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Noise levels and environmental impact assesments: effect of different Weibull-fit parameters.

Gertie Geertsema
KNMI, R&D Weather and Climate Models, De Bilt, Netherlands (gertie@knmi.nl)

Weibull parameters play a key role in the planning phase of a wind turbine: they are used for a first estimate of the wind energy potential and for the noise regulations. Dutch legislation for wind turbine noise level assessments are using the wind data set derived by KNMI, the Dutch Meteorological institute. An update of this data set is foreseen in the near future using a 35 year data set derived with the high resolution weather model HARMONIE in combination with the ERA-Intermim reanalyses dataset. The dataset contains hourly winddata with a horizontal resolution of 2.5 km.

Regulations for wind turbine noise are based on Lden, the year averaged noise level differntiated for the day, evening and night period. Lden is construction by a convolution of the wind speed dependent noise immission of the turbine with the wind speed distribution at hub height at the location of the turbine. The wind statistics are provided by KNMI in the form of wind speed distrbibutions. In practice many users use the Weibull parameters. In this study the effects of using different methods to estimate Weibull parameters from the wind speed distribution on Lden is investigated using different typical wind turbine sound curves.

As stated the noise regulations prescribe that the wind distribution at hub height is used for the calculation of Lden. The resolution of the wind dataset provide the opportunity to investigate in-depth the behaviour of the Weibull parameters as a function of height and geographical location.