

Promoting Streamlining to Improve Profits and Losses

Fiscal 2017 results		Fiscal 2018 outlook	
Net sales	Operating income (loss)	Net sales	Operating income (loss)
54.4 billion yen	(4.7) billion yen	56.0 billion yen	(4.0) billion yen

Results for fiscal 2017 showed net sales of 54.4 billion yen while, with regard to profits and losses, various factors such as the continued streamlining of production systems contributed to a reduced deficit margin with operating losses of 4.7 billion yen.

Business in insulators was sluggish as a result of Japanese electric power companies reducing capital investment. With regard to NAS® battery business, 1.2-megawatt NAS batteries were delivered to Dubai to help in meeting the time-shift power consumption needs of large-scale solar power plants being constructed in the Middle East; however, due to a lull in construction activity, no other major shipments were made.

In fiscal 2018, net sales are projected to be 56.0 billion yen with operating losses of 4.0 billion yen, meaning a continuation of deficits despite a slight increase in revenues compared with the previous period.

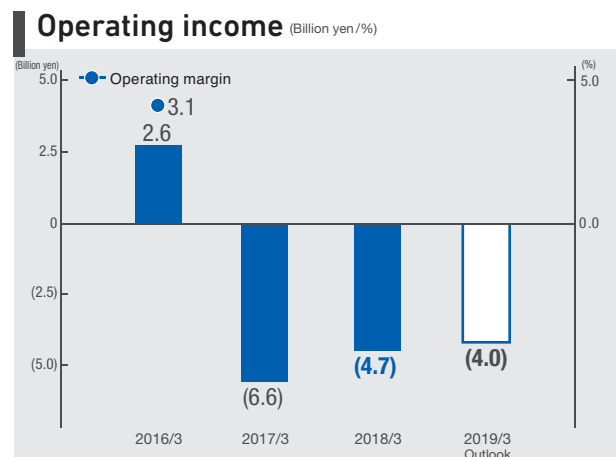
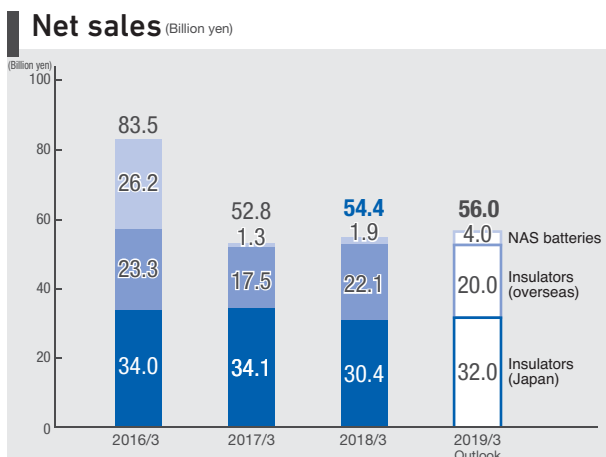
For insulator business, demand within Japan is expected to continue its sluggish trend, while overseas demand in the Middle East and North America is expected to be slow as well.

With regard to NAS battery business, while demand will increase mainly for users in Japan to meet the rapidly spreading adoption of renewable energy, the total number of shipments remains low and figures will remain in the red.



Senior Vice President; Group Executive, Power Business Group **Shigeru Kobayashi**

Financial results



Power business

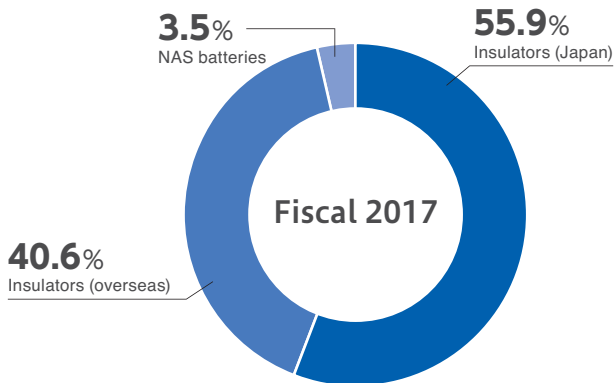
Insulators

Ceramic insulators play a role in insulating power transmission lines and steel towers. Ceramic insulators are an indispensable part in ensuring stable energy lifelines and were the NGK Group's founding products. As a top insulator manufacturer, NGK manufactures and provides high-quality and highly reliable insulators and equipment for power transmission, substations, and distribution, both in Japan and overseas.

NAS batteries

NGK manufactures and sells NAS batteries capable of ensuring power supply stability over the long term and with an array of superior features, including large capacity, high energy density, and long service life. 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.

Sales ratio by business



Manufacturing sites



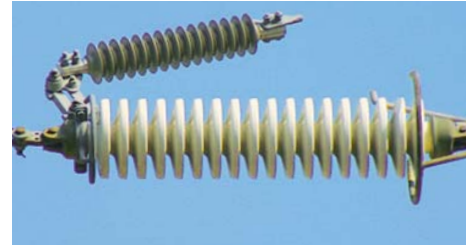
Insulators for power transmission

We constantly seek to innovate, and have succeeded in making our insulators more compact without compromising strength or isolation capacity. Thus, our suspension insulators for UHV power transmission are only 41 cm in diameter but can withstand a load of 84 tons.



Insulators and equipment for substations

These insulators are used to isolate power lines from equipment and the transformer building. In fact, our technological capabilities enabled us to make UHV gas bushings some 11.5 meters long—the largest porcelain products in the world.



Equipment for power transmission

We manufacture devices to prevent power outages when something happens to transmission lines. In particular, our line arresters, which have built-in functional ceramic (zinc oxide elements), make a huge contribution to blackout prevention by selectively discharging the large fluxes in current caused by lightning strikes.

Aiming for Growth in NAS[®] Batteries amidst Business Restructuring

Future outlook

With regard to insulator business, due to the expansion of energy saving in Japan, electric demand is expected continuing decline, in addition, the continued constriction of capital investment among Japanese power companies, which will last until 2020 when legal separation of power generation, transmission and distribution starts, the demand of insulator for transmission and distribution will be sluggish for the time being.

For overseas markets, the continued stagnation in oil prices is prolonging austerity measures in the Middle East, while in North America investment is shifting towards IT measures and distribution area; thus, overall market conditions are expected to remain harsh.

Amidst all of this, in fiscal 2017 the NGK Group began restructuring North American business and scaling down the production system at the Komaki Plant, while in fiscal 2018 this scaling down will be extended to the Chita Plant, which will move to single-shift operation. Despite ongoing, positive results, such as securing OEM* status for some NGK products aimed at the North American market, the market conditions are more severe than were anticipated, and supplemental initiatives are being discussed.

In January 2018 we confirmed that, in some cases, insulators and related products did not undergo appropriate tests in accordance with agreements with customers. Upon taking steps to verify the quality of the concerned products, we have been working with customers to provide detailed explanations. We will work further to strengthen our quality control structures and make all members of the group aware of the importance of compliance in order to prevent reoccurrence.

Demand for insulators is not going to disappear. Our aim is to continue restructuring our business to put it in the black while also enhancing the quality of our products further to satisfy the trust that we have built up with our customers.

It will take time for full-scale demand for NAS batteries to be realized; however, we believe that latent need continues to rise.

In the Middle East, plans to introduce large-scale solar power plants are being implemented as part of efforts to meet the 2030 greenhouse gas reduction targets of the Paris Agreement. Also, in Europe there is a push to revise the 2030 renewable energy ratio targets upward. In Japan, as well, the push to avoid enhancing the transmission network and the push to use solar power generation for shifting peak power consumption times are fostering greater

need for energy storage system offering long-term stability, which we foresee creating a surge in demand starting around 2020.

The power industry is entering an era of revolutionary change. Up until now, thermal and nuclear power were the base load power sources; however, as part of the fight against global warming we are increasingly moving away from coal-fired thermal power and shifting the base load more towards natural gas and renewable energy. One of the needs that is becoming more acute as a result of this transition is the need to shift the large amounts of solar power and other power generated during the day to the peak consumption periods during the night. Energy storage systems like NAS batteries are essential to achieving this.

Insulators have been the foundation of NGK business for 100 years, but NAS batteries will be what carries it through the next 100 years. Although the immediate future looks difficult, we are pushing ahead towards the flood in demand that is coming.

Another trend we are anticipating is the continued shift towards “local production for local consumption” for electricity as communities seek to reduce the distribution costs, which comprise so much of their power production and supply costs. With the ongoing decline in Japan’s population, it is unrealistic to expect underpopulated areas to be able to maintain large-scale power distribution networks. For such areas, the zinc secondary batteries that we are currently developing would be a more suitable option at the power distribution level.

Our work on NAS batteries has revealed a host of new opportunities in business areas where batteries are needed, such as in remote surveillance and maintenance. By such means as partnering with companies that already provide established services in these areas, we can create new business while also contributing to reduced environmental impact through more efficient energy usage.



NAS[®] battery systems

NGK developed the world’s first commercialized battery system capable of storing hours of electricity. These systems, which enable a high output of electric power for long periods of time, have been installed in around 200 locations worldwide.

*Outsourcing to another manufacturer the production of products and components sold under your company’s brand.

TOPICS 1

Delivering 1.2-megawatt (1,200 kilowatt) NAS batteries to Dubai

In March 2018, NGK delivered 1.2-megawatt NAS batteries to Dubai, one of the emirates of the United Arab Emirates (UAE), to be used in its energy storage technology demonstration project. The utility and long-term performance of NAS batteries in stabilizing output from solar power generation will be investigated.

The UAE is undertaking large-scale investment in solar power generation with the aim of increasing the percentage of renewable energy it utilizes from 1% currently to 25% (10 gigawatts or more) by 2030.

NGK has also provided the Emirate of Abu Dhabi in the UAE with NAS batteries totaling 108 megawatts of power, as well as a central control system offering integrated management of this stored power as a virtual power plant. Full operation of this system will begin this summer.

Our aim is to secure large-scale orders from Dubai as well, following success of the demonstration project there.



NAS batteries installed in Dubai

Order for large-scale, 1100kV direct current system in China

In January 2017, the State Grid Corporation of China tendered bids for a 1100kV direct current system, which would be the highest voltage system used anywhere in the world.

This project was incorporated into the Chinese government's 13th five-year plan (elimination of thermal power plants near major cities and construction of 17 long-distance power transmission systems). NGK Insulators Tangshan received an order for approximately 180,000 insulators, including around 50,000 insulators with the world's highest strength rating of 840 kN (full delivery of this order was completed in fiscal 2017). Excellent results from the specified vibration fatigue testing demonstrated the insulators' long-term reliability and helped secure the order.



Insulators offering the world's highest strength rating of 840 kN (shown at right)

TOPICS 2