

Energy Infrastructure Business

Contributing to a carbon-neutral social infrastructure

Current Situation and Future Outlook

■ Striving to return the Insulator business to profitability during lean times of NAS batteries

The period ended March 31, 2020 saw an improvement in profit and loss for the Insulator business. This improvement is due in part to the consolidation of operations into four production facilities in Japan and two overseas, which has taken place over the past 10 years, as well as to other measures, such as the streamlining of indirect personnel. Currently, we are working to improve sale price both in and outside Japan and have already received consent from some of our customers. We are moving step-by-step to return NGK's insulator business to profitability by the end of fiscal 2021. Looking ahead, we are working steadily to stimulate and capture demand for replacing insulators installed during Japan's past high-growth periods.

In the NAS business, demand for large capacity and long-duration battery applications remains lean. However, we are confident that the future will bring with it fully realized demand for NAS[®] batteries. At present, our group is working

on developing business related to zinc rechargeable batteries, and this is being carried out with an eye to developing solutions that incorporate NAS batteries.

At the same time, soon after we discovered non-conformity in testing procedures of insulators, which arose in the past fiscal year, we put priority on changing the old corporate culture to one of openness and positivity. Our vision is to be an organization where employees can express themselves with honesty and where they feel that what they say is heard and acted upon. Results from an in-house survey conducted in February 2020 showed that more than half of employees felt the workplace environment had improved, which I feel shows that progress has come from the initiatives that were implemented these past several years.

Although the impact of the COVID-19 pandemic on business has thus far been limited, we will continue to carefully monitor the situation.

Growth Strategy

■ Collaborating with BASF in building a new business model for NAS batteries

The trend towards a low-carbon, carbon-neutral society continues apace around the world. In Japan, a marketplace for balancing power supply and demand will be established in 2024, which is anticipated to be accompanied by the spread of virtual power plants (VPPs) that will use storage batteries to supply power. In the U.S., photovoltaic power generation used in conjunction with storage batteries is steadily becoming more cost-competitive relative to thermal power plants. We are on the cusp of an era where conventional thermal power generation will be replaced by renewable energy combined with storage batteries as part of a "local production for local consumption" system where local regions produce the energy that they consume.

Looking ahead to that era, last year we concluded an NAS battery sales partnership agreement and joint research agreement with BASF New Business GmbH, a wholly owned subsidiary of major German chemical manufacturer BASF. The aim of this partnership is to jointly develop the next generation of sodium-sulfur batteries, which discharge over four or more hours, and then have BASF leverage its enormous procurement power to keep costs down and use its global sales network to facilitate business expansion.

Consumers in Europe are very focused on greenhouse gas reduction, and BASF itself will build a carbon-free plant at the

behest of the German government. For this idea to work, storage batteries capable of storing renewable energy are essential. Currently, lithium-ion batteries are the mainstream choice, but there are limitations on procuring these batteries' primary ingredient, lithium. Conversely, the sodium, sulfur, and other materials used in NAS batteries are practically unlimited, and, if produced on a large scale, cost would be reduced greatly.

Moving forward, we will work with BASF in examining the optimal supply chain and production organization in order to grow our business in the future.

Also, with regard to zinc rechargeable batteries, we are working on indoor applications, which capitalize on their high level of safety. Zinc rechargeable batteries eliminate the need for any flammable electrolytic solutions and, thus, have the distinct advantage of having no combustion or overheating risks. Our aim is to make these batteries offer high energy density without battery life degradation, even with daily use.

There are a number of facilities where such a highly safe battery would be welcome, including schools, hospitals, commercial facilities, and base stations. We have even heard from customers who are keen to test them out as soon as possible.



Main market

【Global market for large rechargeable batteries】
Storage system market size: 1.882 trillion yen
(Estimate for 2030 by Fuji Keizai Management)

Main customers

【Stationary rechargeable batteries】
Power utilities, engineering companies, etc.

Core products

■ **NAS batteries**

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.

■ **Zinc rechargeable batteries**

Zinc normally causes short-circuiting during charging when used in rechargeable batteries. However, NGK has solved this problem and developed a zinc rechargeable battery by utilizing its proprietary hydroxide ion conducting ceramics. Featuring high capacity and inherent safety, the zinc rechargeable battery is an optimal storage solution for indoor installations.

■ **Insulators**

By ensuring that transmission lines and steel towers and equipment are completely isolated, insulators play a crucial role in maintaining the safety and stability of our energy lifelines. We have developed and are manufacturing products such as the world's strongest ultra-high-voltage (1,000 kV) transmission insulators and bushings that use our transformer insulators, which are among the world's largest. Our products are used in more than 100 countries around the world.

Our Founding Spirit

■ Contributing to a carbon-neutral social infrastructure

In April 2020, we renamed our business group the Energy Infrastructure Business Group to reflect our role in ensuring stable power supply and in broadening the scope of energy possibilities, thereby contributing to the development of social infrastructure.

We hold on to the words of our first president, Kazuchika Okura, who said, "We do this to serve our country, and not for our own profit." The name change can therefore be seen as a return to our origins as a company. Expanding the scope of energy possibilities is the very reason and value for our existence.

Building a carbon-neutral society is essential for our times, and renewable energy will play a key role in tackling that challenge. Transmission lines are crucial to supplying this energy, storage batteries ensure its efficient use, and our products help secure seamless functioning between these elements. We are leading the way towards the coming era of renewable energy.

Shigeru Kobayashi

Director and Senior Vice President;
Group Executive,
Energy Infrastructure Business Group

