News Release

NEDO and Hitachi to Start Cloud-Based Advanced Energy Management System Demonstration Project in Slovenia

— Project aims to realize energy services business, including autonomous operation during power grid failure—

September 25, 2018
New Energy and Industrial Technology Development Organization (NEDO)
Hitachi, Ltd.

New Energy and Industrial Technology Development Organization (NEDO) and Hitachi, Ltd. will expand the Smart Community Demonstration Project being carried out jointly with ELES, d.o.o., Slovenia's state-owned electricity transmission system operator, and will start demonstration of a cloud-based Advanced Energy Management System (AEMS) for the first time from October 2018.

In advance of this, NEDO, Slovenia's Ministry of Economic Development and Technology, Ministry of Infrastructure, and ELES d.o.o. agreed to joint implementation of the expanded project scope and signed the revised version of Memorandum of Cooperation (MOC), Minutes of Meeting (MOM) and Memorandum of Understanding (MOU), respectively, on September 24. At the same occasion, Hitachi, Ltd., which is NEDO's entrusted party, and ELES, d.o.o. signed the revised version of Implementation Document (ID).

Under the expanded project scope, NEDO and Hitachi aim to establish an energy service business for large consumers and electricity retailers by implementing and demonstrating a cloud-based Advanced Energy Management System (AEMS) which is linked with Battery Energy Storage System (BESS) installed on the consumer side, for example, in factories, buildings and homes, and which prevents power outages through autonomous operation during grid failure, ensures the quality of factory electricity through voltage dips mitigation measures, and provides frequency control to electricity transmission system operator.

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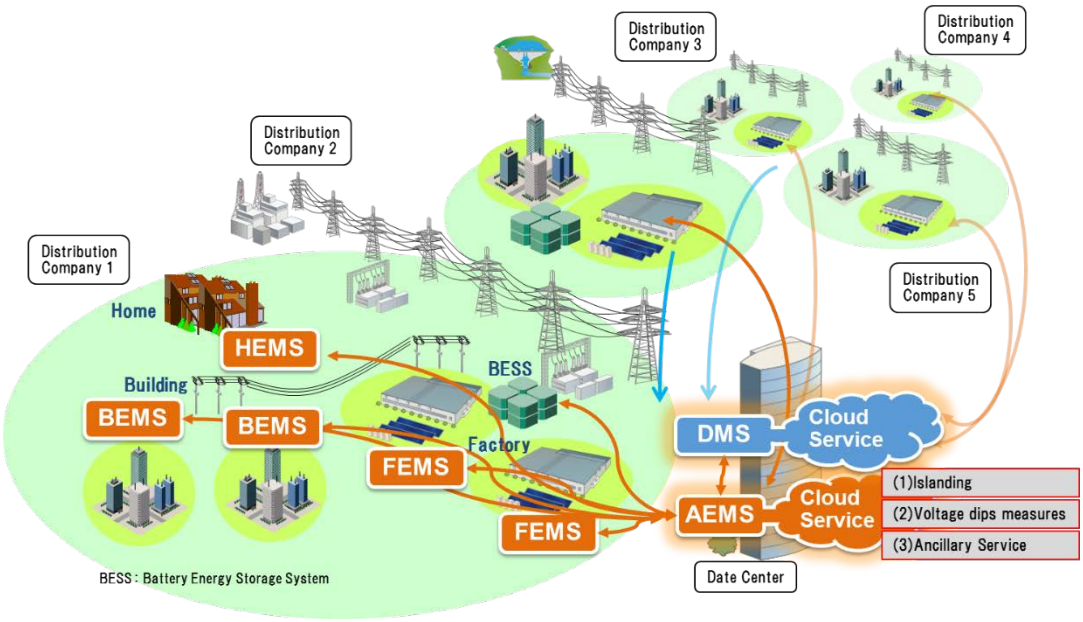

Figure 1 Action Overview

[Explanation of Figure 1]

In this demonstration, a cloud-based Advanced Energy Management System (AEMS) implemented at a date center will link Battery Energy Storage System (BESS) installed on the consumer side within the demonstration area, energy management systems (xEMS) installed to factories, buildings, homes, and a distribution management system (DMS) installed at an electricity distribution company, to provide services including (i) islanding (autonomous operation during grid failure), (2) voltage dips mitigation measures, and (3) ancillary services (frequency control to electricity transmission system operator) to multiple customers.

AEMS（Advanced Energy Management System）: Energy management system for large consumers and electricity retailers

xEMS（x Energy Management System）: General term for factory energy management systems (FEMS), building energy management systems (BEMS) and home energy management systems (HEMS).

DMS（Distribution Management System）: A management system for distribution systems. Under demonstration as part of this project since November 2016.

1. Overview

Slovenia is a country in Central Europe which declared independence from Yugoslavia in 1991. Since joining the EU in 2004, Slovenia has enjoyed improving standards of living and a high rate of growth in the manufacturing industry. As a result, electricity demand is increasing. Under these circumstances, Slovenia adopted the targets of achieving a 25% share of renewable energy sources in gross final energy consumption and a 20% improvement in energy efficiency by 2020, and it ratified the Paris Agreement, a new framework for an internationally coordinated effort to tackle climate change which entered into effect on November 4, 2016. However, the facilities of electricity distribution companies are aging, and an increase in investment expenditure to replace facilities is expected.

In view of this situation, Slovenia is likely to need more sophisticated and cost-effective distribution grid management technologies to solve issues anticipated in connection with the increase in renewable energy sources and electricity demand, such as voltage fluctuation, power outage, overload and ensuring reserve and balancing power

Meanwhile, consumers and electricity retailers need more sophisticated and cost-effective energy management technologies. Especially the power outage occurred due to the severe ice storm in 2014, and other outages affected by extreme weather in recent years raised the importance of measures to protect critical facilities such as hospitals

against huge power outages. Damage from voltage dips (a momentary decrease in voltage caused by snowfall, lightning strike or other natural disaster) also have a serious impact on large consumers that need high quality electricity such as factories, and voltage dips mitigation measures are, therefore, required. Moreover, in the future, number of consumers that have BESS are expected to increase and consumers will also be expected by electricity transmission system operators to contribute to grid stability.

Under these circumstances, on November 25, 2016, New Energy and Industrial Technology Development Organization (NEDO), Solvenia's Ministry of Development and Technology and Ministry of Infrastructure as well ELES. d.o.o., Slovenia's state-owned electricity transmission operator agreed to carry out a smart community demonstration project. Hitachi Ltd., NEDO's entrusted party, and ELES, d.o.o have been selected to undertake a joint project under such agreement. Hitachi and ELES have been implementing the distribution management system (DMS) for electricity distribution companies, which is scheduled to run until December 2019.

NEDO, Slovenia's Ministry of Economic Development and Technology, Ministry of Infrastructure, and ELES, d.o.o., have now agreed to expand the scope of the demonstration project for large consumers and electricity retailers and to start a demonstration project for a cloud-based Advanced Energy Management System (AEMS), and the parties signed the revised version of Memorandum of Cooperation (MOC), Minutes of Meeting (MOM) and Memorandum of Understanding (MOU) respectively on September 24. At the same occasion, Hitachi, Ltd. and ELES d.o.o. agreed to jointly implement this new demonstration scope and signed a revised version of the Implementation Document (ID).

In the demonstration that will now be newly undertaken, Hitachi and ELES will implement a cloud-based Advanced Energy Management System (AEMS) with functions such as islanding (autonomous operation during grid failure), voltage dips mitigation measures and ancillary services (frequency control to electricity transmission system operator), aiming to establish an energy services business for large consumers and electricity retailers.

In the future, based on the analysis and evaluation results of this demonstration, Hitachi, Ltd. and ELES, d.o.o. will examine deployment of a business model, with the main emphasis in Europe, for providing the cloud-based AEMS together with the cloud-based DMS demonstrated earlier in the form of a service.

2. Details of demonstration project

1）Implementation period： From October 2018 to March 2021 (Planned)

(The cloud-based integrated DMS demonstration carried out first will run from November 2016 to December 2019 (Planned))

2）Outline of cloud-based Advanced Energy Management System (AEMS) demonstration project

（1）Islanding

The system is linked with the DMS and prevents huge power outages by isolating areas that contain critical facilities such as hospitals from the grid and providing electricity from BESS during power outages.

（2）Voltage dips mitigation measures

The system mitigates voltage dips caused by snowfall, lightening strike or other natural disaster at factories and other consumers that require a high-quality electricity supply by using BESS installed within the area to protect

consumers' critical facilities from voltage dips.

(3) Ancillary services

The system link with BESS and xEMS installed at consumers within the area and provides frequency control to electricity transmission system operators that contributes to grid stability.

3) Participants and action organization

NEDO signed MOC with the Ministry of Economic Development and Technology in Slovenia

NEDO signed MOM with the Ministry of Infrastructure in Slovenia

NEDO signed MOU with ELES, d.o.o., Slovenia's state-owned electric transmission operator

ELES, d.o.o. signed ID with Hitachi, Ltd.

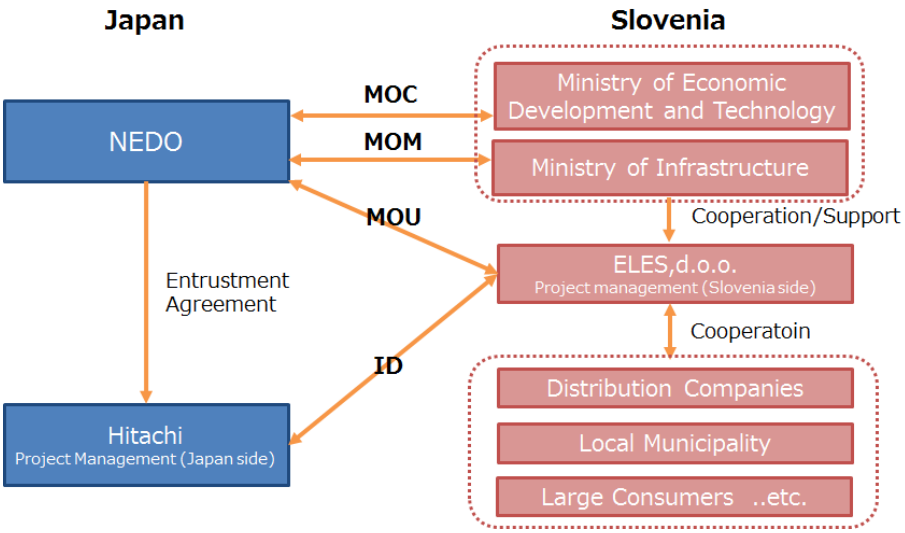

Figure 2 Diagram of demonstration implementation framework

Figure 3 Map of countries surrounding Slovenia

3. Signing ceremony

At the signing ceremony held in Ljubljana, Slovenia on September 24 (local time), Mr. Hiroaki Ishizuka, NEDO Chairman, Mr. Aleš Cantarutti, State Secretary of the Ministry of Economic Development Technology, Mr. Bojan Kumer, State Secretary of the Ministry of Infrastructure, and Mr. Aleksander Mervar, the CEO of ELES signed the revised version of Memorandum of Cooperation (MOC), Minutes of Meeting (MOM) and Memorandum of Understanding (MOU) respectively and Mr. Masaaki Nomoto, Senior Officer of Hitachi, and Mr. Aleksander Mervar, the CEO of ELES signed the revised version of Implementation Document (ID) in the presence of His Excellency Mr. Keiji Fukuda, Ambassador Extraordinary and Plenipotentiary of Japan to Slovenia, His Excellency Mr. Zdravko Počivalšek, Minister of Economic Development and Technology, and Her Excellency Ms. Alenka Bratusek, Deputy Prime Minister and Minister of Infrastructure (former Prime Minister), to establish a framework for cooperation in connection with implementation of the demonstration project.

About NEDO

New Energy and Industrial Technology Development Organization (NEDO) is a national research and development agency under the Ministry of Economy, Trade and Industry, the Government of Japan. Following the two oil crises of the 1970s, NEDO was established in 1980 to promote the development of oil-alternative energy technologies. NEDO is active in a wide variety of areas as one of the largest public research and development management organizations in Japan.

About Hitachi, Ltd.

Hitachi, Ltd. (TSE: 6501), headquartered in Tokyo, Japan, delivers innovations that answer society’s challenges, combining its operational technology, information technology, and products/systems. The company’s consolidated revenues for fiscal 2017 (ended March 31, 2018) totaled 9,368.6 billion yen ($88.4 billion). The Hitachi Group is an innovation partner for the IoT era, and it has approximately 307,000 employees worldwide. Through collaborative creation with customers, Hitachi is deploying Social Innovation Business using digital technologies in a broad range of sectors, including Power/Energy, Industry/Distribution/Water, Urban Development, and Finance/Social Infrastructure/Healthcare. For more information on Hitachi, please visit the company's website at http://www.hitachi.com.

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