Large-scale MV/LV transformer substation planning considering network costs and flexible area decomposition

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Abstract-

In the context of incentive regulation applied to electricity distribution companies, reference network models (RNMs) can be a valuable tool to estimate their efficient costs. Thesemodels have to plan large-scale electricity distribution areas with different voltage levels. This paper describes the planning algorithms proposed to optimize the location, size, and supply area of the mediumvoltage/ low-voltage transformer substations in an RNM that has to plan a network from scratch (Greenfield planning). The presented methodology aims to divide the entire planning area into small zones with a nonpredetermined area so that each one can be optimized separately. Then, a heuristic process based on -means algorithm seeks to find the set of clusters that minimize the cost function, considering the cost of the transformer substations, as well as the LV and MV network costs. The presented case studies show the benefits of applying the proposed methodology.

Index Terms- Power distribution, power system planning, reference network model, substation planning.

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