

News Release

December 3, 2019

Power grid protection system starts its demonstration operation in Poland — Contributing to an integration of renewable energy, investments optimization and operations automation—

The New Energy and Industrial Technology Development Organization ("NEDO") announced today that the Smart Grid Demonstration Project, aimed at the expansion of renewable energy in Poland, entered power grid protection system ("SPS: Special Protection Scheme") operational demonstration phase. The solution implementation, was executed by Hitachi, Ltd. ("Hitachi"), Hitachi Chemical Co., Ltd. ("Hitachi Chemical") and Sumitomo Mitsui Banking Corporation ("SMBC") in cooperation with Polish partner companies, Polskie Sieci Elektroenergetyczne S.A. ("PSE"), ENERGA-OPERATOR S.A. ("EOP") and ENERGA OZE S.A. ("EOZE"). The project was supported by the Ministry of State Assets of the Republic of Poland (formerly the Ministry of Energy). This important milestone achievement was commemorated with an opening ceremony held in Poland, on December 2.

The SPS is a next generation grid automatics system preventing overloading of transmission lines. The system plans optimal countermeasure actions for specific accidents on the power network based on the real-time network status. If an accident actually occurs, the SPS carries out controls automatically (primarily for the automatic control of wind generation) in order to prevent overloads in the power grid.

The demonstration is also being carried out to examine how much the amount of connectable capacity of the existing transmission lines can be raised with the use of the SPS allowing as a result for the optimization of power infrastructure investments in Poland and better integration of renewables.

Moreover, Hitachi, Hitachi Chemical, and SMBC have been cooperating on financing schemes and business models for this system development and expansion.

1. Overview

In accordance with the EU targets, Poland has been planning to raise the share of renewable energy. Since the north of Poland has good wind conditions, the country is aiming at the introduction of a large number of wind generation. A large part of the country's power infrastructure is outdated and the capacity of transmission lines limited putting significant constraint to the further renewables introduction. It is necessary for the country to update, improve and expand its equipment urgently. Under these circumstances, introduction of the SPS, protecting the power grid as a large number of renewable energy generation units is being added at the same time reducing economic burden can facilitate that transition.

With the above background, in March 2017, NEDO concluded a memorandum of understanding (MOU) with the Ministry of Energy of the Republic of Poland 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, Hitachi, Hitachi Chemical, and SMBC, the contractors chosen for the project, have carried out studies, designed equipment, produced, transported and installed the equipment, in accordance with the schedule, in cooperation with Polish partner companies, PSE (the only transmission system operator in Poland), EOP (a distribution system operator located in Northwestern Poland) and EOZE (a power generation company in Northwestern Poland).

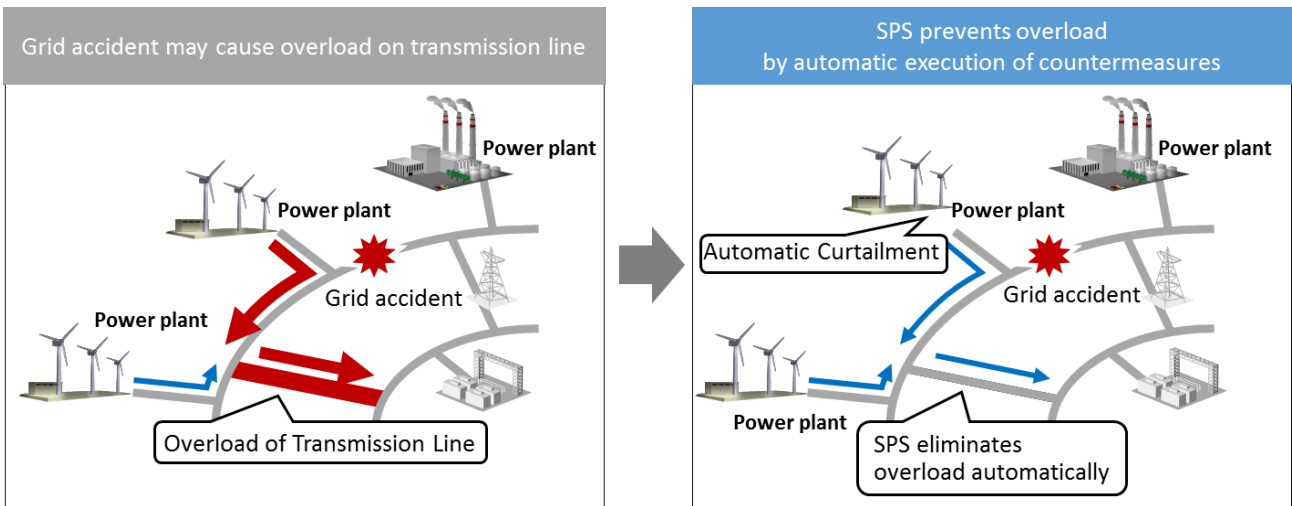
NEDO has completed the introduction of the SPS a technology unique to Japanese companies, in cooperation with the contractors and the cooperating companies described above. In cooperation with the Ministry of State Assets of the Republic of Poland, the demonstration operation was started on October 1 and a commemorative ceremony celebrating the commencement of the operation of the SPS was held at the head office of PSE, with the attendance of involved parties.

The control method for grid accidents affecting the power network has been also discussed in Japan by the Organization for Cross-regional Coordination of Transmission Operators, Japan (OCCTO). This project is a demonstration of leading-edge technology for power grid control, although the subject of the control is not similar to Japanese methods.

2. Description of the Demonstration

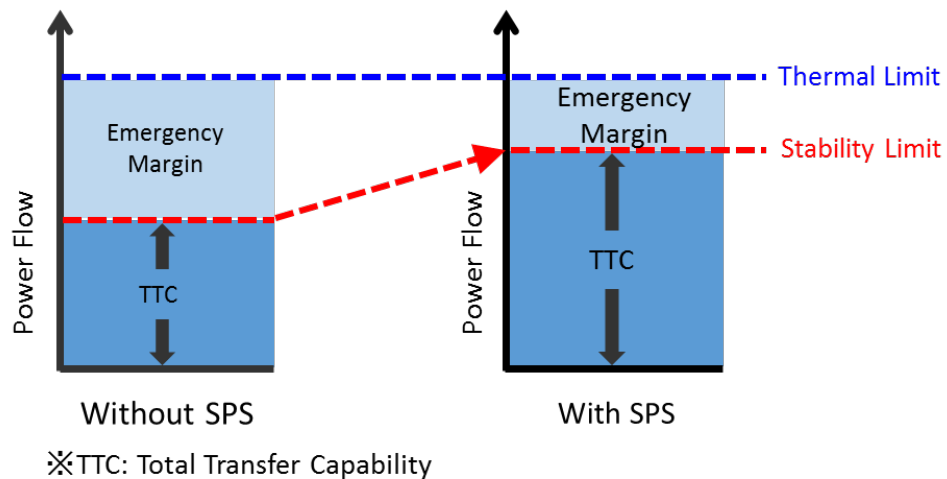
Theme: Protection of the power grid to prevent the overload of transmission lines

In this demonstration operation, in cooperation with PSE and EOP, Hitachi is developing optimal countermeasures to prevent the overload of transmission lines that may occur during accidents affecting the power grid. It is 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. The SPS continuously performs analysis on the basis of information received from the power grid. Hitachi develops the preventive measures on the basis of the simulation of the status of the power grid in accidental situations. In actual cases of such accidental situations in the power grid, the SPS can send control signals automatically to prevent the overload of transmission lines.



Automatic elimination of overload during grid accident (Image)

With the above SPS, the capacity of the existing transmission lines reserved for accidental situations can be effectively used, enabling connection of more renewable energy. In this demonstration, the amount of connectable renewable energy that can be raised with the SPS will be also examined.



※TTC: Total Transfer Capability
The Effective use of Emergency margin
(capacity of the existing transmission lines reserved for accidental situations)

3. Future plans

Hitachi and Hitachi Chemical have been advancing construction work for the installation of the hybrid battery energy storage system (BESS). This is another major piece of the Demonstration project, carried out in cooperation with EOZE. After works completion hybrid BESS (comprised of high-power lithium-ion battery and a large capacity lead acid battery), will be used in combination with the SPS to provide reserve capacity and also eliminate actual overloads of transmission lines. In addition, this demonstration of the combination of the wind generation and BESS can also support the integration of renewables in Poland.

[Notes]

1 News Release (March 29, 2016)

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

<https://www.hitachi.com/New/cnews/month/2017/03/170317.html>

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