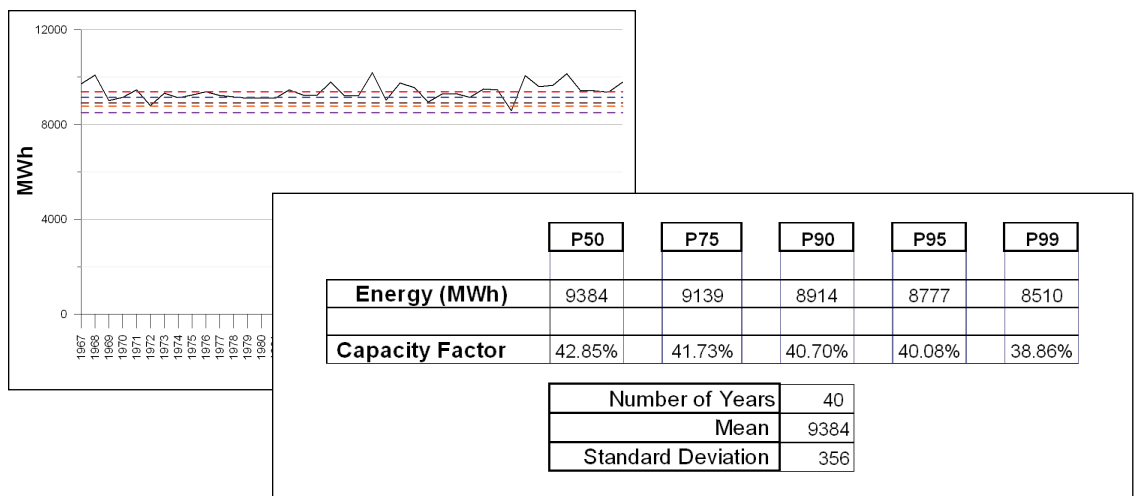


Long-term Wind Analysis for Financial Decision Support

Understanding long-term wind variability is essential for successful wind projects. On-site data are an important input to this analysis, but these data alone cannot provide a clear picture of long-term variability. WindLogics takes a comprehensive and far-reaching approach to understanding this critical component of wind project finance.

Why use long-term data?

In the past, with wind data records of only a few years in length, analysts have had to rely on very basic methods using on-site wind data to estimate long-term values, and then predict the performance of a wind plant. Yet we know that using even eight or ten years of reference wind data can result in significant, costly errors in estimating energy output. WindLogics reduces this uncertainty by leveraging the value of 40 years of actual weather data in a patented, computational approach. This process delivers the true distributions of wind speed and direction and thus energy production over a full 40 years. With this analysis, developers and financiers can move forward with the best long-term wind understanding available today.



Prediction intervals provide a 40-year picture of expected wind energy production.

What does WindLogics Long-term Data Analysis provide?

Using regional weather patterns, along with the latest terrain data, and applying the complete historical record in a statistically sound way, WindLogics provides an unparalleled analysis of the long-term wind speed and direction at any site, anywhere. With accurate data presented in executive summary form, project stakeholders can analyze predictive intervals, and, as desired, apply the full 40-year time series of data to perform more detailed analysis.

- **P-values in wind speed and energy production**—Based on analysis of the full 40-year data set, WindLogics offers the opportunity to gain new understanding of key performance indicators in wind energy planning. Bottom-line results are typically stated in terms of P-values of wind speed, energy production, and capacity factors.
- **Forty-year time series of wind speed, wind direction, and if requested, energy production**—With on-site tower data or WindLogics virtual tower data as a starting point, we deliver a detailed 40-year time series of hub-height wind characteristics at that precise tower location. Our clients use these results as input to financial performance calculations, to clarify historical energy production, and to reduce the risk of traditional methods of long-term analysis.

What are prediction intervals?

“Prediction intervals” for statistics like energy production provide a range of values where the “true” performance can be expected. In this example, the P50 value indicates the mean energy production over the long-term time horizon. Therefore, on average, the energy production at this location is 9,384 MWh. The P99 value indicates the minimum amount of energy that can be expected one year out of 100 (about 8,510 MWh in this case).

Why can you be confident in the WindLogics approach?

The issue with any analysis is the accuracy of the results. The WindLogics process inherently checks its results by predicting the measured site data. This produces a built-in sensitivity analysis of the predictive ability of the results. In many cases, this approach has shown improvements—by as much as 50%—over traditional methods. This accuracy is beneficial in reducing the risk of long-term production predictions.

Where does WindLogics get the long-term reference data?

Since the early 1990s, WindLogics has been using long-term weather data from a variety of sources to answer complex atmospheric questions. Of special interest in diagnosing wind characteristics is the NCEP/NCAR¹ Global Reanalysis (RNL) data set produced by national and global weather modeling centers. Intended to be the most consistent, three-dimensional representation of the weather over the past five decades, it contains a wealth of information about long-term wind patterns.

By properly applying multiple points (and considering multiple variables) in this data archive through the patented WindLogics process, specific on-site data and/or model data can be extended historically to match the time span of the archive. Key benefits are found in the detailed long-term distribution of wind speed and, of course, energy production. For each analysis, WindLogics is able to deliver a time series of wind data that is the foundation for true knowledge of the long-term windiness of the site.

For more information on long-term data, please request *WindLogics Weather Data Archives* or contact WindLogics directly.

¹ National Centers for Atmospheric Prediction and National Center for Atmospheric Research.



1021 Bandana Blvd. East, Suite 111 651.556.4200 TEL
St. Paul, MN 55108 USA 651.556.4210 FAX
www.WindLogics.com sales@windlogics.com