

Reconfiguration and reinforcement allocation as applied to hourly medium-term load forecasting of distribution feeders

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Abstract

In this study, a methodology to develop hourly demand scenarios in a medium-term horizon for primary distribution substations is presented and applied to a case study. The main contribution of this study is that it addresses successfully the effect of saturation of distribution feeders in the medium term due to sustained growth in demand. In addition, the method is able to simulate the future necessary reconfiguration and reinforcements in the distribution feeders. A detailed comparative study of five well-known forecasting techniques, to estimate future demand, is conducted. The methodology is tested with hourly power records, measured from 2008 to 2013, in 169 feeders of the distribution company of Santiago, Chile. When the performance of the forecasting techniques is compared, results of one-year-ahead forecasting, with hourly resolution, show that multilayer perceptron neural networks outperformed the other techniques, having a MAPE lower than 9% for more than 96% of the feeders. A final evaluation for 13 feeders, using the forecasted and registered demand from 2014 to 2017, shows that the MAPE remains in a low range (9-13%), improving the method currently used by the industry. The overall results indicate that reconfiguration and reinforcement allocation are key elements for medium-term hourly demand forecasting in distribution feeders.

Keywords

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