

The Implementation of Grid Interconnection Study of Renewable Energy in the Distribution Grid to ensure Safe Grid Integration: Case Study of PV Grid Connected in Indonesia

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Abstract

Government of Indonesia has a policy to promote renewable energy development to provide green electricity generation to diversify generation resources and reduce greenhouse gas emissions. Hence, the guidelines of grid interconnection study describes the application, review, and approval procedures and technical requirements for the connection of renewable energy generation plant (REGP) to the distribution systems. Thus, these requirements also apply to any over supply power from private sectors/industries that operate on-site REGP. Consequently, the REGP that connected to the distribution system, if not properly designed, may adversely affect the safety, reliability and power quality of the distribution system itself.

Having the regulation applied, REGP developers should comply with the guidelines, and receive PLN's recommendation and approval, before the parallel operation of REGP is implemented to the distribution system. On the other hand, PLN as state power utility, has main purpose to raise the electrification ratio by enlarging the penetration level from variable renewable energy (vRE) in Lombok island. However, the grid integration issue to interconnect vRE into distribution system is considered to maintain safe grid integration. On the other hand, stable operation should be supported by interconnection study.

Some mandatory requirements for grid integration should be addressed, such as; tolerable voltage regulation ranges, and frequency limit. Thus, the interconnection study of 20 MW distributed PV has proposed to decrease the generation cost in Lombok island. Hence, interconnection study; load flow, is performed to determine the power flow on each bus, whether stability study is used to evaluate the impact from the loss of PV operation to the frequency and voltage stability. Based on the evaluation study showed that instability condition should be considered, when the loss supply of PV is occurred in the system, since this would trigger the load shedding operation from under frequency relay. Meanwhile, flexible generation as the load follower, that has ramping rate > 6 MW/Hz should be selected, in order to maintain the system stiffness rating in Lombok.