Featured Topic: Initiatives for a Paradigm Shift in the Environmental and Energy Business

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1. Movements in the Field of Electrical Energy and Our Response

Decarbonization initiatives are gaining momentum alongside the rise in extreme weather events in recent years, which are attributable to global warming. In 2020, the Japanese government declared that it aimed to achieve carbon neutrality by 2050 and announced the Green Growth Strategy, an action plan which compiled industrial policies aiming at establishing a virtuous cycle of the economy and environment.

The Sixth Strategic Energy Plan formulated in 2021 defined the fundamental vision of Japan's energy policy. It aimed to attain a stable supply of energy, ensure environmental sustainability, and promote economic efficiency at the same time while placing safety as a key priority. At that time, electricity demand was expected to decrease as a result of population decline and advances in energy-saving measures. However, subsequent construction of new data centers and semiconductor fabrication plants, which are major electricity consumers, has led to a reversal, with electricity demand now expected to grow.

In February 2025, the goal of maximizing the use of renewable energy as the major power source (accounting for about 40 to 50% in the power source by FY2040) was defined in the Seventh Strategic Energy Plan. A cabinet decision was concurrently made on the GX2040 Vision (GX: green transformation) and the Plan for Global Warming Countermeasures. As described above, despite minor changes in the government's energy vision and strategic plan in response to the global and economic conditions, carbon-free power sources have become increasingly important in line with advances in digital transformation (DX) and GX.

In the Sumitomo Electric Group 2030 VISION, which is our long-term vision, we define energy, infocommunications, and mobility as three key areas of products and services that underpin infrastructure and industry. In 2023, we made Nissin Electric Co., Ltd. our wholly owned subsidiary to further expand and strengthen the Environment & Energy business through synergies between our solid business foundation and proven track record in low-voltage to ultra-high-voltage electric wire and cable products, which we have established since our founding, and Nissin Electric's power system equipment and substation systems business, which have grown over a history of more than 100 years. This has led to the establishment of a seamless system to offer electric wires, equipment, and systems for the entire power grid, from power plants, through transmission and distribution systems, substations, and storage batteries, to customers.

In 2024, we established the Power Transmission, Distribution & Energy Solution Business Unit and upgraded our system to propose optimal solutions that meet customer needs by consolidating our energy management business and leveraging sales channels and technologies of the respective groups. Topics related to power system equipment and substation systems are discussed below from the perspective of the environment in which our Environment & Energy business operates and the future outlook.

2. Renewable Energy

In Japan, the percentage of renewable energy in total power generation has been increasing annually. In FY2023, renewable energy accounted for 22.9%, with photovoltaic power at 9.8%, which represents the highest proportion, hydropower at 7.6%, biomass power at 4.1%, wind power at 1.1%, and geothermal power at 0.3%. In terms of wind power, Europe leads in both onshore and offshore development. In Japan, there has also been rising interest in wind power generation. Japan, a country surrounded by the sea, has been focusing on expansion of offshore wind power generation, whose capacity is expected to reach 10 GW by 2030 and 30 to 45 GW by 2040.

As shown in Fig. 1, electricity generated by offshore turbines is transmitted through long-distance submarine cables, substations, grid connection switching stations, and circuit breakers to overhead power lines of a power company. Wind power generation fluctuates significantly, and harmonics are generated when the balance between the

capacitance of long-distance cables and the electrical power grid becomes disrupted, potentially resulting in harmful effects, such as overheating, on customers' equipment. Nissin Electric has extensive experience and expertise in power system analysis engineering to analyze such effects and has an advantage in offering equipment for mitigating such effects. We hope to contribute to implementing measures to ensure electricity quality by leveraging advanced power system analysis engineering and broad experience and expertise.

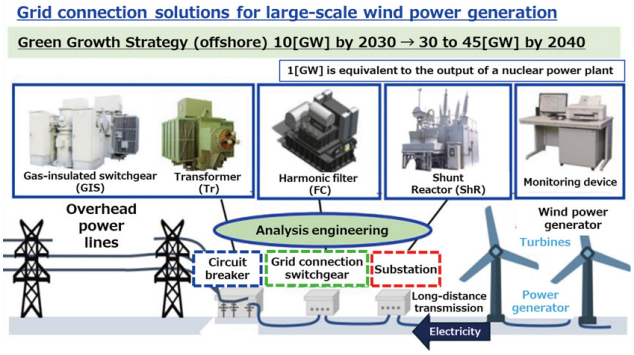

Fig. 1. Equipment for Wind Power Systems

3. Regional Microgrids

Blackouts are one of the factors that significantly impact people's lives during natural disasters such as heavy rain, typhoons, or earthquake. Conventional electricity infrastructure typically supplies electricity from large-scale power plants to different regions, but it is susceptible to widespread blackouts once power plants and power distribution lines are damaged and the power grid is disrupted. Against this backdrop, an energy system known as a regional microgrid, which effectively utilizes distributed energy resources, including renewable energy, has attracted much public attention.

The system shown in Fig. 2 contributes to local energy production for local consumption and lower energy costs during normal operation. During emergency situations, it disconnects from the power company grid and supplements the electricity supply in the region where the system is in place. Microgrids are more highly effective on remote islands that are vulnerable to disaster risks, such as typhoons, and are likely to be isolated over an extended period in the event of a disaster. The system has been introduced to Kurima Island of Miyakojima City, Okinawa Prefecture. When a blackout impacted the entire Miyakojima area on April 25, 2024, the system supplied electricity to all households on the island (about 100 households) for many hours. This is considered the first case in Japan in which a regional microgrid system was operated to supply electricity.

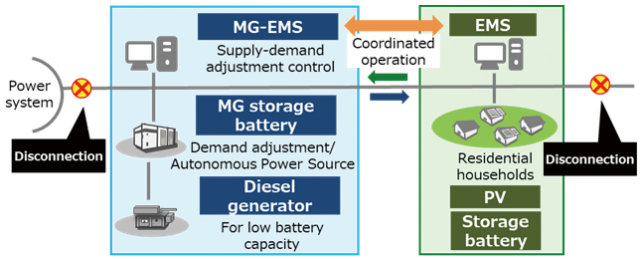

Fig. 2. Regional Microgrids

4. Energy Solution: Smart Power Supply Systems (SPSS)

The Smart Power Supply System (SPSS) is a solution designed to address challenges such as ensuring a stable supply of electricity, energy conservation, cost reduction, and CO_2 emissions reduction. Figure 3 shows the four main functions: renewable energy systems for establishing renewable energy as a primary power source and reducing greenhouse gas emissions, electrical power grid stabilizing systems for enhancing grid stability and resilience, environmentally friendly substation systems that contribute to reducing environmental impacts and saving energy and space, and distributed energy resource control systems for ensuring optimal energy use. There are SPSS variants depending on the application context: SPSS-Factory (for factories and offices), SPSS-Water (for water treatment facilities), SPSS-Grid (for power plants and substations), SPSS-Island (for remote islands and regional grids), and SPSS-Home (for residential areas and households). We will broaden the applications to realize a prosperous, energy-powered society.

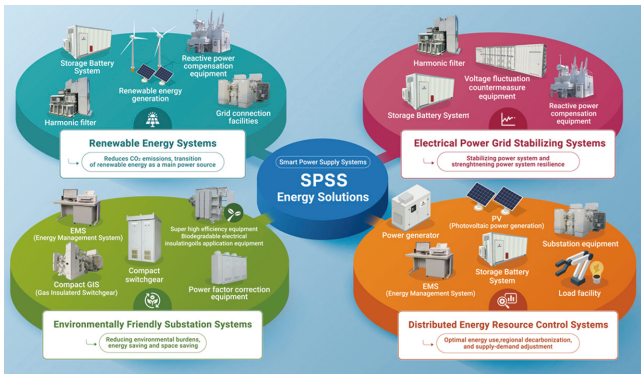

Fig. 3. SPSS

5. Environment & Compact SubStation (ECSS)

The Environment & Compact SubStation (ECSS) helps reduce CO_2 emissions throughout the life cycle of substations, from construction to renewal. As shown in Fig. 4, CO_2 emissions can be reduced by using transformers and power capacitors which have significantly reduced operational losses. Meanwhile, sulfur hexafluoride (SF_6) gas-free GIS (gas-insulated switchgear) and equipment using biodegradable electrical insulating oils are under development and will be implemented in practical

applications in the near future. All equipment is also designed to be compact to help reduce CO_2 emissions throughout the product life cycle, including manufacture, transport, construction, and disposal.

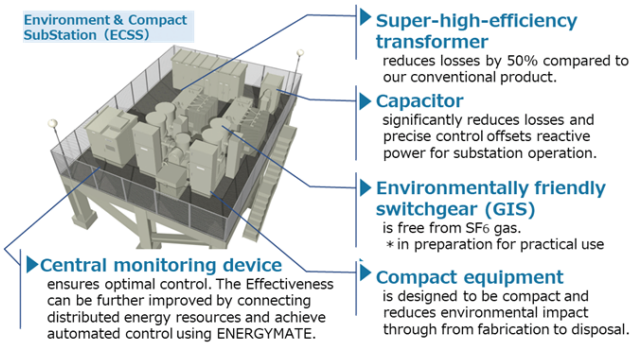

Fig. 4. ECSS

Our initiatives to develop power system equipment technologies to address decarbonization requirements have been detailed above. The Sumitomo Electric Group will actively deploy packaged optimal system solutions for transmission and transformation based on its outstanding electric wires and cables, power quality management equipment, and substation equipment as well as a proven track record. We aim to contribute to the realization of a sustainable society and the global environment through the development of environmentally friendly products and production activities by applying our strengths in materials and analytical technologies, as well as utilizing artificial intelligence (AI) and DX.