

Wind Energy Site Analysis

Your Sample Wind Project

Anywhere USA

2
AW54-750



Prepared by:



Associated Wind Developers

Plymouth, MA

September 8, 2012

Using:



FOCUS

Wind Site Evaluator

Sample Site Name

Your Name

Your Address

Your Town

Your ST

9/8/2012 16:57

Latitude: 42.345670

Longitude: -70.123450

Elevation (ASL): 20

Notes:

Enter project summary information here.

System:

Turbine:	AW54-750
Quantity:	2
Turbine Portion of Project:	\$3,006,000
Balance of Plant Portion:	\$645,000
Total Project Cost:	\$3,651,000

Environmental:

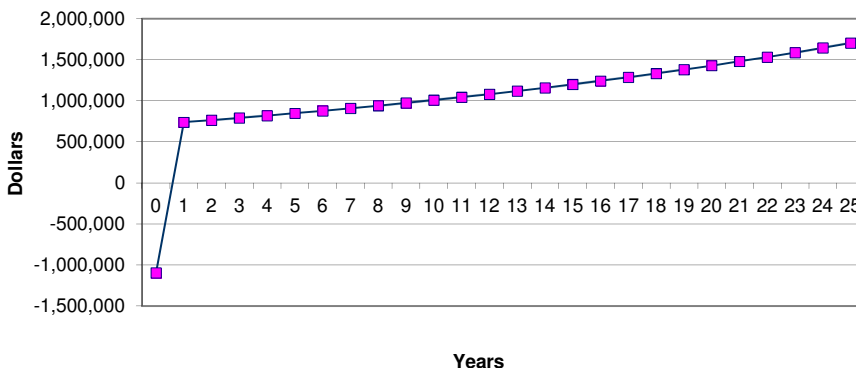
Avg. Wind Speed:	7
Hub Height:	65
Shear:	0.14
Corrected Speed at Hub:	7.26
Total Losses (Avail., Turb., Safety)	8.00%
Corrected Wind Speed:	7.26
Greenhouse Gas Savings Equivalent (CO2)	3,294.12 metric tons/yr

Investment Ratings (at P-50):

Simple Paybacks:	w/NO grants	4.94 years
	w/FED grants	4.94 years
	w/ALL Grants	4.94 years
Cost/kWh: (Inst. cost/nameplate rating)		\$2,434

	Before Fin.	After Fin.
Year 1 Cash Flow:	\$738,672	\$738,816
Year 2 Cash Flow:	\$764,498	\$764,642
IRR (Excl. salv., 10 yr/25 yr)	18.5%	23.5%
Property Taxes Pd. (1 yr/25 yrs)	\$0	\$0
Net Present Value (NPV)		\$8,290,929 (w/out salv. value)
Avg. Annual ROI over 25 yrs		31.6% (w/o fin. and depr.)
Ann. Ret. on Inv. Capital (over 25 yrs)		105.5% (Infinite = \$0 down)
Min. Cum Cash Position after Expenses:		\$738,816 (Min position over 25 yrs)

Net Cash Flow After Financing P&I - (P=50)



Production:

Energy	4,777,128 kWhrs/yr
	398,094 kWhrs/mo
Revenue (25 yr. avg.)	\$1,154,997 \$/year
(25 yr. avg.)	\$96,250 \$/mo
Land Rental (1st year):	\$33,440 \$/year

Power Cost Assumptions:

Percent of Power Mix: Retail vs. Resale	100% Retail
Retail:	
Current value of Retail Electricity (BTM o	\$0.140 \$/kWhr
Contracted Disc. over Current Price:	0.0%
Adjusted Retail Rate	\$0.140 \$/kWhr
Retail Escalators:	3.0% per year
	0.0% 0.0% 0.0% 0.0% 0.0%
Resale:	
Value of Resale (Sold to grid):	\$0.150 \$/kWhr
Resale Escal.	2.0% per year
Value of RECs or Green Tags	\$ 0.030 \$/kWhr
Escalator:	5.00% per year

Financing Structure:

Is Project Financed? (Y/N)	Y	Interest Rate	5.00%
Down payment	30%	Loan term (years)	10
Total Invested Capital			\$1,095,300
Grants Applied against Financing:			\$ -
Total Financed			\$ 2,555,700

Sensitivity:

	P-50	P-70	P-90
Wind Spd	7.26	7.04	6.72
Net kWhrs/yr	4,777,128	4,538,667	4,181,076
Year	Net Cash Flow (from Ann. Proformas)		
1	\$738,816	\$370,076	\$313,660
2	\$764,642	\$394,606	\$336,245
3	\$791,395	\$420,015	\$359,641
4	\$819,109	\$446,338	\$383,877
5	\$847,820	\$473,608	\$408,987
6	\$877,567	\$501,862	\$435,003
7	\$908,388	\$531,137	\$461,959
8	\$940,326	\$561,473	\$489,892
9	\$973,422	\$592,909	\$518,839
10	\$1,007,722	\$625,488	\$548,838
11	\$1,043,246	\$990,229	\$910,906
12	\$1,080,093	\$1,025,228	\$943,134
13	\$1,118,287	\$1,061,507	\$976,542
14	\$1,157,761	\$1,099,116	\$1,011,174
15	\$1,198,809	\$1,138,107	\$1,047,080
16	\$1,241,368	\$1,178,533	\$1,084,307
17	\$1,285,496	\$1,220,450	\$1,122,908
18	\$1,331,256	\$1,263,916	\$1,162,936
19	\$1,378,711	\$1,308,993	\$1,204,447
20	\$1,427,927	\$1,355,744	\$1,247,500
21	\$1,478,974	\$1,404,234	\$1,292,156
22	\$1,531,925	\$1,454,532	\$1,338,477
23	\$1,586,854	\$1,506,710	\$1,386,529
24	\$1,643,840	\$1,560,842	\$1,436,381
25	\$1,702,964	\$1,617,006	\$1,488,105
totals	\$28,876,715	\$24,102,660	\$21,909,522

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25 year Financial Proforma

Project: **Sample Site Name**



Revenue Proformas - Cash Basis - w/out Tax Implications, P Value = 50

Year	Base Energy Value (Cash Revenue)						Expenses					Financing Costs			Results				
	Retail Revenue	Resale Revenue	Gross Elect. Revenue	REC Revenue	Federal Tax Grant ⁽⁶⁾	Other Grants/Inc.	Gross Revenue	O&M	Insurance	Land Costs	Other Mgt	Other Exp.	Net Revenue (EBITDA)	Loan Interest	Loan Principal	Tot. Pmts. (CMLTD)	Net Cash after CMLTD	Cum Net Cash Flow	DCS w/RECs
0															Down Pmt.>	-1,095,300	-1,095,300		
1	668,798	0	668,798	143,314	0		812,112	-25,000	-15,000	-33,440	0	738,672	0	0	144	738,816	738,816		
2	688,862	0	688,862	150,480			839,341	-25,250	-15,150	-34,443	0	764,498	0	0	144	764,642	1,503,458		
3	709,528	0	709,528	158,004			867,531	-25,503	-15,302	-35,476	0	791,251	0	0	144	791,395	2,294,853		
4	730,814	0	730,814	165,904			896,717	-25,758	-15,455	-36,541	0	818,965	0	0	144	819,109	3,113,962		
5	752,738	0	752,738	174,199			926,937	-26,015	-15,609	-37,637	0	847,676	0	0	144	847,820	3,961,782		
6	775,320	0	775,320	182,909			958,229	-26,275	-15,765	-38,766	0	877,423	0	0	144	877,567	4,839,348		
7	798,580	0	798,580	192,054			990,634	-26,538	-15,923	-39,929	0	908,244	0	0	144	908,388	5,747,736		
8	822,537	0	822,537	201,657			1,024,194	-26,803	-16,082	-41,127	0	940,182	0	0	144	940,326	6,688,062		
9	847,213	0	847,213	211,740			1,058,953	-27,071	-16,243	-42,361	0	973,278	0	0	144	973,422	7,661,485		
10	872,630	0	872,630	222,327			1,094,956	-27,342	-16,405	-43,631	0	1,007,578	0	0	144	1,007,722	8,669,206		
11	898,809	0	898,809	233,443			1,132,252	-27,616	-16,569	-44,940	0	1,043,126	0	0	120	1,043,246	9,712,453		
12	925,773	0	925,773	245,115			1,170,888	-27,892	-16,735	-46,289	0	1,079,973	0	0	120	1,080,093	10,792,545		
13	953,546	0	953,546	257,371			1,210,917	-28,171	-16,902	-47,677	0	1,118,167	0	0	120	1,118,287	11,910,832		
14	982,152	0	982,152	270,240			1,252,392	-28,452	-17,071	-49,108	0	1,157,761	0	0	0	1,157,761	13,068,593		
15	1,011,617	0	1,011,617	283,752			1,295,369	-28,737	-17,242	-50,581	0	1,198,809	0	0	0	1,198,809	14,267,402		
16	1,041,965	0	1,041,965	297,939			1,339,905	-29,024	-17,415	-52,098	0	1,241,368	0	0	0	1,241,368	15,508,769		
17	1,073,224	0	1,073,224	312,836			1,386,061	-29,314	-17,589	-53,661	0	1,285,496	0	0	0	1,285,496	16,794,265		
18	1,105,421	0	1,105,421	328,478			1,433,899	-29,608	-17,765	-55,271	0	1,331,256	0	0	0	1,331,256	18,125,521		
19	1,138,584	0	1,138,584	344,902			1,483,486	-29,904	-17,942	-56,929	0	1,378,711	0	0	0	1,378,711	19,504,232		
20	1,172,741	0	1,172,741	362,147			1,534,888	-30,203	-18,122	-58,637	0	1,427,927	0	0	0	1,427,927	20,932,159		
21	1,207,924	0	1,207,924	380,254			1,588,178	-30,505	-18,303	-60,396	0	1,478,974	0	0	0	1,478,974	22,411,133		
22	1,244,161	0	1,244,161	399,267			1,643,428	-30,810	-18,486	-62,208	0	1,531,925	0	0	0	1,531,925	23,943,057		
23	1,281,486	0	1,281,486	419,230			1,700,716	-31,118	-18,671	-64,074	0	1,586,854	0	0	0	1,586,854	25,529,911		
24	1,319,931	0	1,319,931	440,192			1,760,123	-31,429	-18,857	-65,997	0	1,643,840	0	0	0	1,643,840	27,173,750		
25	1,359,529	0	1,359,529	462,201			1,821,730	-31,743	-19,046	-67,976	0	1,702,964	0	0	0	1,702,964	28,876,715		
Totals			24,383,882	6,839,954	0	0	31,223,837	-706,080	-423,648	-1,219,194	0	28,874,915	0	0	1,800	27,781,415			

Results:
 Net Annual Energy Output **4,777,128 kWh/yr**
 20 yr ROI **790.9%** (Cum NP over 25 yrs/Installed Cost)
 Avg. Annual ROI over 25 yrs **31.6%** (25 yr ROI / 25 years)
 Avg. Annual Return on Invested Capital over 25 yrs **105.5%** (If financed, ROIC uses Downpayment, else Capital Cost. Shows DIV/0 if no invested capital (no downpayment))
 Minimum Cum Cash Flow: **738,816**

Investment Analysis:
 Net Present Value \$8,290,929 (does not include a salvage value)
 10 Year IRR: 18.51% 25 Year IRR: 23.5%

Simple Payback (deducts grants from Installed Cost)

	yr 1 savings	inst cost	yrs
w/NO grants	738,672	3,651,000	4.94
w/ FED grants	738,672	3,651,000	4.94
w/ALL Grants	738,672	3,651,000	4.94

Basic Input Values

(input in GREEN cells only)



Site Information:			
Sample Site Name			
Owner Name:	Your Name		
	Your Address		
	Your Town	Latitude	42.34567
	Your ST	Longitude	-70.12345
Developer Name:	Developer Name		
Point of Contact, Phone	Bill Smith	POC Phone	123-456-9876

Facility:			
Select the Wind Turbine Desired:	AW54-750	2	No. of Turbs
If 'Other' selected, name:			

Wind & Environmental			
Ave. Wind Spd (m/s):	7	Corrected Speed:	7.26 m/s
Hub Height (m):	65	Meas. Hgt (m):	50
Wind Shear Exp.	0.14	Weibull K Factor	2
Availability	94.00%	Safety Margin Loss	2.00%
Turb. Intensity Loss:	0.00%	Ann. Energy Output	4,777,128 kWhrs/yr
Alt. Above Sea Lev. (m)	20	Avg. Temp. (Deg.C):	10

Project Costs:	<i>Sched.Date</i>
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A. Turbine Costs:	
Turbine base cost (order date):	\$1,280,000
Shipping to site:	\$120,000
Duties and Fees:	
Lighting, Lifts, cold weather pks, etc.	\$10,000
Other options:	\$0
<i>Per turbine total from Mfgr:</i>	\$1,410,000
Per turbine foundation design cost:	\$8,000
Per turbine foundation constr.cost	\$85,000
<i>Total per turbine cost:</i>	\$1,503,000
No. of turbines:	2
<i>Extended:</i>	\$3,006,000

B. Balance of Plant:	
B1. PreDev and Permitting	
Wind Studies:	\$0
Feasibility Study:	\$10,000
Site Plans:	\$10,000
Soil Geotechnic Study:	\$3,500
Interconnection Studies:	\$2,500
Noise Studies:	\$2,800
Flicker Studies:	\$3,000
Avian, Environmental Studies:	\$4,000
Road Surveys	\$2,500
Other:	\$1,700
Legal:	\$20,000
<i>Total (B1) PreDev and Permitting:</i>	\$60,000

B2. Construction:	
Excavation:	\$50,000
Site and Road Upgrades:	\$20,000
Dewatering:	\$0
Electrical - Turbines to Grid	\$80,000
Grid Upgrades:	\$0
Turbine Wiring:	\$40,000
Erection team costs:	\$75,000
Cranes:	\$120,000
Storage costs:	\$0
Landscaping:	\$0
Commissioning (operational date):	\$0
Security and Details:	\$0
Other:	\$50,000
Contingency:	\$150,000
<i>Total (B2) Construction:</i>	\$585,000
<i>Total Bal of Plant</i>	\$645,000
Total Installed Cost	\$3,651,000
Salvage Value (% of inst cost)	10.00%

^Total Days from Order to Commission

Power Cost Assumptions:			
Percent of Power Mix: Retail vs. Resale			100% Retail
Value of RETAIL Electricity (BTM or NM):			\$0.140 \$/kWhr
Contracted Disc. over Current Price:			0.0%
Adjusted Retail Rate			\$0.140 \$/kWh
Escalate: (A or B, A is default if entered.) A:			3.0%
B:	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%
(* allows rates like: 4% inc. for 5 years, then 2% for next 5 years...)			
Value of RESALE (Merchant Electric sold to grid):			\$0.150 \$/kWhr
Resale escalator			2.0% per year
Value of RECs or Green Tags	\$		0.030 \$/kWhr
Annual escalator			5.00%
Value of PTCs			0.021 \$/kWhr

Expenses by Month			
Land Costs (choose 1):	% of Gr. Elec. Rev.:	5.00%	%Gr.Rev.
	Payment/Turbine:	\$0	\$/mo/Turb
Management Fee (Choose 1. Applied in January)		\$0	\$/yr/Turb

Month	O&M	Insurance	Land	Mgt/Other	Financing
January	25,000	15,000	2,787	0	-12
February			2,787	0	-12
March			2,787	0	-12
April			2,787	0	-12
May			2,787	0	-12
Jun			2,787	0	-12
July			2,787	0	-12
August			2,787	0	-12
September			2,787	0	-12
October			2,787	0	-12
November			2,787	0	-12
December			2,787	0	-12
Totals	25,000	15,000	33,440	0	-144

Total:	O&M \$/kWhr	% of Cost/yr	Mgt \$/Mo
	0.00523	0.41%	\$0
<i>Used in Annual Proforma:</i>			
O&M	0.00523 \$/kWh based on Net Ann. Output		
Land Cost	0.05 % of Rev unless 0, then \$/turb		
Mgt Fee:	\$0 \$/mo		
Insurance	0.41% of Installed Cost/yr.		
Inflation rate	1.00% per year (affects ann. costs)		

Ownership and Financing Structure:			
Type of Ownership	'S-Corp', LLC, Partnership	Comb. Fed. & ST Tax bracket:	35%
Target DSC	1.5	Show Depreciation as:	20yr S/L
Prop. Tax:	Land Valuation (\$)	\$0	Land Mil Rate (\$/'000)
	Equipment Valuation (\$):	\$3,285,900	Equip. Mil Rate (\$/'000)
	or Payment in Lieu of Taxes (PILOT):		Show PropTx as 'Oth. Exp' (Y/N)
			Y
Fed Tax Credit type	None	Grants to:	FINANCING
Financing Type:	Struct. Lease	Loan Term	10
Down Pmt/Equity	30%	Int. Rate	5.00%
If Lease:	Mo. Pmt.	12	Resid. Value
	Resid. Pmt.	10	Resid. Years
			3
			Financed Amount:
			\$2,555,700
			Down Paym't Amt.
			\$1,095,300

Annual Energy Generation Estimate

Estimated Turbine Power Output



Project: **Sample Site Name**

Selected Wind Turbine: **AW54-750**

No. of Turbines: **2** Automatic Manual

Inputs		Values	Output	
Rated Power (kW)		750	Hub Height Avg. Wind Speed (m/s)	7.26
Rotor Diameter (m)*		54	Altitude Correction	1.00
Swept Area (m2)		2290.22	Temperature Correction	1.02
Avg Wind Speed (m/s)*		7	Annual Energy Output (kWh) (incl. losses)	4,777,128
Weibull k value		2	Avg Daily Energy (kWh)	13,088
Actual Weibull C if known		0	Avg. Monthly Energy (kWh)	398,094
Weibull C (act or Vavg/.89)		8.159	Avg. Power	295.99
Anemometer Height (m)*		50	Avg. Wind Energy Conversion Efficiency	0.30
Tower Height (m)*		65	Capacity Factor	0.36
P-Value		50.00%	Annual Specific Yield (kWh/m2/yr)	2086
Sigma		0.42		
Normsiv		0.00		
newVel		7.26		

Wind Speed Bin (m/s)	Gross Wind Power (kW)	Turbine Power Curve (kW)	Effic. (%)	Corrected Turbine Power (kW)	Weibull Freq. Dist.	Turbine Power (kW) columns E*F	Hours/yr wind blows at this speed	Gross Wind Energy (kWhrs/yr)	Turbine Avg. Energy (kWhrs/yr)	Alt. Avg. Energy (input) (kWhrs/yr)	Act. Weibull Distribution	
1	3	0.0	0.00	0.00	0.0	0.0296	0.00	259	727	0		
2	22	0.0	0.00	0.00	0.0	0.0566	0.00	496	11,126	0		
3	76	4.0	0.05	4.0	4.0	0.0787	0.32	690	52,249	5,548		
4	180	30.4	0.17	30.8	30.8	0.0945	2.91	828	148,650	51,052		
5	351	72.6	0.21	73.7	73.7	0.1032	7.61	904	317,028	133,306		
6	606	126.7	0.21	128.7	128.7	0.1050	13.51	919	557,271	236,693		
7	962	211.2	0.22	214.5	214.5	0.1007	21.61	882	849,280	378,598		
8	1437	324.7	0.23	329.8	329.8	0.0919	30.31	805	1,156,565	531,051		
9	2046	455.4	0.22	462.6	462.6	0.0801	37.05	702	1,435,109	649,049		
10	2806	598.0	0.21	607.4	607.4	0.0669	40.63	586	1,644,270	711,824		
11	3735	720.7	0.19	732.1	732.1	0.0537	39.30	470	1,756,126	688,449		
12	4849	750.0	0.15	761.8	761.8	0.0415	31.58	363	1,760,658	553,225		
13	6165	750.0	0.12	761.8	761.8	0.0308	23.50	270	1,665,874	411,702		
14	7700	750.0	0.10	761.8	761.8	0.0221	16.87	194	1,493,665	295,556		
15	9470	750.0	0.08	761.8	761.8	0.0153	11.69	134	1,273,303	204,847		
16	11493	750.0	0.07	761.8	761.8	0.0103	7.83	90	1,034,727	137,163		
17	13786	750.0	0.05	761.8	761.8	0.0067	5.07	58	803,294	88,777		
18	16364	750.0	0.05	761.8	761.8	0.0042	3.17	36	596,836	55,566		
19	19246	750.0	0.04	761.8	761.8	0.0025	1.92	22	425,029	33,646		
20	22448	750.0	0.03	761.8	761.8	0.0015	1.13	13	290,481	19,715		
				Total		0.9957	295.99		17,272,269	5,185,767	0	0.0000