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Strategic decision-making support for distribution system planning with flexibility alternatives

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Abstract-

The ongoing Decision Theory based Multi-Criteria Cost-Benefit Analysis (DT-MCA-CBA) methodology for smart grid initiatives that capture the complexity of the distribution system planning activities in which flexibility competes with grid expansion. Based on international guidelines, the proposed DT-MCA-CBA methodology systematically assesses tangible and intangible impacts, considering multiple conflicting criteria. The DT-MCA-CBA methodology relies on a novel approach that combines MCA and Decision Theory to identify the most valuable option in a complex decision-making problem by modelling the stakeholder perspective with the comparative case study concerning four different approaches for distribution system planning. A web-based software which implements the proposed decision-making framework and the DT-MCA-CBA methodology is developed to provide a novel decision-making support tool for strategical smart distribution system planning.

Index Terms- Cost–benefit analysis; Multicriteria analysis; Decision theory; Power system; Planning; Flexibility

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