100 kW WIND TURBINE FINANCIAL EVALUATION; Project Cashflow Method; $1,000; by Willem Post

	Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Utility buy price; $/MWh; 4%/yr esc.		60.00	62.40	64.90	67.49	70.19	73.00	75.92	78.96	82.11	85.40	88.81	92.37	96.06	99.90	103.90	108.06	112.38	116.87	121.55	126.41			
	Utility sell price; $/MWh; 4%/yr esc.		125.00	130.00	135.20	140.61	146.23	152.08	158.16	164.49	171.07	177.91	185.03	192.43	200.13	208.13	216.46	225.12	234.12	243.49	253.23	263.36			
PROFIT AND LOSS STATEMENT																									
	Standard Offer; $/MWh		346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75	346.75			
	Production; 1000 kWh/yr		175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20	175.20			
1	Revenue Energy Production		60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	1215.02		
1a	Revenue on Reserves		0.28	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.36	0.16	0.08			
2	O & M; 2.5%/yr esc.		5.40	5.54	5.67	5.82	5.96	6.11	6.26	6.42	6.58	6.74	6.91	7.09	7.26	7.44	7.63	7.82	8.02	8.22	8.42	8.63			
3	Net Revenues; (1+1a-2)		55.63	55.77	55.63	55.49	55.35	55.20	55.04	54.89	54.73	54.56	54.39	54.22	54.04	53.86	53.68	53.49	53.29	52.89	52.48	52.20			
4a	Insurance; 2.5%/yr esc.		1.00	1.03	1.05	1.08	1.10	1.13	1.16	1.19	1.22	1.25	1.28	1.31	1.34	1.38	1.41	1.45	1.48	1.52	1.56	1.60			
4b	Property Taxes; 1.78% of 7b		5.00	4.87	4.74	4.62	4.50	4.38	4.26	4.15	4.04	3.94	3.83	3.73	3.63	3.54	3.45	3.35	3.27	3.18	3.10	3.02			
4c	EBITDA; (3-4a-4b)		49.63	49.88	49.84	49.80	49.75	49.69	49.62	49.55	49.47	49.38	49.28	49.18	49.07	48.95	48.82	48.68	48.54	48.19	47.83	47.58	982.71		
4d	Depreciation; Basis $558,586		96.22	155.03	95.12	59.09	58.87	31.83	4.89	4.89	4.90	4.89	4.90	4.89	4.90	4.89	4.90	4.04	3.19	3.19	3.19	3.19	1.60	558.58	
4dd	Loan @ 7.5%/yr; 0.465*(9)	308.76	300.11	290.80	280.80	270.05	258.49	246.07	232.71	218.36	202.92	186.33	168.49	149.32	128.70	106.55	82.73	57.12	29.59	0.00					
4e	Amortization Payment		31.81	31.81	31.81	31.81	31.81	31.81	31.81	31.81	31.81	31.81	31.81	31.81	31.81	31.81	31.81	31.81	31.81	31.81					
4f	Principal Payment		8.65	9.30	10.00	10.75	11.56	12.42	13.36	14.36	15.43	16.59	17.84	19.17	20.61	22.16	23.82	25.61	27.53	29.59			308.76		
4g	Interest Payment		23.16	22.51	21.81	21.06	20.25	19.39	18.46	17.45	16.38	15.22	13.97	12.64	11.20	9.65	7.99	6.20	4.28	2.22					
5	Debt Coverage Ratio; 4c/4e		1.56	1.57	1.57	1.57	1.56	1.56	1.56	1.56	1.56	1.55	1.55	1.55	1.54	1.54	1.53	1.53	1.53	1.51					
6b	Pre-tax VT Inc; (4c-4d-4g)	-325.74	-69.75	-127.66	-67.08	-30.35	-29.37	-1.52	26.27	27.20	28.20	29.27	30.41	31.65	32.97	34.40	35.93	38.44	41.07	42.78	44.64	44.39			
6c	VT Inc Tax; (0.085*6b)	-27.69	-5.93	-10.85	-5.70	-2.58	-2.50	-0.13	2.23	2.31	2.40	2.49	2.59	2.69	2.80	2.92	3.05	3.27	3.49	3.64	3.79	3.77	13.76		
6d	Pre-tax Fed Inc; (6b-6c)	-298.05	-63.82	-116.81	-61.38	-27.77	-26.88	-1.39	24.04	24.89	25.80	26.78	27.83	28.96	30.17	31.48	32.88	35.17	37.57	39.14	40.84	40.62			
6e	Fed Inc Tax; (0.35*6d)	-104.32	-22.34	-40.88	-21.48	-9.72	-9.41	-0.49	8.41	8.71	9.03	9.37	9.74	10.14	10.56	11.02	11.51	12.31	13.15	13.70	14.30	14.22	51.84		
6f	After Tax Income; (4c-4d-4g-6c-6e)	-132.00	-41.48	-75.92	-39.90	-18.05	-17.47	-0.91	15.63	16.18	16.77	17.41	18.09	18.82	19.61	20.46	21.37	22.86	24.42	25.44	26.55	26.40			
6g	Net Final Income; (6f-4f)		-50.14	-85.23	-49.90	-28.80	-29.03	-13.33	2.27	1.82	1.33	0.81	0.25	-0.35	-1.00	-1.70	-2.45	-2.75	-3.10	-4.15	26.55	26.40			
CASH FLOW ANALYSIS																									
4c	EBITDA; (3-4a-4b)		49.63	49.88	49.84	49.80	49.75	49.69	49.62	49.55	49.47	49.38	49.28	49.18	49.07	48.95	48.82	48.68	48.54	48.19	47.83	47.58	982.71		
6b	Pre-tax VT Inc; (4c-4d-4g)		-69.75	-127.66	-67.08	-30.35	-29.37	-1.52	26.27	27.20	28.20	29.27	30.41	31.65	32.97	34.40	35.93	38.44	41.07	42.78	44.64	44.39			
6c	VT Inc Tax; (0.085*6b)		-5.93	-10.85	-5.70	-2.58	-2.50	-0.13	2.23	2.31	2.40	2.49	2.59	2.69	2.80	2.92	3.05	3.27	3.49	3.64	3.79	3.77	13.76		
6d	Pre-tax Fed Inc; (6b-6c)		-63.82	-116.81	-61.38	-27.77	-26.88	-1.39	24.04	24.89	25.80	26.78	27.83	28.96	30.17	31.48	32.88	35.17	37.57	39.14	40.84	40.62			
6e	Fed Inc Tax; (0.35*6d)		-22.34	-40.88	-21.48	-9.72	-9.41	-0.49	8.41	8.71	9.03	9.37	9.74	10.14	10.56	11.02	11.51	12.31	13.15	13.70	14.30	14.22	51.84		
6f	Release Debt Service Reserve	16.00																		16.00					
6g	Release Maintenance Reserve	5.77																				7.20			
6h	Working Capital	1.43																							
6i	Financing Costs	63.81																							
7	Inverter replacement (for PV solar)																								
7a	Residual Value																								
7b	Installed Cost (hard costs)	577.00																							
7c	Total Uses of Funds	664.00																							
8	VT CEDF grant	0.00																							
8a	Tax Adj VT CEDF grant	0.00																							
9a	Debt	308.76																							
9b	Equity	355.24																							
9c	Total Sources of Funds	664.00																							
10	ITC Federal; 0.95*0.3*(7b)		164.45																						
11	ITC Vermont; 0.036*7b*0.95*(1-0.35)/2		6.41	6.41																					
12	Less Amortization Payment (4e)		-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81	-31.81					
13	Owner Equity; 0.535*(9)	355.24																							
14	Net Cash Flow; (4c-6c-6e+6f+6g-7+7a+10+11+12-13)	-333.47	216.94	76.21	45.22	30.29	29.84	18.49	7.16	6.71	6.23	5.71	5.15	4.54	3.89	3.19	2.45	1.29	0.09	15.04	29.74	36.79			
INTERNAL RATE OF RETURN, IRR																									
	Present Value Factor @ 12.1%	0.8921	0.8921	0.7958	0.7958	0.7099	0.7099	0.6333	0.6333	0.5649	0.5649	0.5039	0.5039	0.4495	0.4495	0.4010	0.4010	0.3577	0.3577	0.3191	0.3191	0.2847			
	Net Cash Flow In x PVF		193.5	60.6	36.0	21.5	21.2	11.7	4.5	3.8	3.5	2.9	2.6	2.0	1.7	1.3	1.0	0.5	0.0	4.8	9.5	10.5	393.2		
	PVF =1/(1+I/100)^Y																								
	Present Value Factor @ 12.15%	0.8917	0.8917	0.7951	0.7089	0.6321	0.5636	0.5026	0.4481	0.3996	0.3563	0.3177	0.2833	0.2526	0.2252	0.2008	0.1791	0.1597	0.1424	0.1269	0.1132	0.1009			
	Cash Flow In x PVF		193.4	60.6	32.1	19.1	16.8	9.3	3.2	2.7	2.2	1.8	1.5	1.1	0.9	0.6	0.4	0.2	0.0	1.9	3.4	3.7	355.0		
	PVF =1/(1+I/100)^Y																								

IRR = 12.1% + (Sum of NPV@12.1% - Cash Flow Out)/(Sum of NPV@12.1% - Sum of NPV@12.15%) x (12.15-12.1)% = 12.15 %

The 100 kW wind turbine, project cost $664,003, or $6,640/kW

It is expected to produce 100 kW x 8,760 hrs/yr x CF 0.21 x availability 0.95 = 175,201 kWh/yr

Operations and Maintenance, O & M, costs are assumed inflating at 2.5% per year. The O & M percentage may increase as the system ages.

Wind turbine life is assumed at 20 years, after which it may be upgraded/refurbished/replaced.

Recycling and disposal costs were not included in this analysis.

Bank loan and owner equity are assume to finance the system Financing costs = 0.03 x $300,000 + $50,000 + $577,000*0.05/12* 2 = 63,808.33

Bank loan at 7.5%/yr, amortized over 18 years; end of year loan payments; amortization factor {1-1/(1+0.075)^18}/0.075= 9.706 Annual payment 31.811

Financing and other fees were not included in this analysis.

Depreciation over 20 years Federal tax rate = 0.35 Vermont tax rate = .085 Corp tax rate = F+(S*(1-F)) = 0.35+(0.085*(1-0.35)) = 0.4053

Owner will be able to avoid $132,000 (the 6-yr sum of 6c and 6e) in federal and state corporate taxes on $325,740 of his other taxable business income during the first 6 years.

The state and federal governments will provide $12,827 and $164,445, respectively, at the beginning of the project.

The power needs to be sold to the grid at $0.34675/kWh for 20 years to provide a utility company IRR of 12.13%; the Act 45 mandated PV solar FIT = $0.125/kWh