

Wind Power Ramps Analysis for High Shares of Variable Renewable Generation in Power Systems

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Abstract

The increased penetrations from variable renewable generation (VRG), such as solar and wind, into power systems, growing the flexibility requirements for managing the uncertainty and variability of output power. These flexibility requirements can be achieved by many flexibility options. However, quantifying the flexibility available and required in a power system is a complicated problem. The paper reviews different flexibility metrics that measure the flexibility available from each conventional generator and that measure the flexibility available and needed by a power system at either planning and operational stages. Due to the dynamics of power systems, no flexibility metric has been taken as a standard. Accordingly, for high variable renewable generation shares, it is necessary to have a deeper understanding of power ramping scale as well as times when collective ramp events are most likely to occur. The paper introduces a method for power ramping analysis that will be demonstrated by analysing the output power of aggregated Belgian wind farms. In addition, the ramp characteristic indicators have been proposed for comparing the ramping behaviour of VRG in different years or between different countries.

Indonesian Journal of Electrical Engineering and Informatics (IJEI) 2020, June