

A promising outlook: skilful seasonal forecasts for energy sectors in China

Explainer

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Wind farm in Xinyang, China. Image: Vista Wei, Unsplash

Focus

Wind power is becoming increasingly important as China aims to reduce both greenhouse gas emissions and air pollution by extending its use of renewable energy. The Met Office seasonal forecast system has robust skill in forecasting winter wind speeds in some regions in China which provides a promising basis for seasonal forecast services for the wind energy industry.

Importance

China has strong motivation to increase its adoption of clean renewable energy, driven by commitments to reduce both greenhouse gas emissions and air pollution to meet its target of Net Zero by 2060. Wind power is thus becoming increasingly important: by August 2020, the total installed wind power capacity exceeded 220 million kilowatts, the highest of any country, with a utilisation rate of 97% (National Energy Administration, 2020).

Accurate forecasts of wind speed are key to the planning, development and operation of wind farms. In China, skilful forecasts are in particularly urgent demand in northern and southern coastal areas, where a large number of wind farms are distributed.

Approach

Bett et al. (2017) investigated the ability of the Met Office's global seasonal forecasting system in predicting meteorological variables relevant to the energy sector in China, including near-surface wind speed. Their results suggest the Met Office's system has skill in predicting winter (December-January-February) wind speed in parts of China, in particular a south-eastern coastal region near the South China Sea (SE China), and a region in northern-central China (NC China).

Furthermore, Lockwood et al. (2019) assessed the winter wind speed prediction over these regions, finding that high and robust skill is seen. These results hold for two independent sets of forecasts over different historical time periods. Their detailed research also identified the large-scale predictors that are the source of predictability in the two key regions. For example, the predictability of wind speed in southeast China comes from the model's ability to predict the El Niño Southern Oscillation.

Next steps

The Met Office seasonal forecast system has robust skill in forecasting winter wind speeds in southeast and north-central China, indicating the potential for the development of seasonal climate services for the wind energy sector with estimates of forthcoming renewable electricity supply in autumn for the coming winter. The skill in forecasting near-surface winter wind speeds also applies to winds at typical wind turbine hub heights.

However, the forecast system has no skill in summer wind forecast across most of China, which decision-makers should bear in mind when using this seasonal forecast.

References

Bett et al., 2017 DOI:10.1175/JAMC-D-17-0070.1

Lockwood et al., 2019 DOI:10.1007/s00382-019-04763-8

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