A national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy

National Renewable Energy Laboratory

Innovation for Our Energy Future

# Towards a Wind Energy Climatology at Advanced Turbine Hub-Heights

## Preprint

Marc Schwartz and Dennis Elliott

*To be presented at the American Meteorological Society's 15th Conference on Applied Climatology*
*Savannah, Georgia*
*June 20–23, 2005*

**Conference Paper**
**NREL/CP-500-38109**
**May 2005**

NREL is operated by Midwest Research Institute • Battelle Contract No. DE-AC36-99-GO10337

Available electronically at http://www.osti.gov/bridge

Available for a processing fee to U.S. Department of Energy
and its contractors, in paper, from:

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062
phone: 865.576.8401
fax: 865.576.5728
email: mailto:reports@adonis.osti.gov

Available for sale to the public, in paper, from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
phone: 800.553.6847
fax: 703.605.6900
email: orders@ntis.fedworld.gov
online ordering: http://www.ntis.gov/ordering.htm

Printed on paper containing at least 50% wastepaper, including 20% postconsumer waste

JP1.9 TOWARDS A WIND ENERGY CLIMATOLOGY AT ADVANCED TURBINE HUB HEIGHTS

Marc Schwartz and Dennis Elliott
National Renewable Energy Laboratory, Golden, Colorado

## 1. BACKGROUND

The size and rated capacity of commercial wind turbines have grown steadily since the early 1990s. Typical turbines in the 1990s were rated below 1 MW, with rotor diameters of around 30–50 m and hub heights 40–60 m. Recent technological advances in wind turbine design have increased the generation capacity above 1 MW and raised the hub height of the machines used in new wind farm projects to around 80 m above ground level. The trend of larger turbines will continue; some turbines currently under development for deployment during the second half of this decade are rated at 2–5 MW of energy generation with rotor diameters near 100 m and hub heights of 100–120 m. These advanced turbines will take advantage of the higher wind speeds aloft to generate more wind energy. Specific knowledge of important wind characteristics at turbine hub height is still needed to optimize turbine design and wind farm layout. Physical measurements of parameters such as wind speed, wind power density, and wind speed shear at heights of 80–120 m were virtually nonexistent a few years ago and are still rare today.

Most wind energy anemometer measurements are at heights of 50 m or lower. A common practice in the wind energy industry is to analyze data from the shorter towers and extrapolate these data to turbine hub heights for wind farm design and wind energy prediction. This technique is much less reliable for hub heights of 80 m and higher. The decreasing influence of surface roughness on wind shear and increasing influence of lower atmospheric features such as low-level jets and thermal circulations makes simple extrapolation prone to large errors. Recently updated state wind resource maps (Schwartz and Elliott 2004) are used for regional wind farm siting. However, the maps are only validated for 50 m above the ground and the resource patterns depicted on the maps may not accurately reflect the distribution of the resource for levels 80 m and higher.

*Corresponding author address:* Marc Schwartz, National Renewable Energy Laboratory, Golden, CO 80401; e-mail: marc_schwartz@nrel.gov

The wind energy community has recognized the need to fill the data gap. Programs instituted at the state level and, in large part, supported by the U.S. Department of Energy (DOE) place anemometers and vanes at several levels on existing tall (80 m+) communication towers. The wind resource group at DOE's National Renewable Energy Laboratory (NREL) has obtained many of these measurement data. We have begun to analyze important wind climate parameters such as wind speed, power, and shear from the tall towers. The distribution of the tall towers varies among the states that participate in the program, because the tall tower program is new and the available funding to establish tall towers is variable. Tall tower data from Kansas, Indiana, and Minnesota (which have the greatest number of tall towers with measurement data) will be the focus of this paper. Analyses of data from the tall towers will start the process of developing a comprehensive climatology for wind energy development areas in the United States.

## 2. NEED FOR TALL TOWER CLIMATOLOGY

Measurements of wind characteristics over a wide range of heights up to and above 100 m are useful to: (1) characterize the local and regional wind climate; (2) validate wind resource estimates derived from numerical models; and (3) evaluate changes in wind characteristics and wind shear over the area swept by the blades. Developing wind climatology at advanced turbine hub heights for the United States benefits wind energy development. Regions where a climatology is most important include the central United States between the Rocky Mountains and the Appalachians, the interior western states between the Pacific Ocean and the Rocky Mountains, and the northeastern and mid-Atlantic states. Specific circulations such as the nocturnal low-level jet and the land-sea breeze influence many locations in these regions. These circulations may have a greater influence on the wind resource at 80–100 m than at 50 m. The strong winter winds aloft that frequently affect the northern and central tiers of the United States may also affect the wind resource. These winds are often prevented from mixing down to the 50-m level by a strong surface-based stable layer, but whether or how often these winds descend to the 100-m level is not known.

A tall tower wind climatology will better define areas in the United States where wind energy projects could be feasible, and may include regions where current 50-m measurements indicate the wind resource may not be sufficient for a profitable project. DOE supported projects that establish wind measurements on communication towers through grants from its State Energy Program (SEP) in fiscal years 2002 and 2004. Figure 1 shows states that have established tall tower measurements from SEP funding and in-state programs. Three states in the midwestern United States—Kansas (6 towers), Indiana (5 towers), and Minnesota (9 towers)—had sufficient regional distribution of these towers to begin an analysis of the regional wind climatology at advanced hub heights. Unfortunately, only a subset of the towers in Indiana and Minnesota was used in the analysis because of short periods of record or questionable data. The wind climates in these states are interesting because the southerly nocturnal low-level jet strongly influences the climates in Kansas and Minnesota, and Indiana is on the eastern edge of its area of influence.

## 3. TALL TOWER ANALYSIS METHODOLOGY

The raw time series of 10-minute tall tower observations of wind speed and direction were processed by NREL and converted to our standard graphs of important wind characteristics (Schwartz and Elliott 1997). These include annual, monthly, and diurnal averages of wind speed and power, frequency of wind speed, and frequency of speed by direction from each measurement level. An important goal in the analysis methodology is to have the best possible measurement data. We inspect the patterns on the graphs for possible periods of bad data that can slip through the initial quality control process performed by the organizations that operate these towers. For example, ice sometimes forms on vanes and anemometers, which results in long periods of low or calm wind speeds and unchanging wind directions. This causes bad data that is difficult to detect. The best way to detect this problem is to compare the monthly percentage of calm winds from all the measurement levels. If abnormal patterns occur; for example, one or more months have significantly more calms than others, or the percentage of calms increase with height, we

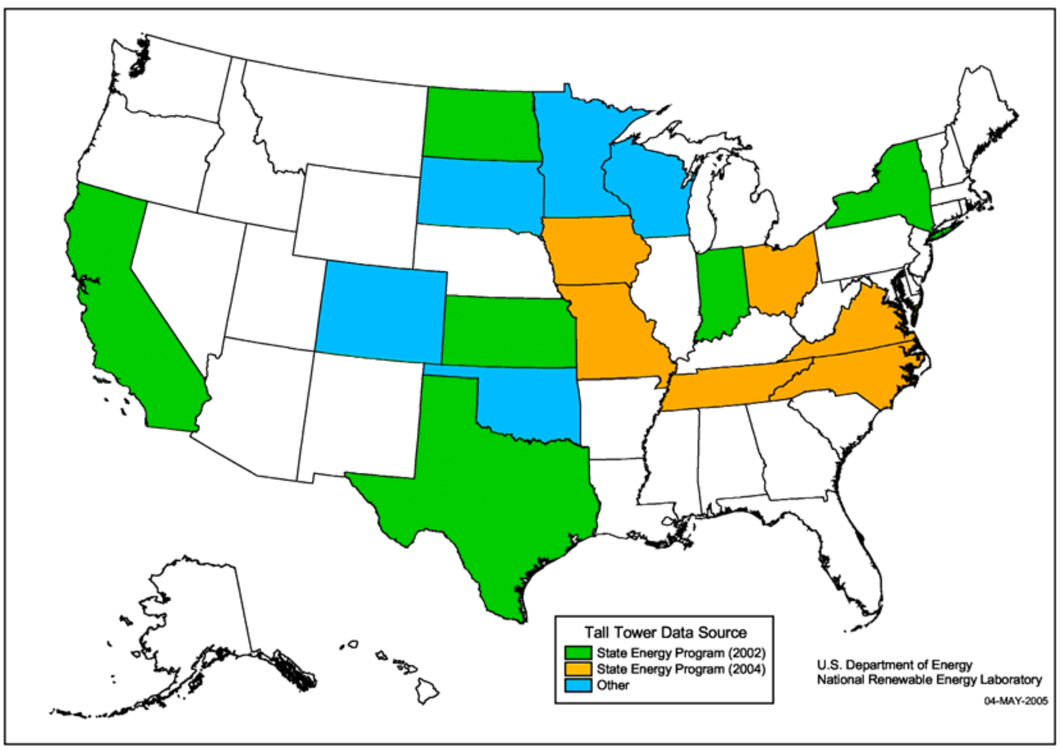


**Figure 1. States with tall tower measurement programs.**

inspect the raw time series and remove the suspicious data. The analysis of important wind characteristics can begin once we are satisfied that a "clean" data set is available for a particular station.

Because tall tower measurement programs are in their infancy, the data periods of record are short, in some cases only one year. Short periods of record hinder our ability to draw definite conclusions about the wind climate, but comparisons among regional locations can still show important patterns. Investigations of the magnitudes of wind speed and wind power at several measurement levels, the change of these parameters with height, and the variation of wind speed by direction at the different measurement levels are the main analysis tools used for the tall tower data.

Annual average wind speeds of 8 m/s and higher for heights of 80-100 m at specific locations generally draw interest from potential wind farm developers. The exact amount of wind energy produced at a particular site would depend on the distribution of the wind speeds, the turbine design, and the wind farm layout. Average wind speed by direction information for a potential wind energy project site plays an important role in designing a wind farm that minimizes turbulence and wake effects. Knowledge of wind shear and the distribution of wind speeds at a wind energy site are important to accurately estimate the power available in the wind at turbine hub height. The 1987 "Wind Energy Resource Atlas of the United States" (Elliott et al. 1987), provides examples of wind shear and wind speed distribution values commonly used for wind energy calculations. In the atlas, extrapolation of measured wind speeds from low (6–10 m) towers to 50 m was based on the 1/7 (0.143) wind speed and 3/7 (.43) wind power density power law exponents for wind shear. The Rayleigh distribution, which corresponds to a Weibull k value of 2.0, often describes the distribution of the wind speeds at measurement sites in the United States and was used in the atlas to relate wind speed to available power.

The results of the analysis of these wind characteristics from the three states are presented in Section 4.

## 4. RESULTS

### 4.1 Kansas Results

Six tall tower stations were established under SEP through the efforts of the Kansas Corporation Commission, Coriolis architecture-energy, and the Kansas Department of Transportation. The stations, which became operational between mid-April and mid-June 2003, are broadly distributed throughout the western two-thirds of Kansas (Figure 2). The towers have anemometers and vanes at three levels: 50 m, 80 m, and 110 m.

Five stations have observations through the end of June 2004; one has observations through early April 2004. The observations of wind speed and direction are 10-minute averages and the data recovery at the stations was 94%–98%.

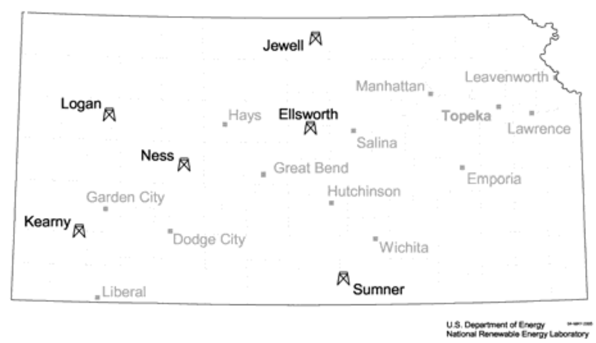


**Figure 2. Kansas tall tower locations.**

The comparison of the wind characteristics among the stations provides some interesting insights into the regional wind climatology. The average 110-m wind speeds at the six sites were 8.4–9.4 m/s (Sumner had the lowest and Ellsworth the highest average speed), a level of resource that would draw interest from potential wind farm developers. There appears to be some influence of regional terrain on the resource because the two stations with the lowest resource are located in river valleys or drainages.

The strong nocturnal wind speed at the 110 m level is an outstanding climatological feature of the Kansas data. The nocturnal speed peaks between 2100 and 2400 Local Standard Time (LST) and the yearly average speeds at the individual towers are 9.5–11.1 m/s. Southerly winds are the prevailing direction for the year and their average speeds are 11.5–15 m/s at the individual towers. In contrast, the afternoon winds are 7.5–8.0 m/s.

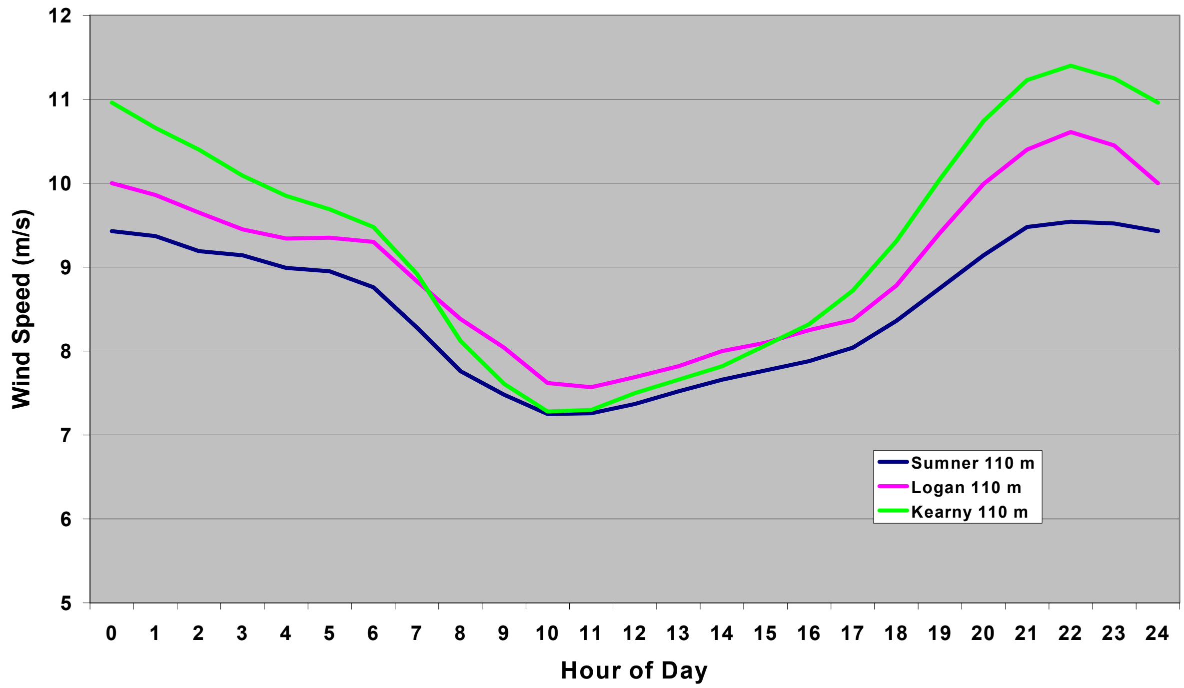


**Figure 3. Diurnal wind speeds at three Kansas tall towers.**

Therefore, most of the difference in wind resource at 110 m among the stations in central and western Kansas is due to the level of nighttime winds. The diurnal pattern at three of the towers (Figure 3) shows strong nighttime winds.

The data from the Kansas tall towers show that the wind shear and wind speed distributions differ from the generalized values used in the atlas. The measured wind shear exponent of 50–110 m at the six towers was close to 0.2, which means the wind speed increased with height more rapidly than with a value of .143. The windier sites at 50 m tended to have lower wind shears than the lower speed sites; however, the range of the speed shear exponents of 0.19– 0.23 at the six towers is small and does not have a major effect on the ranking of the towers in terms of available resource at 110 m. This implies that well-exposed 50-m measurement locations in central and western Kansas are excellent guides to the available wind resource at 110 m. There is some differentiation between the levels of maximum wind shear among the towers. The wind shear at the 50–80-m levels was slightly greater than the 80–110-m wind shear at the two windiest tower locations. At the other four stations, the 80–110-m wind shear was a bit greater than the 50–80-m shear. The wind speed distribution was similar at all the towers; Weibull k values at all levels were generally 2.3–2.5. These k values denote a narrower wind speed distribution than the Weibull k of 2.0 used as the standard in the 1987 atlas.

There are two prevailing wind directions in this region: northwest and south. Data at 110 m from all towers indicate that strong northwesterly winds occur primarily during the cool season (September–February) and strong southerly winds occur all year.

The comparative speeds between the northwesterly and southerly winds showed significant differences among the stations. The average speeds of the northwesterly and southerly winds were about the same at the two stations the furthest north and furthest west in the state. The average speeds of the southerly winds at the other four stations were notably stronger 1–2 m/s) than the northwesterly winds. Overall, the average speed of the northwesterly winds was 9.5–10.5 m/s, and the average southerly wind speed was in the 10–12 m/s range. The two windiest stations (Ellsworth and Kearny) had the strongest average southerly winds (12.2 and 11.8 m/s respectively) and the largest difference between the average northwesterly and southerly wind speeds.

In summary, locations with the strongest nocturnal southerly winds will probably have the greatest

110-m wind resource, which emphasizes the importance of the strength of the low-level jet in central and western Kansas for controlling the available wind resource. There is some indication that the northwesterly winds in the northern and northwestern areas may play a primary role in determining the available resource in this area, but definite conclusions must await future measurements. There are plans to continue wind measurements at these Kansas towers for another one-year period.

### 4.2 Indiana Results

Five tall tower stations under SEP began operations in 2004 for the Indiana State Energy Office with the assistance of Global Energy Concepts, a private consulting firm in Kirkland, Washington. Three started measurements on January 1; the other two commenced in mid-April. The five towers are spread throughout Indiana: four in the central and northern parts of the state, and one in extreme southwestern Indiana near Evansville (Figure 4).

The stations have anemometers and vanes at three levels: 10 m, 49 m, and 99 m (Goodland's upper level is 90 m) above ground. All five stations recorded data through the end of 2004, and the wind speed data recovery exceeded 95%.

The three stations with a full year of data are Goodland (in north central Indiana near the Illinois border), Carthage (east of Indianapolis), and Haubstadt (near Evansville). The comparison of the wind characteristics at the three stations shows significant differences in the wind resource at 90–99 m during 2004. Goodland was the only station to record an average wind speed high enough (7.7 m/s at 90 m) to encourage wind energy development. Carthage averaged 6.8 m/s at 99 m and Haubstadt averaged 6.1 m/s at 99 m. The two stations with more than 8 months of data were Geetinsville (in north-central Indiana near Kokomo) and La Grange (near the Michigan border in the northeastern part of the state). Extrapolating the 8-month average wind speed to 12 months based on the patterns recorded at the other three stations yields average wind speeds around 7 m/s at 99 m at both towers. The predominant wind direction at the stations was south-southwest to southwest; winter and spring had the greatest resource. The most significant climatological feature to be analyzed was the higher wind resource in the north-central region near the Illinois border compared to other parts of the state. The recently updated 50-m wind resource map (at www.windpoweramerica.gov) for Indiana shows relatively high wind power in this region, which confirms that the 2004 wind patterns are not atypical.


**Figure 4. Indiana tall tower locations.**

The diurnal amplitude and pattern of wind speed at the upper level at the three full-year data towers was quite similar (Figure 5). The differences in wind speed among the stations were spread throughout the day rather than concentrated at night. For example, the peak nighttime wind speeds at Goodland averaged 8.2 m/s and the afternoon winds averaged 7.4 m/s. At Carthage the nighttime and afternoon speeds were 7.2 m/s and 6.6 m/s, respectively, and at Haubstadt they were 6.7 m/s and 5.8 m/s. The primary sources of the increased wind resource at Goodland were apparently stronger episodes of south-southwest winds during the winter and spring. The average speed of the southerly winds at Goodland was 10.5–11.0 m/s; they averaged 8 m/s at Carthage and 7.5 m/s at Haubstadt. Winds from the west to northwest averaged 7 m/s at Carthage and 8 m/s at Goodland. The Weibull k values were around 2.1 at Goodland and 2.5 at Carthage and Haubstadt. These data indicate a broader distribution of wind speeds at Goodland than at the other locations.

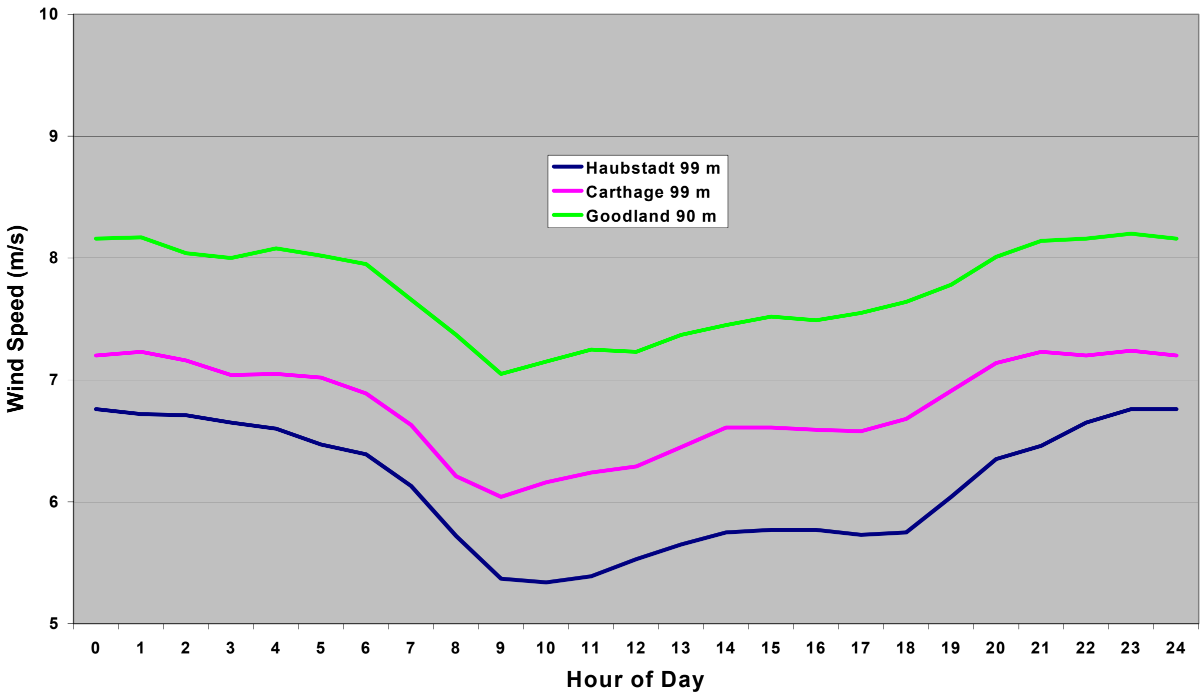


**Figure 5. Diurnal wind speeds at three Indiana tall towers.**

The Indiana stations also exhibit wind shear exponents significantly greater than 0.143. The 49–99-m (90-m at Goodland) shear was 0.23 at Goodland and 0.28 at Carthage. The windiest 49-m locations tended to have less wind shear than the lower speed sites, though the spread of the 49 m speeds was large enough to confirm that exposed 50-m speeds indicate the amount of available resource at advanced turbine hub heights. The speed shear exponent at Haubstadt was extreme (about 0.4). The low wind speed at 49 m of only 4.5 m/s, about 2.2 m/s lower than the 49 m wind speed at Goodland, may reflect disturbed boundary layer flow initiated by the undulating terrain. At the Haubstadt 99-m level the direct terrain influence is reduced and the average wind speed was only 1.7 m/s lower than the extrapolated 99-m speed at Goodland.

Exposed sites in northwestern Indiana that are subject to the strong southerly and westerly winds could have the highest wind resource in the state. However, none of the tall towers were located on the highest terrain in their regions, so wind resource levels as high as Goodland could be measured in other areas of northern Indiana. Unfortunately, the five towers were decommissioned in April 2005, but perhaps this analysis will spur future public domain tall tower measurements across Indiana.

### 4.3 Minnesota Results

The Minnesota Department of Commerce established nine tall tower locations around the state from the mid-1990s through 2004. The highest level at seven of these towers is 90 m. The highest level at one tower is 85 m, and one other tower has wind data at 120 m. NREL downloaded wind data from these towers from the Plains Organization for Wind Energy Resources$^{SM}$ web site. Three of the tall towers had periods of record less than one year and were excluded from the analysis. Data from three other towers were excluded from the formal analysis after processing because of low data recovery levels and questionable data quality. The three towers used for the analysis (Hatfield, Marshall, and Currie) had anemometers at 30 m, 60 m, and 90 m and vanes at the 30- and 90-m levels. These towers are in extreme southwestern Minnesota near the South Dakota border (Figure 6) on the slope of a glacial landform called Buffalo Ridge. Buffalo Ridge extends from northwestern Iowa through southwestern Minnesota to northeastern South Dakota and has been a focal point of regional wind energy development since the early to mid-1990s. A regional wind characteristic resource analysis for southwestern Minnesota was not possible because the three stations are too close together. However, wind characteristic variations (if any)


**Figure 6. Southwestern Minnesota tall tower locations.**

across Buffalo Ridge could be studied because Hatfield is on the southwestern slope and Marshall and Currie are on the northeastern slope.

The years 2001 and 2002 were chosen for the analysis because of good data recovery at the three sites–about 90% at Marshall and about 95% at Hatfield and Currie. The 90-m speeds at the three towers confirm that the Buffalo Ridge area is suitable for wind energy development, but the data showed a significant difference in average wind speeds between Hatfield on the southwestern slope and Marshall and Currie on the northeastern slope (Figure 7). The 90-m speeds at Marshall and Currie were about 8.3 m/s; Hatfield recorded an average speed of 7.8 m/s. Most of the difference in wind speeds occurred at night. The peak nighttime speeds that occur between 2300 and 0300 LST averaged 8.8 m/s on the northeastern slope, but only 8.1 m/s on the southwestern slope. The afternoon wind speeds were 7.6–7.8 m/s. The wind speed shear exponents of 60–90 m were at or slightly above 0.2 at the three towers. Marshall and Currie, the higher wind speed sites at 60 m, recorded lower wind shear exponent values than the 0.25 recorded at Hatfield.

Analysis of wind direction data was difficult because of some erroneous data recorded at Currie and Hatfield. Marshall's wind direction appeared correct at both 30 m and 90 m as it matched the prevailing directions recorded at Worthington, Pipestone, and Marshall airports from 2001 through 2002. The prevailing directions at Marshall are south-southwest and northwest. At 90 m the southerly winds average just over 11 m/s and the northwesterly winds average just over 8.5 m/s. The strong southerly winds occurred throughout the year and the strong northwesterly winds were concentrated from late autumn through early spring. The 90-m southerly winds at Currie were estimated at just over 10.5 m/s and the northwesterly winds around 8.5 m/s, close to the averages observed at Marshall. The 90-m direction data at Hatfield were corrupted but the 30-m data showed the southerly winds averaged 7.2 m/s, about 1.2–1.5 m/s lower than the 30 m southerly wind speeds at Currie and Marshall. The extrapolated 90-m southerly wind speed at Hatfield is around 10 m/s, which is 0.5–1.0 m/s lower than Currie and Marshall.

The analysis revealed some subregional differences in the wind characteristics on Buffalo Ridge. The 90-m average wind speed at stations on the northeastern (downslope) side was 0.5 m/s higher than that at Hatfield on the upslope side of the ridge. The difference in average speeds is caused by stronger nighttime and southerly winds at Marshall and Currie. The results imply that subregional terrain can cause a significant difference in the wind resource. The Minnesota Department of Commerce continues to collect data at five of the tall tower locations.

## 5. CONCLUSIONS

NREL has started to analyze the wind climatology at advanced turbine hub heights based on data measured on existing tall towers in Kansas, Indiana, and Minnesota. The highest measurement level at these towers was 90–110 m. There are two significant findings from the analysis: (1) the difference in wind resource at tall tower sites in the central United States seems to be controlled by the strength of the nocturnal and southerly winds; and (2) the average wind shear exponent of 50–100 m at tall towers in the central United States is influenced by strong southerly winds and is significantly higher than the 0.143 often used for conservative estimates of the wind resource at turbine hub height. A common range of shear exponents at well-exposed sites is apparently 0.2–0.23; the windiest sites have slightly lower shear exponents (0.18–0.20). This finding may prove beneficial to wind energy

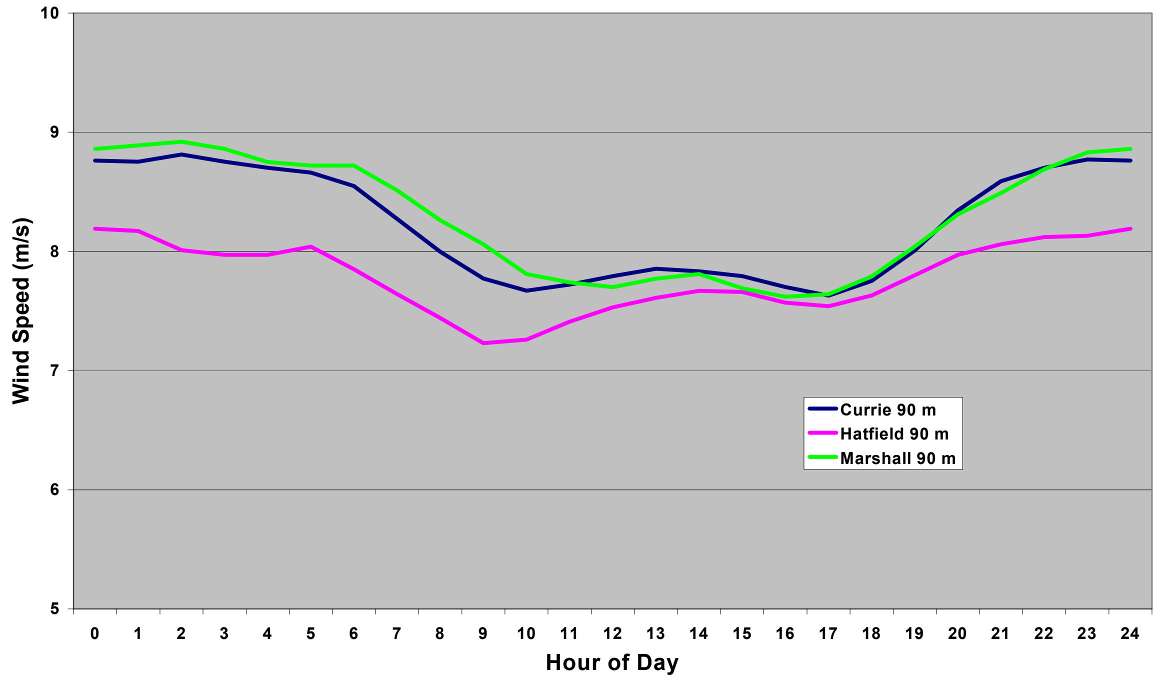


**Figure 7. Diurnal wind speeds at three Minnesota tall towers.**

development in the Midwest. If the shear exponent values above 0.2 are widespread, the wind speed of 100 m for many locations could be up to 0.5 m/s higher than previously estimated, which would make more locations attractive for development.

Tall tower programs are being implemented in Ohio, Iowa, Missouri, South Dakota, Virginia, and North Carolina. Tall tower data are also being collected in California, Texas, North Dakota, and New York. In time, tall tower data supplemented by data from remote sensing networks may help us develop a clearer picture of wind characteristics at advanced turbine hub heights across the United States and allow for a more systematic deployment of wind farm power plants to meet our energy needs.

## 6. ACKNOWLEDGMENTS

We would like to thank George Scott, Steve Haymes, Donna Heimiller, and Ray George of the NREL wind resource assessment group for their help with this project. This paper was written at NREL in support of DOE under contract number DE-AC36-98-GO10337.

## 7. REFERENCES

Elliott, D.L., C.G. Holliday, W.R. Barchet, H.P. Foote, and W.F. Sandusky, 1987: *Wind Energy Resource Atlas of the United States.* DOE/CH 10093-4. Golden, CO: Solar Energy Research Institute, 210 pp.

Schwartz, M.N. and D.L. Elliott, 1997: The Integration of Climatic Data Sets for Wind Resource Assessment. NREL/CP-440-23157. Golden, CO: NREL 5 pp.

Schwartz, M.N. and D.L. Elliott, 2004: Validation of Updated State Wind Resource Maps for the United States. NREL/CP-500-36200. Golden, CO: NREL 5 pp.

# REPORT DOCUMENTATION PAGE

*Form Approved*
*OMB No. 0704-0188*



| 1. REPORT DATE *(DD-MM-YYYY)* | 2. REPORT TYPE | 3. DATES COVERED *(From - To)* |
|---|---|---|
| May 2005 | Conference paper | |

**4. TITLE AND SUBTITLE**
Towards A Wind Energy Climatology at Advanced Turbine Hub-Heights: Preprint

**5a. CONTRACT NUMBER**
DE-AC36-99-GO10337

**5b. GRANT NUMBER**

**5c. PROGRAM ELEMENT NUMBER**

**6. AUTHOR(S)**
M. Schwartz and D. Elliott

**5d. PROJECT NUMBER**
NREL/CP-500-38109

**5e. TASK NUMBER**
WER5.3404

**5f. WORK UNIT NUMBER**

**7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)**
National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO 80401-3393

**8. PERFORMING ORGANIZATION REPORT NUMBER**
NREL/CP-500-38109

**9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)**

**10. SPONSOR/MONITOR'S ACRONYM(S)**
NREL

**11. SPONSORING/MONITORING AGENCY REPORT NUMBER**

**12. DISTRIBUTION AVAILABILITY STATEMENT**
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161

**13. SUPPLEMENTARY NOTES**

**14. ABSTRACT** *(Maximum 200 Words)*
Measurements of wind characteristics over a wide range of heights up to and above 100 m are useful to: (1) characterize the local and regional wind climate; (2) validate wind resource estimates derived from numerical models; and (3) evaluate changes in wind characteristics and wind shear over the area swept by the blades. Developing wind climatology at advanced turbine hub heights for the United States benefits wind energy development. Tall tower data from Kansas, Indiana, and Minnesota (which have the greatest number of tall towers with measurement data) will be the focus of this paper. Analyses of data from the tall towers will start the process of developing a comprehensive climatology.

**15. SUBJECT TERMS**
climatology; wind resources; wind characteristics; wind resource measurement; tall towers

| 16. SECURITY CLASSIFICATION OF: a. REPORT | b. ABSTRACT | c. THIS PAGE | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
|---|---|---|---|---|---|
| Unclassified | Unclassified | Unclassified | UL | | 19b. TELEPHONE NUMBER *(Include area code)* |