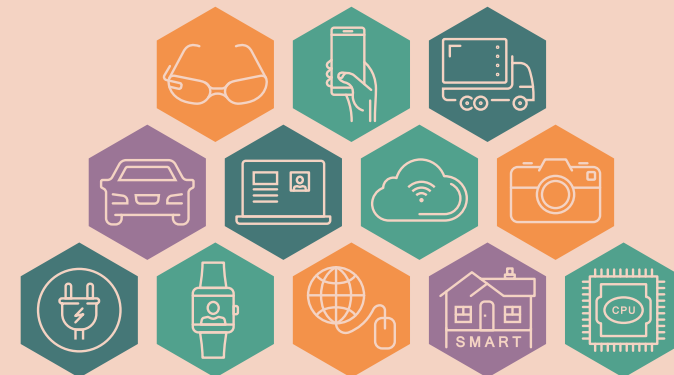


# NGK INSULATORS: Indispensable ceramics for a sustainable future

 **NGK INSULATORS, LTD.**

[www.ngk.co.jp/english/](http://www.ngk.co.jp/english/)

The corporate mascot of NGK Insulators, the industrial ceramics giant, is the “kuroko”, a black-clad stagehand who assists actors in traditional Japanese kabuki theatre. Like such stagehands that remain in the background but are necessary for a show’s success, NGK supplies vital products supporting key industries across the world.



**T**ake cars. In nearly half of the estimated 89 million vehicles sold last year, NGK’s ceramics are used in catalytic converters to purify exhaust pollutants. Or energy. Power grids in more than 100 countries rely on the Japanese company’s high-spec insulators for stable and safe transmission of electricity. Or electronics. NGK supplies key ceramic components necessary for equipment used to manufacture semiconductors.

“We have always seen our role as supporting various industries by supplying useful products designed from our accumulated expertise in ceramics,” says NGK President Taku Oshima. And with key industries heavily dependent on NGK, Oshima emphasizes “supplier responsibility”. This means, he says, that NGK maintains an “unwavering commitment to ensuring consistency of the highest-quality ceramic products in mass production”.

## From strength to strength

Such a commitment has guided the company, since being founded in 1919 to support the electrification of Japan through domestic production of insulators, into a global ceramics giant. Supplying customers in the automotive, power, and electronics industries, the company marked 401bn JPY (US\$3.6bn) in sales and 63bn JPY in profits for the year ended in March 2017. Approximately 70 per cent of its total sales came from overseas, with 62 per cent of its 21,000 employees in 46 offices and factories outside Japan.

The long-term view of NGK reveals a company going from strength to strength. The last five years of consistent growth has pushed up NGK’s sales by 1.6 times and operating profit by 2.4 times. Behind these astonishing figures is vibrant demand in its core domains. Global orders for NGK’s automotive ceramics, which comprise 60 per cent of group sales, have risen inexorably with stricter exhaust regulations and robust growth in vehicle sales. The explosion of digital device markets has driven demand for NGK’s components used in semiconductor equipment and electronics. And in another growing new business, the company has aggressively snapped up orders for its NAS<sup>®</sup> batteries, the world’s first commercialized large-scale storage battery system for renewable energy (see column).

The company’s production capacity is already at full throttle and growing.



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**Taku Oshima**  
President, NGK Insulators, Ltd.

In the past year, the company has expanded factories including in Poland and China for ceramic substrates, gasoline and diesel particulate filters, and NOx sensors. “In the next three years, we plan to invest around 300bn yen in capex to accelerate the expansion of our existing businesses as well as invest in mass-production capacity for new products,” says Oshima. These spending plans are a testament to the company’s bullish outlook.

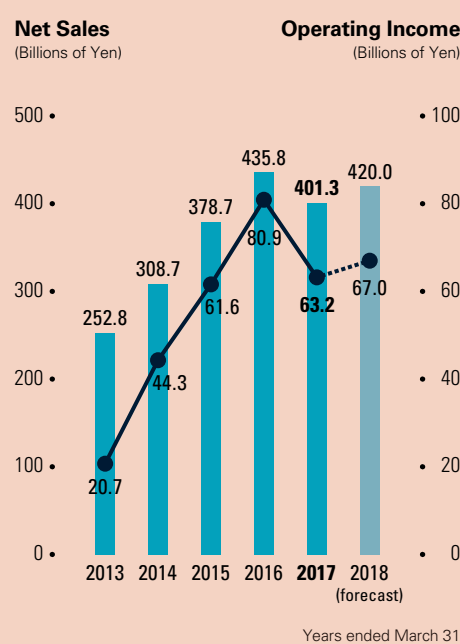
## Next-generation ceramic technologies

NGK has certainly not been resting on its laurels in innovation either. With

a five-year “Challenge 30” project to achieve 30 per cent of total sales from new products annually, on track to be achieved in 2017, NGK has been forging ahead with R&D.

The company is on the cusp of commercializing new types of ceramics-based energy devices. Applying its unique accumulated ceramics know-how for crystalline orientation, for example, NGK is working on a chip-type rechargeable battery that is both extremely thin and has high energy density. The novel battery has a “very wide field of potential applications,” explains Oshima. These include smart cards, wearable devices, and wireless

## Robust growth for NGK Insulators over the past five years

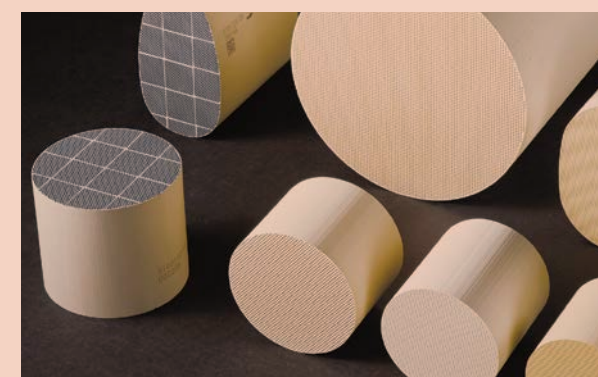


modules for IoT. Another product in the works is a zinc rechargeable battery that applies unique ceramic separators and an aqueous electrolyte to achieve greater safety and a longer lifetime. One more innovation is a highly efficient solid oxide fuel cell module able to generate electricity from gas fuel for home-use.

Elsewhere, the company is broadening its lineup of high-performance wafer products used in wireless communication devices such as smartphones. “Our high-spec ceramics materials can meet the needs of IoT and IT devices that require ever-faster connectivity and ever-greater data capacity,” says Oshima. NGK expects these and other upcoming products to contribute to the company’s continued goal of the sales of new products to comprise 30 per cent of total annual sales.

## Supporting a sustainable future

NGK has not only supported the operations of key industries, but it has also done so while reducing mankind’s environmental footprint. Reflecting this contribution, the company was selected last year as a stock in the Dow Jones Sustainable Index for Asia/Pacific. To this latest prestigious recognition, Oshima responds with modesty: “Since becoming president, I have worked towards making NGK a respected world-class company. We hope to continue in this role of supplying indispensable high-quality ceramics that contribute to a sustainable, dynamic future.”



NGK’s ceramics are used to purify exhaust pollutants in nearly half of all vehicles sold globally.



NGK’s stamp-sized rechargeable battery will have a wide range of applications, including smart cards and IoT wireless modules.



NGK’s ion-conducting ceramic materials are used to create safer, large-capacity rechargeable zinc batteries suitable for home-use and indoors.



Another of NGK’s innovations is a highly efficient solid oxide fuel cell (SOFC) module capable of generating electricity from gas fuel.



## NAS BATTERIES: Ceramics against climate change

**W**ith climate change a pressing concern, governments in Europe, Asia, the Middle East, and North America are mandating the expansion of renewable energies. The challenge is to develop systems to store and stabilize

intermittent power generated from renewables such as wind and solar. NGK’s ceramics-based NAS battery system is a leader in the field. The sodium sulfur (NaS) batteries, jointly researched and developed by NGK and Tokyo Electric Power Company

since the mid-80s, are the first large-scale storage batteries to be commercialized in the world. They have been proven to be one of the most mature and reliable technologies for grid-scale battery storage. Compared to rival batteries such as lithium ion or redox flow, NAS battery is cost-effective, while also being scalable, compact, and able to charge/discharge huge amounts of energy.

NAS systems have already been set up worldwide at some 200 locations. Combined, they provide over 530 megawatts (MW) of output power and 3,700 megawatt-hours (MWh) of storage capacity. These include the 108MW of storage being used in Abu Dhabi for the load levelling of thermal generation and

35MW facilities in Italy which reduce transmission congestion and curtailment of renewable energies in the Italian grid.

The latest overseas NAS battery deployment will be a demonstration project for a large-scale hybrid battery system in Germany. The country has experienced a surge of renewable energy generation after announcing goals to secure 80 per cent of all energy from renewables by 2050. The facility (backed jointly by the Japanese government and the German state of Lower Saxony) will stabilize the distribution grid, and thereby control the electric power supply and demand balance, by charging and discharging wind-generated power in storage batteries.



The compact NAS battery is one of the most mature and reliable technologies for grid-scale battery storage.



NGK supplies power grids in over 100 countries with insulators and equipment for substations, including the world’s largest 11.5-meter UHV gas bushings made of ceramics.