

## WindSpeed Package

Suited for mid sized wind turbine projects with hub heights not to exceed 200'  
On-site measurement of your wind resource with long term airport correlation.



### Met Tower Option:

- Good for sites near buildings or trees
- 40m (130' tall)
- 4 anemometers, 1 vane, 1 temp sensor
- On-site minimum 3 months

COST-\$11,800\*

\*requires verification on availability at your location

### SODAR Option:

- Good in open site (no echoes)
- Can measure from 10m to 60m+
- On-site minimum 1 month

COST- \$10,600\*

\*requires verification on availability at your location



# Wind Energy

What is included in the WindSpeed Package:

The WindSpeed package includes:
<b>Task</b>
Site evaluation and assistance with the site selection
Preliminary Long-Term Wind Speed Estimate
Wind Measurement Campaign - See Options 1 or 2
Raw data collection and cleaning
Obtaining Long Term Reference data (ASOS/Airport or other) and converting it to useable format
Performing multiple correlations and using the best match for producing long term data set
Creating a Report for the Long-Term Wind Speed estimate with Net Energy Output for 3 turbines
Administrative and Other Cost
<b>Option 1 - SODAR</b>
SODAR - Installation and Removal
Installation/Removal- Travel, Two times
*wind speed accuracy based on 1 month measurement= 6% - 10%
<b>Option 2 - Met Tower</b>
40m tower - Install
40m tower - Take-Down
Travel based on 250 miles one way at \$1.25/mile two times
*wind speed accuracy based on 3 month measurement= 5% - 8%
<i>*Consultant may keep measurement device longer at site to obtain needed data for this level of accuracy</i>



## WindSpeed Benefits:

- Reduce energy production estimates to +/- 10% from +/- 50%.
- Obtain grants- many grant agencies need on-site wind data before awarding.
- Satisfy lender requirements- lenders want certainty that in worst year the savings/ revenue will exceed the loan amount.
- Verify location is best choice for wind production on the site before spending large \$ \$\$ on installation.

Below table shows how wind prediction error decreases quickly with number of months of measured data. The error starts at 17% (or greater) with no monitoring, and decreases to approximately 2% within 12 months. Even just 3 months of data can decrease error by half and that means a much more accurate prediction of energy.

Monitoring Period (months)	Standard Error
1	6.4 - 11.8
3	4.9 - 10.3
6	3.5 - 7.8
12	1.2 - 2.8
24	0.6 - 1.5

*\* from AWS Truewind article in North American Windpower Feb, 2006*

## Example of Uncertainty reduction for N100 turbine:

Project site average wind speed is 5.5 m/s (12.3 mph) at 37m (121') height above ground. Northern Power Systems 100kW wind turbine with 21m rotor on 37m tall tower. Assumed 15% losses to convert from gross energy estimate to a net energy amount expected for one year. Annual production estimate at 5.5 m/s is 142,000 kWhrs.

Number of months of data	Avg.% variability wind speed	annual wind speed-lower limit (m/s)	Annual Energy Estimate- lower (kwhrs)	Percentage increase in energy and revenue certainty
0	17	4.57	87,000	None
1	9	5.01	112,000	28.7%
3	7.5	5.09	116,000	33.3%
6	5.6	5.19	122,000	40.2%
12	2	5.39	133,000	52.9%

Table 2- Sample 5.5 m/s wind site reduction in uncertainty with measurement intervals

