

Investigation into Micro-Grids with Renewable Energy Sources for Use as High Reliability Electrical Power Supply in a Nuclear Facility

Authors : Gerard R. Lekhema, Willie A Cronje, Ian Korir

Abstract : The objective of this research work is to investigate the use of a micro-grid system to improve the reliability and availability of emergency electrical power in a nuclear facility. The nuclear facility is a safety-critical application that requires reliable electrical power for safe startup, operation and normal or emergency shutdown conditions. The majority of the nuclear facilities around the world utilize diesel generators as emergency power supply during loss of offsite power events. This study proposes the micro-grid system with distributed energy sources and energy storage systems for use as emergency power supply. The systems analyzed include renewable energy sources, decay heat recovery system and large scale energy storage system. The configuration of the micro-grid system is realized with guidelines of nuclear safety standards and requirements. The investigation results presented include performance analysis of the micro-grid system in terms of reliability and availability.

Keywords : emergency power supply, micro-grid, nuclear facility, renewable energy sources

Conference Title : ICNE 2017 : International Conference on Nuclear Engineering

Conference Location : Zurich, Switzerland

Conference Dates : January 13-14, 2017