Energies, vol.13, no.13, pp.3495-1-3495-21, July, 2020.

Location and sizing of micro-grids to improve continuity of supply in radial distribution networks

F. Postigo Marcos; C. Mateo Domingo; T. Gómez San Román; R. Cossent Arín

Abstract-

The steady decline in the prices of distributed energy resources (DERs), such as distributed renewable generation and storage systems, together with more sophisticated monitoring and control strategies allow power distribution companies to enhance the performance of the distribution network, for instance improving voltage control, congestion management, or reliability. The latter will be the subject of this paper. This paper addresses the improvement of continuity of supply in radial distribution grids in rural areas, where traditional reinforcements cannot be carried out because they are located in secluded areas or in naturally protected zones, where the permits to build new lines are difficult to obtain. When a contingency occurs in such a feeder, protection systems isolate it, and all downstream users suffer an interruption until the service is restored. This paper proposes a novel methodology to determine the optimal location and size of micro-grid systems (MGs) used to reduce non-served energy, considering reliability and investment costs. The proposed model additionally determines the most suitable combination of DER technologies. The resulting set of MGs would be used to supply consumers located in the isolated area while the upstream fault is being repaired. The proposed methodology is validated through its application to a case study of an actual rural feeder which suffers from reliability issues due to the difficulties in obtaining the necessary permissions to undertake conventional grid reinforcements.

Index Terms- Micro-grids; continuity of supply; power distribution; power system planning

Citation:
Postigo Marcos, F.; Mateo, C.; Gómez, T.; Cossent, R. "Location and sizing of

micro-grids to improve continuity of supply in radial distribution networks", Energies, vol.13, no.13, pp.3495-1-3495-21, July, 2020.