

## Auto ML-MPC Artificial Intelligence Model as an Advanced Tool to Control Electricity Generation and Storage of Hybrid Renewable Sources

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### Abstract

As the world's population grows, the demand for energy is growing, which often leads to high prices for energy resources. For these reasons, it is necessary to find new and reliable ways not only to ensure a reliable supply of electricity, but also to manage energy flows in the event of a surplus of electricity. One of such advanced methods is the use of artificial intelligence (AI) systems to predict the production, consumption and storage of electricity. The study presents the production of electricity using renewable energy sources – wind, solar and bioenergy electricity generation. The results show that in the event of a surplus of electricity, it is optimal to store electricity in batteries and only later use the electrolysis process to store energy in the form of hydrogen. Research shows that the proposed hybrid artificial intelligence system, consisting of an Auto Machine Learning (Auto ML) block for predicting the load on the electricity grid and electricity production from renewable energy sources and a Model Predictive Control (MPC) block for storing electricity in batteries and in the form of hydrogen, allows for more accurate prediction of the amount of electricity produced, stored and consumed. The research results show that the AI model not only allows for more efficient management of energy flows, but also reduces energy prices due to lower electricity demand.

### Keywords

Wind Energy, Solar Energy, Power Prediction, Artificial Intelligence, Renewables.

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