Comparative Analysis of the Measurement and Numerical Weather Prediction for Wind Speed and Solar Irradiance

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Abstract

The development of renewable energy has become more important. The target for the installed capacity of solar and wind power generation in Taiwan increases up to 20GW by 2030. A large scale of renewable energy integration brings a huge technical challenge to the power system operation. One of the major challenges comes from the uncertainty of renewable energy generation. Accordingly, accurate forecasts of renewable generation reduce power system's operation risk. It is no doubt that wind speed and solar irradiance play important roles on wind and solar power generation. This study collects the measurements from real sites and the predictions based on the numerical weather prediction (NWP) model for wind speeds and solar irradiances; then the study compares the real measurements with NWP predictions. The comparative analyses would reveal the accuracy of the NWP-based wind speeds and solar irradiance predicted by Central Weather Bureau in Taiwan. The research results provide useful reference for modifying the utilized NWP model, as well as the dispatch of thermal power plants and the determination of reserve capacity.

Key word: Renewable Energy; Solar; Wind; Numerical Weather Prediction;