Format 3

Abstract

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Application of Real-Time EMT Simulation Technology in Taiwan's Microgrid Simulation Analysis and Testing

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Abstract

A microgrid is a system that integrates distributed energy resources (DERs), loads, and energy storage systems (ESS). Under normal conditions, when connected to the utility grid, it can provide auxiliary services, manage regional power flow, and offer other services. In emergency situations, it can operate in island mode, ensuring power supply to critical loads and reducing outage duration. Due to its integration of various resources, a microgrid can increase the hosting capacity of renewable energy, reduce emissions from fossil fuel use, and simultaneously lower the costs associated with upgrading transmission and distribution lines. Considering these advantages, microgrids are seen as an effective solution for enhancing grid resilience and reducing emissions.

In the past, Taiwan Power Company (TPC) primarily developed island-type and rural disaster prevention microgrids. In recent years, they have begun developing regional microgrids at the feeder level. Taiwan Power Research Institute (TPRI) has invested significant research and development efforts into microgrid technology, aiming to assist in the successful development of various microgrid projects within the company. This article mainly introduces how TPRI applies Real-Time Electromagnetic Transient (RT-EMT) simulation and hardware in loop (HIL) testing technology for microgrid simulation analysis and equipment validation.

Furthermore, TPRI is actively incorporating standards and specifications from IEEE 2030.7, 2030.8, and the IEC 62898 series for the development and testing of microgrids and Microgrid Control Systems (MGCS). The goal is to align Taiwan Power Company's microgrid technology with international standards in the future.

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