News Release

2019.6.27

Nissin Electric Co., Ltd.

Nissin Electric Starts a New Field Test of SPSS (Smart Power Supply Systems)

— Strengthening Energy Solutions by Utilizing the Nissin Academy Training Center —

Nissin Electric Co., Ltd. today announced that it has started a new field test of SPSS at the Nissin Academy Training Center ("the Training Center") for "the self-consumption photovoltaic (PV) solution" and "direct current (DC) power distribution solution" in stages in June.

The Training Center will be widely utilized for field testing, development, and verification to expand the use of renewable energy, which has been increasingly important from the viewpoint of achieving a decarbonized society and energy-based economic development, and to achieve energy conservation, thereby strengthen the energy solutions business and train engineers. The Training Center will also serve as a facility for disseminating information for overall promotion of the SPSS initiative by helping visualize the full-scale operation of distributed energy resources at the Maebashi Works that started in March 2014 and utilization of the Virtual Power Plant (VPP) that was launched in October 2018.

Overview of the SPSS Field Test Plan at the Training Center

- **Self-consumption PV Solution**

  The solution aims to utilize excess PV electricity by introducing a self-consumption PV system and using self-consignment.

- **DC Power Distribution Solution**

  A DC power distribution system that combines renewable energy with storage batteries has been built on the premises of the Training Center to conduct a field test of its effectiveness.

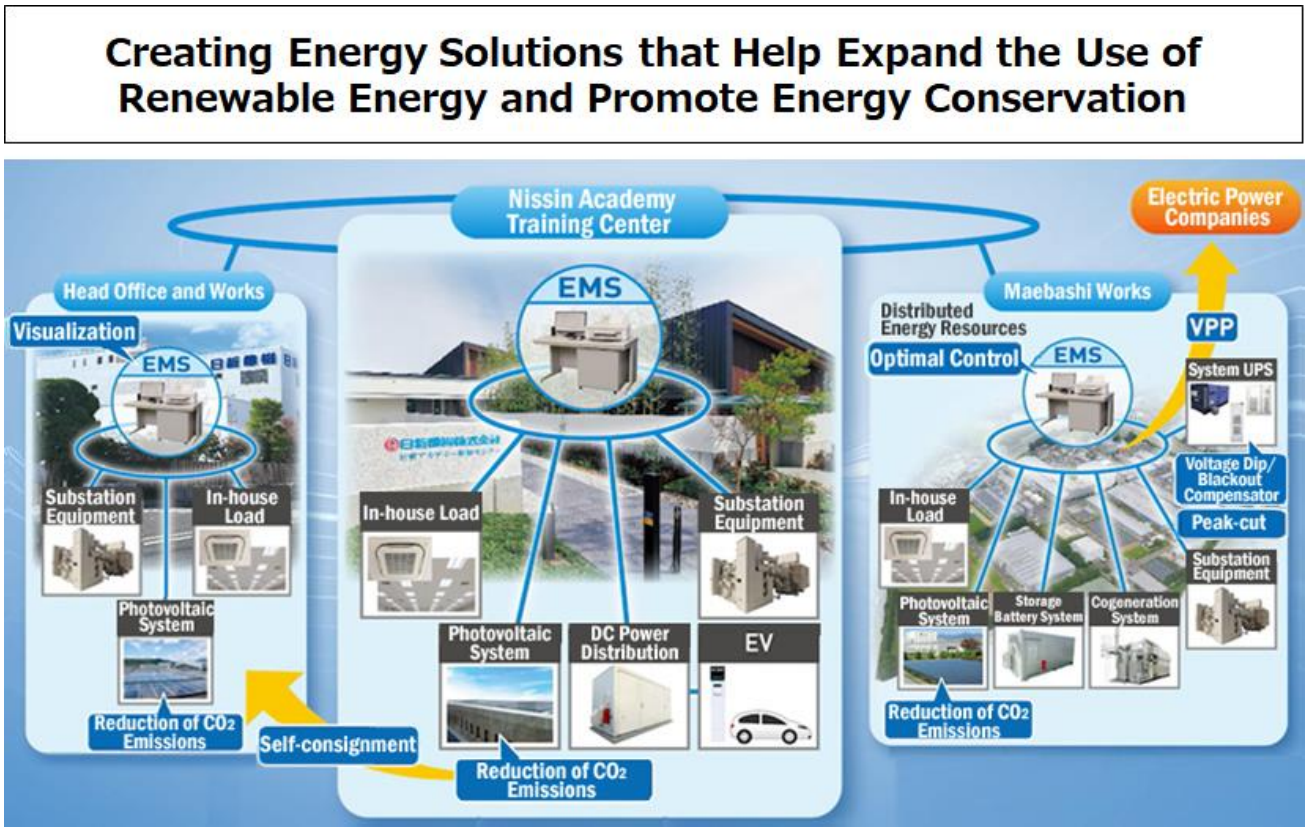


Image of the SPSS field test at the Training Center

1. Self-consumption PV Solution

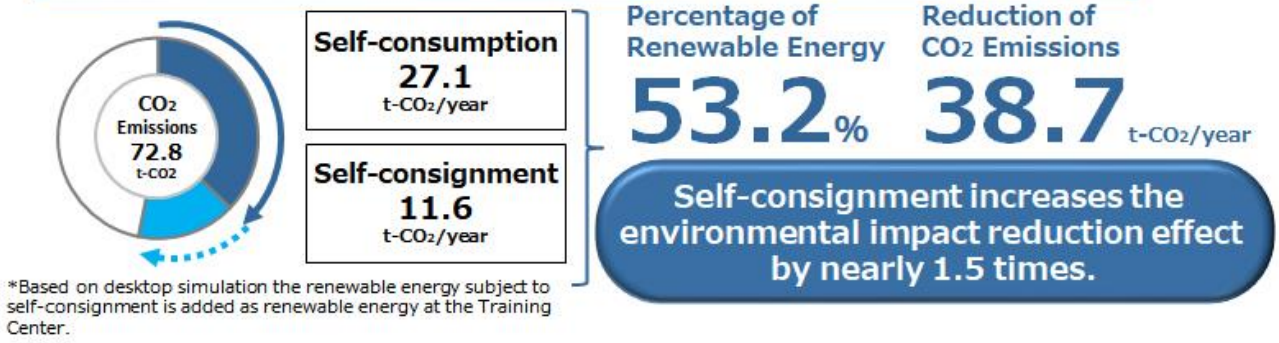
Nissin Electric introduced a PV system of about 100 kW (92.4 kW) at the Training Center. The power generated by the PV system is used for self-consumption. The percentage of renewable energy used at the Training Center is expected to reach 37.2%, and CO_2 emissions are expected to be reduced by 27.1 t-CO_2/year.

There has been an increasing number of customers who are considering the possibility of introducing a self-consumption PV solution to reduce CO_2 emissions. Excess electricity may pose an issue when the load is low. Measures include shutting down the PV system or reducing the output on holidays. However, such measures result in a waste of electricity generated by the PV system. The percentage of renewable energy can be improved further and CO_2 emissions can be reduced by fully utilizing the excess electricity through self-consignment.

■Self-consignment of excess PV electricity increases the CO_2 emissions reduction effect by about 1.5 times. (The self-consignment operation is scheduled to commence by the end of the year.)

The self-consumption PV system offers a solution to fully utilize excess PV electricity when the load is low such as on holidays through self-consignment to the adjacent Head Office and Works. When the renewable energy subject to self-consignment is added as renewable energy at the Training Center, the simulated percentage of renewable energy increases to 53.2%, and CO_2 emissions reduction increases to 38.7 t-CO_2/year. The environmental impact reduction effect is about 1.5 times that of a system without self-consignment.

The self-consumption PV solution using self-consignment is expected to be useful as a new environmental measure.



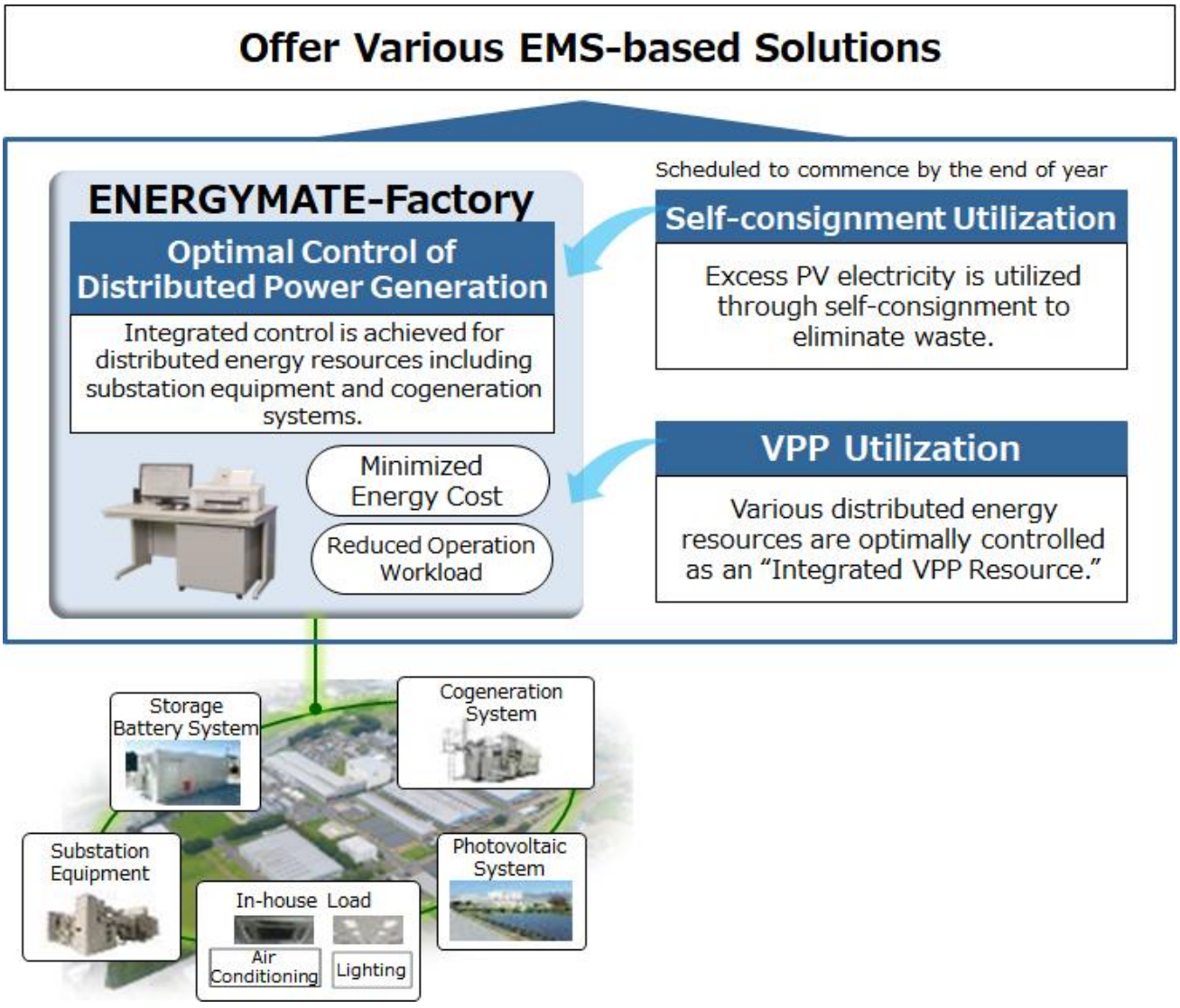
Self-consignment of excess PV electricity increases the CO_2 emissions reduction effect by about 1.5 times.

(The self-consignment operation is scheduled to commence by the end of the year.)

■ **Nissin Electric has been developing an energy management system (EMS) to achieve self-consignment of PV electricity and offer various EMS-based solutions.**

To achieve self-consignment of excess PV electricity, it is necessary to plan the power generation amount subject to self-consignment in advance and achieve self-consignment to support planned power balancing. Nissin Electric has been developing an EMS for controlling PV electricity to support planned power balancing as an additional function for ENERGYMATE-Factory. The self-consignment operation is scheduled to commence by the end of the year.

Development of the new EMS will enable Nissin Electric to offer various solutions including ENERGYMATE-Factory with the self-consignment capability, in addition to optimal control of various distributed energy resources and utilization of VPP.



Development of an EMS that achieves self-consignment of PV electricity to offer various EMS-based solutions

2. DC Power Distribution Solution (Operation Scheduled to Commence in Stages in July)

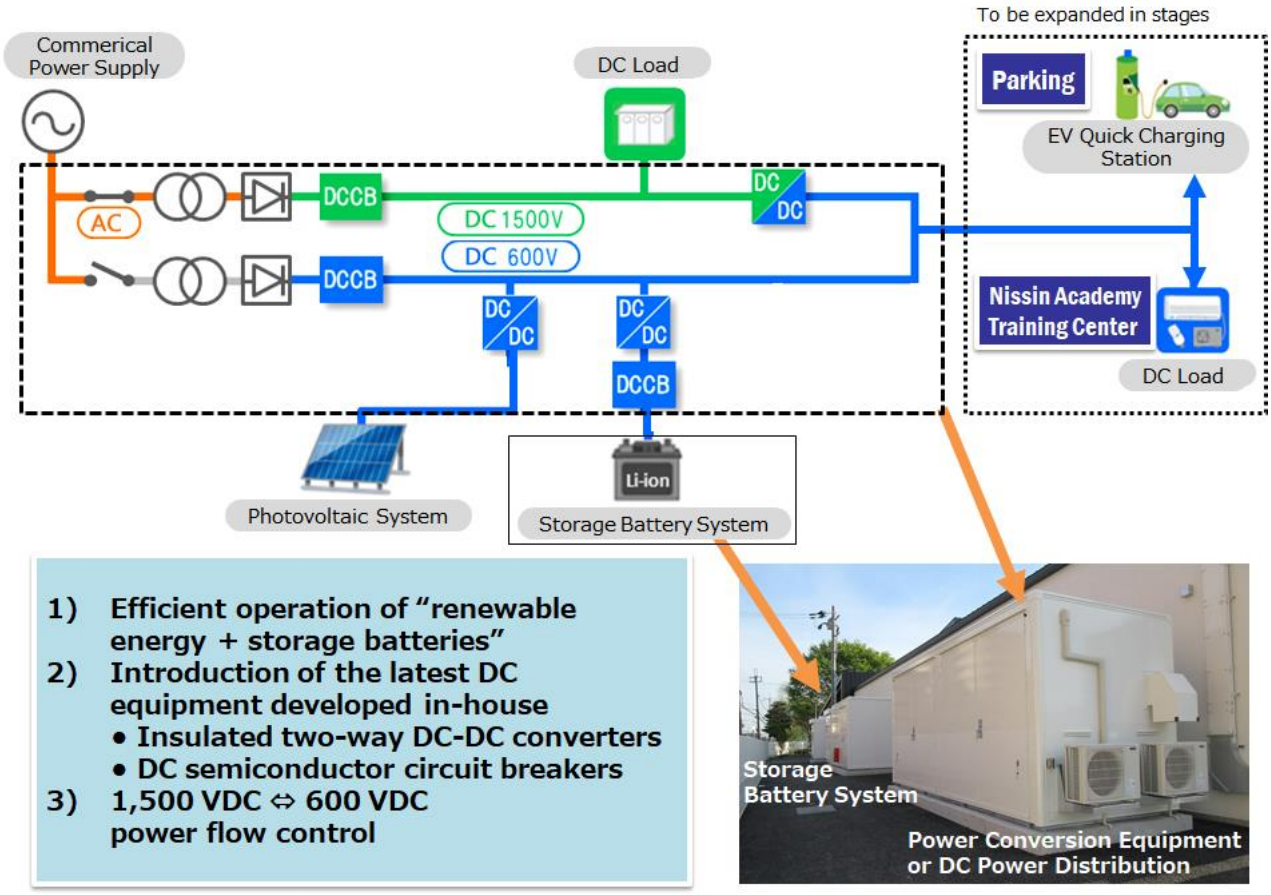
Customers have been increasingly introducing distributed energy resources that generate DC electricity such as renewable energy and DC loads such as electric vehicles (EVs) and LED lights in order to reduce CO_2 emissions. Against this backdrop, a DC electricity network is expected to reduce AC-DC conversion loss and promote energy conservation due to advancements in semiconductor and battery technologies in the future. Meanwhile, less expensive storage batteries will be used to suppress electricity fluctuation or cope with excess electricity derived from renewable energy. This will make it possible to take full advantage of the DC power distribution, including effective utilization of renewable energy by electric power interchange between customers and continuous operation by isolated operation in the event of a voltage dip or blackout on the AC system side.

Nissin Electric is building a DC power distribution system that combines renewable energy with storage batteries at the Training Center and will start field tests to solve technical and safety issues and conduct verification with a vision to “achieve a DC power distribution system in the near future.”

■ Configuration of the DC Power Distribution System and Details of the Field Test

A DC power distribution network is established by connecting DC power generation sources, DC loads, DC circuit breakers (by applying semiconductors), and DC-DC converters (DC transformers).

① The PV electricity is stored in storage batteries. This makes it possible to supply DC electricity to loads almost without purchasing electricity.
② Storage batteries help cut the peak load caused by a sudden load such as a quick charger. This reduces the increase in contract power consumption.
③ Stable operation continues even in the event of a voltage dip or blackout on the AC system side.
④ The semiconductor circuit breakers enable high-speed break in the event of a short circuit fault in the DC power distribution system, preventing the fault from spreading.
⑤ DC power distribution backbone systems of 1,500 VDC and 600 VDC are established to achieve electric power interchange and DC power distribution to multiple feeders.



DC power distribution field test system