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Investigation into a high reliability micro-grid for a nuclear facility emergency power supply

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Abstract

The objective of this research work is to investigate the use of a high reliability micro-grid to supply emergency electrical power to a nuclear facility following loss of offsite power (LOOP) accident. Most of the nuclear facilities around the world utilize diesel generators and battery banks as emergency power to back up the grid power supply. This power supply configuration represents the concept of the micro-grid system. The research work proposes reliability improvement of the emergency power supply by introducing diverse energy sources and energy storage systems. The energy sources and storage systems that were investigated include renewable energy sources, decay heat recovery system and large scale energy storage systems. The investigation results presented include information on the suitable energy sources and energy storage system, establishment of the reliable architectural layout and evaluation of the micro-grid system in terms of capacity adequacy and reliability.