

Wind power long-term scenario generation considering spatial-temporal dependencies in coupled electricity markets

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Abstract-

Wind power has been increasing its participation in electricity markets in many countries around the world. Due to its economical and environmental benefits, wind power generation is one of the most powerful technologies to deal with global warming and climate change. However, as wind power grows, uncertainty in power supply increases due to wind intermittence. In this context, accurate wind power scenarios are needed to guide decision-making in power systems. In this paper, a novel methodology to generate realistic wind power scenarios for the long term is proposed. Unlike most of the literature that tackles this problem, this paper is focused on the generation of realistic wind power production scenarios in the long term. Moreover, spatial-temporal dependencies in multi-area markets have been considered. The results show that capturing the dependencies at the monthly level could improve the quality of scenarios at different time scales. In addition, an evaluation at different time scales is needed to select the best approach in terms of the distribution functions of the generated scenarios. To evaluate the proposed methodology, several tests have been made using real data of wind power generation for Spain, Portugal and France.

Index Terms- ARIMA; long-term forecasting; multi-area electricity markets; SARIMA; wind power forecasting

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Citation:

Marulanda, G.; Bello, A.; Cifuentes, J.; Reneses, J. "Wind power long-term scenario generation considering spatial-temporal dependencies in coupled electricity markets", Energies, vol.13, no.13, pp.3427-1-3427-19, July, 2020.