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Microgrid: An Alternative of Electricity Supply to an Island in Thailand

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Abstract : There are several solutions to supply electricity to an island in Thailand such as diesel generation, submarine power cable, and renewable energy power generation. However, each alternative has its own limitation like fuel and pollution of diesel generation, submarine power cable length resulting in loss of cable and cost of investment, and potential of renewable energy in the local area. This paper shows microgrid system which is a new alternative for power supply to an island. It integrates local power plant from renewable energy, energy storage system, and microgrid controller. The suitable renewable energy power generation on an island is selected from geographic location and potential evaluation. Thus, photovoltaic system and hydro power plant are taken into account. The capacity of energy storage system is also estimated by transient stability study in order to supply electricity demand sufficiently under normal condition. Microgrid controller plays an important role in conducting, communicating and operating for both sources and loads on an island so that its functions are discussed in this study. The conceptual design of microgrid operation is investigated in order to analyze the reliability and power quality. The result of this study shows that microgrid is able to operate in parallel with the main grid and in case of islanding. It is applicable for electricity supply to an island and a remote area. The advantages of operating microgrid on an island include the technical aspect like improving reliability and quality of power system and social aspects like outage cost saving and CO_2 reduction.

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