Tokyo microgrid operation

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In March 2022, Toshiba developed a GFM inverter that can maintain the grid frequency of distribution systems by providing pseudo-inertia through power output from the inverter when the grid frequency rapidly fluctuates. The company has now verified the results of using GFM inverters in a setting similar to real environments, including the actual use of renewable energy, and has demonstrated that mounting GFM inverters on photovoltaic power generators suppresses decreases in grid frequency by approximately 30%.

Toshiba commissioned this research under "The Smart Synchronous Inverter (SSI) and its control systems based on virtual synchronization with power girds to utilize power from multiple renewable energy sources" as part of the Ministry of the Environment"s fiscal 2019-2021 Project for Low Carbon Technology Research, Development and Demonstration Program. This work was conducted in collaboration with Pacific Power Co., Ltd., Energy & Environment Technology Research Institute, National Institute of Advanced Industrial Science and Technology, and Pacific Consultants Co., Ltd.

To realize a decarbonized society by 2050, the Japanese government has formulated its "Regional Decarbonization Roadmap" for developing measures through collaboration and co-creation between the national and local governments, and has indicated a policy for "realizing decarbonized, robust, and vibrant communities across the country, without waiting for 2050." With the aim of utilizing the GFM inverter developed for microgrids, Toshiba will continue to engage in research, development, and demonstrations for early commercialization.

Microgrids are networks of small, distributed electrical power generators operated as a collective unit - a system of energy systems. The range of hardware and control options for Microgrid operation are reviewed. The paper summarizes and highlights the operating principles and key conclusions of research and field trials to-date. An overview is given on demonstration projects for Microgrids which have been, and are being, constructed.

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