Chena Hot Springs Wind Resource Summary Report

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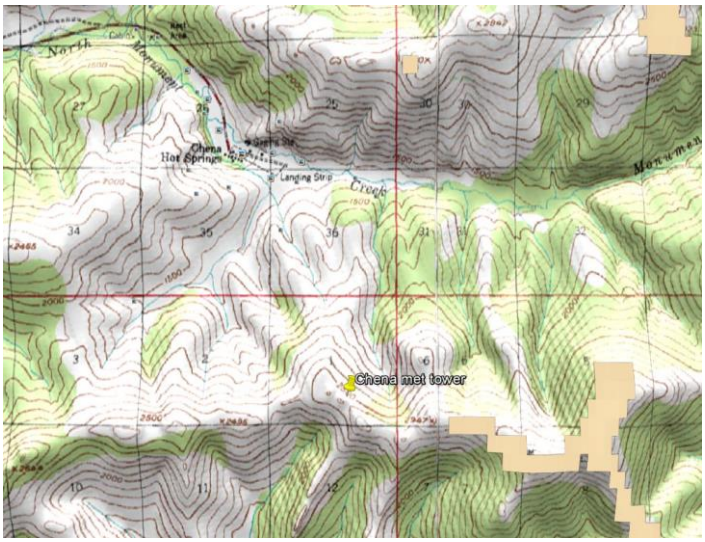
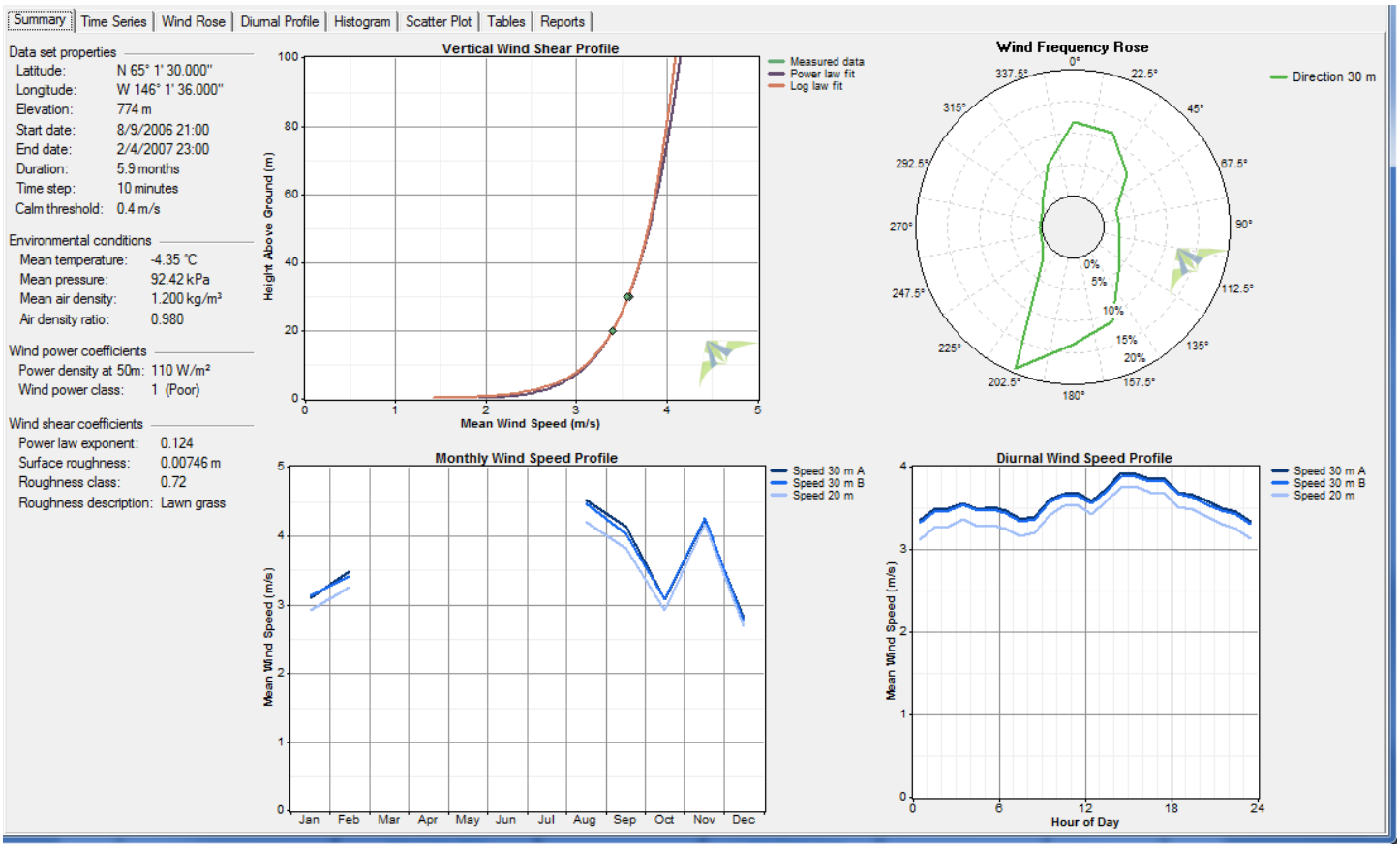
OVERVIEW

A 6-month wind study was conducted southeast of Chena Hot Springs Resort on a ridge at ~ 775 meters ASL in 2006/7. Data recovery was exceptional with no missing data during the collection period. The wind resource is poor with an expected net capacity factor of less than 10 percent. The surrounding high terrain blocks much of the wind in the region, with modest levels of turbulent air flow. Wind energy production is not recommended at this site/unless it is the only choice for an off-grid application. Low levels of icing were observed during the short study. Very cold winter temperatures in the Interior tend to bring calmer winds.



Chena Hot Springs Met Tower Application/Grant #		
Average Wind Speed @ 30 m:	3.590	m/s
Average Power Density @ 50 m:	110	W/m^2
Average Power Density @ 30 m:	102	W/m^2
Air Density:	1.200	kg/m^3
Weibull k:	1.15	
Shear Factor:	0.124	
Roughness Class:	0.720	
Turbulence Intensity @ 15 m/s:	0.147	
IEC Turbine Class:	III-B	
Wind Class @ 30 m:	1	
Associated CF:	<11%	
Predicted CF:	7.9%	

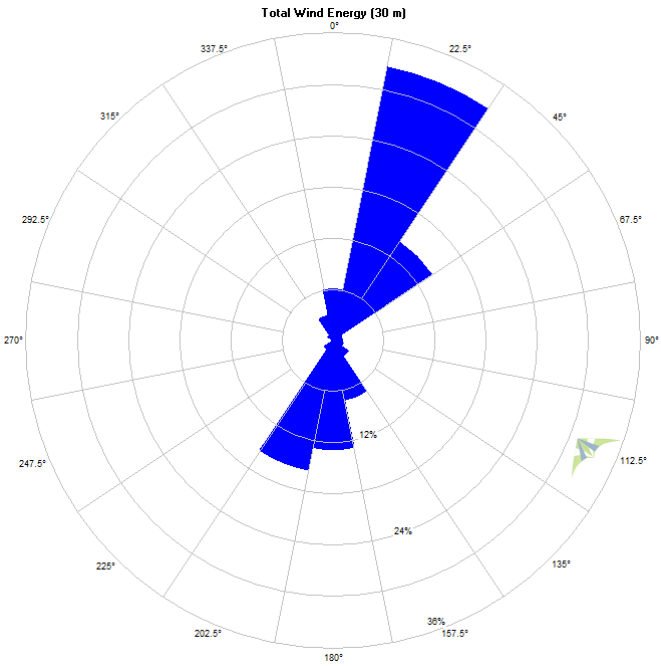
DATA SUMMARY

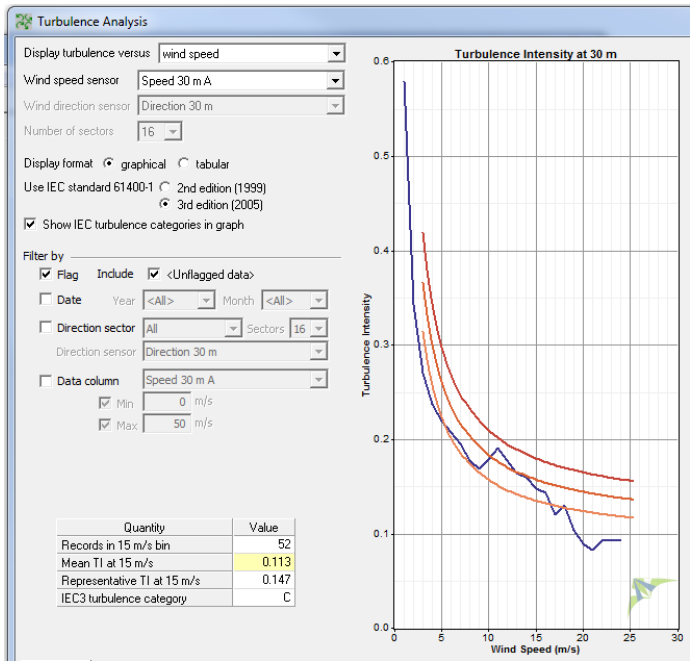


Variable	Speed 30 m A	Speed 30 m B	Speed 20 m
Measurement height (m)	30	30	20
Mean wind speed (m/s)	3.590	3.565	3.402
MoMM wind speed (m/s)	3.590	3.565	3.402
Median wind speed (m/s)	3.100	3.100	2.900
Min wind speed (m/s)	0.400	0.400	0.400
Max wind speed (m/s)	24.400	24.400	24.500
Weibull k	1.153	1.152	1.091
Weibull c (m/s)	3.728	3.703	3.473
Mean power density (W/m²)	102	101	95
MoMM power density (W/m²)	102	101	95
Mean energy content (kWh/m²/yr)	895	884	835
MoMM energy content (kWh/m²/yr)	895	884	835
Energy pattern factor	3.651	3.680	3.989
Frequency of calms (%)	14.50	14.20	16.22
Possible records	25,788	25,788	25,788
Valid records	25,788	25,788	25,788
Missing records	0	0	0
Data recovery rate (%)	100.00	100.00	100.00

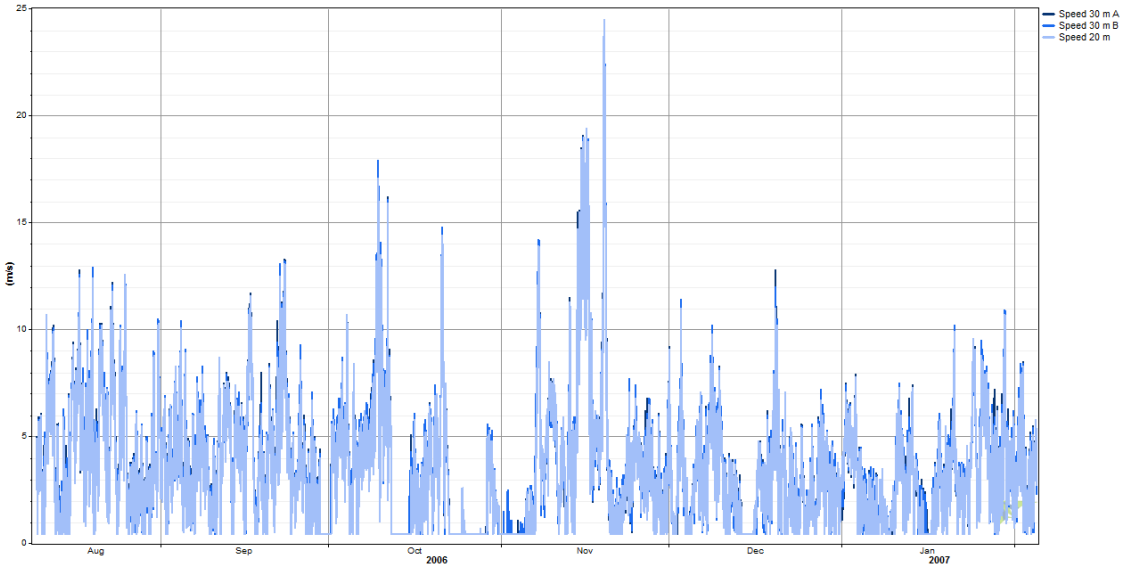
Winds are mild at a mean wind power density of 101 watts per square meter. A Weibull K of 1.15 versus a more normal 2.0 is also indicative of a low wind regime. The colder, dense air almost exactly negates the elevation losses with air density averaging 98% of sea level over the study period.

Average winds are low at 3.6 meters per second. Minimal level of icing seen during winter months with modest icing in October. Low wind shear (good). Low extreme wind estimates. Estimated net capacity factor for a 100kW wind turbine is 7.9% (very poor). Energy-producing winds are generally out of the north-northeast. Diurnal pattern indicates stronger afternoon winds driven by surface heating. Winds are strongest during the few passing storm systems. Turbulence intensity is IEC level B.





The wind speed trend indicates a fairly consistent pattern with only a few periods driven by stronger storm-based systems.



WIND TURBINE SITING CONSIDERATIONS

Siting constraints will be driven primarily by land ownership issues and distance to a transmission line (for grid-connected systems). Higher terrain tends to block winds while most occupied areas are in the lower elevations. AEA is not aware of any met tower permitting issues with the FAA or US Fish & Wildlife Service, having not been involved in the permitting process.

INTEGRATED POWER SYSTEM CONSIDERATIONS

Most applications in this region are off-grid. The wind resource is low and would need significant augmentation from solar PV and a diesel generator.

BARRIERS

- The site has a very low wind resource.
- The absence of an area power grid limits applications to residential and small-scale commercial.

CONCLUSIONS

Wind energy development is not recommended in this area unless it is the only choice available for off-grid applications. Even under this scenario, the project developer should compare cost payback of a wind system with the cost of running a diesel generator.

CONTACT INFORMATION

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ACKNOWLEDGMENTS