

## **Nippon Koei develops storage battery control system for controlling power frequency**

### **Commencement of balancing services in the U.K. from 2018**

Nippon Koei Co. Ltd. ("Nippon Koei", with headquarters in Tokyo, Japan and Ryuichi Arimoto as President) has developed a storage battery control system that offers demand/supply balancing services and frequency control services to the electricity grid in the U.K. This unit started its operation in February 2018.

The expansion of renewable energy and its proper integration within the electricity grid is becoming a global issue due to increasing intermittency of renewable energy sources such as wind and solar with power output fluctuating with the weather conditions. The U.K. is not an exception. National Grid, the transmission system operator in the U.K., to maintain power quality and to regulate the power frequency purchased services from third parties via products and organized markets aligned with energy regulator requirements.

Nippon Koei has developed its own control system named NK-EMS and connected it to a storage battery system as the third party manufacturer. The Company will offer to National Grid a Firm Frequency Response (FFR) service which automatically controls the frequency, keeping it within the designated range. Our control system discharges when the frequency drops to below the designed range, and charges when the frequency rises by detecting frequency fluctuation that occurs at every moment. NK-EMS, developed in our Fukushima Works factory, has undergone the National Grid's test to confirm connectivity to storage battery system.

The storage battery control system developed by Nippon Koei aims for multivendor compatibility with any storage battery system and will be extendable with additional features including control system for hybrid renewable energy systems.

Thanks to technological innovation and cost reduction, the market for businesses using batteries is expected to grow rapidly and the storage and distribution technologies will be the core to the energy management business. Nippon Koei will accumulate expertise in relation to the regulation, technology and operations for services related to maintain power quality through its business activities in the U.K., a pioneering nation in this field. Nippon Koei will seek business opportunities to offer services both in hardware/software and EPC \*1 related to energy management. With the perspectives of the Legal Unbundling of Transmission and Distribution Sectors in 2020, Nippon Koei will also deploy such activities in Japan where the market for demand response, virtual power plant and energy storage is expected to develop and expand going forward.

\*1 A comprehensive service covering the Engineering, Procurement and Construction of power generation facilities

■ Control system (NK-EMS)

Services to be provided:

- (1) Balancing services (Firm Frequency Response: FFR): Provision of frequency fluctuation control and reserve electricity capacity
- (2) Capacity Market: Securing of back-up power supplies during the peak demand periods

Development and manufacturing: Fukushima Works, Nippon Koei Co., Ltd.

Features: Multivendor compatibility

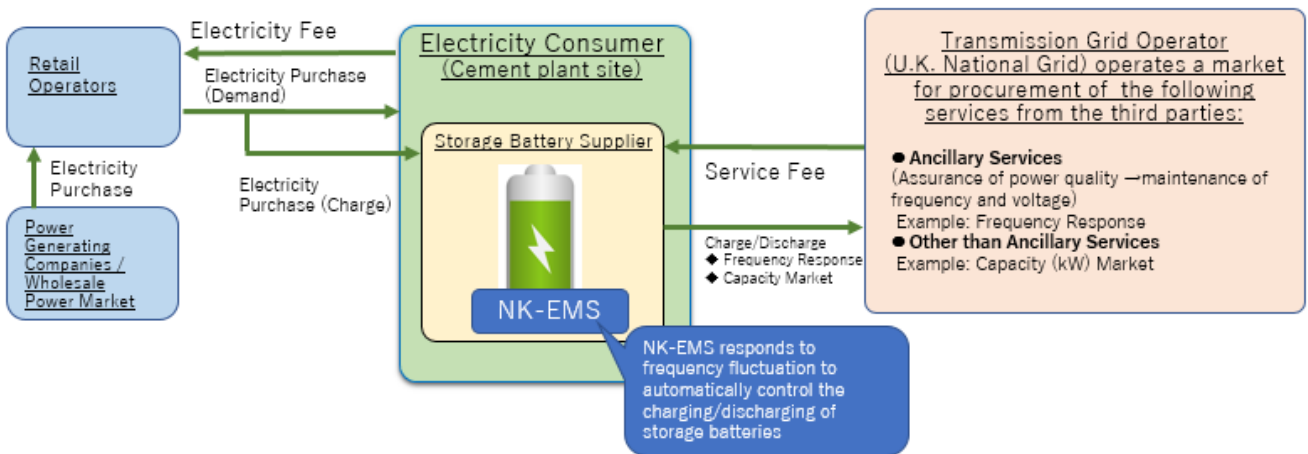
Business site: Cement plant site in Wales, U.K.

Storage Battery System Capacity: 4.0 MW

Commencement of operations: February 2018

Aggregator: KiWi Power Co.,Ltd

■ Structure of services



■ Site Photos



Project site along with Wind and Solar.



Enclosure which contains NK-EMS



Battery system overview

**About Nippon Koei**

Nippon Koei is Japan's No.1 International Engineering Consultants.

Our project managers and engineers provide strong engineering solutions for our clients by planning, designing and supervising construction of infrastructure projects in the fields of energy, transportation, resources, urban and public sector development.

During 70 years, Nippon Koei has worked on over 5000 multi-disciplinary infrastructure projects in 156 countries all over the world.

Nippon Koei is the oldest independent consulting firm in Japan. We have been providing consulting services for economic development projects since 1946. We have a sound financial base with a total paid-in capital of over \$70 million.

Nippon Koei is listed on the First Section of the Tokyo Stock Exchange.

<http://www.n-koei.co.jp/english/>