

Assessment of energy distribution losses for increasing penetration of distributed generation

V.H. Méndez Quezada; J. Rivier Abbad; T. Gómez San Román

Abstract-

High levels of penetration of distributed generation (DG) are a new challenge for traditional electric power systems. Power injections from DGs change network power flows modifying energy losses. Although it is considered that DG reduce losses, this paper shows that this is not always true. This paper presents an approach to compute annual energy losses variations when different penetration and concentration levels of DG are connected to a distribution network. In addition, the impact on losses of different DG technologies, such as combined heat and power, wind power, photovoltaic, and fuel-cells, is analyzed. Results show that energy losses variation, as a function of the DG penetration level, presents a characteristic U-shape trajectory. Moreover, when DG units are more dispersed along network feeders, higher losses reduction can be expected. Regarding DG technologies, it should be noted that wind power is the one that shows the worst behavior in losses reduction. Finally, DG units with reactive power control provide a better network voltage profile and lower losses.

Index Terms- Distributed generation (DG), distribution, losses.

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