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STUDY OF A MICROGRID WITH VEHICLE-TO-GRID SOURCES DURING NETWORK CONTINGENCIES

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ABSTRACT—A MicroGrid without a central fast-acting controller or a central energy storage unit was considered in order to establish the problems of a MicroGrid using traditional technology and to identify the additional benefits which could be derived by installing supplementary hardware (i.e. energy storage and central control). In view of the fast expanding electric drive vehicle market, fuel cell cars were considered as a combined micro-source/energy storage unit along with Photovoltaic units. Simulation results are presented. The study highlights that voltage regulation is critically important in a MicroGrid, there are still substantial challenges in the design of control for renewable sources in such systems and energy storage is crucial for successful operation of any MicroGrid, though such storage may be distributed throughout the system. It was established that electric vehicles or plug-in-hybrids could be highly suitable due to the fast charge/discharge characteristic of on-board storage.