

Power Business

Promoting Sustainable Energy by Staying ahead of Trends to Consistently Offer Products and Services that Exceed Customer Expectations

The Power Business Group offers products and services aimed at the support and development of electricity infrastructure around the world.

Needs for large-capacity storage batteries that help stabilize power supply have increased with the expansion of renewable energy.

We have further strengthened our business structure for insulators from customer's perspective in order to provide optimal products and services that meet customer demands in a prompt, accurate and flexible manner.

With the aim of becoming our customers' brand of choice, the NGK Group will continue to promote businesses that will contribute to the development of power infrastructure as well as the spread and expansion of renewable energy.

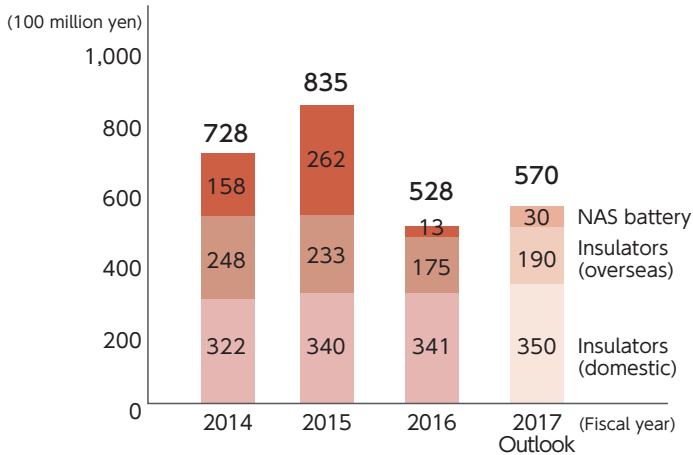


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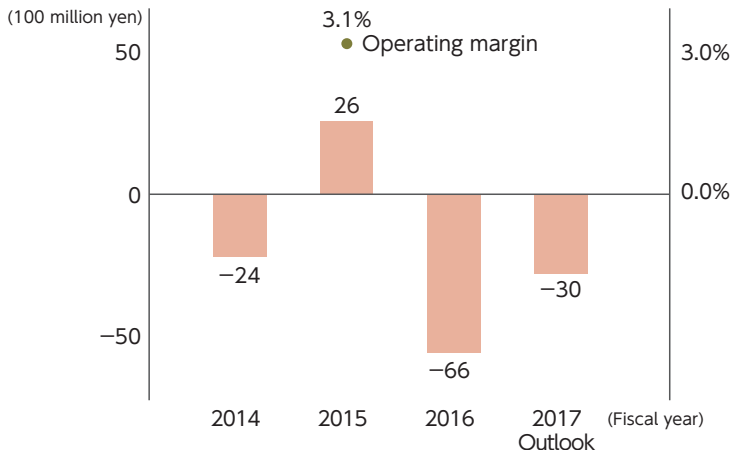
Financial Data

Financial results and outlook

Net Sales (After elimination of intersegment sales)



Operating Income (Loss)



Products

Main products

Insulators

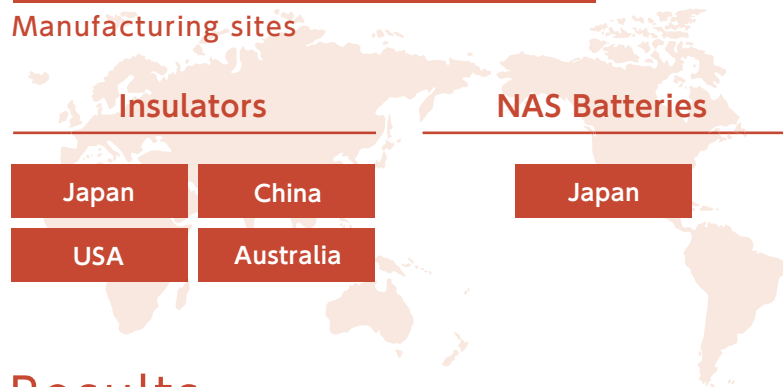
Insulators are the NGK Group's founding products made by ceramics. It helps maintaining staple power supply and ensures that transmission lines and steel towers are completely isolated. As a top insulator manufacturer, NGK manufactures and provides high-quality and highly reliable insulators and equipment for power transmission, substations and distribution.

NAS Batteries

NAS® battery systems has strengths for Large-capacity, high-energy density and long-life which ensure a stable power supply over the long term. NAS® battery systems also contribute to peak power reduction by leveling out the power load, help stabilize renewable energy, act as countermeasures against surplus power, and facilitate power savings and cost cutting.

Product Sites

Manufacturing sites



Results

Business overview for fiscal 2016

Steady Progress in Promising Projects that will Lead to Future Growth

Net sales and operating income for both the insulators business and the NAS battery business fell below the forecasts made at the beginning of the fiscal year. In the insulators business, sales decreased due to sluggish replacement demand in North America. In the NAS battery business, sales declined mainly because there were no major shipments for both Japan and overseas.

Meanwhile, there has been steady progress in promising projects that will lead to future growth both for the insulators business and the NAS battery business. In Japan, replacement demand for insulators installed during the period of high economic growth has been strong, and such demand is expected to grow in the future. In overseas, while large-scale projects have been at a standstill due to the effects of economic slowdown and a decline in the price of crude oil, there is a demand of developing power grid system to solve the transmission networks against the backdrop of power shortages in emerging markets in the Middle East, China and Southeast Asia. As for NAS batteries, a large-scale hybrid battery system demonstration project was launched in Germany, which has been actively introducing renewable energy. Conditions for the widespread use of NAS battery systems are emerging since discussions on installing electric power storage batteries have commenced in Japan toward the expansion of renewable energy.



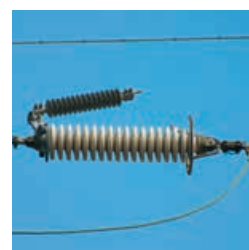
Insulators for power transmission which are indispensable for supplying power in a safe and stable manner



Insulators and equipment for power substations, the world's largest hollow insulators for substation system which resist up to 1,000kV-power transmission system (megavolt class)



Polymer insulators for power transmission which meet customer needs with a broad range of products including those made of porcelain



Equipment for power transmission such as line arresters that significantly contribute to reducing power outages



Equipment for power distribution that contributes to the maintenance and efficiency of power supply equipment



NAS battery which is the first megawatt-class electric energy storage system being utilized in the world

Summary of Fiscal 2016

Net sales 52.8 billion yen
(30.7 billion yen decrease from the previous year)

Operating income (Loss) (6.6) billion yen
(9.2 billion yen decrease from the previous year)

Insulators

Net sales 51.6 billion yen
(5.7 billion yen decrease from the previous year)

- Japan: Steady replacement demand
- Overseas: Decreased due to the postponement of large-scale projects, etc. (Asia, Middle East, etc.)

NAS batteries

Net sales 1.3 billion yen
(24.9 billion yen decrease from the previous year)

- Decreased due to no major shipments for both Japan and overseas.

Present Action

Challenges and initiatives for fiscal 2017

[Insulators]

Enhancing Competitiveness and Establishing a Lean Business Structure

In the insulators business, we will continue to respond to strong replacement demand in Japan while strengthening the competitiveness of our products, approaching quality improvement and offering products and services that gain even higher levels of customer trust.

In order to respond to changes in the market conditions and demand swiftly, we will establish a lean business structure by streamlining production lines at plants, reorganizing and integrating business operations, thereby improving profits. Furthermore, we will promote the procurement and sales of OEM* products and enhance our market presence, especially in the North American market, with the aim of responding to market calls for a broader product lineup.

[NAS Batteries]

Aggressively Developing Overseas Markets with the Aim of Generating Demand

While the environment surrounding the NAS battery business is likely to remain extremely challenging for the foreseeable future, the potential needs are high.

For example, we aim to capture the orders in Hokkaido where the discussions are on-going about installing storage battery system to stabilize the power system to help the expansion of wind power generation. Looking at overseas, especially Europe where the expansion of renewable energy is particularly prominent, there is a movement to utilize storage batteries for demand management. Also in the Middle East, the plans have been coming up which introduce solar power systems to replace thermal power generation.

Our extensive experience and track record in the installation of NAS batteries are significant advantages for approaching to such various needs above. As one another example, we have just announced that NGK will provide its NAS batteries for the large-scale hybrid battery system demonstration project to be conducted in Germany from April 2017. By actively leveraging these kinds of opportunities, we will endeavor to further enhance recognition of NAS battery systems and expand their applications.

Outlook for Fiscal 2017

Net sales 57.0 billion yen
(4.2 billion yen increase from the previous year)

Operating income (Loss) (3.0) billion yen
(3.6 billion yen increase from the previous year)

Insulators

Net sales 54.0 billion yen
(2.4 billion yen increase from the previous year)

- Japan: Replacement demand remained steady
- China: Long-distance, large-scale power transmission projects increased
- North America, South Asia, Middle East: Large-scale projects remained stagnant due to the effects of economic downturn, decline in crude oil price, etc.

NAS batteries

Net sales 3.0 billion yen
(1.7 billion yen increase from the previous year)

- Japan: While detailed studies of storage batteries for power systems are underway in Hokkaido, full-fledged adoption will take time.
- Overseas: A large-scale hybrid battery system demonstration project was launched in Germany, which has been actively introducing renewable energy.

* OEM is an abbreviation for "original equipment manufacturing," which refers to the manufacture of products to be sold under the brand of the entrusting firm (entrustment of manufacturing using the NGK brand).

Topics1

Contributing to Enhancing Safety and Reliability of Power Distribution Networks Expansion into Myanmar, Asia's Last Frontier

Myanmar has been maintaining a high rate of economic growth, the highest level in Asia, in fact. Following the 2011 shift in power away from military rule, the modernization of the country's infrastructure such as roads, railways, electricity, etc. has progressed.

While the Myanmar government has a national policy to improve its electrification rate from 30% in 2014 to 100% by 2030, the existing power distribution networks that cover the nation are made up of bare power cables and exposed cut-outs, which are susceptible to electric shock hazards and blackouts.

Given such situation, the NGK Group established a local entity in August 2016 by initiating the standardization of sealed cut-outs without exposure in the charger. We have since been providing instructions on manufacturing technologies and quality management to local alliance partners. It is our aim to enhance the safety and reliability of power distribution networks through the isolation of power cables, thus contributing to realizing a better standard of living and economic growth for people in Myanmar.

Cut-outs

There is a fuse inside the cut-out, which stops the flow of current when an overcurrent is detected safely and promptly due to an accident involving the power distribution line, etc., thereby protecting power distribution equipment. Cut-outs manufactured by Energy Support Corporation being used by all electric companies and boast significant market share across Japan for their high reliability.



Conclusion of business alliance between Energy Support Corporation and a local company

Next Vision

Future outlook and initiatives

[[Insulators]

Establishing Sustainable Business Structure and Enhancing Brand Value

In the insulators business, we will endeavor to establish a business structure that can deliver high profitability. Replacement demand is expected to expand in the future since the aging of power equipment both in Japan and the U.S. NGK's products have been highly recognized for their track records and quality and what we must focus on now is establishing a lean production system and a sustainable business structure. In addition, we will aim to further strengthen our systems from the customers' perspective in order to provide even more optimal products and services in a prompt, accurate and flexible manner.

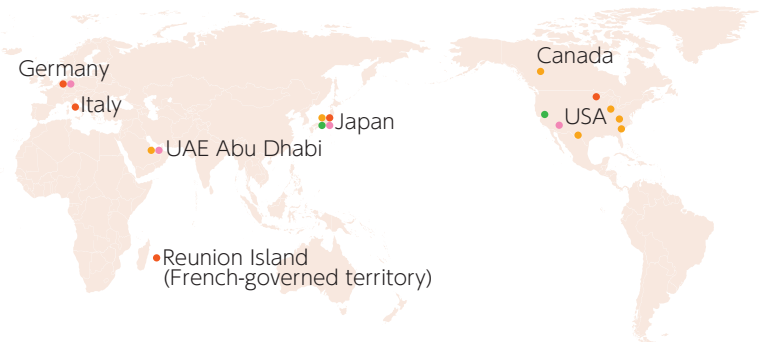
[NAS Batteries]

Capturing Demand by Taking Advantage of Global Expansion of Renewable Energy

In the NAS battery business, we will strive to grow business in line with the global expansion of renewable energy by leveraging our strengths in large capacity, compact size and superior cost performance as the large capacity storage battery. It is expected that renewable energy will be fully introduced as energy infrastructure around the period between 2020 and 2025. Since NAS® battery systems have high demand potential, we will actively engage in demonstration experiments in various countries and regions in the next few years and prepare for an increase in demand in the future. By doing so, we will be possible to offer more practical solutions by accumulating insights and building up a track record as

Track record of NAS battery installation

Approximately 200 locations worldwide, with power output amounting to approximately 530,000 kWh and storage capacity of 3,700,000 kWh



Applications of NAS batteries	
● Peak reduction shift	● Smart grid
● Power system measures, built with renewable energy	
● Frequency adjustment	

there are significant background differences in reasons for introduction and use environment for storage batteries, depending on the customers. In addition, we are striving to establish operations related to remote monitoring systems after installing and also the after-sales services expected to cause as customers' needs. As a leading company of large-capacity storage batteries, NGK has been preceding its competitors in terms of both track record and performance. Looking ahead to the large-capacity storage battery market to emerge in three to four years' time, we will promote our sales activities and demonstration projects in overseas markets which leads us to be a top brand that is chosen by customers.

Topics2

Demonstration Project Commenced in Germany, Environmentally Advanced Country

NGK Offers NAS Battery Systems for Three Years from April 2017

The NGK Group has been endeavoring to be a highly proven and known brand for NAS batteries in the European market especially in Germany. Germany is an advanced country actively introducing renewable energy and in the meanwhile, they are facing imbalances and grid voltage instability due to the vulnerable power transmission network while a large amount of power generated in the northern region is sent to south, the consumption area.

To address these problems, Japan's New Energy and Industrial Technology Development Organization (NEDO*) has worked for the commencement of the "Large-Scale Hybrid Battery System Demonstration Project" with the Ministry for Economics, Labour and Transport of Niedersachsen, where is the region in

Signing ceremony held in March 2017. Germany aims to shift more than 80% of its domestic electric power demand to renewable energy by 2050.



Germany that produces wind power the most. They signed a memorandum of understanding in March 2017. At the same time, one Japanese power company, NGK Insulators, Ltd a company commissioned by NEDO, and the energy provider in Germany have agreed to collaborate the project and concluded an implementation document. Our aim by introducing NAS batteries is to stabilize the distribution grid, and thereby control the electric power supply and demand balance. Another aim is to establish a new business model for electricity trading using the battery system.