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Reliability options in distribution planning using distributed generation

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Abstract— Since the start of the 90s, the Spanish power system has experienced unprecedented demand growth. This growth combined with oil price increases, new environmental requirements and regulatory changes have encouraged an incentive to increase Distributed Generation (DG), which involves profound changes to the operation and planning of electricity distribution networks. Networks have stopped being passive elements that transmit electricity and turned into active elements in which control, safety and flexibility have become relevant factors. In this context, the Distribution System Operator (DSO) plays a key role by having to provide flexibility to its distribution networks and integrate all distributed energy resources connected to its network. Therefore, the investment in new network facilities has become a challenge for the distributor having to combine its decisions with the presence of DG. Its networks have stopped having the passive nature they were designed for. This paper seeks to approach a mechanism of guaranteeing power, which we call Reliability Options with Distributed Generation (RODG), focusing on providing the distribution network with an alternative to investing in firm capacity not determined by the rated capacity of distribution facilities but through generator facilities encompassed in the DG concept.

Index Terms— Distributed Generation, Distribution, Firmness, Guaranty of supply, Reliability, Reliability options

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