

# **Assessing low voltage network constraints in Distributed Energy Resources planning**

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## **Abstract-**

Many efforts are being devoted towards achieving optimal planning and operation of DER (Distributed Energy Resources). However, during the planning process, not all relevant thermal constraints of the distribution network are considered; some works claim that they must be taken into account, while others follow the single-node approach. This paper assesses the effects of the distribution network thermal constraints in DER planning, using a deterministic linear programming problem to find the optimal DER planning and operation. Three case studies with different network topologies under several DER implementation scenarios are analyzed. A DC load flow is used to estimate the required network reinforcements to accommodate optimal DER investments, if any. Reinforcement costs are then calculated to assess the net benefit compared to limiting DER investments and operation, according to the network thermal limits. Results suggest that there is no significant economic advantage in limiting DER investments and line flows, compared to reinforcing the low voltage network to allow the larger flows that result from an unconstrained network problem.

**Index Terms-** Distributed energy resources; Renewable sources; Energy storage; Distribution network; Energy system planning models

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