Development of direct current microgrid control for ensuring power supply from renewable energy sources

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Renewable energy sources such as wind, solar, and microhydro have the potential to fulfill the energy needs of society. To optimize their utilization, the generators using this kind of energy are connected to a microgrid. A microgrid combines electrical power supplied from several renewable energy power plants; it can operate as an isolated distribution network or it can be connected to the utility national grid. In this study, a control device for a 254-volt direct current microgrid supplied by a solar cell, a wind turbine, and battery storage is discussed as a potential solution toward ensuring a stable supply to the microgrid's loads, even when the energy sources supply reduced power. The experimental result shows that DC microgrid can be applied widely as alternative solution for renewable energy utilization particularly in low voltage level to supply DC and AC loads.