IBIMA Publishing
Communications of International Proceedings
https://ibimapublishing.com/p-articles/40NRGECO /2022/3976222/
Vol. 2022 (22), Article ID 3976222

Forecasting Medium-Term Territorial Natural Gas Consumption: An Economic Perspective of Quantitative Research*

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* Presented at the 39th IBIMA International Conference, 30-31 May 2022, Granada, Spain

Abstract

This study is aimed to determine how to improve accuracy of natural gas consumption forecasting in medium-term horizon and to improve theory and practice of natural gas time series forecasting. We analyzed and compared classic approaches such as ARIMA, ETS with newer ones THETA, TBATS and artificial networks: recurrent ANN and LSTM. We focus on automated hierarchical forecasting models. The analysis was based on dataset which contains time series from counties and municipalities of Poland. We found out that all-time series forecasting methods brought not fully satisfactory results for individual territorial units – MAPE error for 6-years forecasts ranged between 10% and 12 %. Much better results we achieved with hierarchical approach, where MAPE error of the best method LSTM for coherent aggregated forecasts of total polish natural gas consumption was only 0.93%. The most promising method is artificial network LSTM, giving the lowest errors. Our research leads to conclusion, that proper medium-term forecasting methodology should comprise not only time series but economic and demographic data of territorial units as well.

Keywords: forecasting, medium-term, time series, territorial forecasting, natural gas

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Cite this Article as: Bartłomiej GAWEŁ and Andrzej PALIŃSKI " Forecasting Medium-Term Territorial Natural Gas Consumption: An Economic Perspective of Quantitative Research" Communications of International Proceedings, Vol. 2022 (22), Article ID 3976222.