

## **Effect of wind energy unit availability on power system adequacy**

### **ABSTRACT**

Wind power has remarkable economic and environmental advantages when compared to other power generation sources. Presently, wind power is considered to be an essential alternative source for generating power. The growing pervasiveness of Wind Energy Conversion System (WECS) in power systems has a huge influence on the electrical system's reliability in relation to other conventional sources for power generation. If the variation in the speed of the wind of a specific site is significant, then, the power output from the wind turbine may get severely affected. The output power from the WECS may also get affected by the unavailability of wind generating units for a considerable period of time. The impact of wind turbine units on the reliability of power generating systems and operating reserves is explained in this paper, while considering wind power units that are frequently unavailable and for a considerable amount of time. The paper presents the impacts of the duration and frequency of failures of the Wind Turbine Generators (WTGs) on the WECS output power. A Sequential Monte Carlo Simulation (SMCS) technique along with Frequency and Duration method shows it is effective for estimating the WECS output power, and the simulation was conducted on IEEE RTS-79 bus system.

**Keyword:** Generating capacity adequacy; Sequential Monte Carlo Simulation; Wind power; Wind energy conversion system

