

The World's Most Popular Grid-Scale Battery Storage System NGK's NAS[®] System



NGK's NAS[®] system is the world's most widely deployed grid-scale battery storage system. Since 1995, over 200 projects have been installed worldwide, totaling 530 MW and 3,700 MWh. NAS systems are operating in climates ranging from the freezing cold of Canadian

winters to the desert heat of Abu Dhabi, UAE.

NAS storage systems enable grids to reliably provide some, or all, of their electricity from intermittent renewables sources, such as wind and solar. The NAS system stores, time-shifts and dispatches renewable electricity, reliably and precisely meeting demand, all day and all night.

NAS batteries are made of sodium, sulphur and NGK's proprietary beta-alumina ceramic, all of which are recyclable. "High quality, low cost and dependable performances are all essential for widespread deployment of grid storage. We have achieved these capabilities thanks to beta alumina, which we devel-



Container-type NAS battery

Photo courtesy of NGK INSULATORS, LTD.



Container-type NAS battery ordered by Mitsubishi Electric Corporation and delivered to the Buzen Substation of Kyushu Electric Power Co., Inc.

Single NAS battery
This battery uses a special ceramic material (beta alumina) that passes only sodium ions to repeatedly charge and discharge electricity with chemical reaction of sulfur and sodium.

NAS unit

oped using our advanced ceramic technologies," said Mr. Toshiyuki Mima, who is the Executive Officer in charge of the NAS Battery Division.

NGK ships its NAS system in plug-and-play 20 foot shipping containers. Each NAS container can store the electricity used in 1 day by about 120 households. The containerized packaging allows rapid deployment, even for massive projects. NGK demonstrated this rapid deployment by building the world's largest energy storage facility in just 6 months. This 50 MW, 300 MWh NAS project was energized in March 2016. It is being used by a customer to increase the solar generation on its grid, as well as simultaneously providing many other grid functions.

NAS batteries are known for their large capacity (6 hours discharge at full power output), high energy density (triple that of lead acid batteries) and long life (15 years and 4,500 cycles). The performance, lifetime and high reliability of NAS systems are field-proven, which allows storage projects to be financed using traditional infrastructure financing.

NAS storage systems are just one of NGK's many innovative ceramic products. NGK's ceramics products are used worldwide in power systems, automotive and semiconductor applications. NGK is traded on the Tokyo stock exchange as NGK INSULATORS, LTD.

COLUMN

To Understand the Global Environment, knowing the Importance of the Environment. International Center for Environmental Technology Transfer (ICETT)



1



2

1. Study-tour of a septic tank model
2. Practical training with a water quality inspection kit (PACKTEST)

ICETT has accepted 7,882 participants from 90 countries so far.

Japan is expected to use the experience and technologies accumulated through its commitment to environmental issues to actively contribute to the world in cooperation with other countries.

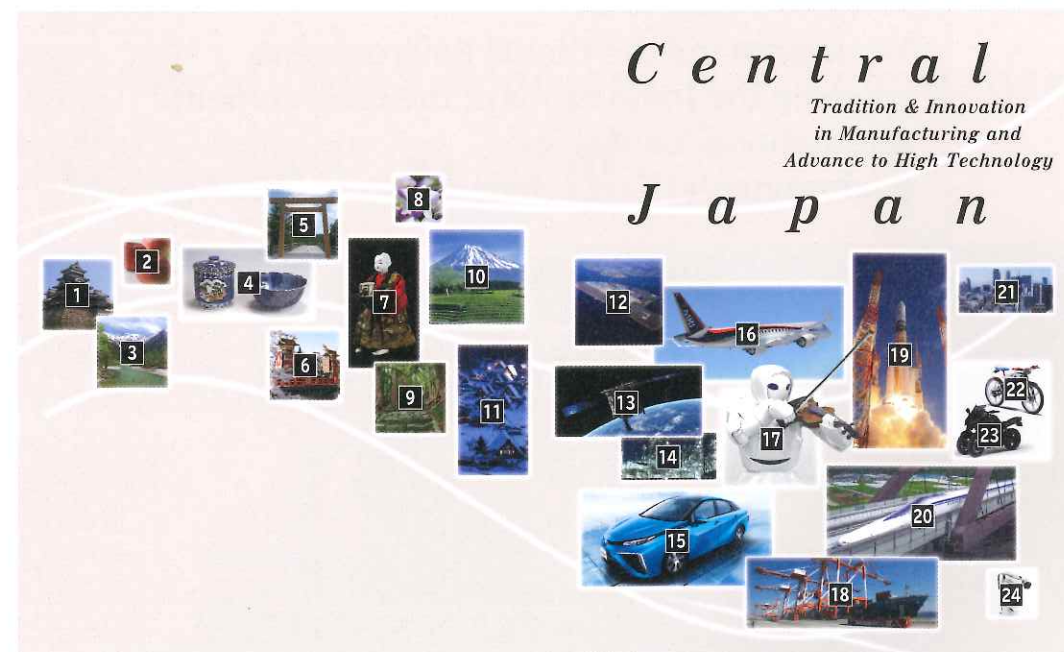
In March 1990, ICETT was established in Yokkaichi in cooperation between industry, government and academia to transfer the pollution prevention technologies and know-how on environmental management accumulated in the country to developing countries. Yokkaichi had experienced severe pollution in the course of its economic

growth and developed and accumulated excellent environmental conservation technologies and management methods to solve the problem.

ICETT is now promoting technical transfers to improve the environment of other countries that suffer pollution caused by rapid industrialization through introduction of public environmental conservation measures, technical guidance for companies, capacity development, support of environmental businesses and other initiatives.

Photo courtesy of ICETT

Cover Photos



Central Japan

*Tradition & Innovation
in Manufacturing and
Advance to High Technology*

(Photo courtesy)

1	Matsumoto Castle	
2	Shinshu apples	
3	Kamikochi	(Nagano Prefecture Tourism Association)
4	Pottery from Seto	(Sightseeing Association Aichi)
5	Ise Jingu	(ISESHIMA TOURISM & Convention Organization)
6	Floats parading around the town in the Takayama Festival	(Takayama City Tourism Department)
7	Tea-serving doll	
8	Orchids	
9	Kumano Kodo Pilgrimage Routes [World Heritage]	
10	Mt. Fuji [World Heritage]	(Shizuoka Prefecture Tourism Association)
11	Villages with Gassho-style houses in Shirakawa-go and Gokayama [World Heritage]	(Shirakawa Village Office)
12	Chubu Centrair International Airport, Nagoya	(Central Japan International Airport Co., Ltd.)
13	Hayabusa2	
14	Yokkaichi industrial complex	(Yokkaichi City)
15	MIRAI	(TOYOTA MOTOR CORPORATION)
16	MRJ (Mitsubishi Regional Jet)	(Mitsubishi Aircraft Corporation)
17	Partner robot	(TOYOTA MOTOR CORPORATION)
18	Port of Nagoya	(Nagoya Port Authority)
19	H-IIA Launch Vehicle	(Mitsubishi Heavy Industries, Ltd.)
20	Superconducting Maglev	(Central Japan Railway Company)
21	City center of Nagoya	
22	Motorcycle	(SUZUKI MOTOR CORPORATION)
23	3-Wheel Motorcycle - Reverse Trike	(Yamaha Motor Co., Ltd.)
24	Robot for the pharmaceutical and medical fields "VS-050S2"	(DENSO CORPORATION)

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Published: Spring, 2016

For the purpose of the promotional activities by
"Central Japan Council for the Ise-Shima Summit"

Planning & Published by
Chubu Economic Federation (Chukeiren)
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<http://www.chukeiren.or.jp>

Produced by
Shinto Tsushin Co., Ltd.

Edited by
Editorial and Planning Office Gune Co., Ltd.

Designed by
Mitsuya Design Office

Printed by
Futawa Insatsu Shigyo Co., Ltd.



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