

## **Distribution planning with reliability options for distributed generation**

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### **Abstract-**

**The promotion of electricity generation from renewable energy sources (RES) and combined heat and power (CHP) has resulted in increasing penetration levels of distributed generation (DG). However, large-scale connection of DG involves profound changes in the operation and planning of electricity distribution networks. Distribution System Operators (DSOs) play a key role since these agents have to provide flexibility to their networks in order to integrate DG. Article 14.7 of EU Electricity Directive states that DSOs should consider DG as an alternative to new network investments. This is a challenging task, particularly under the current regulatory framework where DSOs must be legally and functionally unbundled from other activities in the electricity sector. This paper proposes a market mechanism, referred to as reliability options for distributed generation (RODG), which provides DSOs with an alternative to the investment in new distribution facilities. The mechanism proposed allocates the firm capacity required to DG embedded in the distribution network through a competitive auction. Additionally, RODG make DG partly responsible for reliability and provide DG with incentives for a more efficient operation taking into account the network conditions.**

**Index Terms-** Distributed generation; Distribution planning; Reliability options; Firmness

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### **Citation:**

*Treballe, D.; Gómez, T.; Cossent, R.; Frías, P. "Distribution planning with reliability options for distributed generation", Electric Power Systems Research, vol.80, no.2, pp.222-229, February, 2010.*