

【NEWS RELEASE】

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Polskie Sieci Elektroenergetyczne S.A.
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Polish-Japanese Smart Grid Demonstration Project in Poland has been completed

Tokyo, July 8, 2021 --- Sumitomo Mitsui Banking Corporation ("SMBC"), Hitachi, Ltd. ("Hitachi"), Polskie Sieci Elektroenergetyczne S.A. ("PSE"), Energa Operator S.A. ("EOP") and Energia OZE S.A. ("EOZE") today announced that the Polish-Japanese Smart Grid Demonstration Project in Republic of Poland ("Poland"), which promoted with Showa Denko Materials Co., Ltd. ("Showa Denko Materials") has been completed on June 30, 2021. The project was supported by the Ministry of Climate and Environment of the Republic of Poland and the Japanese government agency New Energy and Industrial Technology Development Organization ("NEDO") and has been carried out in cooperation with Polish project partner companies: PSE, EOP and EOZE. The project aimed to contribute to further integration of renewable energy in Poland by achieving secure power grid operation while minimizing investment costs for power transmission equipment at the same time. The project consisted of the implementation of the Special Protection Scheme system (SPS) and the hybrid Battery Energy Storage System (BESS) located at the Bystra Wind Farm in northern Poland and started the full-scale operation gradually from September 2020. These systems will be used continuously for enhancing the management of Polish power grid.

Along with the introduction of large amounts of wind power generation in Poland, the risk of the grid destabilization and the shortage of load balancing capabilities become an issue, generating a need for a system that will stabilize the power grid while at the same time suppressing economic burden and enabling the introduction of large amounts of wind power generation and other renewable energies.

In March 2017, NEDO concluded a Memorandum of Understanding (MOU) with the Ministry of Energy in Poland (currently the Ministry of Climate and Environment) for "The Demonstration Project for Applying Special Protection Scheme in Poland" intended to enable the expansion of renewable energy in Poland⁽¹⁾. At the same time, three contractors chosen for the project implementation by NEDO, namely SMBC, Hitachi and Showa Denko Materials, conducted on-site surveys and designed, manufactured, transported, and installed equipment, and commenced its demonstrative operation in cooperation with PSE (the transmission system

operator in Poland), EOP (a power distribution system operator in northern Poland) and EOZE (a power generation company in Poland).

In parallel with that, Hitachi, SMBC and Showa Denko Materials worked together to develop business models in consideration of the possibility for wide-deployment of such systems and explore their finance schemes.

Within the scope of work, Hitachi designed and implemented SPS in PSE. On September 30, 2020, the SPS has become operational after the demonstrative operation phase. In parallel, Hitachi and Showa Denko Materials supplied BESS located at Energa OZE's Bystra Wind Farm. At the beginning of April 2021, BESS became operational after the demonstrative operation phase.

As the verification of SPS technical ability covering the northern part of the Polish power system, Hitachi developed optimal countermeasures to prevent the overload of transmission lines that may occur during accidents affecting the power grid. It was carried out by conducting simulations that assume the conditions of such accidents and also by examining the methods of control in case of the actual accident. At the same time, the amount of connectable renewable energy that can be raised with the SPS was examined based on the fact that the capacity of the existing transmission lines reserved for accidental situations can be effectively used, enabling connection of more renewable energy.

Regarding BESS, it has been installed at the Bystra Wind Farm in Gdansk, northern Poland. The functionality of alleviating short-term fluctuations in wind power generation and providing necessary reserve power for adjusting demand-supply balance was verified.

Furthermore, SMBC worked with Hitachi and Showa Denko Materials for exploring the business model and the finance scheme for both systems.

This demonstration project was completed upon the accomplishment of the goal that the technical effectiveness of both systems, which were developed under the entrustment by NEDO, were confirmed through the demonstration period.

SPS and BESS will continue to be utilized by Polish companies after the demonstration project. SMBC, Hitachi, and Showa Denko Materials will contribute to the enhancement of Polish power system with the know-how gained from the demonstration project.

(1) News Release (March 17, 2017)

“Smart Grid Demonstration Project in Poland to improve power system protection in case of high penetration of renewable energy”

https://www.nedo.go.jp/english/news/AA5en_100189.html

Statement by Eryk Klossowski, CEO, Polskie Sieci Elektroenergetyczne S.A.

“Rising integration of non-dispatchable sources of energy in energy mix constitutes a challenge for Transmission System Operator, hence PSE searches for solutions increasing the security of the Polish Power System. The SPS and BESS will contribute to improving the operation of the transmission grid in the increasing wind power environment. For this reason, I am satisfied that PSE could participate in this project and become one of the first companies in Europe to implement a system with intelligent grid functionalities.”

Statement by Piotr Meler, CEO, Energa OZE SA

“Energa Group owned by ORLEN Group, as the leader in the development of renewable sources of energy in Poland, spotted technical challenges related to the expansion of RES and acts for the quality and reliability of energy supply. We want to achieve that through the development of modern infrastructure for energy storage purposes. Our attention and active participation, as well as Energa Group's engagement at almost all stages of the project permitted us to acquire and develop the best world-class technical knowledge and reach unique competence. Due to another modern energy storage, we have gained experience in this type of investments and we can see further ‘green’ prospects, which should be beneficial for the entire Polish energy and industrial sectors.”

Detail of SPS and BESS in Demonstration

(1) SPS

SPS is composed of two units:

1. RAS-Engine
2. RAS-Agent

SPS has been implemented in PSE. To assure its continuous operation, all critical elements of SPS are redundant.

SPS makes cyclical analysis based on real-time data from the SCADA PSE online system and eliminates overloads of the power grid by optimal limitation of active power generation by wind farms. The above solution may reduce the necessity of preventive interventions.

(2) BESS

In the demonstration, BESS has been connected to the grid of Bystra Wind Farm. The storage is composed of five modules of lead-acid batteries (LAB), each with a capacity of 1 MW and one module of lithium-ion batteries (LiB) with a capacity of 1 MW. The total capacity of this hybrid energy storage amounts to 6 MW, while its storage capacity reaches 26.9 MWh (LAB) and 0.47 MWh (LiB). This system is the largest storage battery system in Poland.

(3) Functions of SPS and BESS

SPS and BESS can optimally manage wind generation to eliminate or mitigate power-grid overloads occurring as a result of power grid failure and to support Polish Power System in frequency regulation.

Functionalities of SPS and BESS energy storage include:

1. elimination of overloads on transmission (220 and 400 kV) and distribution (110 kV) network occurring as a result of disruptions by limiting generation at wind farms connected to medium- or high-voltage lines in the area covered by the project (SPS functionality).
2. generation of recommendations to dispatch services with optimum remedial measures (Decision Support System, DSS, SPS functionality)
3. frequency restoration reserve (BESS functionality, based on TSO's dispositions sent via SPS)
4. replacement reserve (BESS functionality, based on TSO's dispositions sent via SPS)
5. curtailment of short-term fluctuations of the Bystra Wind Farm output (BESS functionality)
6. price arbitrage (charging BESS at a low energy price, discharging at a high energy price).

About the project participants

1. NEDO (New Energy and Industrial Technology Development Organization) – Japanese government agency has supervised and substantially financed the project.
2. The Ministry of Climate and Environment (previously Ministry of Energy) – has sponsored the Polish-Japanese initiative, expressing its support by signing the Memorandum of Understanding with New Energy and Industrial Technology Development (NEDO) for the implementation of the project concerned.
3. Polskie Sieci Elektroenergetyczne (PSE) – transmission system operator in Poland. PSE is the project leader responsible for the coordination of work. PSE is currently the user and owner of SPS.
4. Energa Operator (EOP) – distribution system operator in the northern part of Poland, responsible mainly for ensuring technical capability for SPS to limit generation at wind farms connected to the EOP 110 kV distribution network.
5. Energa OZE (EOZE) – the owner of the Bystra wind farm to whose network the energy storage facility has been connected. The EOZE was responsible mainly for the construction and commissioning of the storage facility as well as for performing functional testing of all BESS functions in cooperation with project partners. The EOZE is currently the owner of the energy storage facility.
6. Hitachi and Showa Denko Materials – responsible for designing, producing, and implementing the SPS system and the battery energy storage system (BESS).
7. Sumitomo Mitsui Banking Corporation (SMBC) – Japanese commercial bank. SMBC explored business models for SPS and BESS including financial scheme aimed at their adoption. As a global financial group, SMBC will contribute to the development of a sustainable society together with the project participants.

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