Wind-Solar Energy (WISE) Demonstration System

System Outline

The "WISE residential hybrid demonstration system" was constructed in 2007 with funding provided by Maryland Energy Administration.

The system consists of a 2-kW Photovoltaic (PV) array and a 1.8-kW wind turbine connected to the low voltage grid via net metering.

Ten 200-W PV modules (panels) mounted on the roof of the building form the PV array

The wind turbine is mounted on a 45' monopole tower. The turbine characteristics are summarized in Table 2

The actual daily average energy generation of the wise system for each month from September 2007 to August 2008 is shown in Figure 1. Figure 2 shows the solar path at the location.

For more information or questions

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Table 1 Electrical characteristics of the PV modules

Rated Power	P_{max}	W	200
Maximum Power Voltage	V_{pm}	V	55.8
Maximum Power Current	I_{pm}	A	3.59
Open Circuit Voltage	V_{oc}	V	68.7
Short Circuit Current	I_{sc}	A	3.83
Minimum Power	P_{min}	W	180.0
Max System Voltage	V_{sys}	V	600
Cell Efficiency		%	19.7
Module Efficiency		%	17
Power per Square Foot		W	15.8

Figure 1

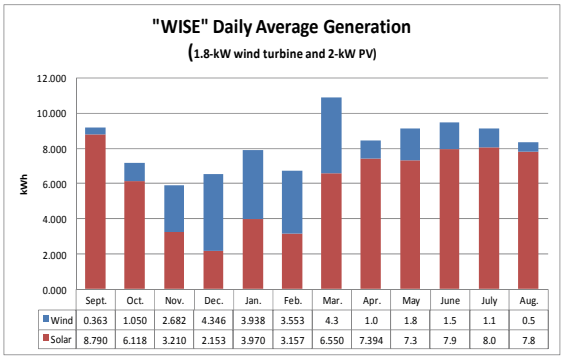

Figure 2

Table 2 Wind turbine characteristics

Rated Power	1.8 kW
Weight	154 lbs. / 70 kg
Rotor Diameter	12 feet / 3.72 meters
Swept Area	115.7 ft^2 / 10.87 m^2
Type	Downwind rotor with stall regulation control
Direction of Rotation	Clockwise looking upwind
Blade Material	Fiberglass reinforced composite
Number of Blades	3
Rated Speed	50 - 325 rpm
Tip Speed	66 - 213 f/s / 9.7 - 63 m/s
Alternator	Slotless permanent magnet brushless
Yaw Control	Passive
Grid Feeding	120/240 VAC 50-60/Hz inverter enclosed in the na-
Braking System	Electronic stall regulation w/redundant relay switch
Cut-in Wind Speed	8 mph / 3.5 m/s
Rated Wind Speed	20 mph / 9 m/s
Survival Wind Speed	140 mph / 63 m/s