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USE OF SHORT-TERM ELECTRICAL LOAD FORECASTING TO IMPROVE THE QUALITY OF ELECTRICAL POWER FROM GAS TURBINE POWER PLANTS

In today's electric power market, there is a significant demand for gas turbine power plants (GTPP). Such power plants have greater efficiency, manoeuvrability and low emissions. Due to these advantages in these areas, combined-cycle power plants have gained popularity and are beginning to account for a significant portion of the generation mix in many power systems around the world. Approximately two-thirds of the generation capacity in a combined-cycle power plant is produced by gas turbines. Such turbines and their controls are significantly different from fossil-fuel steam-turbine power plants. However, they require shorter reaction times and increased fidelity from the control system. Process modeling is used in control systems to meet these demands. Existing models do not meet the current requirements for power quality. One of the methods to improve the quality of electricity is the use of fuzzy logic, neural networks and AI. The current level of technology makes it possible to create special equipment for computing in the field of fuzzy logic. Research in this area is ongoing, which should develop the functions of such equipment. Then it will be possible to make use of the advantages of the abovementioned methods. In the next three decades, the importance of fuzzy logic, neural networks and AI will play an important role in energy systems, automation systems, monitoring, and control, ensuring reliable supply aligned with techno-economic and sustainability requirements.

Optimizing the model should increase energy efficiency, reduce emissions and improve economic efficiency. To optimize power generation plants and grids, including wholesale power purchases, is possible by using modern methods of control and forecasting parameters. Forecasts of electricity consumptions with different time periods and permissible errors are required. Day-ahead forecasts have the highest requirements. Universal artificial neural networks (ANNs) and deep learning methods are used to solve prediction tasks, but they are not ideal due to the variety and specificity of load schedules and power consumption. Special ANNs are developed with different algorithms. This results in numerous forecasting methods based on the same principles but different variables and network types.

The scientific relevance is summarized in predicting electrical power output in a GTPP based on a few features using simpler algorithms than reported deep learning and neural networks algorithms combined. This means a lower cost and less complicated procedure for everyone, but it also means that the results are accepted in practice, according to the evaluation metrics used.