



Wind speed (m/s)	Wind speed (mph)	Rated power (DC kW ♦)	Output power (DC kW ▼)	Inverter efficiency (%)	Delivered power (AC kW ▲)
1	2.2	0.00	0.00	12%	0.00
2	4.5	0.07	0.06	20%	0.01
3	6.7	0.29	0.23	41%	0.10
4	8.9	0.88	0.70	75%	0.53
5	11.2	1.73	1.38	87%	1.20
6	13.4	3.05	2.44	93%	2.28
7	15.7	4.65	3.72	96%	3.56
8	17.9	6.32	5.05	97%	4.91
9	20.1	8.05	6.44	97%	6.26
10	22.4	9.62	7.70	97%	7.49
11	24.6	11.07	8.86	97%	8.59
12	26.8	12.27	9.82	97%	9.50
13	29.1	13.45	10.76	97%	10.39
14	31.3	14.22	11.38	97%	10.99
15	33.6	13.94	11.15	97%	10.77
16	35.8	13.69	10.95	96%	10.56
17	38.0	13.44	10.75	96%	10.35
18	40.3	13.20	10.56	96%	10.14
19	42.5	12.96	10.37	96%	9.94
20	44.7	12.73	10.19	96%	9.74
21	47.0	12.50	10.00	95%	9.54
22	49.2	12.28	9.82	95%	9.35
23	51.4	12.06	9.65	95%	9.16
24	53.7	11.84	9.47	95%	8.98
25	55.9	11.63	9.30	95%	8.80

Technical Specifications	
Rotor diameter	23.3 ft (7.1 m)
Peak rated power	~12 kW @ 30+ mph (14+ m/s)
Number of blades	3
Length of blades	10.8 ft (3.3 m)
Swept area	414 ft² (38.5 m²)
Blade profile	NLF 416
Blade manufacturer	PFT
Blade material	Fiberglass-reinforced polyester or epoxy
Rated speed	25 - 300 rpm
Blade rotation	Clockwise (viewed upwind of turbine, from hub toward tail vane)
Rotor axis angle	10°
Cone angle	0°
Pitch control & hub design	Fixed pitch, Rigid hub
Generator	Permanent magnet alternator
Battery-charging option	120 VDC (nominal)
Grid connection option	1Ø 240VAC or 3Ø 208VAC line-to-line or 3Ø 277VAC line-to-neutral
Braking system	Mechanical: inclined-hinge tail vane furling Electrical: alternator output brake
Yaw control	Passive alignment by tail vane
Towers	Self-supporting lattice (SSL) recommended
Total weight	847 lb (385 kg)
Generator weight	506 lb (230 kg)
Blade weight	132 lb (60 kg)
Tail + frame weight	169 lb (77 kg)
Load controllers	1 x SMA Protection Box per inverter with matched resistive diversion loads
Inverters	SMA WindyBoys - 3 x SB5000US-WB or 2 x SB6000US-WB

Assumptions and Comments:

- (1) Turbulence Factor (TF) = 20%. TF assumes a roughness length of 0.4, which is typical for rural terrain in central New York. This is a relatively high value compared to many other locations in the U.S. An excellent description of roughness length values for various types of terrain can be found on the website of the Danish Wind Energy Association. TF is a function of both roughness length and wind shear and therefore varies with tower height.
- (2) Rated Power (DC kW) is estimated from Output Power by dividing the latter by the factor (1-TF).
- (3) Output Power (DC kW) is calculated from Delivered Power (AC kW) by multiplying the latter by the measured values of Inverter Efficiency.
- (4) **Delivered Power (AC kW) is the actual, observed power delivered into the utility grid.** Power output at wind speeds of 34mph (15m/s) or greater are estimates. No U.S. data are yet available for constant (5min average) wind speeds \geq 15m/s.
- (5) Inverters configured as (3) grid-connected SMA WindyBoy SB5000US-WB units operating in parallel. Other configurations are possible which may be more (or less) efficient.
- (6) Performance calculation spreadsheets which estimate energy production from Fortis wind turbines under a wide range of conditions are available from Fortis Wind Energy U.S.