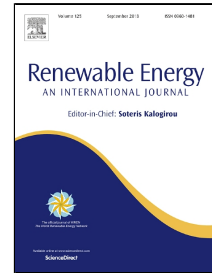


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New Methods to Assess Wind Resources in Terms of Wind Speed, Load, Power and Direction

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1 New Methods to Assess Wind Resources in Terms of Wind Speed, Load, Power and Direction

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9 **Abstract**

10 The two-parameter Weibull distribution is widely used, accepted, and recommended as probability  
11 law to describe and evaluate the wind speed frequency, which is especially useful for assessing  
12 wind resources. In this study, six popular parameter estimation methods are reviewed and  
13 compared with a new method that we call Modified Energy Pattern Factor (MEPF) method. The  
14 advantage of MEPF is that it is free from binning, linear least square problems or iterative  
15 procedures. All methods are compared via a thorough Monte Carlo simulation study with sample  
16 sizes varying from 100 to 100,000. The results indicate that the MEPF is a suitable alternative and  
17 comparable with the relatively best estimator of the Weibull parameters at each sample size.  
18 Consequently, we have used the MEPF to estimate the Weibull parameters of wind data from three  
19 regions in India, and we explain how to use these insights for the calculation and prediction of  
20 wind energy production. In particular, for harnessing the wind energy, both wind speed and  
21 direction are important. For the wind direction assessment, we have compared the conventional  
22 von Mises distribution to the new 4-parameter Kato-Jones distribution, and found that the latter  
23 approach provides better results.

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