Keynote Address “TEPCO’s Experience in Dispersed Power Generation / Storage Projects”

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Abstract

It is estimated that there are some two billion people in the world who go about their daily lives without the ability to make use of electricity, which might be called the cornerstone of a modern lifestyle. Roughly half of these people are Asians; in addition, a large fraction of the population of Africa does not receive the benefits of electricity.

Much attention is currently being paid to systems for supplying electric power to non-electrified regions, which do not require fuel or a fuel supply infrastructure, which utilize renewable energy, and maintenance of which is relatively easy. In particular, electric power generation based on solar cells, wind power, and micro-hydroelectric power generation, have been adopted. But in order to advance with electrification projects, in addition to installing power generation systems (hardware) suited to regional circumstances, the preparation of programs (software) for the sustainable operation of such systems (fee collection and so on) is also necessary.

Prompted by the oil crises, TEPCO has conducted development, evaluations and research of solar power, wind power, and other forms of renewable energy, and has amassed technical expertise in these areas. TEPCO has also established a track record in the development and utilization of advanced high-performance NAS(Sodium-Sulfur) batteries, as an electric power storage technology indispensable for the construction of power systems in non-electrified area.

<Solar Cell Power Generation>

Solar cell power systems are one type of stationary power generation system, and feature minimal malfunctions and easy maintenance even by untrained persons. In Japan, nearly all of the more than 300,000 kW of power generation capacity, the highest in the world, is accounted for by solar cell systems of 3 to 4 kW or so in scale, mounted on the roofs of ordinary homes. TEPCO has various solar cell power generation facilities with capacities in the range of 700 kW, and is conducting analyses of the effects of power generation characteristics, degradation characteristics, and the effect of large-scale integration into power distribution grids.

There are three types of power systems employing solar cells in non-electrified area, as follows.

- SHS (Solar Home System)
- Battery charging stations
- Centralized systems (connected to the grid)

<Wind Power Generation>

Previously, TEPCO conducted demonstrating experiments at Miyakejima-Is. of domestically-produced 100 kW and imported 150 kW plants. At present, a 300 kW plant is in operation at the Futtsu New Energy Park, and a 500 kW commercial system is in operation at Hachijojima-Is., with the aim of reducing the unit cost of power generation on islands. In order to absorb and mitigate the fluctuations in wind power generation, the grid is also connected to 400 kW NAS batteries. Based on this demonstrating data, the power supply characteristics are now being evaluated and analyzed.

<NAS(Sodium-sulfur) Batteries>

TEPCO has long been engaged in the development of NAS batteries, which have a high energy density for good compactness as power storage means, high charge/discharge efficiency and other excellent characteristics, and which employ electrode materials in abundant supply, including sodium (Na) in the cathode and sulfur (S) in the anode.

At present, in addition to installation at TEPCO substations for loads leveling, NAS batteries are also installed at consumer sites, and are also being used in such value-added applications as uninterruptible power supplies, for expanding use.

In the past, lead batteries have been widely used as storage batteries in regional electric power systems; but the need to replenish water and otherwise maintain cells, as well as low cycle lifetimes, have posed problems. In contrast, NAS batteries are completely encapsulated and maintenance-free, and offer long cycle lifetimes as well. They are expected to see extensive use in electric power systems.

By combining the above dispersed electric power generation systems in a manner consistent with the circumstances of regions for electrification in developing nations, TEPCO expects to be able to make substantial contributions in proposing and constructing electric power supply systems.

In addition, the regional electrification project in Indonesia as part of the E7 project (micro-hydroelectric and solar cell power generation) for regional electrification in developing countries undertaken by TEPCO (The Tokyo Electric Power Co. group), as well as the regional

electrification master plan survey (micro-hydroelectric and solar cell generation) in Malawi, Africa, to begin in September of this year as part of the JICA project, will also be described.