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Bayesian structural time-series approach to a long-term electricity demand forecasting

Paul Mokilane[1,2,*], Pravesh Debba[1,2], Venkata S. S. Yadavalli 3 and Caston Sigauke[4]

[1] Council for Scientific and Industrial Research, Pretoria, South Africa
[2] School of Statistics and Actuarial Science, University of the Witwatersrand, Johannesburg, South Africa
[3] Department of Industrial and Systems Engineering, School of Engineering, University of Pretoria, Pretoria, South Africa
[4] Department of Statistics, University of Venda, Thohoyandou, South Africa

Abstract

The paper presents an application of Bayesian structural time-series model to forecast long-term electricity demand. Accurate trend specification in long-term forecasting is important; otherwise erroneous forecasts could be obtained especially in South Africa where it is difficult to determine if the trend would continue a downward trajectory or would revert to an upward trajectory. Long-term probabilistic electricity demand forecasts in South Africa from 2013 to 2023 are presented in this paper. The findings are; (a) electricity demand in South Africa is less likely to exceed the highest historical hourly demand of 36 826 kW until 2023 (b) South African demand from Eskom is more likely to maintain the downward trend until 2023 (c) electricity demand lies between 15 849 kW and 39 810 kW with a 90% probability between 2013 and 2023. The contributions of the paper are; (a) application of BSTS to long-term electricity demand forecasting (b) use of autocorrelation plot to determine the number of time lags in long-term electricity demand forecasting (c) long-term forecasting of electricity demand using South African data with their uncertainties quantified.