# Forecasting of Hydropower Production Using Box-Jenkins Model at Tasik Kenyir, Terengganu

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**Abstract.** Hydropower is one of the most essential mainstays in the long list of renewable energy resources that implements the use of potential energy of water to generate power by transforming the energy in the form of electricity. Forecasting the future energy production benefits in maintaining the effectiveness of the hydropower plant in the long term. This study aims to forecast the hydropower energy produced as electricity in Sultan Mahmud Hydropower Plant, Lake Kenyir, Terengganu using Box-Jenkins model in the short term from October 2020 until December 2022. Analysis and forecast is based on the historical data from a total of four unit of electricity generator from January 1997 to September 2020. Evaluation is made on the forecasted result using Mean Absolute Percentage Error (MAPE) to validate the accuracy of the model. The results demonstrated that by using the proposed model and numerical calculation, Box-Jenkins model is effective in forecasting the monthly electricity energy produced by the hydropower plant. The best model obtained with the smallest MAPE value of 26.4% is ARIMA (2,0,0).

## INRODUCTION

Countries in the world are positively changing towards consumption of renewable and environmental friendly energy generations. Reports made by the International Energy Agency (IEA) in their Global Energy Review 2021 states that the global energy use in year 2020 has grown by 3% and is set to increase in 2021. Electricity generated from renewable resources had a growth of almost 7% in 2020 and is projected to increase by 30% of total electricity generation by the year 2021. Most common renewable energy sources include the hydropower, wind and solar energy. Hydropower energy is the third highest contributor next to solar and wind energy where both contributed to two-third of the renewable energy growth since 2019. In Malaysia, use of renewable energy has seen an increase of 4% as mention in the National Energy Balance 2018. As of 2018, hydropower has contributed 18.1% from total installed capacity in Malaysia which was 33,991 MWh.

Hydropower system implements the use of potential energy of water to generate power without making changes on its composition, hence avoiding direct pollution on the environment. There are several types of hydropower plants such as run-of-river and conventional dams. Conventional dams are built in large facilities including a water reservoir that can store water. Water from the reservoir is released to flow through the turbines which will then generate electricity to be supplied to areas in demand. Reservoirs are not solely designed for generation of electricity purposes but can also be used as drought or flood control, irrigation and recreational activity spot (1).