

An assessment of wind power potential along the coast of Tamaulipas, northeastern Mexico (Article)

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Abstract

Herein, we present an assessment of wind power potential along the coast of Tamaulipas, northeastern Mexico. We propose a method to characterize wind variability and to estimate wind potential in coastal areas where appropriate meteorological measurements may not be available. A gridded reanalysis wind product (BMW-CERSAT), which provides data of zonal and meridional components of wind with a resolution of $1/4^\circ$ (~25km) from years 2004-2009, is used as the reference wind field after a statistical comparison to near-surface observations. Mean wind intensity field at 50-m height and its corresponding mean power density are modeled by using the Wind Atlas Analysis and Application Program (WAsP). The wind power potential of the southern half of Tamaulipas State is classified as poor ($200\text{-}300\text{Wm}^{-2}$), becoming marginal in some areas near the coast. Only the northern half of the State is classified with moderate potential ($400\text{-}500\text{Wm}^{-2}$), while the lagoon zone has good potential. Estimates, however, could be 30-50% higher if wind observations are measured at a higher frequency. Results show that the wind potential along Tamaulipas is lower than that suggested by the official prevailing eolic-potential map in Mexico. We conclude that even if the assessment presented in this work is preliminary, it gives a realistic approximation of wind as a promising renewable source for electric generation along the coast of Tamaulipas. © 2015 Elsevier Ltd.

Author keywords

Northeastern Mexico; Reanalysis wind product; Tamaulipas State; Wind Atlas Analysis and Application Program; Wind power potential