extra notes

Power Transmission & Distribution

Yukiyoshi Yanagisawa

Emerging economies have an urgent need to augment their power transmission infrastructure to meet vigorous growth in energy demand, while developed economies need to upgrade their aging power transmission infrastructures. Around the world, stronger wide-area or transnational interconnections are being created using UHV or HVDC power transmission. Several countries are adopting renewable energy which makes the power grid unstable, and looking to bring stabilization technology to the power grids. Hitachi will work to meet these global needs in the power T&D sector.

WORKING ON LOCAL PROBLEMS FROM GLOBAL BASES

HITACHI'S global power transmission & distribution (T&D) bases were created to draw on resources such as engineering, overseas production, and procurement to provide appropriate solutions to various local problems. Bases in North America provide the switchgear and transformers needed to upgrade aging facilities, while also working on grid stabilization systems and energy storage battery systems. Bases in Asia bring together engineering bases and transformer and switchgear production bases to meet demand for various power T&D infrastructure. Bases in China are contributing to create China's domestic power transmission network mainly through production of ultra-high-voltage (UHV) gas-insulated switchgears (GISs).

In 2013, Hitachi signed a cooperation agreement with Russian grid for technical cooperation on the modernization and stabilization of electric power T&D

Katsunori Sone
President & CEO, Hitachi HVB, Inc.

Established in 1977 through a joint venture between Hitachi Ltd. and GE, Hitachi High-Voltage Breaker Inc. has since become a wholly owned subsidiary of Hitachi. Located about 30 miles northwest of Atlanta, the company manufactures and sells high-voltage (HV) and extra-high-voltage (EHV) circuit breakers (VCBs/GCBs), and sells generator main circuit breakers (GMCBs) and gas-insulated switchgears (GISs). It has delivered over 8,000 GCBs in the USA nationwide, including fifty-five 800 kV GCBs delivered or manufacturing for American Electric Power Company, Inc (AEP), and has the top share of the US domestic market. It has also delivered GISs to about 30 sites, including Mott Haven 345/138-kV S/S in New York City for Consolidated Edison (Con Ed). In July 2013 Hitachi HVB started selling transformers.

With demand expected to grow in North America, Hitachi HVB will continue providing the products and services to this market.

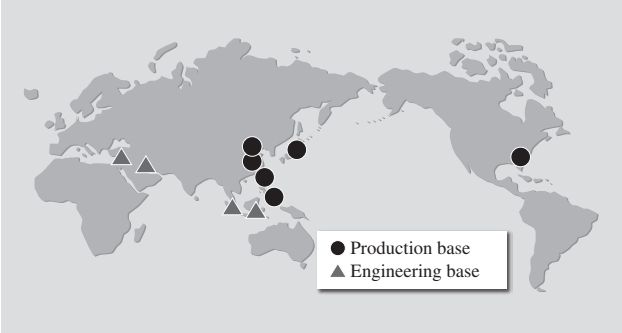

Fig. 1—Engineering Bases and Production Bases.
Hitachi will work with overseas engineering bases to propose solutions to the various problems of local regions.

infrastructure, and also signed cooperation agreement on power generation and T&D area with Mongolia Ministry of Energy and Sumitomo Mitsui Banking Corporation. In the years ahead, Hitachi will further improve and expand global systems rooted in local regions, while helping to solve problems unique to each area (see Fig. 1).

The Americas

Demand for upgrading of existing facilities and the application of renewable energy are expected to create growth in the markets of the Americas. In 1977, Hitachi partnered with GE to create joint-venture Hitachi HVB and begin manufacture and sales of high-voltage switchgear in the USA. Hitachi HVB has since become a wholly owned subsidiary of Hitachi and is one of the five largest manufacturers of switchgear in the US market. It added transformers to its sales lineup in July 2013.

To meet demand for grid stabilization needed with the application of renewable energy, Hitachi is also providing wide-area grid protection/control systems and energy storage systems.

Asia

In the Association of Southeast Asian Nations (ASEAN) region, an organization of power providers known as Heads of ASEAN Power Utilities/Authorities (HAPUA) is leading construction of the ASEAN Power Grid, a power transmission network linking the ten member nations. Among these nations, Thailand has started work on grid expansion and implementing a modernization plan driven by GIS upgrading of aging power transmission facilities, while Indonesia is working on a plan for direct current (DC) interconnection facilities between Java and Sumatra along with generator facility upgrading work.

Along with power T&D engineering bases in Singapore and Indonesia, Hitachi has the ASEAN region's only production base capable of 500-kV GIS

Shinji Nogami
President & CEO, Hitachi T&D Systems Asia Pte. Ltd.

Operating mainly in Southeast Asia, Hitachi T&D Systems Asia Pte. Ltd. (HTDA) engineers, procures, and constructs transformers, circuit breakers and other hardware and systems vital for substation equipment. In addition to substation equipment for power companies, HTDA also deals with industrial electric equipment such as substation equipment for overseas plants and railways system. Maintenance is another main business area, and expanding business to Singapore, Hong Kong, Thailand, Bhutan, and Saudi Arabia in which Hitachi has delivered substation equipment. Hitachi also constructs solar generation facilities, and has delivered a 1.2-MW megasolar facility to Brunei and a solar facility for Petroliam National Berhad (Petronas), Malaysia's state-run oil company.

PT. Hitachi Asia Indonesia (HAS-IDN) does business mainly in Indonesia. It sells, engineers and markets products for power and substation systems, civil/industrial systems, and information and communication systems.

With the demand for power infrastructure equipment in Southeast Asian countries expected to continue, HTDA is aiming to improve and coordinate its accumulated engineering expertise and provide system solutions for total grid optimization.

manufacture (located in Indonesia), which will help Hitachi meet the demands of the ASEAN nations. Hitachi has also created a new transformer plant in Taiwan that can produce equipment with capacities of up to 500 kV, 600 MVA, and will meet transformer demand from all over the world. To meet demand for grid stabilization needed with the application of renewable energy in India, Hitachi has created a research and development base that provides functions such as grid analysis.

China

While power generation is primarily coal-fired thermal generation, renewable energy sources such as hydroelectric and wind power, as well as nuclear power sources are being developed as a means of protecting the environment and reducing global warming.

Amid China's vast land area, coal and hydroelectric resources are centered in the center and western part of the country, while demand is centered along the southeast coastal region. Construction is underway to create power transmission and substation facilities for low-loss, long-distance transport of power from large thermal and hydroelectric power plants in the central and western parts of the country. Construction of UHV power transmission networks for low-loss, long-distance transport has been particularly active recently.

Fig. 2—SDEE Hitachi High-Voltage Switchgear (Left), UHV GIS Exterior (Right)
UHV GISs were developed for the world's first commercial 1,100 kV UHV alternating current (AC) power transmission project.

SDEE Hitachi High-Voltage Switchgear Co., Ltd. is a local company located in China's Shandong province created with SDEE which is subsidiary of State Grid Corporation of China. It can produce UHV GISs (see Fig. 2) and many other types of GISs (with capacities ranging from 110 to 1,100-kV). Hitachi will use this base to contribute to the power transmission network in China.

Middle East, Africa

Recent economic growth and growing populations

Kenji Annou
President & CEO, PT. Hitachi Power Systems Indonesia

PT. Hitachi Power Systems Indonesia (HPSI) is the Indonesian manufacturing subsidiary of the Power Systems Company, Hitachi, Ltd. Since its establishment in 1995, it has served as an ASEAN-region manufacturer of extra-high-voltage (EHV) power transmission equipment, producing GISs and GCBs. To meet demand for augmented power transmission and distribution networks in Indonesia, the ASEAN region and the Pacific Rim region, the company completed construction work to increase production capacity in June 2014, and started manufacturing Indonesia's first 500-kV-class GISs.

The growing populations of Indonesia and the ASEAN and Pacific Rim regions are expected to create growing demand for thermal power facilities and other main-line power plants, and for natural energy facilities such as wind and solar power facilities. This will lead augmentation of transmission and distribution networks, and HPSI will work on meeting these needs as a major base in the global value chain for the power systems industry.

are expected to result in major growth in demand for power in the Middle East and Africa. Indoor GIS substations are the focus in this region of harsh natural environments.

Hitachi has been constructing GIS substations in countries such as Saudi Arabia and Kuwait since the 1970s. Hitachi's transformer technology has been highly praised by the Saudi Electricity Company (SEC), and Hitachi has a near-monopoly in providing step-up transformers for recently constructed large thermal power plants.

Drawing on its high-reliability hardware and ability to successfully complete projects, Hitachi plans to continue helping the power transmission market in this region.

Europe

Nowhere in the world has championed renewable energy more actively than the EU, as seen in its '20-20-20' environmental targets and the efforts of several member countries to introduce various systems and create funds. As the region works to adopt large-scale renewable energy, problems such as shortages of power transmission facilities and grid instability have been coming to light. This environment has generated aggressive investment in DC power transmission for connecting remote power plants or upgrading power transmission facilities, grid stabilization using flexible alternating current transmission system (FACTS) devices, higher-speed monitoring using phasor measurement units (PMUs), and smart grids.

Hitachi has worked on smart grid verification projects such as verifying stabilization of power distribution voltages in the UK, and verifying the mass-introduction of electric vehicles (EVs) in Spain. Hitachi has also signed a cooperation agreement with Russian Grid to modernize and stabilize its power transmission and distribution network, and have studied the potential applicability of storage battery systems and grid stabilization solutions.

BECOMING A MAJOR GLOBAL PLAYER

In the years ahead, there will be increasing demand for system solutions combining hardware and IT, such as wide-area interconnections among different power grids, grid stabilization to prevent major power failures, industrial energy-saving, and high-reliability environmentally friendly power receiving/transforming equipment. Through the bases in the USA, China, Singapore, Indonesia, Taiwan, and elsewhere, Hitachi will work on providing solutions more closely tailored to the needs of each region.

ABOUT THE AUTHOR

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