

A Comparative Analysis of Failure, Reliability, and Maintenance Features of Onshore and Offshore Wind Turbines

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Onshore and offshore winds complement each other and collectively constitute the entire supply configuration of wind energy. This paper reveals differences between failure, reliability, and maintenance features of onshore and offshore wind turbines with the assistance of released new detests. Initially, the new detests recording operation and maintenance activities of wind farms are introduced. Subsequently, failure, reliability, and maintenance properties of onshore and offshore wind turbines are characterized and compared, including (i) Failure properties such as failure mode, failure causes, failure frequency, and failure criticality; (ii) Reliability features such as failure rate and mean time to failure of components and the entire system; (iii) Maintenance actions including maintenance measures, times related to maintenance and logistics. The novel contribution of this paper includes: (i) failure features, maintenance aspects of wind turbines will be identified to support the operation and maintenance of multiple types of wind turbines and wind farms; (ii) New understandings of failure and maintenance of wind turbines will be provided in a comparative way to clarify their similarity and differences. Overall, the results support the understanding of the failure features of wind turbines and will benefit the operation and maintenance of wind farms especially their failure prevention and cost-saving aspects.

Keywords: Wind turbines, failure features, reliability properties, maintenance features.