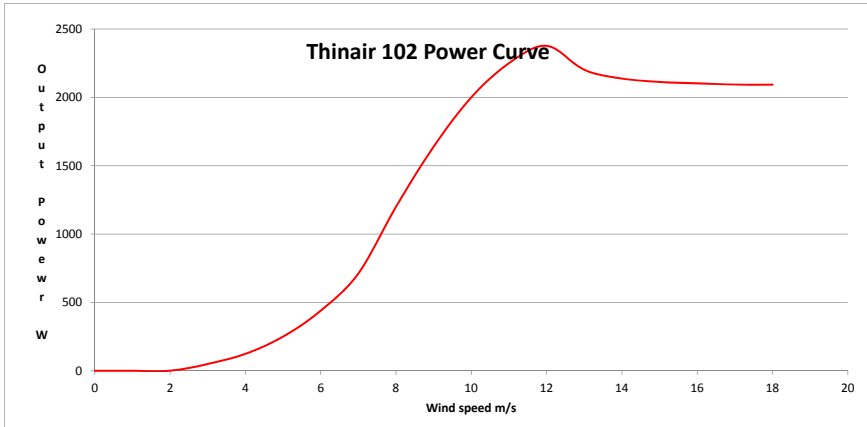
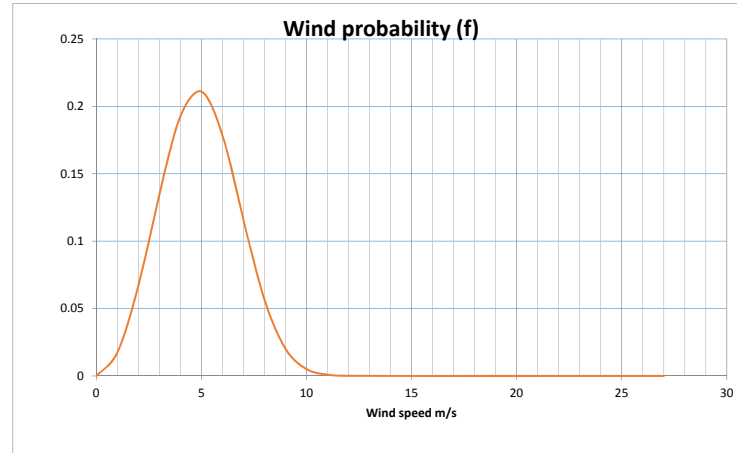


# Turbine Performance Model - Thinair 102

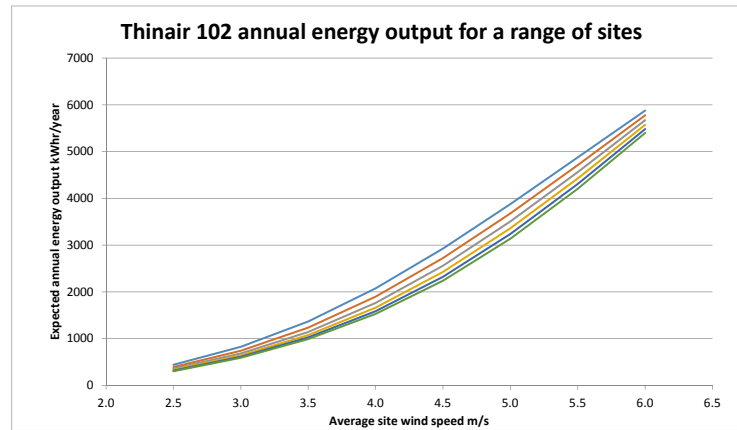
Inputs:		Results:	
Average Wind m/s	5	Weibull C	5.56
Weibull k	3	Hub Average Wind Speed m/s	5.0
Site Altitude m	30	Air Density Factor	-0.3%
Wind Shear Exponent	0.143	Average Output Power W	358
Anem. Height m	11.8	Daily Energy Output kWh/day	<b>8.6</b>
Tower Height m	11.8	Monthly Energy Output kWh/month	261
Turbulence Factor	1.0%	Annual Energy Output kWh/year	3,137
gamma	0.9	Percent Operating Time	78.1%

## Weibull Performance Calculations

Wind Speed Bin (m/s)	Power (W)	Wind probability (f)	Cumulative prob.	Power@ V	Energy kWh/year@ V	Cumulative energy kWh
0	0	0	0%	0	0	0
1	0	1.7%	1%	0.0	0	0
2	0	6.7%	5%	0.0	0	0
3	50	13.5%	15%	6.7	59	59
4	124	19.3%	31%	23.9	209	268
5	250	21.1%	52%	52.7	462	730
6	440	17.9%	72%	78.6	689	1,419
7	712	11.6%	86%	82.6	723	2,143
8	1,200	5.7%	95%	67.8	594	2,737
9	1,640	2.0%	99%	33.1	290	3,027
10	2,000	0.5%	100%	10.3	90	3,117
11	2,250	0.1%	100%	2.0	18	3,134
12	2,377	0.0%	100%	0.3	2	3,137
13	2,202	0.0%	100%	0.0	0	3,137
14	2,137	0.0%	100%	0.0	0	3,137
15	2,113	0.0%	100%	0.0	0	3,137
16	2,103	0.0%	100%	0.0	0	3,137
17	2,093	0.0%	100%	0.0	0	3,137
18	2,093	0.0%	100%	0.0	0	3,137
19	0	0.0%	100%	0.0	0	3,137
20	0	0.0%	100%	0.0	0	3,137
21	0	0.0%	100%	0.0	0	3,137
22	0	0.0%	100%	0.0	0	3,137
23	0	0.0%	100%	0.0	0	3,137
24	0	0.0%	100%	0.0	0	3,137
25	0	0.0%	100%	0.0	0.0000	3,137
26	0	0.0%	100.000000%	0.0	0.0000	3,137
27	0	0.0%	100%	0.0	0.0000	3,137
Totals:		100.0%	100%	358.1	3137	



Weibull k	Site average wind speed m/s							
	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
3137	442	825	1368	2076	2927	3877	4877	5877
2.0	393	741	1236	1899	2724	3678	4713	5776
2.4	359	684	1142	1764	2559	3506	4562	5672
2.6	335	643	1075	1663	2427	3360	4427	5573
2.8	317	613	1027	1587	2322	3238	4308	5482
3.0	303	591	991	1529	2239	3137	4205	5398



**Inputs:** Use annual or monthly Average Wind speeds. If Weibull K is not known, use K = 2 for inland sites, use 3 for coastal sites, and use 4 for island sites and trade wind regimes. Site Altitude is meters above sea level. Wind Shear Coefficient: For perfectly smooth (calm water) use 0.1. For flat grassland or low shrubs use 0.2. For trees or hills, buildings in area use 0.3. Close to trees or buildings use 0.4. Very close to trees or buildings use 0.5. Surrounded by trees or buildings use 0.6. Anemometer Height is for the data used for the Average Wind speed. If unknown, use 10 meters. Tower Height is the nominal height to the hub centreline. Turbulence Factor is a derating for turbulence. Use 0.00 (0%) - 0.05 (5%) in most cases.

**Results:** Hub Average Wind Speed is corrected for wind shear and used to calculate the Weibull wind speed probability. Air Density Factor is the reduction from sea level performance. Average Power Output is the average 24-hour power produced and includes all deratings and is the primary performance parameter. Daily, Annual and Monthly Energy Outputs are calculated from the Average Power Output. Percent Operating Time is the percentage of the time the turbine should be producing power.