

# **A reference network model for large-scale distribution planning with automatic street map generation**

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**Abstract—** A Reference Network Model (RNM) is a large-scale distribution planning tool that can help regulators to estimate efficient costs in the context of incentive regulation applied to distribution companies. This paper presents the main features of an RNM developed for planning distribution networks from scratch, greenfield planning, or incrementally from an existing grid. Two properties of the model are highlighted: the simultaneous planning of high-, medium-, and low-voltage networks by using simultaneity factors; and the layout of cables in urban areas, taking into consideration the street map, which is automatically generated by the model. A case study evaluates the impact of these features on the results.

**Index Terms—** Power distribution , power distribution planning , power system planning , regulators

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