

# Enhanced representative time periods for transmission expansion planning problems

A. García Cerezo; R. Garcia Bertrand; L. Baringo Morales

## Abstract-

The use of historical data in transmission network expansion planning problems is key to represent the short-term uncertainties in demand and stochastic renewable production conditions. Nevertheless, the use of all available historical data leads to intractable problems. For this reason, input data should be reduced while keeping important information about the system under study. Several clustering methods have been used in the technical literature for this purpose, but these generally do not represent extreme conditions such as peak demand levels, which may be critical to avoid load shedding. This letter proposes a novel approach to obtain representative time periods based on the maximum dissimilarity algorithm, which properly represents these extreme conditions. Numerical results show that the load is completely supplied using the proposed technique in all cases and that the number of required representative time periods is significantly reduced in comparison with other techniques, which translates into a reduction of the complexity of the transmission expansion planning problem.

**Index Terms-** Maximum dissimilarity algorithm, time-period aggregation, transmission expansion planning, extreme values.

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