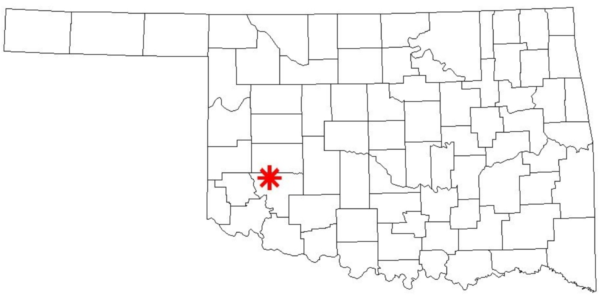
April 2002 to March 2003 Wind Summary
Hobart's KTJS Tower
Sensors at 40, 70, and 100 m*

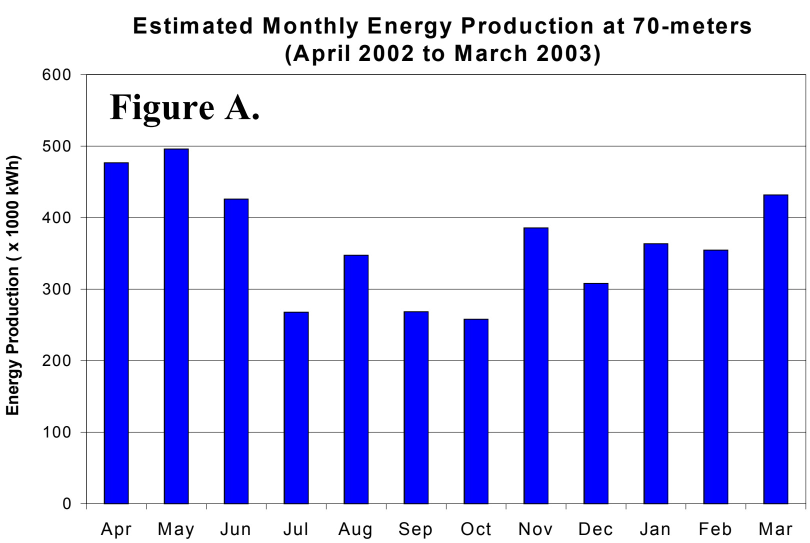
Oklahoma Wind Power Initiative (OWPI)

Height	Average Wind Speed	Wind Power Density
40 m (131 ft)	6.62 m/s (14.8 mph)	280 W/m^2
70 m (230 ft)	7.62 m/s (17.1 mph)	401 W/m^2
100 m (328 ft)	8.24 m/s (18.5 mph)	510 W/m^2



BACKGROUND - On March 28th, 2002 OWPI installed wind monitoring equipment on the KTJS radio tower located on the north side of Hobart in cooperation with the community of Hobart and the Plains Organization for Wind Energy Resources (POWER).

POTENTIAL ENERGY PRODUCTION - A 1.5 MW wind turbine with a 70.5-m rotor diameter (i.e., GE Wind's 1.5 MW turbine) at a hub height of 70 meters, could have produced roughly 4383310 kWh of electricity for the entire year. Based on year 2000 statistics from the Energy Information Administration, 4383310 kWh in a year could have powered approximately 340 Oklahoma households per month.



SUMMARY - (Figure A) The estimated monthly energy production for a 1.5 MW wind turbine (i.e., GE Wind's 1.5 MW turbine) is plotted for the entire year at the 70-m level. The energy units on the vertical axis are plotted in thousands of kWh. For example, a value of 400 represents 400,000 kWh of energy produced.

(Figure B) At the 70-meter level, the winds were from the south-southeast, south, and south-southwest directions 40% of the time, and accounted for 47% of the total wind energy for the year.

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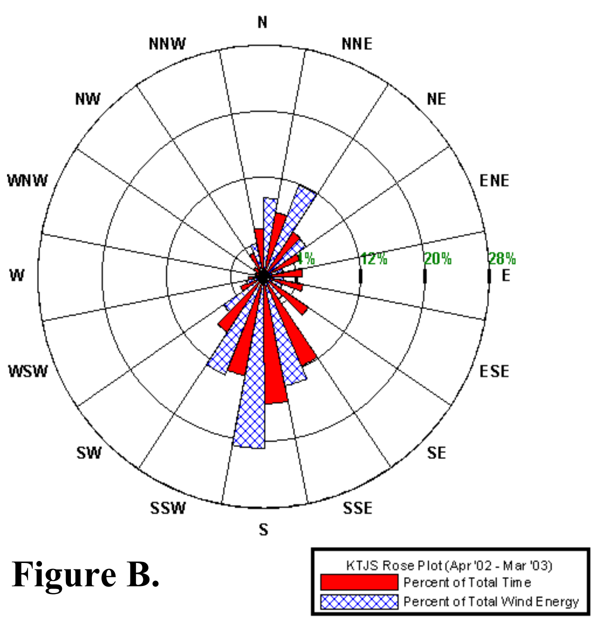
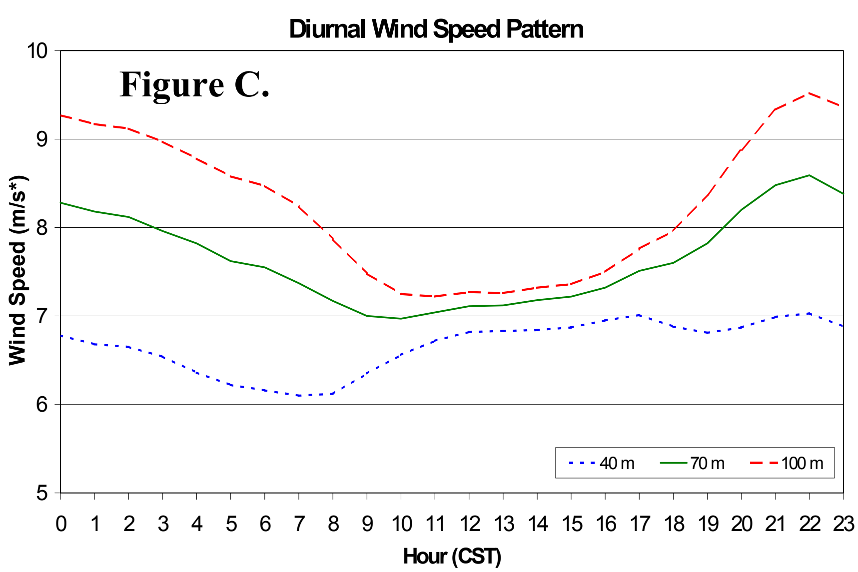


Figure B.



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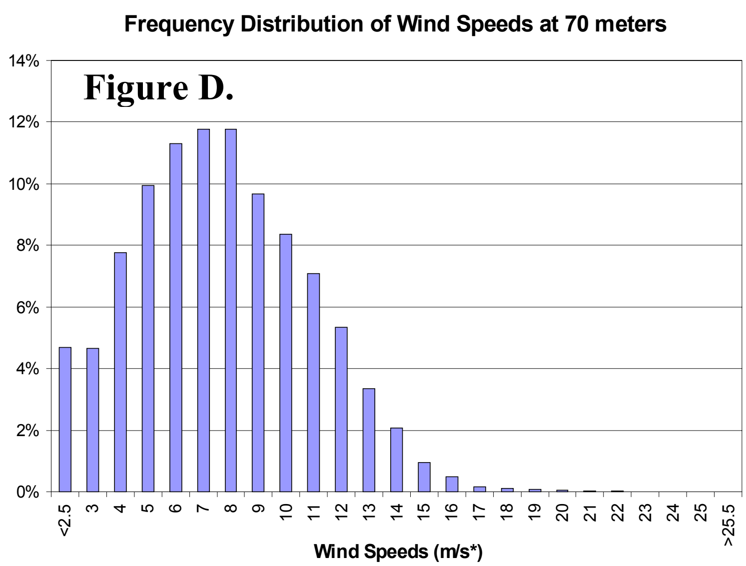
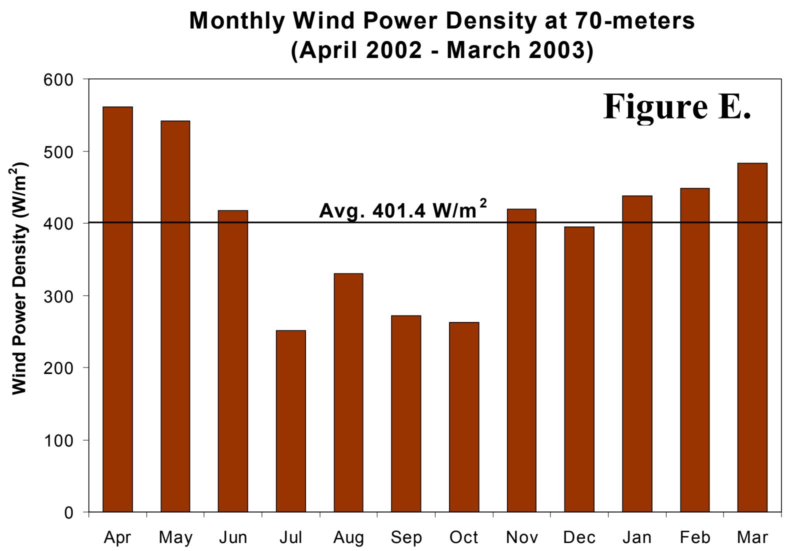
(Figure C) The average-hourly wind speed is plotted for the three heights for the year. The line chart illustrates the variation of wind speed with height, otherwise known as wind shear. Large wind shear values are typically observed during the night. The **Average Wind Shear Exponent** between 40 and 100 m for the year is 0.20 ($1/5^{th}$). The exponent can be used in conjunction with Power Law Profile equation to calculate the average wind speed at other heights.

(Figure D) Categories or bins are labeled with the center point and have a width of 1 m/s. For example, the 6 m/s bin has a frequency of 11.5%, so wind speeds between 5.5 and 6.5 m/s occur 11.5% of the time.

The frequency distribution can be used to determine the performance of a wind turbine. For instance, a typical cut-in wind speed for a wind turbine is 4 m/s, while a typical cut-out wind speed is 25 m/s. Based on wind data at the 70-meter level, an operational wind turbine would have generated electricity for 89% of the year.

(Figure E) The average monthly wind power density is plotted for the year at 70-meters. The chart illustrates fluctuations in wind power between each month as well as each season. Wind power is typically highest in the spring months.





NOTES:

*m – to convert meters to feet multiply value by 3.28.
*m/s – to convert meters per second to miles per hour multiply value by 2.24.

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