolidated domestic subsidiaries are in the process of determining the effects of these new standards on the consolidated financial statements.

- "Leases" (IFRS No. 16)

(1) Overview

The standard requires lessees to recognize most leases on the balance sheet, resulting in the recognition of lease assets and liabilities.

(2) Effective date

The standard will be applied from the beginning of the fiscal year ending March 31, 2020.

(3) Effects of application

The Company and its consolidated overseas subsidiaries are in the process of determining the effects of the new standard on the consolidated financial statements.

(t) Changing in presentation

(Changes due to adoption of "Partial Amendments to Accounting Standard for Tax Effect Accounting")

Upon application of "Partial Amendments to Accounting Standard for Tax Effect Accounting" (ASBJ Statement No. 28, February 16, 2018 (hereinafter, "Statement No. 28")) from the beginning of the current fiscal year, the Company and its domestic subsidiaries changed the presentation and related notes of deferred tax assets and deferred tax liabilities such that deferred tax assets and deferred tax liabilities are classified as part of 'investments and other assets' and 'noncurrent liabilities,' respectively.

As a result, ¥12,427 million of deferred tax assets classified as "Current assets" and ¥7,797 million of deferred tax liabilities classified as "Noncurrent liabilities" have been included in deferred tax assets (¥7,672 million) in "Investments and other assets," and deferred tax liabilities classified as "Noncurrent liabilities" have been adjusted to ¥169 million in the balance sheet as of the end of the previous fiscal year.

The notes related to tax effect accounting additionally included those described in Notes 8 (excluding total amount of valuation reserves) and 9 of "Accounting Standard for Tax Effect Accounting," which are required in Paragraphs 3 to 5 of Statement No. 28. However, this additional information corresponding to the previous fiscal year is not disclosed, in accordance with the transitional treatments prescribed in paragraph 7 of Statement No. 28.

(Consolidated Statements of Income)

"Product compensation expenses," which was included in "Other nonoperating expenses" in the previous fiscal year is presented as a separate item under "Nonoperating expenses" from the current fiscal year because the amount has become more than 10% of total nonoperating expenses. In order to reflect the change in presentation, the consolidated statement of income for the previous fiscal year has been reclassified to reflect a consistent presentation format. As a result of this change, ¥746 million of "Other nonoperating expenses" for the previous fiscal year was reclassified as "Product compensation expenses" (¥117 million) and "Other nonoperating expenses" (¥628 million).

(u) Additional information

(Performance-linked stock compensation plan)

In order to increase the Directors' awareness of their contributions to the Company's medium- to long-term performance and the improvement of corporate value, the Company introduced a performance-linked stock compensation plan (the "Plan"), which is also transparent and objective, for Directors and Corporate Officers (excluding Outside Directors and nonresidents of Japan, collectively "Directors, etc.").

The Company applies the "Practical Solution on Transactions of Delivering the Company's Own Stock to Employees, etc. through Trusts" (PITF No. 30, March 26, 2015) for the accounting treatment of the Plan.

(1) Transaction summary

The Plan uses an officer compensation BIP (Board Incentive Plan) trust by which Directors, etc., are granted shares of the Company and paid the cash equivalent to the market value of the shares after conversion into cash. Share are granted to the Directors, etc., according to the degree of achievement of

performance targets outlined in the medium-term management plan and other considerations.

(2) The Company's own stock in the trust

The Company's own stock in the possession of the trust is recorded as treasury stock under net assets at book value (excluding ancillary expenses). The book value and number of shares of treasury stock as of the fiscal years ended March 31, 2019 and 2018 were ¥884 million (\$7,964 thousand) and 416,402 shares and ¥919 million and 433,200 shares, respectively.

3. Notes to Consolidated Balance Sheets**(a) Inventories**

At March 31, 2019 and 2018, inventories consisted of the following:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Finished goods	¥60,544	¥50,915	\$545,441
Work-in-process	32,008	29,906	288,360
Raw materials	20,570	14,132	185,315

(b) Accumulated depreciation of property, plant and equipment

At March 31, 2019 and 2018, accumulated depreciation of property, plant and equipment amounted to ¥306,676 million (\$2,762,847 thousand) and ¥299,878 million, respectively.

(c) Investment securities

Among investment securities, shares of unconsolidated subsidiaries and associates at March 31, 2019 and 2018 amounted to ¥12,112 million (\$109,117 thousand) and ¥12,349 million, respectively.

(d) Notes receivable maturing at the end of fiscal year

Notes receivable that were to mature at the consolidated balance sheet date were accounted for at the date of actual settlement. Since the last days of the fiscal years were bank holidays and the following notes matured on March 31, 2019 and 2018, they were included in the consolidated balance sheets as of March 31, 2019 and 2018:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Notes receivable – trade	¥58	¥66	\$523

(e) Contingent Liabilities**(1) Guarantees on loans**

At March 31, 2019 and 2018, contingent liabilities in respect to guarantees of indebtedness, principally of employees, amounted to ¥8 million (\$72 thousand) and ¥11 million, respectively.

(2) The NGK Spark Plug Group is subject to investigations by overseas authorities regarding possible violations of competition laws in relation to certain past transactions in the automotive components segment. In connection with these investigations, compensation for damage claims have been discussed with some customers and civil lawsuits have been filed. Additional losses may arise if new facts related to possible violations become known. However, the effect of these contingent liabilities on the consolidated financial statements is not reasonably estimable at this stage.

Notes to Consolidated Financial Statements

4. Notes to Consolidated Statements of Income

(a) Loss on valuation of inventories

For the years ended March 31, 2019 and 2018, a write-down of ¥578 million (\$5,207 thousand) and ¥1,193 million, respectively, was recognized as costs of goods sold.

(b) Selling, general and administrative expenses

Major components of selling, general and administrative expenses for the years ended March 31, 2019 and 2018 were as follows:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Depreciation	¥ 3,014	¥ 2,401	\$ 27,153
Provision of allowance for doubtful accounts	14	223	126
Retirement benefit costs	1,080	1,269	9,730
Director compensation and employee salaries and allowances	29,738	27,246	267,910
Packing and transportation expenses	10,957	8,653	98,712
Advertising expenses	6,389	5,974	57,559
Research and development expenses*	5,252	4,448	47,315

* The aggregate amount of research and development expenses included in selling, general and administrative expenses for the years ended March 31, 2019 and 2018, was ¥5,252 million (\$47,315 thousand) and ¥4,448 million, respectively.

(c) Gain on sale of noncurrent assets

Major components of gain on sale of noncurrent assets for the years ended March 31, 2019 and 2018 were as follows:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Buildings and structures	¥ 0	¥ 0	\$ 0
Machinery, equipment and vehicles	283	78	2,550
Land	—	113	—
Software	—	0	—
Other	70	6	631

(d) Loss on sale or disposal of noncurrent assets

Major components of loss on sale or disposal of noncurrent assets for the years ended March 31, 2019 and 2018 were as follows:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Buildings and structures	¥329	¥371	\$2,964
Machinery, equipment and vehicles	471	917	4,243
Software	7	5	63
Other	417	31	3,757

(e) Environmental expenses

The NGK Spark Plug Group recognized environmental expenses for the soil improvement costs of an overseas subsidiary as extraordinary loss in the amount of ¥254 million (\$2,288 thousand) and ¥559 million for the years ended March 31, 2019 and 2018, respectively.

5. Notes to Consolidated Statements of Comprehensive Income

Amounts reclassified as profit in the current period that were recognized in other comprehensive income in the current or previous periods and the tax effects for each component of other comprehensive income were as follows:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Valuation difference on available-for-sale securities			
(Decrease) increase during the year	¥ (8,171)	¥ 6,463	\$(73,613)
Reclassification adjustments	(959)	(1,117)	(8,640)
Subtotal, before tax	(9,130)	5,345	(82,252)
Tax effect	2,809	(1,690)	25,306
Subtotal, net of tax	(6,321)	3,655	(56,946)

Foreign currency translation adjustments

(Decrease) increase during the year

	(3,297)	16	(29,703)
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Subtotal, before tax	(1,479)	3,593	(13,324)
Tax effect	453	(1,033)	4,081
Subtotal, net of tax	(1,025)	2,560	(9,234)

Share of other comprehensive income of associates accounted for using equity method

Decrease during the year

	(80)	(161)	(721)
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Total other comprehensive income

	¥(10,725)	¥ 6,070	\$(96,622)
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6. Notes to Consolidated Statements of Change in Net Assets

For the year ended March 31, 2019

(a) Class and total number of issued and outstanding shares and treasury stock

	Number of Shares			
	As of March 31, 2018	Increase	Decrease	As of March 31, 2019
Issued and outstanding shares				
Common stock	212,544,820	—	3,633,200	208,911,620
Total	212,544,820	—	3,633,200	208,911,620
Treasury stock				
Common stock	2,655,888	1,733,576	3,650,107	739,357
Total	2,655,888	1,733,576	3,650,107	739,357

Notes: 1) The decrease of 3,633,200 shares of issued and outstanding shares of common stock was due to the retirement of treasury stock.
 2) The breakdown of the increase of 1,733,576 shares of treasury stock was 1,176 shares from the purchase of shares in quantities of less than one share unit, 1,732,400 shares from the repurchase of shares pursuant to the resolution at the meeting of the Board of Directors held on February 26, 2018.
 3) The breakdown of the decrease of 3,650,107 shares of treasury stock was 3,633,200 shares from the retirement of treasury stock, 109 shares from the sale of shares in quantities of less than one share unit, and 16,798 shares granted to Directors by the officer compensation BIP trust.
 4) The number of shares of treasury stock as of March 31, 2019 included 416,402 shares held by the officer compensation BIP trust.

(b) Dividends

i) Cash dividends paid

Resolution	Type of Shares	Total dividends	Dividend per share	Date of record	Payment date
Board of Directors meeting on April 27, 2018	Common stock	¥6,309 million (\$56,838 thousand)	¥30 (\$270)	March 31, 2018	June 5, 2018
Board of Directors meeting on Oct 29, 2018	Common stock	¥7,300 million (\$65,766 thousand)	¥35 (\$315)	September 30, 2018	November 30, 2018

Notes: 1) Total cash dividends paid in accordance with the resolution of the meeting of the Board of Directors held on April 27, 2018 included ¥12 million (\$108 thousand) of cash dividends for the stock held by the officer compensation BIP trust.
 2) Total cash dividends paid in accordance with the resolution of the meeting of the Board of Directors held on October 29, 2018 included ¥14 million (\$126 thousand) of cash dividends for the stock held by the officer compensation BIP trust.

ii) Dividends for which the date of record falls within the fiscal year under audit but the payment date occurs in the following fiscal year

Resolution	Type of shares	Source of dividends	Total dividends	Dividend per share	Date of record	Payment date
Board of Directors meeting on April 26, 2019	Common stock	Retained earnings	¥7,300 million (\$65,766 thousand)	¥35 (\$315)	March 31, 2019	June 4, 2019

Note: Total cash dividends paid included ¥14 million (\$126 thousand) of cash dividends for the stock held by the officer compensation BIP trust.

For the year ended March 31, 2018

(a) Class and total number of issued and outstanding shares and treasury stock

	Number of Shares			
	As of March 31, 2017	Increase	Decrease	As of March 31, 2018
Issued and outstanding shares				
Common stock	223,544,820	—	11,000,000	212,544,820
Total	223,544,820	—	11,000,000	212,544,820
Treasury stock				
Common stock	11,320,756	2,335,168	11,000,036	2,655,888
Total	11,320,756	2,335,168	11,000,036	2,655,888

Notes: 1) The decrease of 11,000,000 shares of issued and outstanding shares of common stock was due to the retirement of treasury stock.
 2) The breakdown of the increase of 2,335,168 shares of treasury stock was 1,168 shares from the purchase of shares in quantities of less than one share unit, 1,900,800 shares from the repurchase of shares pursuant to the resolution at the meeting of the Board of Directors held on February 26, 2018 and 433,200 shares from the purchase of shares by the officer compensation BIP trust.
 3) The breakdown of the decrease of 11,000,036 shares of treasury stock was 11,000,000 shares from the retirement of treasury stock and 36 shares from the sale of shares in quantities of less than one share unit.
 4) The number of shares of treasury stock as of March 31, 2018 included 433,200 shares held by the officer compensation BIP trust.

(b) Dividends

i) Cash dividends paid

Resolution	Type of shares	Total dividends	Dividend per share	Date of record	Payment date
Board of Directors meeting on May 9, 2017	Common stock	¥4,456 million	¥21	March 31, 2017	June 8, 2017
Board of Directors meeting on Oct 30, 2017	Common stock	¥6,366 million	¥30	September 30, 2017	November 30, 2017

Note: Total cash dividends paid in accordance with the resolution of the meeting of the Board of Directors held on October 30, 2017 included ¥12 million of cash dividends for the stock held by the officer compensation BIP trust.

ii) Dividends for which the date of record falls within the fiscal year under audit but the payment date occurs in the following fiscal year

Resolution	Type of shares	Source of dividends	Total dividends	Dividend per share	Date of record	Payment date
Board of Directors meeting on April 27, 2018	Common stock	Retained earnings	¥6,309 million	¥30	March 31, 2018	June 5, 2018

Note: Total cash dividends paid included ¥12 million of cash dividends for the stock held by the officer compensation BIP trust.

7. Notes to Consolidated Statements of Cash Flows

(a) Cash and cash equivalents

Reconciliation of cash and cash equivalents on the consolidated statements of cash flows to the amounts disclosed on the consolidated balance sheets at March 31, 2019 and 2018, were as follows:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Cash and deposits	¥48,639	¥ 56,235	\$438,189
Short-term investment securities	34,921	59,905	314,604
Subtotal	83,561	116,141	752,802
Time deposits with deposit term of over 3 months	(9,088)	(9,556)	(81,874)
Short-term investment securities other than cash equivalents	(221)	(19,205)	(1,991)
Cash and cash equivalents	¥74,250	¥ 87,378	\$668,919

(b) Assets and liabilities of newly consolidated subsidiaries through acquisition of shares

Assets acquired and liabilities assumed of CAIRE Inc., CAIRE Medical Limited, CAIRE Medical Technology (Chengdu) Co., Ltd. and their 5 subsidiaries, newly consolidated subsidiaries due to the acquisition of shares, as of the acquisition date, related acquisition cost and net expenditure for the acquisition of shares were as follows:

	Millions of yen	Thousands of U.S. dollars
Current assets	¥11,699	\$105,396
Noncurrent assets	3,092	27,856
Goodwill	5,517	49,703
Current liabilities	(3,748)	(33,766)
Noncurrent liabilities	(447)	(4,027)
Acquisition cost of shares	¥16,113	\$145,162
Cash and cash equivalents of acquired companies	(2,271)	(20,459)
Net cash used for acquisition of acquired companies	¥13,842	\$124,703

Notes to Consolidated Financial Statements

8. Lease Commitments**(a) Finance lease transactions**

Financing lease transactions without transfer of ownership of leased assets

- i) The components of lease assets were as follows:
- 1) Property, plant and equipment: mainly equipment (tools, furniture and fixtures) for development in the automotive components segment.
 - 2) Intangible assets: mainly intra-communication systems (software).
- ii) Depreciation of lease assets:
Depreciation is calculated using the straight-line method over the lease term and assuming no residual value.

(b) Operating lease transactions

At March 31, 2019 and 2018, the NGK Spark Plug Group had annual commitments under operating leases as lessee. The aggregate future minimum payments for noncancelable operating leases were as follows:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Due within one year	¥1,168	¥ 804	\$10,523
Due after one year	4,345	2,909	39,144
	¥5,513	¥3,713	\$49,667

9. Financial Instruments**(a) Qualitative information on financial instruments**

The NGK Spark Plug Group does not invest surplus funds in securities other than short-term bank deposits and debt securities with high liquidity from issuers with high credit ratings in accordance with its accounting rules and policies. The NGK Spark Plug Group uses indirect financing from financial institutions such as correspondent banks and direct financing from financial markets principally by the issuance of corporate bonds to satisfy short-term and long-term funding requirements.

The NGK Spark Plug Group is exposed to credit risk primarily with respect to trade receivables. In order to reduce the credit risk of these receivables, the NGK Spark Plug Group sets payment terms according to the credit capability of its customers. In some cases, the NGK Spark Plug Group receives security deposits in advance.

The NGK Spark Plug Group holds investments in securities such as negotiable certificates of deposits, debt securities and equity securities whose fair values are monitored on a quarterly basis.

The NGK Spark Plug Group is a party to derivative instruments, such as foreign currency forward exchange contracts, currency option contracts and interest rate and currency swap agreements, in the normal course of business principally to reduce its exposure to fluctuations in exchange rates and interest rates. The NGK Spark Plug Group does not hold or issue derivative financial instruments for trading purposes. Under the NGK Spark Plug Group's financial management policies, contract balances of currency derivatives are limited to certain anticipated export sales and import purchases.

(b) Fair value of financial instruments

The fair value and carrying value of financial instruments at March 31, 2019 and 2018, other than unlisted equity securities for which the fair value was extremely difficult to determine, were as follows:

	Carrying value	Fair value	Difference
	Millions of yen		
At March 31, 2019:			
Financial assets:			
Cash and deposits	¥ 48,639	¥ 48,639	¥ —
Notes and accounts receivable - trade	96,834	96,834	—
Short-term investment securities:			
Available-for-sale securities	34,921	34,921	—
Investment securities:			
Shares of associates	6,559	8,617	2,058
Available-for-sale securities	47,624	47,624	—
Total	¥234,579	¥236,637	¥2,058
Financial liabilities:			
Accounts payable - trade	¥ 34,957	¥ 34,957	¥ —
Short-term loans payable	27,587	27,587	—
Bonds payable	50,000	50,196	196
Long-term loans payable *2)	32,986	33,049	63
Total	¥145,530	¥145,790	¥ 259
Derivative instruments *3)	¥ (55)	¥ (55)	¥ —
At March 31, 2018:			
Financial assets:			
Cash and deposits	¥ 56,235	¥ 56,235	¥ —
Notes and accounts receivable - trade	93,615	93,615	—
Short-term investment securities:			
Available-for-sale securities	59,905	59,905	—
Investment securities:			
Shares of associates	6,322	7,903	1,581
Available-for-sale securities	56,961	56,961	—
Total	¥273,040	¥274,621	¥1,581
Financial liabilities:			
Accounts payable - trade	¥ 32,407	¥ 32,407	¥ —
Short-term loans payable	10,113	10,113	—
Bonds payable*1)	55,000	55,143	143
Long-term loans payable *2)	32,848	32,902	54
Total	¥130,368	¥130,567	¥ 198
Derivative instruments *3)	¥ 247	¥ 247	¥ —

At March 31, 2018:

	Carrying value	Fair value	Difference
	Thousands of U.S. dollars		
At March 31, 2019:			
Financial assets:			
Cash and deposits	\$ 438,189	\$ 438,189	\$ —
Notes and accounts receivable - trade	872,378	872,378	—
Short-term investment securities:			
Available-for-sale securities	314,604	314,604	—
Investment securities:			
Shares of associates	59,090	77,631	18,541
Available-for-sale securities	429,045	429,045	—
Total	\$2,113,324	\$2,131,865	\$18,541

At March 31, 2019:

	Carrying value	Fair value	Difference
	Thousands of U.S. dollars		
At March 31, 2018:			
Financial assets:			
Cash and deposits	¥ 56,235	¥ 56,235	¥ —
Notes and accounts receivable - trade	93,615	93,615	—
Short-term investment securities:			
Available-for-sale securities	59,905	59,905	—
Investment securities:			
Shares of associates	6,322	7,903	1,581
Available-for-sale securities	56,961	56,961	—
Total	¥273,040	¥274,621	¥1,581

Financial liabilities:

Accounts payable - trade	\$ 314,928	\$ 314,928	\$ —
Short-term loans payable	248,532	248,532	—
Bonds payable	450,450	452,216	1,766
Long-term loans payable *2)	297,171	297,739	568
Total	\$1,311,081	\$1,313,423	\$ 2,333
Derivative instruments *3)	\$ (495)	\$ (495)	\$ —

- *1) The carrying value of bonds payable includes the current portion.
*2) The carrying value of long-term loans payable includes the current portion.
*3) The value of derivative instruments is shown as a net position.

Notes:

- (1) The methods and assumptions used to estimate the fair value of financial instruments are summarized below:

The fair value of cash and deposits, notes and accounts receivable - trade, accounts payable - trade and short-term loans payable is approximately equal to the carrying value due to their short-term maturities. The fair value of investment equity securities is based on quoted market prices. The fair value of bonds and other securities included in investment securities, bonds payable and derivative instruments is based on the price provided by correspondent financial institutions. The fair value of long-term loans payable is computed based on the total amount of principal and interest discounted at an interest rate applicable to new loans under the same conditions.

- (2) The following securities are not included in the table above because the fair value was extremely difficult to determine.

	Carrying value		
	Millions of yen	Thousands of U.S. dollars	
	2019	2018	2019
Investments (equity securities) in unconsolidated subsidiaries and associates	¥5,552	¥6,027	\$50,018
Unlisted equity securities	3,573	2,369	32,189

- (3) Expected maturities of financial assets at March 31, 2019 and 2018, were as follows:

	Millions of yen		
	Due in one year or less	Due in one year through five years	Due later than five years
At March 31, 2019:			
Cash and deposits	¥ 48,639	¥ —	¥—
Notes and accounts receivable - trade	96,834	—	—
Investments			
Bonds	221	332	—
Negotiable deposits	34,700	—	—
Other	—	—	—
Total	¥180,395	¥332	¥—

At March 31, 2018:

Cash and deposits	¥ 56,235	¥ —	¥—
Notes and accounts receivable - trade	93,615	—	—
Investments			
Bonds	9,000	—	—
Negotiable deposits	40,700	—	—
Other	10,200	—	—
Total	¥209,751	¥ —	¥—

	Thousands of U.S. dollars		
	2019	2018	2019
At March 31, 2019:			
Cash and deposits	\$ 438,189	\$ —	\$—
Notes and accounts receivable - trade	872,378	—	—
Investments			
Bonds	1,991	2,991	—
Negotiable deposits	312,613	—	—
Other	—	—	—
Total	\$1,625,180	\$2,991	\$—

- (4) Contractual maturities of bank loans and bonds payable at March 31, 2019 and 2018 were as follows:

	Millions of yen		
	2019	2018	
Year ending March 31,	Short-term loans payable	Bonds payable	Long-term loans payable
2020	¥27,587	¥ —	¥ 9,924
2021	—	30,000	4,962
2022	—	—	8,000
2023	—	—	—
2024	—	10,000	100
2025 and thereafter	—	10,000	10,000

	Millions of yen		
	2018	2019	
Year ending March 31,	Short-term loans payable	Bonds payable	Long-term loans payable
2019	¥10,113	¥25,000	¥9,962
2020	—	—	9,924
2021	—	30,000	4,962
2022	—	—	8,000
2023	—	—	—
2024 and thereafter	—	—	—

	Thousands of U.S. dollars		
	2019	2018	
Year ending March 31,	Short-term loans payable	Bonds payable	Long-term loans payable
2020	\$248,532	\$ —	\$89,405
2021	—	270,270	44,703
2022	—	—	72,072
2023	—	—	—
2024	—	90,090	901
2025 and thereafter	—	90,090	90,090

Notes to Consolidated Financial Statements

10. Investment securities

(a) At March 31, 2019 and 2018, the cost and fair value of available-for-sale securities were summarized as follows:

	Millions of yen		
	2019		
	Fair and carrying value	Cost	Unrealized gains (losses)
With unrealized gains:			
Equity securities	¥47,257	¥11,384	¥35,873
Bonds	554	543	11
Other	—	—	—
Subtotal	47,812	11,927	35,884
With unrealized losses:			
Equity securities	34	38	(4)
Bonds	—	—	—
Negotiable deposits	34,700	34,700	—
Other	—	—	—
Subtotal	34,734	34,738	(4)
Total	¥82,546	¥46,666	¥35,879

	Millions of yen		
	2018		
	Fair and carrying value	Cost	Unrealized gains (losses)
With unrealized gains:			
Equity securities	¥ 56,960	¥11,870	¥45,090
Bonds	4,000	3,999	0
Other	7,200	7,200	0
Subtotal	68,162	23,069	45,092
With unrealized losses:			
Equity securities	0	0	(0)
Bonds	5,004	5,036	(31)
Negotiable deposits	40,700	40,700	—
Other	3,000	3,000	—
Subtotal	48,705	48,736	(31)
Total	¥116,867	¥71,806	¥45,060

	Thousands of U.S. dollars		
	2019		
	Fair and carrying value	Cost	Unrealized gains (losses)
With unrealized gains:			
Equity securities	\$425,739	\$102,559	\$323,180
Bonds	4,991	4,892	99
Other	—	—	—
Subtotal	430,739	107,450	323,279
With unrealized losses:			
Equity securities	306	342	(36)
Bonds	—	—	—
Negotiable deposits	312,613	312,613	—
Other	—	—	—
Subtotal	312,919	312,955	(36)
Total	\$743,658	\$420,414	\$323,234

Note: For equity investments in nonpublic companies, amounting to ¥3,573 million (\$32,189 thousand) and ¥2,369 million in the years ended March 31, 2019 and 2018, respectively, the fair values were not included in equity securities as no quoted market prices were available and it was deemed extremely difficult to determine the fair values due to the impossibility of estimating future cash flows.

(b) Available-for-sale securities sold during the years ended March 31, 2019 and 2018 were as follows:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Sale of available-for-sale securities	¥1,425	¥1,918	\$12,838
Gain on sales	960	1,117	8,649
Loss on sales	0	—	0

(c) Loss on the write-down of available-for-sale securities was not material for the years ended March 31, 2019 and 2018.

11. Derivative Instruments

At March 31, 2019 and 2018, derivative instruments, except for derivative instruments accounted for by hedge accounting, were stated at fair value and recognized for valuation gains and losses in current earnings as follows:

	Millions of yen		
	Notional principal or contract amounts	Fair value	Valuation gains (losses)
At March 31, 2019:			
Foreign exchange contracts:			
Forward contracts to sell	¥14,612	¥(52)	¥(52)
Currency call options	496	(15)	(15)
Currency put options	503	12	12
			¥(55)
At March 31, 2018:			
Foreign exchange contracts:			
Forward contracts to sell	¥12,347	¥242	¥242
Currency call options	2,242	(34)	(34)
Currency put options	1,831	39	39
			¥247

	Thousands of U.S. dollars		
	2019		
	Fair and carrying value	Cost	Unrealized gains (losses)
With unrealized gains:			
Equity securities	\$425,739	\$102,559	\$323,180
Bonds	4,991	4,892	99
Other	—	—	—
Subtotal	430,739	107,450	323,279
With unrealized losses:			
Equity securities	306	342	(36)
Bonds	—	—	—
Negotiable deposits	312,613	312,613	—
Other	—	—	—
Subtotal	312,919	312,955	(36)
Total	\$743,658	\$420,414	\$323,234

At March 31, 2019 and 2018, derivative instruments to which hedge accounting was applied were as follows:

	Thousands of U.S. dollars		
	Hedged items	Notional principal or contract amounts	Contract amounts due after one year
At March 31, 2019:			
Interest rate and currency swaps:			
(floating rate receipt, fixed rate payment)			
(U.S.\$ receipt, Japanese yen payment)	Long-term bank loans	¥22,886	¥12,962
			¥—
At March 31, 2018:			
Interest rate and currency swaps:			
(floating rate receipt, fixed rate payment)			
(U.S.\$ receipt, Japanese yen payment)	Long-term bank loans	¥32,848	¥22,886
			¥—

At March 31, 2019:

	Thousands of U.S. dollars		
	2019	2018	2019
Balance at April 1	¥42,094	¥39,893	\$379,225
Expected return on plan assets	891	1,130	8,027
Actuarial (loss) gain	(304)	424	(2,739)
Contributions paid by the employer	1,810	2,074	16,306
Benefits paid	(1,929)	(1,261)	(17,378)
Other	84	(166)	757
Balance at March 31	¥42,647	¥42,094	\$384,207

At March 31, 2018:

	Thousands of U.S. dollars		
	2019	2018	2019
Balance at April 1	¥69,242	¥68,909	\$623,802
Service cost	3,659	3,765	32,964
Interest cost	405	418	3,649
Actuarial gain (loss)	2,083	(1,492)	18,766
Benefits paid	(2,781)	(2,002)	(25,054)
Other	(19)	(355)	(171)
Balance at March 31	¥72,591	¥69,242	\$653,973

Thousands of U.S. dollars

At March 31, 2019:

	Thousands of U.S. dollars		
	2019	2018	2019
Interest rate and currency swaps:			
(floating rate receipt, fixed rate payment)			
(U.S.\$ receipt, Japanese yen payment)	Long-term bank loans	\$206,180	\$116,775
			\$—

The above interest rate and currency swaps which qualify for hedge accounting and meet specific matching criteria are not separated from the hedged bank loans. The fair values of the derivative instruments are reflected in the calculation of the fair values of the related bank loans (see Note 9).

12. Employee Retirement Benefits

The Company has a lump-sum retirement benefit plan and a defined benefit pension plan that cover 80% of the retirement benefits for employees of the Company who retire at the compulsory retirement age after ten years or more of service. Certain domestic consolidated subsidiaries have similar retirement benefit plans. Certain overseas consolidated subsidiaries have defined contribution plans. The Company contributes certain plan assets to the employee retirement benefit trust under the defined benefit pension plan. Net defined benefit liability and retirement benefit costs of certain consolidated subsidiaries are calculated using the simplified method as permitted by the accounting standard for retirement benefits.

Employee retirement benefits for the years ended March 31, 2019 and 2018 were as follows:

(a) Defined benefit plans

Movement in retirement benefit obligations, except for plans applying the simplified method:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Balance at April 1	¥69,242	¥68,909	\$623,802
Service cost	3,659	3,765	32,964
Interest cost	405	418	3,649
Actuarial gain (loss)	2,083	(1,492)	18,766
Benefits paid	(2,781)	(2,002)	(25,054)
Other	(19)	(355)	(171)
Balance at March 31	¥72,591	¥69,242	\$653,973

Movement in plan assets, except for plans applying the simplified method:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Balance at April 1	¥42,094	¥39,893	\$379,225
Expected return on plan assets	891	1,130	8,027
Actuarial (loss) gain	(304)	424	(2,739)
Contributions paid by the employer	1,810	2,074	16,306
Benefits paid	(1,929)	(1,261)	(17,378)
Other	84	(166)	757
Balance at March 31	¥42,647	¥42,094	\$384,207

Movement in net defined benefit liability for plans applying the simplified method:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Balance at April 1	¥294	¥247	\$2,649
Retirement benefit costs	45	94	405
Benefits paid	(8)	(24)	(72)
Contributions paid by the employer	(21)	(22)	(189)
Balance at March 31	¥310	¥294	\$2,793

Reconciliation from retirement benefit obligations and plan assets to net defined benefit liability:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Funded retirement benefit obligations	¥ 51,958	¥ 49,558	\$ 468,090
Plan assets	(42,829)	(42,265)	(385,847)
	9,128	7,292	82,234
Unfunded retirement benefit obligations	21,125	20,150	190,315
Total net defined benefit liability	30,254	27,443	272,559
Net defined benefit liability	30,254	27,443	272,559
Total net defined benefit liability	¥ 30,254	¥ 27,443	\$ 272,559

Note: Includes those under plans applying the simplified method.

Retirement benefit costs:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Service cost	¥3,659	¥ 3,765	\$32,964
Interest cost	405	418	3,649
Expected return on plan assets	(891)	(1,130)	(8,027)
Net actuarial loss amortization	907	1,661	8,171
Past service cost amortization	10	12	90
Retirement benefit costs based on the simplified method	45	94	405
Total	¥4,138	¥ 4,821	\$37,279

Remeasurements of defined benefit plans included in other comprehensive income (before adjusting for tax effects):

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Past service costs	¥ (11)	¥ (13)	\$ (99)
Actuarial gain (loss)	1,490	(3,579)	13,423
Total	¥1,479	¥(3,593)	\$13,324

Remeasurements of defined benefit plans included in accumulated other comprehensive income (before adjusting for tax effects):

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Past service cost yet to be recognized	¥ (39)	¥ (28)	\$ (351)
Actuarial losses yet to be recognized	6,047	4,557	54,477
Total	¥6,007	¥4,528	\$54,117

Notes to Consolidated Financial Statements

Plan assets:

(1) Plan assets comprise:

	2019	2018
Bonds	29%	29%
Equity securities	12%	19%
General life insurance accounts	26%	26%
Alternative investments	16%	14%
Other	17%	12%
Total	100%	100%

Notes: 1) Alternative investments are mainly investments in hedge funds and infrastructure funds.

2) As of March 31, 2019 and 2018, 4% and 7% of plan assets, respectively, were assets held by the employee retirement benefit trust under the defined benefit pension plan.

(2) Long-term expected rate of return:

Current and target asset allocation and historical and expected returns on various categories of plan assets have been considered in determining the long-term expected rate of return.

Actuarial assumptions:

The principal actuarial assumptions at March 31, 2019 and 2018 were as follows:

	2019	2018
Discount rate	Mainly 0.2%	Mainly 0.4%
Long-term expected rate of return	Mainly 1.82%	Mainly 1.82%

Note: In calculating retirement benefit obligations, the NGK Spark Plug Group uses mainly an index for salary increase by age based on a point system.

(b) Defined contribution plans

For the years ended March 31, 2019 and 2018, the amount of required contribution to the defined contribution plans of the overseas consolidated subsidiaries was ¥366 million (\$3,297 thousand) and ¥295 million, respectively.

13. Income Taxes

The tax effects of temporary differences that gave rise to a significant portion of deferred tax assets and liabilities at March 31, 2019 and 2018 were as follows:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Deferred tax assets:			
Net operating loss carryforwards	¥ 4,944	¥ 4,084	\$ 44,541
Impairment loss on fixed assets	3,762	4,505	33,892
Net defined benefit liability	9,370	8,476	84,414
Depreciation	2,375	2,481	21,396
Accrued expenses	4,400	4,312	39,640
Inventories	3,487	2,921	31,414
Intercompany profits	6,089	5,457	54,856
Other	2,623	2,167	23,631
Deferred tax assets - subtotal	37,053	34,407	333,811
Valuation reserve for carryforward tax loss	(3,673)	—	(33,090)
Valuation reserve for deductible temporary differences	(5,576)	—	(50,234)
Valuation reserve - total	(9,250)	(8,647)	(83,333)
Total deferred tax assets	27,803	25,759	250,477

Deferred tax liabilities:

Unrealized gains on available-for-sale securities	(10,996)	(13,807)	(99,063)
Retained earnings of overseas consolidated subsidiaries	(3,734)	(3,357)	(33,640)
Depreciation	(1,145)	(798)	(10,315)
Other	(636)	(294)	(5,730)
Total deferred tax liabilities	(16,512)	(18,257)	(148,757)
Net deferred tax assets	¥ 11,291	¥ 7,502	\$ 101,721

Note: Carryforward tax loss and its deferred tax assets by expiration periods

	Carryforward tax loss *1	Valuation reserve	Net deferred tax assets
Millions of yen			
2020	¥ 261	¥ (55)	¥ 205
2021	263	—	263
2022	206	—	206
2023	—	—	—
2024	564	—	564
2025 and beyond	3,647	(3,617)	29
Total	¥4,944	¥(3,673)	¥1,271 ^{*2}

Thousands of U.S. dollars			
2020	\$ 2,351	\$ (495)	\$ 1,847
2021	2,369	—	2,369
2022	1,856	—	1,856
2023	—	—	—
2024	5,081	—	5,081
2025 and beyond	32,856	(32,586)	261
Total	\$44,541	\$(33,090)	\$11,450 ^{*2}

*1) Carryforward tax loss shown in the above table is after multiplying the statutory tax rate.

*2) Regarding net deferred tax assets to the carryforward tax loss, a valuation reserve was not recognized for the portion deemed to be recoverable based on estimates of future taxable income.

For the years ended March 31, 2019 and 2018, the reconciliation of the differences between the combined Japanese statutory tax rate and the effective income tax rate on pretax income reflected in the accompanying consolidated statements of income was as follows.

	Percentage of pretax income (%)	
	2019	2018
Combined Japanese statutory tax rate	30.6	30.7
Increase (decrease) due to:		
Permanently nondeductible expenses	0.3	0.3
Tax exempt income	(0.9)	(0.8)
Tax credits for research and development expenses	(3.4)	(4.7)
Differences between Japanese and foreign tax rates	(0.8)	(1.0)
Changes in valuation allowance	0.3	(1.8)
Retained earnings of overseas consolidated subsidiaries	0.6	0.7
Loss on violation of antitrust law	—	2.0
Other	0.6	0.2
Effective income tax rate	27.3	25.6

14. Business combinations

(a) Overview of the combination

(1) Names and businesses of the acquired companies

Name: CAIRE Inc.
Chart BioMedical Limited
Chart BioMedical (Chengdu) Co., Ltd.

Business: Manufacture and sale of oxygen concentrators

(2) Major reasons for the combination

We plan to further expand the oxygen concentrator business in the medical field where we expect growth in the future. By acquiring the businesses of the acquired companies, we aim to expand our business in the medical field and acquire new sales channels and customers.

(3) Date of the combination

20 December 2018 (Share acquisition date)
31 December 2018 (Deemed acquisition date)

(4) Legal form of the combination

Acquisition of shares

(5) Name of the acquired companies after the combination

Chart BioMedical Limited and Chart BioMedical (Chengdu) Co., Ltd have been renamed to CAIRE Medical Limited and CAIRE Medical Technology (Chengdu) Co., Ltd, respectively.

(6) Ratio of voting rights acquired

100%

(7) Main reason for determining the acquiring company

The Company acquired 100% of the voting rights by acquiring shares of CAIRE Inc, CAIRE Medical Limited and CAIRE Medical Technology (Chengdu) Co., Ltd. for cash.

(b) Period of operation of the acquired companies included in the consolidated financial statements

From January 1, 2019 to March 31, 2019.

(c) Acquisition cost of the acquired companies

Consideration for acquisition	\$143.1 million	Cash
Acquisition cost	\$143.1 million	

(d) Expenses for the acquisition

Advisory costs ¥756 million (\$6,811 thousand)

(e) Amount of goodwill, reason for recognition and amortization method and period

(1) Amount of goodwill

¥5,517 million (\$49,703 thousand)

The amount of goodwill was provisionally calculated because the allocation of the acquisition cost had not been completed as of the end of the fiscal year.

(2) Reason for recognition

The acquisition cost exceeded the net amount of assets acquired and liabilities assumed.

(3) Amortization method and period

Straight-line amortization over 8 years.

(f) Assets acquired and liabilities assumed as of the date of the business combination

	Millions of yen	Thousands of U.S. dollars
Current assets	¥11,699	\$105,396
Noncurrent assets	3,092	27,856
Total assets	14,791	133,252
Current liabilities	3,748	33,766
Noncurrent liabilities	447	4,027
Total liabilities	¥ 4,195	\$ 37,793

(g) Purchase price allocation

As the purchase price allocation had not been completed as of March 31, 2019, the Company has been making provisional accounting treatment based on the information available at that time.

(h) Estimated impact on the consolidated financial results if the business combination had been completed as of the beginning of the fiscal year (April 1, 2018)

A description is omitted as it is difficult to reasonably calculate the estimated amount in the current consolidated fiscal year. The note has not been audited by auditors.

15. Net Assets

Under Japanese laws and regulations, the entire amount paid for new shares is required to be designated as common stock. However, a company may, by a resolution of the Board of Directors, designate an amount not exceeding one half of the price of the new shares as additional paid-in capital, which is included in capital surplus.

Under Japanese Corporate Law (the "Law"), in cases in which a dividend distribution of surplus is made, the smaller of an amount equal to 10% of the dividend or the excess, if any, of 25% of common stock over the total of additional paid-in capital and legal earnings reserve must be set aside as additional paid-in capital or legal earnings reserve. Legal earnings reserve is included in retained earnings in the accompanying consolidated balance sheets.

Under the Law, legal earnings reserve and additional paid-in capital can be used to eliminate or reduce a deficit by a resolution of the shareholders' meeting. Additional paid-in capital and legal earnings reserve may not be distributed as dividends. All additional paid-in capital and all legal earnings reserve may be transferred to other capital surplus and retained earnings, respectively, which are potentially available for dividends.

At March 31, 2019 and 2018, respectively, capital surplus consisted principally of additional paid-in capital. In addition, retained earnings included legal earnings reserve of the Company in the amount of ¥5,837 million (\$52,586 thousand) at March 31, 2019 and 2018, respectively.

The maximum amount that the Company can distribute as dividends is calculated based on the separate financial statements of the Company in accordance with Japanese laws and regulations.

Notes to Consolidated Financial Statements

16. Segment Information

(a) General information about reportable segments

The reportable segments of the Company are the business units for which the Company is able to obtain financial information separately in order for the Board of Directors of the Company to conduct periodic investigations to determine the distribution of management resources and evaluate business results. The Company has its business units identified by products. Each business unit plans its own comprehensive domestic and overseas strategies for its own products and conducts its own business activities. Accordingly, the NGK Spark Plug Group consists of two reportable segments: "Automotive Components" and "Technical Ceramics." The "Technical Ceramics" segment consists of the "Semiconductor" and "Ceramics" subsegments.

- In the "Automotive components" segment, the Company manufactures and sells spark plugs, glow plugs, various automotive sensors, ceramic engine parts and other automotive components.
- In the "Technical ceramics" segment, the Company manufactures and sells IC packages and other semiconductor components in the "Semiconductor" subsegment and manufactures and sells cutting tools and ceramics products for industrial use in the "Ceramics" subsegment.
- In April 2018, the segment management division of medical, environmental and energy related products from "Ceramics" in Technical ceramics was changed to "Other". Segment information for the year ended March 31, 2018 below is based on the reportable segments of the year ended March 31, 2019.

(b) Methods to determine net sales, income or loss, assets and other items by reportable business segment

Accounting methods used for reportable segment are principally the same as those written in Note 2, "Summary of Significant Accounting Policies."

Profit by reportable business segment is stated on an operating income basis.

(c) Reportable segment profit and loss, segment assets and other material items

Information about reportable segments as of and for the years ended March 31, 2019 and 2018 was as follows:

	Reportable segments								
	Technical ceramics				Total	Other	Total	Adjustments	Consolidated
	Automotive components	Semiconductor	Ceramics	Total Technical ceramics					
	Millions of yen								
For the year 2019:									
Operating revenue - net sales:									
External customers	¥356,680	¥17,075	¥40,677	¥57,753	¥414,433	¥10,579	¥425,013	¥—	¥425,013
Intersegment sales	—	—	—	—	—	—	—	—	—
Total net sales	356,680	17,075	40,677	57,753	414,433	10,579	425,013	—	425,013
Segment income (loss)	¥ 61,196	¥ (1,554)	¥ 2,796	¥ 1,241	¥ 62,438	¥ (3,765)	¥ 58,672	¥—	¥ 58,672
Segment assets	¥510,429	¥25,471	¥59,696	¥85,168	¥595,598	¥33,371	¥628,970	¥—	¥628,970
Other items:									
Depreciation	¥ 19,416	¥ 1,207	¥ 2,657	¥ 3,864	¥ 23,281	¥ 683	¥ 23,964	¥—	¥ 23,964
Increase in property, plant and equipment and intangible assets	45,614	3,817	6,072	9,890	55,504	1,083	56,587	—	56,587
	Thousands of U.S. dollars								
For the year 2018:									
Operating revenue - net sales:									
External customers	¥348,198	¥17,901	¥37,650	¥55,551	¥403,750	¥ 6,162	¥409,912	¥—	¥409,912
Intersegment sales	—	—	—	—	—	—	—	—	—
Total net sales	348,198	17,901	37,650	55,551	403,750	6,162	409,912	—	409,912
Segment income (loss)	¥ 68,098	¥ (2,571)	¥ 3,650	¥ (1,079)	¥ 69,177	¥ (1,897)	¥ 67,279	¥—	¥ 67,279
Segment assets	¥504,231	¥28,495	¥54,986	¥83,482	¥587,713	¥12,258	¥599,972	¥—	¥599,972
Other items:									
Depreciation	¥ 17,429	¥ 730	¥ 2,221	¥ 2,952	¥ 20,382	¥ 538	¥ 20,920	¥—	¥ 20,920
Increase in property, plant and equipment and intangible assets	29,525	2,452	4,893	7,346	36,871	719	37,591	—	37,591
	Thousands of U.S. dollars								
For the year 2019:									
Operating revenue - net sales:									
External customers	\$3,213,333	\$153,829	\$366,459	\$520,297	\$3,733,631	\$ 95,306	\$3,828,946	\$—	\$3,828,946
Intersegment sales	—	—	—	—	—	—	—	—	—
Total net sales	3,213,333	153,829	366,459	520,297	3,733,631	95,306	3,828,946	—	3,828,946
Segment income (loss)	\$ 551,315	\$ (14,000)	\$ 25,189	\$ 11,180	\$ 562,505	\$ (33,919)	\$ 528,577	\$—	\$ 528,577
Segment assets	\$4,598,459	\$229,468	\$537,802	\$767,279	\$5,365,748	\$300,640	\$5,666,396	\$—	\$5,666,396
Other items:									
Depreciation	\$ 174,919	\$ 10,874	\$ 23,937	\$ 34,811	\$ 209,739	\$ 6,153	\$ 215,892	\$—	\$ 215,892
Increase in property, plant and equipment and intangible assets	410,937	34,387	54,703	89,099	500,036	9,757	509,793	—	509,793

Notes: The "Other" segment represents businesses such as medical, environmental and energy related products, material sales and welfare program service which are not included in reportable segments.

(d) Related information

(1) Products and services

Information on products and services is the same as that already reported in (c) Information about reportable segment profit and loss, segment assets and other material items. Therefore, the information is omitted here.

(2) Geographic information

Geographic areas as of and for the years ended March 31, 2019 and 2018 were as follows:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Operating revenue - net sales:			
Japan	¥ 66,278	¥ 67,467	\$ 597,099
North America	118,299	108,259	1,065,757
Europe	114,563	107,052	1,032,099
Asia	83,847	81,468	755,378
Other area	42,023	45,663	378,586
	¥425,013	¥409,912	\$3,828,946

Note: Net sales are categorized by country or region based on the location of the customer.

(f) Information about goodwill as of and for the years ended March 31, 2019 and 2018 was as follows:

	Reportable segments								Adjustments	Consolidated
	Technical ceramics				Total	Other	Total	Total		
	Automotive components	Semiconductor	Ceramics	Total Technical ceramics						
	Millions of yen									
March 31, 2019										
Amortization	¥—	¥—	¥153	¥153	¥153	¥ 169	¥ 323	¥—	¥ 323	
Balance	—	—	153	153	153	5,268	5,422	—	5,422	
March 31, 2018										
Amortization	¥—	¥—	¥153	¥153	¥153	¥ —	¥ 153	¥—	¥ 153	
Balance	—	—	307	307	307	—	307	—	307	
	Thousands of U.S. dollars									
March 31, 2019										
Amortization	\$—	\$—	\$1,378	\$1,378	\$1,378	\$ 1,523	\$ 2,910	\$—	\$ 2,910	
Balance	—	—	1,378	1,378	1,378	47,459	48,847	—	48,847	

(g) Information about negative goodwill by business segment.

No items to report.

17. Information on Related Parties

No items to report.

18. Per Share Information

Basic and diluted net assets per share and earnings per share for the years ended March 31, 2019 and 2018 were as follows:

	Yen		U.S. dollars
	2019	2018	2019
Basic net assets per share	¥1,917.89	¥1,837.46	\$17.28
Basic earnings per share	205.58	209.37	1.85

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Property, plant and equipment:			
Japan	¥176,006	¥154,401	\$1,585,640
Asia	31,300	20,923	281,982
Other area	21,412	19,777	192,901
	¥228,720	¥195,102	\$2,060,541

(3) Major customers

The NGK Spark Plug Group had no single external customer which accounted for more than 10% of net sales for the years ended March 31, 2019 or 2018.

(e) Information about impairment of fixed asset by business segment.

No items to report.

(a) Calculation of net assets per share

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Total net assets	¥401,683	¥388,115	\$3,618,766
Amount deducted from total net assets	2,431	2,454	21,901
Amount which represents noncontrolling interests	(2,431)	(2,454)	(21,901)
Net assets allocated to common stock	399,251	385,661	3,596,856
Number of shares of common stock outstanding at fiscal year-end used in calculation of net assets per share (thousands)	208,172	209,888	—

Notes to Consolidated Financial Statements

(b) Calculation of earnings per share

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Profit attributable to owners of the parent	¥ 42,813	¥ 44,335	\$385,703
Amount not attributable to shareholders of common stock	—	—	—
Profit attributable to common stock owners of the parent	42,813	44,335	385,703
Weighted average number of shares of common stock (thousands)	208,255	211,758	—

Note: 1) As the Company had no dilutive shares at March 31, 2019 or 2018, the Company did not disclose diluted net income per share for the years ended March 31, 2019 and 2018.

2) Shares held by the officer compensation BIP trust are included in treasury stock and deducted from the number of shares at the fiscal year-end and the weighted average number of shares. The number of shares held by the officer compensation BIP trust was as follows.

	2019	2018
Number of shares at the fiscal year end (thousands)	416	433
Weighted average number of shares (thousands)	419	288

19. Significant subsequent events

Issuance of unsecured straight bonds

The Company issued the tenth series unsecured straight bonds and the eleventh series unsecured straight bonds on June 20, 2019.

Tenth series unsecured straight bonds

1. Total amount of issue	¥20,000 million (\$180,180 thousand)
2. Issue price	¥100 per face value of ¥100
3. Redemption price	¥100 per face value of ¥100
4. Interest rate	0.110% per annum
5. Payment date	June 20, 2019
6. Maturity date	June 20, 2024
7. Principal redemption method	Lump-sum redemption at maturity
8. The purpose of bond issue	Capital investment and repayment of borrowings

Eleventh series unsecured straight bonds

1. Total amount of issue	¥10,000 million (\$90,090 thousand)
2. Issue price	¥100 per face value of ¥100
3. Redemption price	¥100 per face value of ¥100
4. Interest rate	0.270% per annum
5. Payment date	June 20, 2019
6. Maturity date	June 20, 2029
7. Principal redemption method	Lump-sum redemption at maturity
8. The purpose of bond issue	Capital investment and repayment of borrowings

20. Borrowings

(a) Bonds payable at March 31, 2019 and 2018 comprised the following:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
0.391% unsecured bonds due September 2018	¥ —	¥25,000	\$ —
0.296% unsecured bonds due October 2020	30,000	30,000	270,270
0.110% unsecured bonds due June 2023	10,000	—	90,090
0.370% unsecured bonds due June 2028	10,000	—	90,090
Total	¥50,000	¥55,000	\$450,450

Note: The aggregate annual maturities of bonds payable after March 31, 2019 were as follows:

Year ending March 31,	Millions of yen		Thousands of U.S. dollars
	2020	2021	2022
2020	¥ —	—	\$ —
2021	30,000	—	270,270
2022	—	—	—
2023	—	—	—
2024	10,000	—	90,090

(b) Loans payable and lease obligations at March 31, 2019 and 2018 comprised the following:

	Millions of yen		Thousands of U.S. dollars
	2019	2018	2019
Short-term loans payable with interest rate of 1.66%	¥27,587	¥10,113	\$248,532
Current portion of long-term loans payable with interest rate of 0.18%	9,924	9,962	89,405
Current portion of lease obligations	52	43	468
Long-term loans payable (except portion due within one year) with interest rate of 0.11%	23,062	22,886	207,766
Lease obligations (except portion due within one year)	129	111	1,162
Other	—	—	—
Total	¥60,755	¥43,115	\$547,342

Notes: 1) Interest rates shown are weighted average interest rates for the balance outstanding at March 31, 2019.

2) Average interest rates for lease obligations are omitted because lease obligations include assumed interest amounts.

3) The aggregate annual maturities of long-term loans payable and lease obligations (except portion due within one year) after March 31, 2019 were as follows:

Year ending March 31,	Long-term loans payable		Lease obligations	
	Millions of yen	Thousands of U.S. dollars	Millions of yen	Thousands of U.S. dollars
2021	¥4,962	\$44,703	¥57	\$514
2022	8,000	72,072	39	351
2023	—	—	26	234
2024	100	901	6	54

21. Asset Retirement Obligation

Information is omitted due to immateriality.

Independent Auditor's Report



Independent Auditor's Report

To the Board of Directors of
NGK SPARK PLUG CO., LTD.:

We have audited the accompanying consolidated financial statements of NGK SPARK PLUG CO., LTD. and its consolidated subsidiaries (the "NGK Spark Plug Group"), which comprise the consolidated balance sheets as at March 31, 2019 and 2018, and the consolidated statements of income, consolidated statements of comprehensive income, consolidated statements of changes in net assets and consolidated statements of cash flows for the years then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Consolidated Financial Statements

Management is responsible for the preparation and fair presentation of these consolidated financial statements in accordance with accounting principles generally accepted in Japan, and for such internal control as management determines is necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these consolidated financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in Japan. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the consolidated financial statements. The procedures selected depend on our judgment, including the assessment of the risks of material misstatement of the consolidated financial statements, whether due to fraud or error. In making those risk assessments, we consider internal control relevant to the entity's preparation and fair presentation of the consolidated financial statements in order to design audit procedures that are appropriate in the circumstances, while the objective of the financial statement audit is not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the NGK Spark Plug Group as at March 31, 2019 and 2018, and their financial performance and cash flows for the years then ended in accordance with accounting principles generally accepted in Japan.

Convenience Translation

The U.S. dollar amounts in the accompanying consolidated financial statements with respect to the year ended March 31, 2019 are presented solely for convenience. Our audit also included the translation of yen amounts into U.S. dollar amounts and, in our opinion, such translation has been made on the basis described in Note 1 of Notes to the consolidated financial statements.

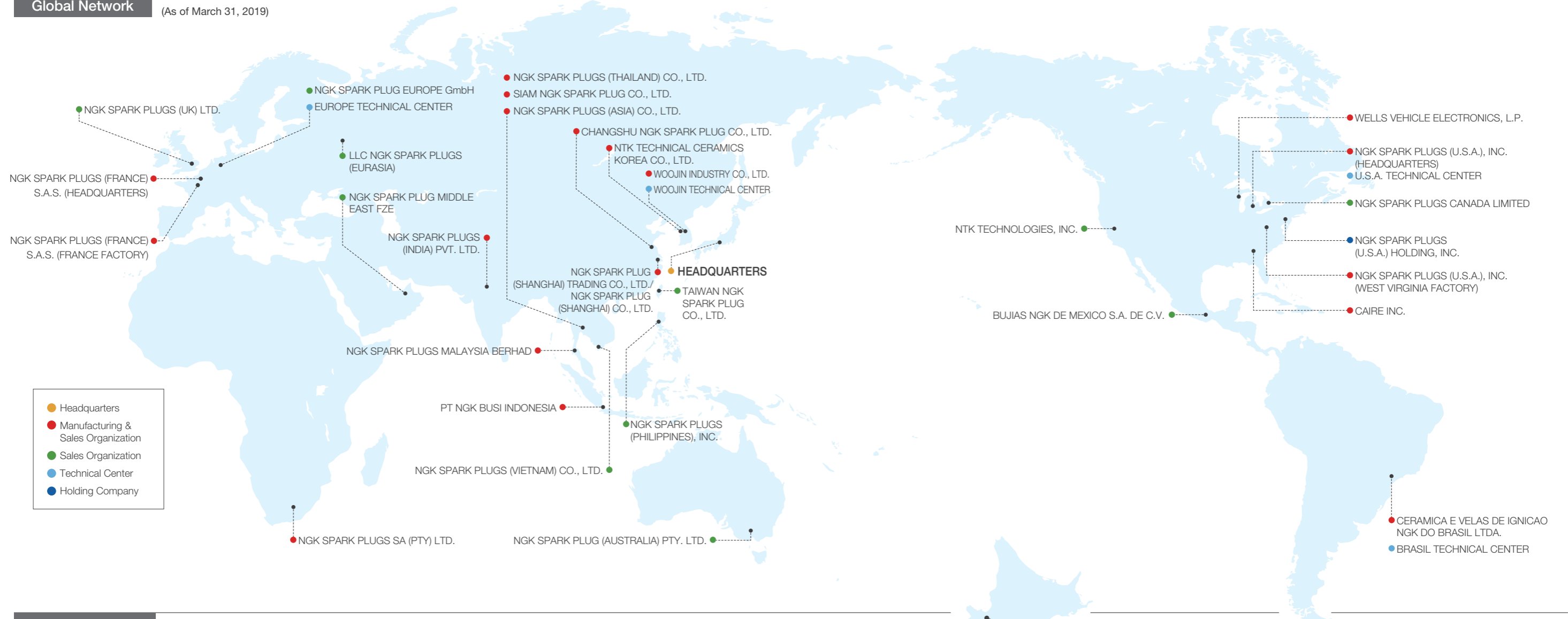
KPMG AZSA LLC

July 26, 2019
Nagoya, Japan

KPMG AZSA LLC, a limited liability audit corporation incorporated under the Japanese Certified Public Accountants Law and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity.

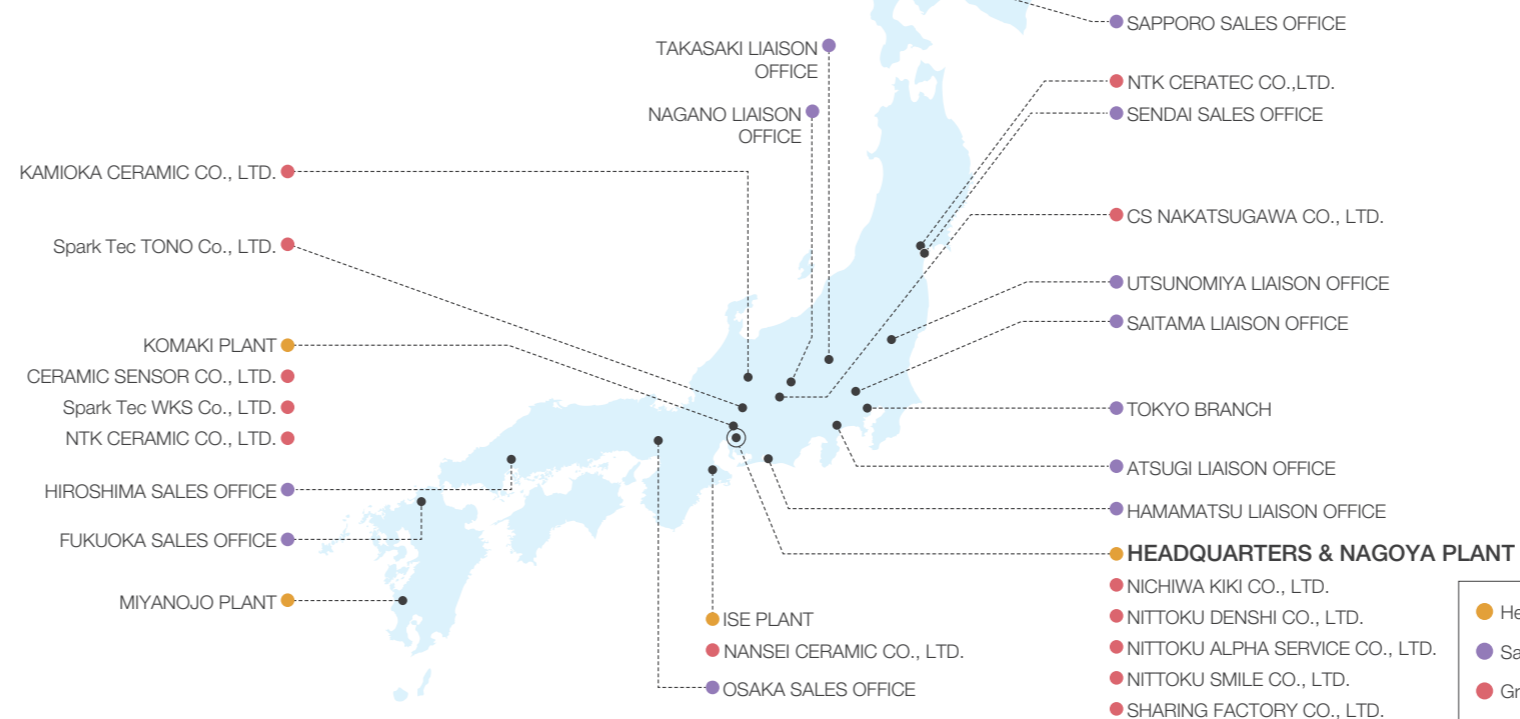
Global Network

(As of March 31, 2019)



Domestic Network

(As of March 31, 2019)



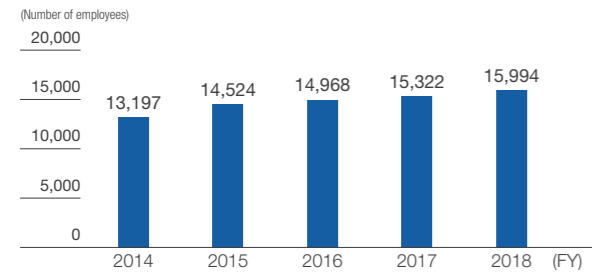
Corporate Data (As of March 31, 2019)

NGK SPARK PLUG CO., LTD.

Headquarters 14-18 Takatsuji-cho, Mizuho-ku, Nagoya 467-8525, Japan
Established October 1936
Number of Employees Non-Consolidated: 5,767 (March 2019)
 Consolidated: 15,994 (March 2019)

Number of employees at work (Consolidated)

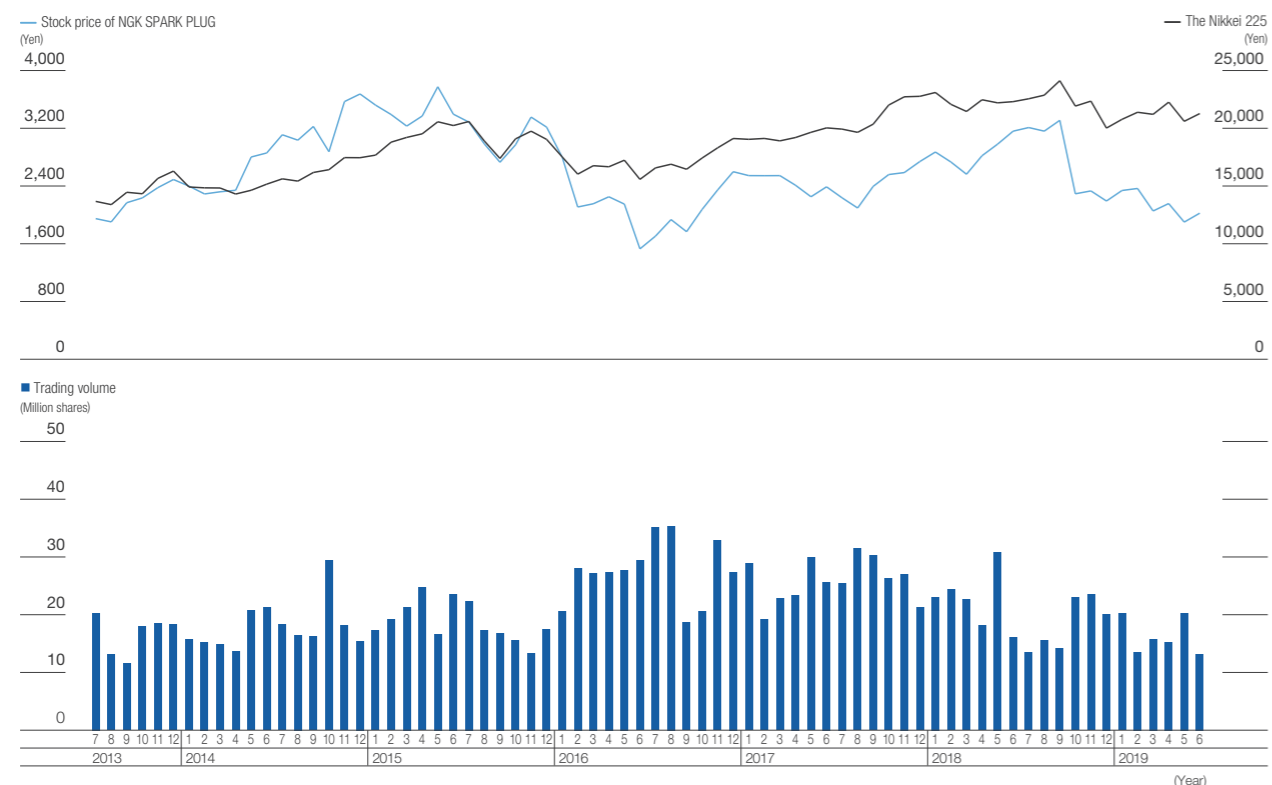
(As of March 31, 2019)



Number of Shares and Shareholders (As of March 31, 2019)

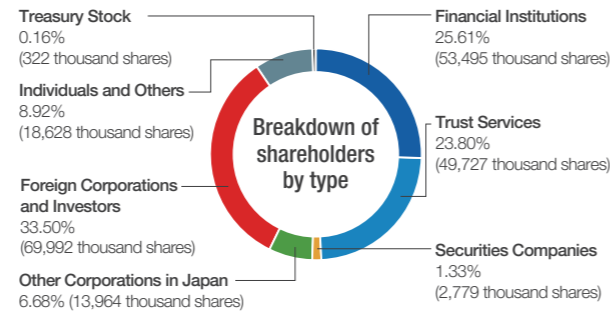
Paid-in Capital 47,869 million yen
Total number of authorized shares 390,000,000
Total number of issued shares 208,911,620
Listed market First section of the Tokyo Stock Exchange and Nagoya Exchange
Shareholder registry administrator Mitsubishi UFJ Trust and Banking Corporation
Accounting auditor KPMG AZSA LLC
Number of shareholders 15,235

Stock price/trading volume (As of June 30, 2019)



*Trading volume does not include trades via the ToSTNet system.

Breakdown of shareholders by type (As of March 31, 2019)



Major Shareholders (As of March 31, 2019)

Name of shareholders	Shares held (thousands)	Ownership ratio (%)
Meiji Yasuda Life Insurance Company	16,794	8.05
The Dai-ichi Life Insurance Company, Limited	16,752	8.03
The Master Trust Bank of Japan, Ltd. (Trust Account)	14,290	6.85
Japan Trustee Services Bank, Ltd. (Trust Account)	10,456	5.01
National Mutual Insurance Federation of Agricultural Cooperatives	7,964	3.81
MUFG Bank, Ltd.	4,380	2.09
The Master Trust Bank of Japan, Ltd. (for Toyota Motor Corporation)	3,929	1.88
The nomura Trust and Banking Co., Ltd	3,872	1.85
Nippon Life Insurance Company	3,563	1.70
TOTO Ltd.	3,433	1.64

*The percentage of total shares is calculated without this treasury stock.

Independent Verification Report



No.1811003510

Independent Verification Report

To: NGK SPARK PLUG CO., LTD.

1. Objective and Scope

Japan Quality Assurance Organization (hereafter "JQA") was engaged by NGK SPARK PLUG CO., LTD. (hereafter "the Company") to provide an independent verification on "FY2018* CSR Data Calculation Report" (hereafter "the Report"). The content of our verification was to express our conclusion, based on our verification procedures, on whether the statement of information regarding GHG emissions, Water Usage, Waste Amount and Injury Frequency Rate in the Report was correctly measured and calculated, in accordance with the "Standard for Aggregating Rules of Environmental Performance Data (ESKW-027-1)" and "Standard for Calculating the Injury Frequency Rates (ZESAF-001)" (hereafter "the Rules").

The purpose of the verification is to evaluate the Report objectively and to enhance the credibility of the Report.

*The fiscal year 2018 of the Company ended on March 31, 2019.

2. Procedures Performed

JQA conducted verification in accordance with "ISO 14064-3" for GHG Emissions and with "ISAE3000" for Water Usage, Waste Amount and Injury Frequency Rate, respectively. The scope of this verification assignment covers energy-derived CO2 emissions from Scope 1, 2 as GHG emissions, Water Usage, Waste Amount and Injury Frequency Rate. The verification was conducted to a limited level of assurance and quantitative materiality was set at 5 percent each of the total emissions and total amount of Water Usage and Injury Frequency Rate in the Report.

The organizational boundaries of this verification include the domestic and international Group sites (38 domestic sites and 27 international sites).

Our verification procedures included:

- Visiting three domestic sites: NGK SPARK PLUG CO., LTD. Head Office and Nagoya Plant, NGK SPARK PLUG CO., LTD. Kagoshima-Miyanojo Plant and NGK SPARK PLUG CO., LTD. Ise Plant, selected by the Company.
- On-site assessment to check the report scope and boundaries; monitoring points of activity data; monitoring and calculation system; and activity data. The number and location of sampling sites for on-site assessment were selected by the Company.
- Visiting NGK SPARK PLUG CO., LTD. Head Office and Nagoya Plant for validation of the Rules and verification of Injury Frequency Rates.

3. Conclusion

Based on the procedures described above, nothing has come to our attention that caused us to believe that the statement of the information regarding the Company's FY2018 GHG emissions, Water Usage, Waste Amount and Injury Frequency Rate in the Report is not materially correct, or has not been prepared in accordance with the Rules.

4. Consideration

The Company was responsible for preparing the Report, and JQA's responsibility was to conduct verification of GHG emissions, Water use, Waste amount and Injury Frequency Rate in the Report only. There is no conflict of interest between the Company and JQA.

Sumio Asada, Board Director
 For and on behalf of Japan Quality Assurance Organization
 1-25, Kandasudacho, Chiyoda-ku, Tokyo, Japan
 July 25, 2019