Chignik Lake Wind Resource Summary Report

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OVERVIEW

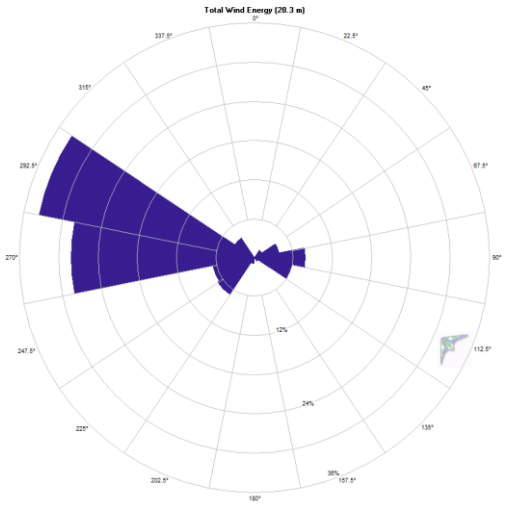
A 17-month wind study was conducted southwest of town in 2009-11 under funding from Round 1 of the Renewable Energy Fund (grant 2195374). Chignik Lake has good wind energy potential, but multiple major barriers to that preclude further project development.

Data set properties

Latitude:	N 56° 14' 57.090"
Longitude:	E 158° 46' 36.460"
Elevation:	28 m
Start date:	10/25/2009 00:00
End date:	3/16/2011 09:00
Duration:	17 months
Time step:	10 minutes
Calm threshold:	0.4 m/s

DATA SUMMARY

AEA Wind Data () Chignik Lake Wind Analysis Application/Grant #			Comments
Average Wind Speed @ 30 m:	6.266	m/s	
Average Power Density @ 50 m:	477	W/m^2	
Average Power Density @ 30 m:	404	W/m^2	
Air Density:	1.039	kg/m^3	
Weibull k:	1.54		
Shear Factor:	0.092		Low shear
Roughness Class:	0.160		
Turbulence Intensity @ 15 m/s:	0.186		Max allowable is .180
IEC Turbine Class:	III-A		Exceeds IEC class due to turbulence.
Wind Class @ 30 m:	4		
Associated CF:	24.0%		
Predicted CF:	28.1%		



Average winds are good at 6.26 meters per second. Minimal level of icing seen during winter months. Low wind shear (good). Low extreme wind estimates. Estimated net capacity factor for a 100kW wind turbine is 28.1% (good). Energy-producing winds are generally out of the west. Diurnal pattern indicates stronger afternoon winds driven by surface heating. Winds are strongest in the winter months and calmest in the summer months. Unfortunately, the turbulence intensity exceeds allowable limits for wind turbine manufacturers according to IEC standards.

WIND TURBINE SITING CONSIDERATIONS

The village is east of the east-west runway. All potential wind turbine sites are inside approach and take off pattern. Community is within .8 km of wind turbine site with some shadow flicker expected. Layout of town site versus land/lake doesn't allow for a turbine on the north side of the town.

FAA		
Distance to airport	2200	Feet
Airport elev	52	Feet
Turbine elevation	97	Feet
Turbine hub height	37	Meters
Turbine rotor dia.	54	Meters
Turbine height	209.9712	Feet
Slope ratio X:1	8.628425	20 min.

INTEGRATED POWER SYSTEM CONSIDERATIONS

Average village electrical load of 44 kW is well below minimum load for viable wind turbine and diesel generator configuration. This is further reflected in the average diesel efficiency of 10.38 kWh per gallon versus a desired level of 12-14 or higher.

BARRIERS

- Turbulence intensity is too high at the met tower site and exceeds allowable levels required by wind turbine manufacturers.
- Average village electrical load of 44 kW is well below minimum load for viable wind turbine and diesel generator configuration.
- FAA requirements versus available, developable sites prohibit any viable wind turbine locations.

CONCLUSIONS

While there is reasonable energy potential in the wind resource, the high turbulence at the site, alternate siting limitations due to the airport and landforms, plus the low electrical load in the community prevent the development of a reliable and economic wind-diesel system with currently available technology.

CONTACT INFORMATION

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