Appendix A

Wind Turbine Permitting Matrix

	Agency	Permit or Approval	Project Relevance	Approval Process/Timeframe	Comments
Local	Planning Board	Site Plan Review	Wind Projects will require either a major or minor Site Plan Review	20 days for review of application. Once initial approval, must present to Planning Board.	N/A
Local	Design Review Board	Design Review	Construction of new structures in various districts and historic building.	30 days of presentation and review	N/A
State	Maine DEP Wind Energy Development	Siting Certification for Small-Scale Wind Energy Development	Required Wind Energy Generation Systems greater than 100 kW	185 days	Subject to review of Noise, Shadow Flicker, and Public Safety.
State	Maine DEP Wind Energy Development	Site Location of Development (Site Law)	Wind Projects that exceed 20 acres of development or the addition of 3 acres of impervious surface	185 days	Subject to review of shadow flicker, public safety, stormwater, scenic/aesthetic, tangible benefits, and decommissioning.
State	Maine DEP NRPA	Individual Permit	Wetlands/Natural /Historical/Cultural Resources	14 days	Subject to Site location and effected areas
State	Maine DEP NRPA	Permit by Rule (PBR)	Wetlands/Natural /Historical/Cultural Resources	14 days	Subject to Site location and effected areas
State	Maine DEP Bureau of Land & Water Quality	Stormwater Management Law	Developments that create greater than 1 acre of new impervious area or 1 acre of developed area	14 days	
State	DOT & Bureau of Motor Vehicles	Permit to Move Overweight or Over dimensional Loads	Transportation of Turbine parts/accessories via Roads & State Turnpike	If regulated as oversize load, Overlimit Permit is required, which takes min. 2 day processing. If regulated as "extreme load," then extreme permit application must be filed in writing and requires full structural analysis and detailed transportation routing plan.	No limit on Dimensions. Classification of loads is dependent on total weight and number of axles.
State	Maine Historic Preservation Commission	Project Review Form	All projects that require a permit, license or funding from any state agency or federal must file a Project Review	30 days	N/A

	Bangor Hydro	Interconnection Application	Interconnection with existing transmission system study (dependent of project size).	Project application and Interconnection Transmission System Study. Notification of application acceptance within 25 days	N/A
Federal	EPA	NPDES/CGP/NOI	Applies to construction sites that disturb > 1 acre	Notification only, supported with SWPP plan.	Construction General Permit is applied for by the entity that has operational control over the job site, and the ability to enforce SWPP plan.
	FAA	Aircraft warning lighting	Required for all towers greater than 200 feet	Must file Form 7460-1 at least 30 days prior to start of construction	Max height of turbine expected to be 500 feet
	FERC	Qualifying Facility Status	Required in order to enter power purchase agreement w/ electrical utility	Must file Form No. 556 with FERC	Dependent upon size of generating facility
	FWS	Informal Consultation Notice and/or Biological Assessment	Requires applicant request a list of all threatened, endangered, candidate species and critical habitats prior to beginning construction.	Notification only	If at the completion of informal consultation, further assessment is required a formal Biological Assessment must be prepared and reviewed by FWS. May require implementation of Habitat Conservation Plan (HCP)

Appendix B

Project Economic Calculations

Wind Turbine Project Pro Forma
Bar Harbor, ME

Wind Turbine	**Northwind 100**					Annual Use: at selected sites	233,113 kWh
Turbine size (kW)		100	Tower Height	37 meters			
Capacity Factor		13.6%	Average Wind Speed	6.3 m/s		Average Electric Cost	0.08194
Annual Energy Production (kWh)		107,222	Project Term	20 years			
Annual Town Energy Use - selected sites		233,113	Financing:	Equity		**Value of Retail Offset**	**0.07640**
Value of Retail Offset (kWh)		$ 0.0764	Energy Inflation	2%		Value of Excess Power	0.04500
Value of Excess Power (kWh)		$ 0.0450	General Inflation	2%			
REC value (kWh)	Y1-Y10	$ 0.025	Discount Rate	4.0%			
REC value (kWh)	Y11-Y20	$ 0.015	Project Cost (No Grant)	$765,000			
Coincidence		100.0%	Simple Payback	NA	years		
			Residual Value	$191,250			

NPV	($1,106,218)
Net Cash Flow	($1,281,313)
Present Value Benefit	$236,777
Present Value Cost	$1,342,995
Benefit Cost Ratio	0.18
Internal Rate of Return	NA

Year	Retail Offset	Excess Power Revenue	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$0	$875	$765,000	$0	$765,875	($765,875)	($765,875)
2	$8,192	$0	$2,681	$10,873	$10,873	$40,000	$893	$0	$0	$40,893	($30,020)	($795,895)
3	$8,356	$0	$2,681	$11,036	$21,909	$40,800	$910	$0	$0	$41,710	($30,674)	($826,569)
4	$8,523	$0	$2,681	$11,204	$33,113	$41,616	$929	$0	$0	$42,545	($31,341)	($857,910)
5	$8,693	$0	$2,681	$11,374	$44,487	$42,448	$947	$0	$0	$43,395	($32,021)	($889,931)
6	$8,867	$0	$2,681	$11,548	$56,034	$43,297	$966	$0	$0	$44,263	($32,715)	($922,647)
7	$9,045	$0	$2,681	$11,725	$67,760	$44,163	$985	$0	$0	$45,149	($33,423)	($956,070)
8	$9,226	$0	$2,681	$11,906	$79,666	$45,046	$1,005	$0	$0	$46,052	($34,145)	($990,216)
9	$9,410	$0	$2,681	$12,091	$91,756	$45,947	$1,025	$0	$0	$46,973	($34,882)	($1,025,098)
10	$9,598	$0	$2,681	$12,279	$104,035	$46,866	$1,046	$0	$0	$47,912	($35,633)	($1,060,731)
11	$9,790	$0	$1,608	$11,399	$115,434	$47,804	$1,067	$0	$0	$48,870	($37,472)	($1,098,203)
12	$9,986	$0	$1,608	$11,594	$127,028	$48,760	$1,088	$0	$0	$49,848	($38,253)	($1,136,456)
13	$10,186	$0	$1,608	$11,794	$138,822	$49,735	$1,110	$0	$0	$50,845	($39,051)	($1,175,507)
14	$10,389	$0	$1,608	$11,998	$150,820	$50,730	$1,132	$0	$0	$51,862	($39,864)	($1,215,370)
15	$10,597	$0	$1,608	$12,206	$163,026	$51,744	$1,155	$0	$0	$52,899	($40,693)	($1,256,063)
16	$10,809	$0	$1,608	$12,418	$175,443	$52,779	$1,178	$0	$0	$53,957	($41,539)	($1,297,603)
17	$11,025	$0	$1,608	$12,634	$188,077	$53,835	$1,201	$0	$0	$55,036	($42,402)	($1,340,005)
18	$11,246	$0	$1,608	$12,854	$200,931	$54,911	$1,225	$0	$0	$56,137	($43,282)	($1,383,287)
19	$11,471	$0	$1,608	$13,079	$214,010	$56,010	$1,250	$0	$0	$57,259	($44,180)	($1,427,467)
20	$11,700	$0	$1,608	$13,309	$227,319	$57,130	$1,275	$0	$0	$58,405	($45,096)	($1,281,313)

Wind Turbine Project Pro Forma
Bar Harbor, ME

Wind Turbine		**Elecon T-600**	
Turbine size (kW)			600
Capacity Factor			12.5%
Annual Energy Production (kWh)			591,300
Annual Town Energy Use - selected sites (kWh/yr)			233,113
Value of Retail Offset (kWh)		$	0.0764
Value of Excess Power (kWh)		$	0.0450
REC value (kWh)	Y1-Y10	$	0.025
REC value (kWh)	Y11-Y20	$	0.015
Coincidence			100.0%

Tower Height	50	meters
Average Wind Speed	6.3	m/s
Project Term	20	years
Financing:	Equity	
Energy Inflation	2%	
General Inflation	2%	
Discount Rate	4.0%	
Project Cost (No Grant)	$1,900,000	
Simple Payback	61.84	years
Residual Value	$475,000	

Annual Use: at selected sites	233,113 kWh
Average Electric Cost	0.08194
Value of Retail Offset	**0.07640**
Value of Excess Power	0.04500

NPV	($1,224,456)
Net Cash Flow	($844,432)
Present Value Benefit	$1,280,286
Present Value Cost	$2,504,742
Benefit Cost Ratio	0.51
Internal Rate of Return	NA

Year	Retail Offset	Excess Power Revenue	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$0	$5,250	$1,900,000	$0	$1,905,250	($1,905,250)	($1,905,250)
2	$45,177	$16,118	$14,783	$76,078	$76,078	$40,000	$5,355	$0	$0	$45,355	$30,723	($1,874,527)
3	$46,080	$16,441	$14,783	$77,303	$153,381	$40,800	$5,462	$0	$0	$46,262	$31,041	($1,843,486)
4	$47,002	$16,770	$14,783	$78,554	$231,935	$41,616	$5,571	$0	$0	$47,187	$31,367	($1,812,119)
5	$47,942	$17,105	$14,783	$79,829	$311,764	$42,448	$5,683	$0	$0	$48,131	$31,698	($1,780,421)
6	$48,901	$17,447	$14,783	$81,130	$392,895	$43,297	$5,796	$0	$0	$49,094	$32,037	($1,748,385)
7	$49,879	$17,796	$14,783	$82,457	$475,352	$44,163	$5,912	$0	$0	$50,076	$32,382	($1,716,003)
8	$50,876	$18,152	$14,783	$83,811	$559,163	$45,046	$6,031	$0	$0	$51,077	$32,734	($1,683,269)
9	$51,894	$18,515	$14,783	$85,191	$644,354	$45,947	$6,151	$0	$0	$52,099	$33,093	($1,650,177)
10	$52,932	$18,885	$14,783	$86,599	$730,953	$46,866	$6,274	$0	$0	$53,141	$33,459	($1,616,718)
11	$53,990	$19,263	$8,870	$82,123	$813,076	$47,804	$6,400	$0	$0	$54,203	$27,919	($1,588,799)
12	$55,070	$19,648	$8,870	$83,588	$896,664	$48,760	$6,528	$0	$0	$55,287	$28,300	($1,560,498)
13	$56,172	$20,041	$8,870	$85,082	$981,746	$49,735	$6,658	$0	$0	$56,393	$28,689	($1,531,809)
14	$57,295	$20,442	$8,870	$86,606	$1,068,353	$50,730	$6,791	$0	$0	$57,521	$29,085	($1,502,724)
15	$58,441	$20,851	$8,870	$88,161	$1,156,514	$51,744	$6,927	$0	$0	$58,672	$29,490	($1,473,234)
16	$59,610	$21,268	$8,870	$89,747	$1,246,261	$52,779	$7,066	$0	$0	$59,845	$29,902	($1,443,332)
17	$60,802	$21,693	$8,870	$91,365	$1,337,626	$53,835	$7,207	$0	$0	$61,042	$30,323	($1,413,009)
18	$62,018	$22,127	$8,870	$93,015	$1,430,640	$54,911	$7,351	$0	$0	$62,263	$30,752	($1,382,257)
19	$63,258	$22,570	$8,870	$94,697	$1,525,337	$56,010	$7,498	$0	$0	$63,508	$31,189	($1,351,068)
20	$64,523	$23,021	$8,870	$96,414	$1,621,751	$57,130	$7,648	$0	$0	$64,778	$31,636	($844,432)

Wind Turbine Project Pro Forma
Bar Harbor, ME

Wind Turbine	**Elecon T-600**					Annual Use: at selected sites	233,113 kWh
Turbine size (kW)		600	Tower Height	50 meters			
Capacity Factor		12.5%	Average Wind Speed	6.3 m/s		Average Electric Cost	0.08194
Annual Energy Production (kWh)		591,300	Project Term	20 years			
Annual Town Energy Use - selected sites (kWh/yr)		233,113	Financing:	Equity		**Value of Retail Offset**	**0.07640**
Value of Retail Offset (kWh)		$ 0.0764	Energy Inflation	2%		Value of Excess Power	0.10000
Value of Excess Power (kWh)		$ 0.1000	General Inflation	2%			
REC value (kWh)	Y1-Y10	$ 0.025	Discount Rate	4.0%			
REC value (kWh)	Y11-Y20	$ 0.015	Project Cost	$1,900,000			
Coincidence		100.0%	Simple Payback	37.68	years		
			Residual Value	$475,000			

NPV	($932,233)
Net Cash Flow	($394,467)
Present Value Benefit	$1,572,509
Present Value Cost	$2,504,742
Benefit Cost Ratio	0.63
Internal Rate of Return	NA

Year	Retail Offset	Excess Power Revenue	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$0	$5,250	$1,900,000	$0	$1,905,250	($1,905,250)	($1,905,250)
2	$45,177	$35,819	$14,783	$95,778	$95,778	$40,000	$5,355	$0	$0	$45,355	$50,423	($1,854,827)
3	$46,080	$36,535	$14,783	$97,398	$193,176	$40,800	$5,462	$0	$0	$46,262	$51,136	($1,803,691)
4	$47,002	$37,266	$14,783	$99,050	$292,226	$41,616	$5,571	$0	$0	$47,187	$51,863	($1,751,829)
5	$47,942	$38,011	$14,783	$100,735	$392,961	$42,448	$5,683	$0	$0	$48,131	$52,604	($1,699,224)
6	$48,901	$38,771	$14,783	$102,454	$495,416	$43,297	$5,796	$0	$0	$49,094	$53,361	($1,645,864)
7	$49,879	$39,547	$14,783	$104,208	$599,624	$44,163	$5,912	$0	$0	$50,076	$54,132	($1,591,731)
8	$50,876	$40,338	$14,783	$105,996	$705,620	$45,046	$6,031	$0	$0	$51,077	$54,919	($1,536,812)
9	$51,894	$41,144	$14,783	$107,821	$813,441	$45,947	$6,151	$0	$0	$52,099	$55,722	($1,481,090)
10	$52,932	$41,967	$14,783	$109,681	$923,122	$46,866	$6,274	$0	$0	$53,141	$56,541	($1,424,549)
11	$53,990	$42,807	$8,870	$105,666	$1,028,789	$47,804	$6,400	$0	$0	$54,203	$51,463	($1,373,086)
12	$55,070	$43,663	$8,870	$107,602	$1,136,391	$48,760	$6,528	$0	$0	$55,287	$52,315	($1,320,771)
13	$56,172	$44,536	$8,870	$109,577	$1,245,968	$49,735	$6,658	$0	$0	$56,393	$53,184	($1,267,587)
14	$57,295	$45,427	$8,870	$111,591	$1,357,559	$50,730	$6,791	$0	$0	$57,521	$54,070	($1,213,517)
15	$58,441	$46,335	$8,870	$113,646	$1,471,205	$51,744	$6,927	$0	$0	$58,672	$54,974	($1,158,543)
16	$59,610	$47,262	$8,870	$115,741	$1,586,946	$52,779	$7,066	$0	$0	$59,845	$55,896	($1,102,647)
17	$60,802	$48,207	$8,870	$117,879	$1,704,825	$53,835	$7,207	$0	$0	$61,042	$56,837	($1,045,810)
18	$62,018	$49,171	$8,870	$120,059	$1,824,884	$54,911	$7,351	$0	$0	$62,263	$57,796	($988,014)
19	$63,258	$50,155	$8,870	$122,283	$1,947,166	$56,010	$7,498	$0	$0	$63,508	$58,775	($929,239)
20	$64,523	$51,158	$8,870	$124,551	$2,071,717	$57,130	$7,648	$0	$0	$64,778	$59,773	($394,467)

Wind Turbine Project Pro Forma
Bar Harbor, ME

Wind Turbine	**GE 1.5 XLE**					Annual Use: at Mount Desert High Schoo	101,044 kWh
Turbine size (kW)		1500	Tower Height	80 meters			
Capacity Factor		27.1%	Average Wind Speed	6.3 m s		Average Electric Cost	0.08194
Annual Energy Production (kWh)		3,204,846	Project Term	20 years			
Annual Town Energy Use - selected sites (kWh/yr)		101,044	Financing:	Equity		**Value of Retail Offset**	**0.07640**
Value of Retail Offset (kWh)		$ 0.0764	Energy Inflation	2%		Value of Excess Power	0.04500
Value of Excess Power (kWh)		$ 0.0450	General Inflation	2%			
REC value (kWh)	Y1-Y10	$ 0.025	Discount Rate	4.0%			
REC value (kWh)	Y11-Y20	$ 0.015	Project Cost (No Grant)	$4,050,000			
Coincidence		100.0%	Simple Payback	23.26	years		
			Residual Value	$1,012,500			

NPV	($1,214,137)
Net Cash Flow	$298,287
Present Value Benefit	$3,484,635
Present Value Cost	$4,698,771
Benefit Cost Ratio	0.74
Internal Rate of Return	0.6%

Year	Retail Offset	Excess Power Revenue	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$0	$13,125	$4,050,000	$0	$4,063,125	($4,063,125)	($4,063,125)
2	$7,720	$139,671	$80,121	$227,512	$227,512	$40,000	$13,388	$0	$0	$53,388	$174,125	($3,889,000)
3	$7,874	$142,465	$80,121	$230,460	$457,972	$40,800	$13,655	$0	$0	$54,455	$176,005	($3,712,995)
4	$8,032	$145,314	$80,121	$233,467	$691,439	$41,616	$13,928	$0	$0	$55,544	$177,922	($3,535,073)
5	$8,193	$148,220	$80,121	$236,534	$927,973	$42,448	$14,207	$0	$0	$56,655	$179,879	($3,355,194)
6	$8,356	$151,184	$80,121	$239,662	$1,167,635	$43,297	$14,491	$0	$0	$57,788	$181,874	($3,173,321)
7	$8,523	$154,208	$80,121	$242,853	$1,410,488	$44,163	$14,781	$0	$0	$58,944	$183,909	($2,989,412)
8	$8,694	$157,292	$80,121	$246,107	$1,656,595	$45,046	$15,076	$0	$0	$60,123	$185,984	($2,803,428)
9	$8,868	$160,438	$80,121	$249,427	$1,906,022	$45,947	$15,378	$0	$0	$61,325	$188,102	($2,615,326)
10	$9,045	$163,647	$80,121	$252,813	$2,158,836	$46,866	$15,686	$0	$0	$62,552	$190,261	($2,425,065)
11	$9,226	$166,920	$48,073	$224,219	$2,383,054	$47,804	$15,999	$0	$0	$63,803	$160,416	($2,264,649)
12	$9,411	$170,258	$48,073	$227,742	$2,610,796	$48,760	$16,319	$0	$0	$65,079	$162,663	($2,101,986)
13	$9,599	$173,663	$48,073	$231,335	$2,842,131	$49,735	$16,646	$0	$0	$66,381	$164,954	($1,937,032)
14	$9,791	$177,137	$48,073	$235,000	$3,077,131	$50,730	$16,979	$0	$0	$67,708	$167,292	($1,769,740)
15	$9,987	$180,679	$48,073	$238,739	$3,315,870	$51,744	$17,318	$0	$0	$69,062	$169,676	($1,600,064)
16	$10,186	$184,293	$48,073	$242,552	$3,558,422	$52,779	$17,665	$0	$0	$70,444	$172,108	($1,427,955)
17	$10,390	$187,979	$48,073	$246,442	$3,804,864	$53,835	$18,018	$0	$0	$71,853	$174,589	($1,253,366)
18	$10,598	$191,738	$48,073	$250,409	$4,055,273	$54,911	$18,378	$0	$0	$73,290	$177,119	($1,076,247)
19	$10,810	$195,573	$48,073	$254,456	$4,309,728	$56,010	$18,746	$0	$0	$74,755	$179,700	($896,546)
20	$11,026	$199,485	$48,073	$258,583	$4,568,312	$57,130	$19,121	$0	$0	$76,250	$182,333	$298,287

Wind Turbine Project Pro Forma
Bar Harbor, ME

Wind Turbine	**GE 1.5 XLE**					Annual Use: at Mount Desert High School	101,044 kWh
Turbine size (kW)		1500	Tower Height	80 meters			
Capacity Factor		27.1%	Average Wind Speed	6.3 m/s		Average Electric Cost	0.08194
Annual Energy Production (kWh)		3,204,846	Project Term	20 years			
Annual Town Energy Use - selected sites (kWh/yr)		101,044	Financing:	Equity		**Value of Retail Offset**	**0.07640**
Value of Retail Offset (kWh)		$ 0.0764	Energy Inflation	2%		Value of Excess Power	0.10000
Value of Excess Power (kWh)		$ 0.1000	General Inflation	2%			
REC value (kWh)	Y1-Y10	$ 0.025	Discount Rate	4.0%			
REC value (kWh)	Y11-Y20	$ 0.015	Project Cost	$4,050,000			
Coincidence		100.0%	Simple Payback	11.74 years			
			Residual Value	$1,012,500			

NPV	$1,318,067
Net Cash Flow	$4,197,378
Present Value Benefit	$6,016,839
Present Value Cost	$4,698,771
Benefit Cost Ratio	1.28
Internal Rate of Return	7.2%

Year	Retail Offset	Excess Power Revenue	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$0	$13,125	$4,050,000	$0	$4,063,125	($4,063,125)	($4,063,125)
2	$7,720	$310,380	$80,121	$398,221	$398,221	$40,000	$13,388	$0	$0	$53,388	$344,834	($3,718,291)
3	$7,874	$316,588	$80,121	$404,583	$802,805	$40,800	$13,655	$0	$0	$54,455	$350,128	($3,368,163)
4	$8,032	$322,920	$80,121	$411,073	$1,213,877	$41,616	$13,928	$0	$0	$55,544	$355,528	($3,012,635)
5	$8,193	$329,378	$80,121	$417,692	$1,631,569	$42,448	$14,207	$0	$0	$56,655	$361,036	($2,651,598)
6	$8,356	$335,966	$80,121	$424,443	$2,056,012	$43,297	$14,491	$0	$0	$57,788	$366,655	($2,284,944)
7	$8,523	$342,685	$80,121	$431,329	$2,487,341	$44,163	$14,781	$0	$0	$58,944	$372,385	($1,912,558)
8	$8,694	$349,539	$80,121	$438,354	$2,925,695	$45,046	$15,076	$0	$0	$60,123	$378,231	($1,534,328)
9	$8,868	$356,529	$80,121	$445,518	$3,371,213	$45,947	$15,378	$0	$0	$61,325	$384,193	($1,150,135)
10	$9,045	$363,660	$80,121	$452,826	$3,824,040	$46,866	$15,686	$0	$0	$62,552	$390,274	($759,861)
11	$9,226	$370,933	$48,073	$428,232	$4,252,271	$47,804	$15,999	$0	$0	$63,803	$364,429	($395,432)
12	$9,411	$378,352	$48,073	$435,835	$4,688,106	$48,760	$16,319	$0	$0	$65,079	$370,756	($24,676)
13	$9,599	$385,919	$48,073	$443,590	$5,131,697	$49,735	$16,646	$0	$0	$66,381	$377,210	$352,534
14	$9,791	$393,637	$48,073	$451,501	$5,583,197	$50,730	$16,979	$0	$0	$67,708	$383,792	$736,326
15	$9,987	$401,510	$48,073	$459,569	$6,042,767	$51,744	$17,318	$0	$0	$69,062	$390,507	$1,126,833
16	$10,186	$409,540	$48,073	$467,799	$6,510,566	$52,779	$17,665	$0	$0	$70,444	$397,355	$1,524,188
17	$10,390	$417,731	$48,073	$476,194	$6,986,759	$53,835	$18,018	$0	$0	$71,853	$404,341	$1,928,530
18	$10,598	$426,086	$48,073	$484,756	$7,471,515	$54,911	$18,378	$0	$0	$73,290	$411,466	$2,339,996
19	$10,810	$434,607	$48,073	$493,490	$7,965,005	$56,010	$18,746	$0	$0	$74,755	$418,734	$2,758,730
20	$11,026	$443,299	$48,073	$502,398	$8,467,403	$57,130	$19,121	$0	$0	$76,250	$426,148	$4,197,378

PV System Pro Forma
Bar Harbor, ME

PV System

Size (kW)			60
Capacity Factor			14.0%
Annual Energy Production (kWh)			66,226
Annual Facility Energy Use (kWh/yr)			699,840
Value of Retail Off Set (kWh)		$	0.0134
Value of Excess Power (kWh)		$	-
SREC value (kWh)	Y1-Y2	$	0.30
SREC value (kWh)	Y3-Y10	$	0.20
SREC value (kWh)	Y11-Y20	$	0.10
Coincidence			100.0%

Solar resource	4 kWhr-m²/day
Project Term	20 years
Financing: Equity (Cash)	
Energy Inflation	2%
General Inflation	2%
Discount Rate	4.0%
Project Cost (No Grant)	$480,000
Simple Payback	25.70 years
Residual Value	$120,000

Existing Power Use and Cost Basis**

Annual Use:	699,840
Demand (one month)	136

Rate: Med. Commerical Secondary

	Avg Rate
Distribution Demand	6.67000
Distribution Energy	**0.01343**
Transmission	8.09000
Customer Charge	-
Transition Demand Charge	0.19000
Total Electric Cost	0.01343
Value of Retail Offset	**0.01343**

NPV	($291,618)
Net Cash Flow	($201,931)
Present Value Benefit	$199,729
Present Value Cost	$491,347
Benefit Cost Ratio	0.41
Internal Rate of Return	n/a

* Financial scenario assumes 100% equity financing
* Potential property tax revenue is not included in the financial analysis
**Based on Bangor Hydro Electric Company Bill (09/02/10 - 10/04/10) provided by the Town

Year	Retail Offset	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$525	$480,000	$0	$480,525	($480,525)	($480,525)
2	$885	$22,075	$22,960	$22,960	$1,440	$536	$0	$0	$1,976	$20,985	($459,540)
3	$903	$22,075	$22,978	$45,938	$1,469	$546	$0	$0	$2,015	$20,963	($438,577)
4	$921	$22,075	$22,996	$68,934	$1,498	$557	$0	$0	$2,055	$20,941	($417,637)
5	$939	$22,075	$23,014	$91,948	$1,528	$568	$0	$0	$2,096	$20,918	($396,719)
6	$958	$22,075	$23,033	$114,981	$1,559	$580	$0	$0	$2,138	$20,895	($375,824)
7	$977	$22,075	$23,052	$138,034	$1,590	$591	$0	$0	$2,181	$20,871	($354,953)
8	$997	$22,075	$23,072	$161,105	$1,622	$603	$0	$0	$2,225	$20,847	($334,106)
9	$1,017	$22,075	$23,092	$184,197	$1,654	$615	$0	$0	$2,269	$20,823	($313,283)
10	$1,037	$22,075	$23,112	$207,309	$1,687	$627	$0	$0	$2,315	$20,797	($292,486)
11	$1,058	$14,717	$15,774	$223,084	$1,721	$640	$0	$0	$2,361	$13,414	($279,072)
12	$1,079	$14,717	$15,796	$238,879	$1,755	$653	$0	$0	$2,408	$13,387	($265,685)
13	$1,100	$14,717	$15,817	$254,696	$1,790	$666	$0	$0	$2,456	$13,361	($252,324)
14	$1,122	$14,717	$15,839	$270,536	$1,826	$679	$0	$0	$2,505	$13,334	($238,990)
15	$1,145	$14,717	$15,862	$286,397	$1,863	$693	$0	$0	$2,556	$13,306	($225,684)
16	$1,168	$14,717	$15,884	$302,282	$1,900	$707	$0	$0	$2,607	$13,278	($212,407)
17	$1,191	$14,717	$15,908	$318,189	$1,938	$721	$0	$0	$2,659	$13,249	($199,157)
18	$1,215	$14,717	$15,932	$334,121	$1,977	$735	$0	$0	$2,712	$13,220	($185,938)
19	$1,239	$14,717	$15,956	$350,077	$2,016	$750	$0	$0	$2,766	$13,190	($172,748)
20	$1,264	$14,717	$15,981	$366,058	$2,057	$765	$0	$0	$2,822	$13,159	($159,589)

PV System Pro Forma
Bar Harbor, ME

PV System

Size (kW)			60
Capacity Factor			14.0%
Annual Energy Production (kWh)			66,226
Annual Facility Energy Use (kWh/yr)			699,840
Value of Retail Off Set (kWh)		$	0.0134
Value of Excess Power (kWh)		$	-
SREC value (kWh)	Y1-Y2	$	0.30
SREC value (kWh)	Y3-Y10	$	0.20
SREC value (kWh)	Y11-Y20	$	0.10
Coincidence			100.0%

NPV	($247,021)
Net Cash Flow	($161,065)
Present Value Benefit	$194,024
Present Value Cost	$441,045
Benefit Cost Ratio	0.44
Internal Rate of Return	n/a

Solar resource	4 kWhr/m²/day
Project Term	20 years
Financing: Equity (Cash)	
Energy Inflation	2%
General Inflation	2%
Discount Rate	4.0%
Project Cost	$430,000
Simple Payback	22.84 years
Residual Value	$107,500

Existing Power Use and Cost Basis**

Annual Use:	699,840
Demand	136

Existing Power Use and Cost Basis**

Rate: Med. Commerical Seconday

	Avg Rate
Distribution Demand	6.67000
Distribution Energy	**0.01343**
Transmission	8.09000
Customer Charge	-
Transition Demand Charge	0.19000
Energy Charge	**0.08890**
Total Electric Cost	0.01343
Value of Retail Offset	**0.01343**

* Financial scenario assumes 100% equity financing
* Potential property tax revenue is not included in the financial analysis
**Based on Bangor Hydro Electric Company Bill (09/02/10 - 10/04/10) provided by the Town

Year	Retail Offset	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$525	$430,000	$0	$430,525	($430,525)	($430,525)
2	$885	$22,075	$22,960	$22,960	$1,290	$536	$0	$0	$1,826	$21,135	($409,390)
3	$903	$22,075	$22,978	$45,938	$1,316	$546	$0	$0	$1,862	$21,116	($388,274)
4	$921	$22,075	$22,996	$68,934	$1,342	$557	$0	$0	$1,899	$21,097	($367,178)
5	$939	$22,075	$23,014	$91,948	$1,369	$568	$0	$0	$1,937	$21,077	($346,101)
6	$958	$22,075	$23,033	$114,981	$1,396	$580	$0	$0	$1,976	$21,057	($325,044)
7	$977	$22,075	$23,052	$138,034	$1,424	$591	$0	$0	$2,015	$21,037	($304,007)
8	$997	$22,075	$23,072	$161,105	$1,453	$603	$0	$0	$2,056	$21,016	($282,991)
9	$1,017	$22,075	$23,092	$184,197	$1,482	$615	$0	$0	$2,097	$20,995	($261,996)
10	$1,037	$22,075	$23,112	$207,309	$1,511	$627	$0	$0	$2,139	$20,973	($241,023)
11	$1,058	$14,717	$15,774	$223,084	$1,542	$640	$0	$0	$2,182	$13,593	($227,430)
12	$1,079	$14,717	$15,796	$238,879	$1,573	$653	$0	$0	$2,225	$13,570	($213,860)
13	$1,100	$14,717	$15,817	$254,696	$1,604	$666	$0	$0	$2,270	$13,547	($200,312)
14	$1,122	$14,717	$15,839	$270,536	$1,636	$679	$0	$0	$2,315	$13,524	($186,788)
15	$1,145	$14,717	$15,862	$286,397	$1,669	$693	$0	$0	$2,361	$13,500	($173,288)
16	$1,168	$14,717	$15,884	$302,282	$1,702	$707	$0	$0	$2,409	$13,476	($159,813)
17	$1,191	$14,717	$15,908	$318,189	$1,736	$721	$0	$0	$2,457	$13,451	($146,362)
18	$1,215	$14,717	$15,932	$334,121	$1,771	$735	$0	$0	$2,506	$13,426	($132,936)
19	$1,239	$14,717	$15,956	$350,077	$1,806	$750	$0	$0	$2,556	$13,400	($119,536)
20	$1,264	$14,717	$15,981	$366,058	$1,842	$765	$0	$0	$2,607	$13,373	$1,337

PV System Pro Forma
Bar Harbor, ME

PV System

Size (kW)			10
Capacity Factor			14.0%
Annual Energy Production (kWh)			11,038
Annual Facility Energy Use (kWh/yr)			66,612
Value of Retail Off Set (kWh)		$	0.1625
Value of Excess Power (kWh)		$	-
SREC value (kWh)	Y1-Y2	$	0.30
SREC value (kWh)	Y3-Y10	$	0.20
SREC value (kWh)	Y11-Y20	$	0.10
Coincidence			100.0%

Solar resource	4 kWhr/m²/day
Project Term	20 years
Financing: Equity (Cash)	
Energy Inflation	2%
General Inflation	2%
Discount Rate	4.0%
Project Cost (No Grant)	$80,000
Simple Payback	16.84 years
Residual Value	$20,000

Existing Power Use and Cost Basis**
Annual Use: 66,612

Rate: Gen. Serv-Sm. Comm.

	Avg Rate
Distribution Energy	**0.04780**
Transmission	**0.02691**
Customer Charge	-
Electric Supply	**0.087820**
Total Electric Cost	0.16253
Value of Retail Offset	**0.16253**

NPV	($25,398)
Net Cash Flow	$2,003
Present Value Benefit	$56,583
Present Value Cost	$81,891
Benefit Cost Ratio	0.69
Internal Rate of Return	0.2%

* Financial scenario assumes 100% equity financing
* Potential property tax revenue is not included in the financial analysis
**Based on Bangor Hydro Electric Company Bill (09/27/10 - 10/26/10) provided by the Town

Year	Retail Offset	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$88	$80,000	$0	$80,088	($80,088)	($80,088)
2	$1,785	$3,679	$5,464	$5,464	$240	$89	$0	$0	$329	$5,135	($74,953)
3	$1,821	$3,679	$5,500	$10,964	$245	$91	$0	$0	$336	$5,164	($69,789)
4	$1,857	$3,679	$5,536	$16,500	$250	$93	$0	$0	$343	$5,194	($64,595)
5	$1,894	$3,679	$5,573	$22,074	$255	$95	$0	$0	$349	$5,224	($59,371)
6	$1,932	$3,679	$5,611	$27,685	$260	$97	$0	$0	$356	$5,255	($54,116)
7	$1,971	$3,679	$5,650	$33,335	$265	$99	$0	$0	$364	$5,286	($48,829)
8	$2,010	$3,679	$5,689	$39,024	$270	$101	$0	$0	$371	$5,319	($43,511)
9	$2,050	$3,679	$5,730	$44,754	$276	$103	$0	$0	$378	$5,351	($38,159)
10	$2,091	$3,679	$5,771	$50,525	$281	$105	$0	$0	$386	$5,385	($32,775)
11	$2,133	$2,453	$4,586	$55,111	$287	$107	$0	$0	$393	$4,193	($28,582)
12	$2,176	$2,453	$4,629	$59,739	$293	$109	$0	$0	$401	$4,227	($24,355)
13	$2,219	$2,453	$4,672	$64,411	$298	$111	$0	$0	$409	$4,263	($20,092)
14	$2,264	$2,453	$4,717	$69,128	$304	$113	$0	$0	$418	$4,299	($15,793)
15	$2,309	$2,453	$4,762	$73,890	$310	$115	$0	$0	$426	$4,336	($11,457)
16	$2,355	$2,453	$4,808	$78,698	$317	$118	$0	$0	$434	$4,374	($7,083)
17	$2,402	$2,453	$4,855	$83,553	$323	$120	$0	$0	$443	$4,412	($2,671)
18	$2,450	$2,453	$4,903	$88,456	$329	$123	$0	$0	$452	$4,451	$1,780
19	$2,499	$2,453	$4,952	$93,408	$336	$125	$0	$0	$461	$4,491	$6,271
20	$2,549	$2,453	$5,002	$98,411	$343	$127	$0	$0	$470	$4,532	$30,803

PV System Pro Forma
Bar Harbor, ME

PV System								Existing Power Use and Cost Basis**	
								Annual Use:	66,612
Size (kW)			10						
Capacity Factor			14.0%	Solar resource		4 kWhr/m²/day		Rate: Gen. Serv-Sm. Comm.	
Annual Energy Production (kWh)			11,038	Project Term		20 years			Avg Rate
Annual Facility Energy Use (kWh/yr)			66,612	Financing:	Equity (Cash)			**Distribution Energy**	**0.04780**
Value of Retail Off Set (kWh)		$	0.1625	Energy Inflation		2%		**Transmission**	**0.02691**
Value of Excess Power (kWh)		$	-	General Inflation		2%		Customer Charge	-
SREC value (kWh)	Y1-Y2	$	0.30	Discount Rate		4.0%		**Electric Supply**	**0.087820**
SREC value (kWh)	Y3-Y10	$	0.20	Project Cost		$30,000			
SREC value (kWh)	Y11-Y20	$	0.10	Simple Payback		6.12	years	Total Electric Cost	0.16253
Coincidence			100.0%	Residual Value		$7,500		**Value of Retail Offset**	**0.16253**

NPV	$19,289
Net Cash Flow	$42,929
Present Value Benefit	$50,878
Present Value Cost	$31,589
Benefit Cost Ratio	1.61
Internal Rate of Return	11.0%

* Financial scenario assumes 100% equity financing
* Potential property tax revenue is not included in the financial analysis
**Based on Bangor Hydro Electric Company Bill (09/27/10 - 10/26/10) provided by the Town

Year	Retail Offset	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$88	$30,000	$0	$30,088	($30,088)	($30,088)
2	$1,785	$3,679	$5,464	$5,464	$90	$89	$0	$0	$179	$5,285	($24,803)
3	$1,821	$3,679	$5,500	$10,964	$92	$91	$0	$0	$183	$5,317	($19,486)
4	$1,857	$3,679	$5,536	$16,500	$94	$93	$0	$0	$186	$5,350	($14,136)
5	$1,894	$3,679	$5,573	$22,074	$96	$95	$0	$0	$190	$5,383	($8,753)
6	$1,932	$3,679	$5,611	$27,685	$97	$97	$0	$0	$194	$5,417	($3,335)
7	$1,971	$3,679	$5,650	$33,335	$99	$99	$0	$0	$198	$5,452	$2,117
8	$2,010	$3,679	$5,689	$39,024	$101	$101	$0	$0	$202	$5,488	$7,604
9	$2,050	$3,679	$5,730	$44,754	$103	$103	$0	$0	$206	$5,524	$13,128
10	$2,091	$3,679	$5,771	$50,525	$105	$105	$0	$0	$210	$5,561	$18,689
11	$2,133	$2,453	$4,586	$55,111	$108	$107	$0	$0	$214	$4,372	$23,060
12	$2,176	$2,453	$4,629	$59,739	$110	$109	$0	$0	$219	$4,410	$27,471
13	$2,219	$2,453	$4,672	$64,411	$112	$111	$0	$0	$223	$4,449	$31,920
14	$2,264	$2,453	$4,717	$69,128	$114	$113	$0	$0	$227	$4,489	$36,409
15	$2,309	$2,453	$4,762	$73,890	$116	$115	$0	$0	$232	$4,530	$40,939
16	$2,355	$2,453	$4,808	$78,698	$119	$118	$0	$0	$237	$4,572	$45,511
17	$2,402	$2,453	$4,855	$83,553	$121	$120	$0	$0	$241	$4,614	$50,124
18	$2,450	$2,453	$4,903	$88,456	$124	$123	$0	$0	$246	$4,657	$54,782
19	$2,499	$2,453	$4,952	$93,408	$126	$125	$0	$0	$251	$4,701	$59,483
20	$2,549	$2,453	$5,002	$98,411	$129	$127	$0	$0	$256	$4,746	$71,729

PV System Pro Forma
Bar Harbor, ME

PV System

Size (kW)			100
Capacity Factor			14.0%
Annual Energy Production (kWh)			110,376
Annual Facility Energy Use (kWh/yr)			203,760
Value of Retail Off Set (kWh)		$	0.1023
Value of Excess Power (kWh)		$	-
SREC value (kWh)	Y1-Y2	$	0.30
SREC value (kWh)	Y3-Y10	$	0.20
SREC value (kWh)	Y11-Y20	$	0.10
Coincidence			100.0%

NPV	($302,541)
Net Cash Flow	($863,014)
Present Value Benefit	$466,069
Present Value Cost	$768,609
Benefit Cost Ratio	0.61
Internal Rate of Return	n/a

Solar resource	4 kWhr/m^2/day
Project Term	20 years
Financing: Equity (Cash)	
Energy Inflation	2%
General Inflation	2%
Discount Rate	4.0%
Project Cost (No Grant)	$750,000
Simple Payback	18.27 years
Residual Value	$187,500

Existing Power Use and Cost Basis**

Annual Use:	203,760
Demand	59

Rate: Med. Commerical Secondary

	Avg Rate
Distribution Demand	6.67000
Distribution Energy	**0.01343**
Transmission	8.09000
Customer Charge	-
Energy Charge	**0.08890**
Capacity Charge	0.13667
Total Electric Cost	14.99900
Value of Retail Offset	**0.10233**

* Financial scenario assumes 100% equity financing
* Potential property tax revenue is not included in the financial analysis
**Based on Bangor Hydro Electric Company Bill (09/29/10 - 10/30/10) provided by the Town

Year	Retail Offset	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$875	$750,000	$0	$750,875	($750,875)	($750,875)
2	$11,238	$36,792	$48,030	$48,030	$2,250	$893	$0	$0	$3,143	$44,888	($705,987)
3	$11,463	$36,792	$48,255	$96,285	$2,295	$910	$0	$0	$3,205	$45,050	($660,937)
4	$11,692	$36,792	$48,484	$144,770	$2,341	$929	$0	$0	$3,269	$45,215	($615,723)
5	$11,926	$36,792	$48,718	$193,488	$2,388	$947	$0	$0	$3,335	$45,383	($570,339)
6	$12,165	$36,792	$48,957	$242,445	$2,435	$966	$0	$0	$3,402	$45,555	($524,784)
7	$12,408	$36,792	$49,200	$291,645	$2,484	$985	$0	$0	$3,470	$45,730	($479,054)
8	$12,656	$36,792	$49,448	$341,093	$2,534	$1,005	$0	$0	$3,539	$45,909	($433,145)
9	$12,909	$36,792	$49,701	$390,794	$2,585	$1,025	$0	$0	$3,610	$46,092	($387,053)
10	$13,167	$36,792	$49,959	$440,753	$2,636	$1,046	$0	$0	$3,682	$46,278	($340,775)
11	$13,431	$24,528	$37,959	$478,712	$2,689	$1,067	$0	$0	$3,756	$34,203	($306,572)
12	$13,699	$24,528	$38,227	$516,940	$2,743	$1,088	$0	$0	$3,831	$34,397	($272,175)
13	$13,973	$24,528	$38,501	$555,441	$2,798	$1,110	$0	$0	$3,907	$34,594	($237,581)
14	$14,253	$24,528	$38,781	$594,222	$2,854	$1,132	$0	$0	$3,985	$34,795	($202,786)
15	$14,538	$24,528	$39,066	$633,288	$2,911	$1,155	$0	$0	$4,065	$35,001	($167,785)
16	$14,829	$24,528	$39,357	$672,645	$2,969	$1,178	$0	$0	$4,146	$35,210	($132,575)
17	$15,125	$24,528	$39,653	$712,298	$3,028	$1,201	$0	$0	$4,229	$35,424	($97,151)
18	$15,428	$24,528	$39,956	$752,254	$3,089	$1,225	$0	$0	$4,314	$35,642	($61,509)
19	$15,736	$24,528	$40,264	$792,518	$3,151	$1,250	$0	$0	$4,400	$35,864	($25,645)
20	$16,051	$24,528	$40,579	$833,097	$3,214	$1,275	$0	$0	$4,488	$36,091	$197,946

PV System Pro Forma
Bar Harbor, ME

PV System

Size (kW)			100
Capacity Factor			14.0%
Annual Energy Production (kWh)			110,376
Annual Facility Energy Use (kWh/yr)			203,760
Value of Retail Off Set (kWh)		$	0.1023
Value of Excess Power (kWh)		$	-
SREC value (kWh)	Y1-Y2	$	0.30
SREC value (kWh)	Y3-Y10	$	0.20
SREC value (kWh)	Y11-Y20	$	0.10
Coincidence			100.0%

Solar resource	4 kWhr/m²/day
Project Term	20 years
Financing:	Equity (Cash)
Energy Inflation	2%
General Inflation	2%
Discount Rate	4.0%
Project Cost	$700,000
Simple Payback	16.99 years
Residual Value	$175,000

NPV	($257,944)
Net Cash Flow	($342,988)
Present Value Benefit	$460,364
Present Value Cost	$718,307
Benefit Cost Ratio	0.64
Internal Rate of Return	n/a

Existing Power Use and Cost Basis**

Annual Use:	203,760
Demand	59

Rate: Med. Commerical Secondary

	Avg Rate
Distribution Demand	6.67000
Distribution Energy	**0.01343**
Transmission	8.09000
Customer Charge	-
Energy Charge	**0.08890**
Capacity Charge	0.13667
Total Electric Cost	14.77343
Value of Retail Offset	**0.10233**

* Financial scenario assumes 100% equity financing
* Potential property tax revenue is not included in the financial analysis
**Based on Bangor Hydro Electric Company Bill (09/29/10 - 10/30/10) provided by the Town

Year	Retail Offset	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$875	$700,000	$0	$700,875	($700,875)	($700,875)
2	$11,238	$36,792	$48,030	$48,030	$2,100	$893	$0	$0	$2,993	$45,038	($655,837)
3	$11,463	$36,792	$48,255	$96,285	$2,142	$910	$0	$0	$3,052	$45,203	($610,634)
4	$11,692	$36,792	$48,484	$144,770	$2,185	$929	$0	$0	$3,113	$45,371	($565,264)
5	$11,926	$36,792	$48,718	$193,488	$2,229	$947	$0	$0	$3,176	$45,543	($519,721)
6	$12,165	$36,792	$48,957	$242,445	$2,273	$966	$0	$0	$3,239	$45,718	($474,004)
7	$12,408	$36,792	$49,200	$291,645	$2,319	$985	$0	$0	$3,304	$45,896	($428,107)
8	$12,656	$36,792	$49,448	$341,093	$2,365	$1,005	$0	$0	$3,370	$46,078	($382,029)
9	$12,909	$36,792	$49,701	$390,794	$2,412	$1,025	$0	$0	$3,437	$46,264	($335,766)
10	$13,167	$36,792	$49,959	$440,753	$2,460	$1,046	$0	$0	$3,506	$46,453	($289,312)
11	$13,431	$24,528	$37,959	$478,712	$2,510	$1,067	$0	$0	$3,576	$34,382	($254,930)
12	$13,699	$24,528	$38,227	$516,940	$2,560	$1,088	$0	$0	$3,648	$34,580	($220,350)
13	$13,973	$24,528	$38,501	$555,441	$2,611	$1,110	$0	$0	$3,721	$34,781	($185,570)
14	$14,253	$24,528	$38,781	$594,222	$2,663	$1,132	$0	$0	$3,795	$34,986	($150,584)
15	$14,538	$24,528	$39,066	$633,288	$2,717	$1,155	$0	$0	$3,871	$35,195	($115,389)
16	$14,829	$24,528	$39,357	$672,645	$2,771	$1,178	$0	$0	$3,949	$35,408	($79,981)
17	$15,125	$24,528	$39,653	$712,298	$2,826	$1,201	$0	$0	$4,028	$35,626	($44,355)
18	$15,428	$24,528	$39,956	$752,254	$2,883	$1,225	$0	$0	$4,108	$35,848	($8,507)
19	$15,736	$24,528	$40,264	$792,518	$2,941	$1,250	$0	$0	$4,190	$36,074	$27,567
20	$16,051	$24,528	$40,579	$833,097	$2,999	$1,275	$0	$0	$4,274	$36,305	$238,872

PV System Pro Forma
Bar Harbor, ME

PV System

Size (kW)		290
Capacity Factor		14.0%
Annual Energy Production (kWh)		320,090
Annual Facility Energy Use (kWh/yr)		537,600
Value of Retail Off Set (kWh)		$ 0.10233
Value of Excess Power (kWh)		$ -
SREC value (kWh)	Y1-Y2	$ 0.30
SREC value (kWh)	Y3-Y10	$ 0.20
SREC value (kWh)	Y11-Y20	$ 0.10
Coincidence		100.0%

NPV	($748,036)
Net Cash Flow	($122,056)
Present Value Benefit	$1,335,055
Present Value Cost	$2,083,091
Benefit Cost Ratio	0.64
Internal Rate of Return	n/a

Solar resource	4 kWhr/m²/day
Project Term	20 years
Financing: Equity (Cash)	
Energy Inflation	2%
General Inflation	2%
Discount Rate	4.0%
Project Cost (No Grant)	$2,030,000
Simple Payback	16.99 years
Residual Value	$507,500

Existing Power Use and Cost Basis**
Rate: Med Commerical Secondary

Annual Use:	537,600
Demand	183
	Avg Rate
Distribution Demand	6.67000
Distribution Energy	**0.01343**
Transmission	8.09000
Customer Charge	-
Energy Charge	**0.08890**
Capacity Charge	0.13667
Total Electric Cost	14.99900
Value of Retail Offset	**0.10233**

* Financial scenario assumes 100% equity financing
* Potential property tax revenue is not included in the financial analysis
**Based on Bangor Hydro Electric Company Bill (09/22/10 - 10/21/10) & Constellation New Energy Bill (05/22/10 - 06/15/10) provided by the Town

Year	Retail Offset	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$2,538	$2,030,000	$0	$2,032,538	($2,032,538)	($2,032,538)
2	$32,591	$106,697	$139,288	$139,288	$6,090	$2,588	$0	$0	$8,678	$130,610	($1,901,928)
3	$33,243	$106,697	$139,940	$279,228	$6,212	$2,640	$0	$0	$8,852	$131,088	($1,770,840)
4	$33,908	$106,697	$140,605	$419,832	$6,336	$2,693	$0	$0	$9,029	$131,576	($1,639,264)
5	$34,586	$106,697	$141,283	$561,115	$6,463	$2,747	$0	$0	$9,209	$132,073	($1,507,191)
6	$35,278	$106,697	$141,974	$703,089	$6,592	$2,802	$0	$0	$9,394	$132,581	($1,374,610)
7	$35,983	$106,697	$142,680	$845,769	$6,724	$2,858	$0	$0	$9,581	$133,098	($1,241,512)
8	$36,703	$106,697	$143,400	$989,169	$6,858	$2,915	$0	$0	$9,773	$133,627	($1,107,885)
9	$37,437	$106,697	$144,134	$1,133,303	$6,995	$2,973	$0	$0	$9,969	$134,165	($973,720)
10	$38,186	$106,697	$144,882	$1,278,185	$7,135	$3,033	$0	$0	$10,168	$134,714	($839,006)
11	$38,949	$71,131	$110,081	$1,388,266	$7,278	$3,093	$0	$0	$10,371	$99,709	($739,296)
12	$39,728	$71,131	$110,860	$1,499,125	$7,424	$3,155	$0	$0	$10,579	$100,281	($639,016)
13	$40,523	$71,131	$111,654	$1,610,779	$7,572	$3,218	$0	$0	$10,790	$100,864	($538,152)
14	$41,333	$71,131	$112,465	$1,723,244	$7,724	$3,283	$0	$0	$11,006	$101,458	($436,693)
15	$42,160	$71,131	$113,291	$1,836,535	$7,878	$3,348	$0	$0	$11,226	$102,065	($334,628)
16	$43,003	$71,131	$114,134	$1,950,669	$8,036	$3,415	$0	$0	$11,451	$102,684	($231,945)
17	$43,863	$71,131	$114,994	$2,065,664	$8,196	$3,483	$0	$0	$11,680	$103,315	($128,630)
18	$44,741	$71,131	$115,872	$2,181,536	$8,360	$3,553	$0	$0	$11,913	$103,958	($24,672)
19	$45,635	$71,131	$116,767	$2,298,302	$8,527	$3,624	$0	$0	$12,152	$104,615	$79,943
20	$46,548	$71,131	$117,679	$2,415,982	$8,698	$3,697	$0	$0	$12,395	$105,285	$692,728

PV System Pro Forma
Bar Harbor, ME

PV System			
Size (kW)			40
Capacity Factor			14.0%
Annual Energy Production (kWh)			44,150
Annual Facility Energy Use (kWh/yr)			129,684
Value of Retail Off Set (kWh)		$	0.0134
Value of Excess Power (kWh)		$	-
SREC value (kWh)	Y1-Y2	$	0.30
SREC value (kWh)	Y3-Y10	$	0.20
SREC value (kWh)	Y11-Y20	$	0.10
Coincidence			100.0%

Solar resource	4 kWhr/m^2/day
Project Term	20 years
Financing: Equity (Cash)	
Energy Inflation	2%
General Inflation	2%
Discount Rate	4.0%
Project Cost (No Grant)	$320,000
Simple Payback	25.70 years
Residual Value	$80,000

Existing Power Use and Cost Basis**	
Annual Use:	129,684
Demand	28
Rate: Med. Commerical Secondary	
	Avg Rate
Distribution Demand	6.67000
Distribution Energy	**0.01343**
Transmission	8.09000
Customer Charge	-
Transition Demand Charge	0.19000
Total Electric Cost	0.01343
Value of Retail Offset	**0.01343**

NPV	($194,412)
Net Cash Flow	($134,621)
Present Value Benefit	$133,153
Present Value Cost	$327,564
Benefit Cost Ratio	0.41
Internal Rate of Return	n/a

* Financial scenario assumes 100% equity financing
* Potential property tax revenue is not included in the financial analysis
**Based on Bangor Hydro Electric Company Bill (09/02/10 - 10/04/10) provided by the Town

Year	Retail Offset	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$350	$320,000	$0	$320,350	($320,350)	($320,350)
2	$590	$14,717	$15,307	$15,307	$960	$357	$0	$0	$1,317	$13,990	($306,360)
3	$602	$14,717	$15,319	$30,625	$979	$364	$0	$0	$1,343	$13,975	($292,385)
4	$614	$14,717	$15,331	$45,956	$999	$371	$0	$0	$1,370	$13,960	($278,425)
5	$626	$14,717	$15,343	$61,299	$1,019	$379	$0	$0	$1,398	$13,945	($264,479)
6	$639	$14,717	$15,355	$76,654	$1,039	$386	$0	$0	$1,426	$13,930	($250,549)
7	$651	$14,717	$15,368	$92,022	$1,060	$394	$0	$0	$1,454	$13,914	($236,635)
8	$664	$14,717	$15,381	$107,404	$1,081	$402	$0	$0	$1,483	$13,898	($222,737)
9	$678	$14,717	$15,394	$122,798	$1,103	$410	$0	$0	$1,513	$13,882	($208,856)
10	$691	$14,717	$15,408	$138,206	$1,125	$418	$0	$0	$1,543	$13,865	($194,991)
11	$705	$9,811	$10,516	$148,722	$1,147	$427	$0	$0	$1,574	$8,942	($186,048)
12	$719	$9,811	$10,530	$159,253	$1,170	$435	$0	$0	$1,605	$8,925	($177,123)
13	$734	$9,811	$10,545	$169,798	$1,194	$444	$0	$0	$1,638	$8,907	($168,216)
14	$748	$9,811	$10,559	$180,357	$1,218	$453	$0	$0	$1,670	$8,889	($159,327)
15	$763	$9,811	$10,574	$190,931	$1,242	$462	$0	$0	$1,704	$8,871	($150,456)
16	$778	$9,811	$10,590	$201,521	$1,267	$471	$0	$0	$1,738	$8,852	($141,604)
17	$794	$9,811	$10,605	$212,126	$1,292	$480	$0	$0	$1,773	$8,833	($132,772)
18	$810	$9,811	$10,621	$222,747	$1,318	$490	$0	$0	$1,808	$8,813	($123,958)
19	$826	$9,811	$10,637	$233,385	$1,344	$500	$0	$0	$1,844	$8,793	($115,165)
20	$843	$9,811	$10,654	$244,039	$1,371	$510	$0	$0	$1,881	$8,773	($26,392)

PV System Pro Forma
Bar Harbor, ME

PV System			
Size (kW)			40
Capacity Factor			14.0%
Annual Energy Production (kWh)			44,150
Annual Facility Energy Use (kWh/yr)			129,684
Value of Retail Off Set (kWh)		$	0.0134
Value of Excess Power (kWh)		$	-
SREC value (kWh)	Y1-Y2	$	0.30
SREC value (kWh)	Y3-Y10	$	0.20
SREC value (kWh)	Y11-Y20	$	0.10
Coincidence			100.0%

Solar resource	4 kWhr/m²/day
Project Term	20 years
Financing: Equity (Cash)	
Energy Inflation	2%
General Inflation	2%
Discount Rate	4.0%
Project Cost	$270,000
Simple Payback	21.43 years
Residual Value	$67,500

Existing Power Use and Cost Basis**	
Annual Use:	129,684
Demand	28
Rate: Med. Commerical Secondary	
	Avg Rate
Distribution Demand	6.67000
Distribution Energy	**0.01343**
Transmission	8.09000
Customer Charge	-
Transition Demand Charge	0.19000
Total Electric Cost	0.01343
Value of Retail Offset	**0.01343**

NPV	($149,815)
Net Cash Flow	($93,605)
Present Value Benefit	$127,448
Present Value Cost	$277,263
Benefit Cost Ratio	0.46
Internal Rate of Return	n/a

* Financial scenario assumes 100% equity financing
* Potential property tax revenue is not included in the financial analysis
**Based on Bangor Hydro Electric Company Bill (09/02/10 - 10/04/10) provided by the Town

Year	Retail Offset	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$350	$270,000	$0	$270,350	($270,350)	($270,350)
2	$590	$14,717	$15,307	$15,307	$810	$357	$0	$0	$1,167	$14,140	($256,210)
3	$602	$14,717	$15,319	$30,625	$826	$364	$0	$0	$1,190	$14,128	($242,082)
4	$614	$14,717	$15,331	$45,956	$843	$371	$0	$0	$1,214	$14,116	($227,966)
5	$626	$14,717	$15,343	$61,299	$860	$379	$0	$0	$1,238	$14,104	($213,861)
6	$639	$14,717	$15,355	$76,654	$877	$386	$0	$0	$1,263	$14,092	($199,769)
7	$651	$14,717	$15,368	$92,022	$894	$394	$0	$0	$1,288	$14,080	($185,689)
8	$664	$14,717	$15,381	$107,404	$912	$402	$0	$0	$1,314	$14,067	($171,622)
9	$678	$14,717	$15,394	$122,798	$930	$410	$0	$0	$1,341	$14,054	($157,568)
10	$691	$14,717	$15,408	$138,206	$949	$418	$0	$0	$1,367	$14,041	($143,527)
11	$705	$9,811	$10,516	$148,722	$968	$427	$0	$0	$1,395	$9,122	($134,406)
12	$719	$9,811	$10,530	$159,253	$987	$435	$0	$0	$1,423	$9,108	($125,298)
13	$734	$9,811	$10,545	$169,798	$1,007	$444	$0	$0	$1,451	$9,094	($116,204)
14	$748	$9,811	$10,559	$180,357	$1,027	$453	$0	$0	$1,480	$9,079	($107,125)
15	$763	$9,811	$10,574	$190,931	$1,048	$462	$0	$0	$1,510	$9,065	($98,060)
16	$778	$9,811	$10,590	$201,521	$1,069	$471	$0	$0	$1,540	$9,050	($89,010)
17	$794	$9,811	$10,605	$212,126	$1,090	$480	$0	$0	$1,571	$9,035	($79,975)
18	$810	$9,811	$10,621	$222,747	$1,112	$490	$0	$0	$1,602	$9,019	($70,957)
19	$826	$9,811	$10,637	$233,385	$1,134	$500	$0	$0	$1,634	$9,003	($61,953)
20	$843	$9,811	$10,654	$244,039	$1,157	$510	$0	$0	$1,667	$8,987	$14,534

PV System Pro Forma
Bar Harbor, ME

PV System

Size (kW)			10
Capacity Factor			14.0%
Annual Energy Production (kWh)			11,038
Annual Facility Energy Use (kWh/yr)			20,532
Value of Retail Off Set (kWh)		$	0.1625
Value of Excess Power (kWh)		$	-
SREC value (kWh)	Y1-Y2	$	0.30
SREC value (kWh)	Y3-Y10	$	0.20
SREC value (kWh)	Y11-Y20	$	0.10
Coincidence			100.0%

Solar resource	4 kWhr/m²/day
Project Term	20 years
Financing: Equity (Cash)	
Energy Inflation	2%
General Inflation	2%
Discount Rate	4.0%
Project Cost (No Grant)	$80,000
Simple Payback	16.84 years
Residual Value	$20,000

Existing Power Use and Cost Basis**

Annual Use:	20,532
Rate: Gen. Serv-Sm. Comm.	
	Avg Rate
Distribution Energy	**0.04780**
Transmission	**0.02691**
Customer Charge	-
Electric Supply	**0.087820**
Total Electric Cost	0.16253
Value of Retail Offset	**0.16253**

NPV	($25,398)
Net Cash Flow	$2,003
Present Value Benefit	$56,583
Present Value Cost	$81,891
Benefit Cost Ratio	0.69
Internal Rate of Return	0.2%

* Financial scenario assumes 100% equity financing
* Potential property tax revenue is not included in the financial analysis
**Based on Bangor Hydro Electric Company Bill (09/07/10 - 10/06/10) provided by the Town

Year	Retail Offset	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$88	$80,000	$0	$80,088	($80,088)	($80,088)
2	$1,785	$3,679	$5,464	$5,464	$240	$89	$0	$0	$329	$5,135	($74,953)
3	$1,821	$3,679	$5,500	$10,964	$245	$91	$0	$0	$336	$5,164	($69,789)
4	$1,857	$3,679	$5,536	$16,500	$250	$93	$0	$0	$343	$5,194	($64,595)
5	$1,894	$3,679	$5,573	$22,074	$255	$95	$0	$0	$349	$5,224	($59,371)
6	$1,932	$3,679	$5,611	$27,685	$260	$97	$0	$0	$356	$5,255	($54,116)
7	$1,971	$3,679	$5,650	$33,335	$265	$99	$0	$0	$364	$5,286	($48,829)
8	$2,010	$3,679	$5,689	$39,024	$270	$101	$0	$0	$371	$5,319	($43,511)
9	$2,050	$3,679	$5,730	$44,754	$276	$103	$0	$0	$378	$5,351	($38,159)
10	$2,091	$3,679	$5,771	$50,525	$281	$105	$0	$0	$386	$5,385	($32,775)
11	$2,133	$2,453	$4,586	$55,111	$287	$107	$0	$0	$393	$4,193	($28,582)
12	$2,176	$2,453	$4,629	$59,739	$293	$109	$0	$0	$401	$4,227	($24,355)
13	$2,219	$2,453	$4,672	$64,411	$298	$111	$0	$0	$409	$4,263	($20,092)
14	$2,264	$2,453	$4,717	$69,128	$304	$113	$0	$0	$418	$4,299	($15,793)
15	$2,309	$2,453	$4,762	$73,890	$310	$115	$0	$0	$426	$4,336	($11,457)
16	$2,355	$2,453	$4,808	$78,698	$317	$118	$0	$0	$434	$4,374	($7,083)
17	$2,402	$2,453	$4,855	$83,553	$323	$120	$0	$0	$443	$4,412	($2,671)
18	$2,450	$2,453	$4,903	$88,456	$329	$123	$0	$0	$452	$4,451	$1,780
19	$2,499	$2,453	$4,952	$93,408	$336	$125	$0	$0	$461	$4,491	$6,271
20	$2,549	$2,453	$5,002	$98,411	$343	$127	$0	$0	$470	$4,532	$30,803

PV System Pro Forma
Bar Harbor, ME

PV System

Size (kW)			10
Capacity Factor			14.0%
Annual Energy Production (kWh)			11,038
Annual Facility Energy Use (kWh/yr)			20,532
Value of Retail Off Set (kWh)		$	0.1625
Value of Excess Power (kWh)		$	-
SREC value (kWh)	Y1-Y2	$	0.30
SREC value (kWh)	Y3-Y10	$	0.20
SREC value (kWh)	Y11-Y20	$	0.10
Coincidence			100.0%

Solar resource	4 kWhr/m²/day
Project Term	20 years
Financing: Equity (Cash)	
Energy Inflation	2%
General Inflation	2%
Discount Rate	4.0%
Project Cost	$30,000
Simple Payback	6.12 years
Residual Value	$7,500

Existing Power Use and Cost Basis**

Annual Use:	20,532
Rate: Gen. Serv-Sm. Comm.	
	Avg Rate
Distribution Energy	**0.04780**
Transmission	**0.02691**
Customer Charge	-
Electric Supply	**0.087820**
Total Electric Cost	0.16253
Value of Retail Offset	**0.16253**

NPV	$19,289
Net Cash Flow	$42,929
Present Value Benefit	$50,878
Present Value Cost	$31,589
Benefit Cost Ratio	1.61
Internal Rate of Return	11.0%

* Financial scenario assumes 100% equity financing
* Potential property tax revenue is not included in the financial analysis
**Based on Bangor Hydro Electric Company Bill (09/07/10 - 10/06/10) provided by the Town

Year	Retail Offset	RECs Revenue	Total Annual Revenue	Cummulative Revenue	Annual O&M	Annual Insurance	Annual Principal	Annual Interest	Total Annual Cost	Net Annual Cash Flow	Cummulative Cash Flow
1	$0	$0	$0	$0	$0	$88	$30,000	$0	$30,088	($30,088)	($30,088)
2	$1,785	$3,679	$5,464	$5,464	$90	$89	$0	$0	$179	$5,285	($24,803)
3	$1,821	$3,679	$5,500	$10,964	$92	$91	$0	$0	$183	$5,317	($19,486)
4	$1,857	$3,679	$5,536	$16,500	$94	$93	$0	$0	$186	$5,350	($14,136)
5	$1,894	$3,679	$5,573	$22,074	$96	$95	$0	$0	$190	$5,383	($8,753)
6	$1,932	$3,679	$5,611	$27,685	$97	$97	$0	$0	$194	$5,417	($3,335)
7	$1,971	$3,679	$5,650	$33,335	$99	$99	$0	$0	$198	$5,452	$2,117
8	$2,010	$3,679	$5,689	$39,024	$101	$101	$0	$0	$202	$5,488	$7,604
9	$2,050	$3,679	$5,730	$44,754	$103	$103	$0	$0	$206	$5,524	$13,128
10	$2,091	$3,679	$5,771	$50,525	$105	$105	$0	$0	$210	$5,561	$18,689
11	$2,133	$2,453	$4,586	$55,111	$108	$107	$0	$0	$214	$4,372	$23,060
12	$2,176	$2,453	$4,629	$59,739	$110	$109	$0	$0	$219	$4,410	$27,471
13	$2,219	$2,453	$4,672	$64,411	$112	$111	$0	$0	$223	$4,449	$31,920
14	$2,264	$2,453	$4,717	$69,128	$114	$113	$0	$0	$227	$4,489	$36,409
15	$2,309	$2,453	$4,762	$73,890	$116	$115	$0	$0	$232	$4,530	$40,939
16	$2,355	$2,453	$4,808	$78,698	$119	$118	$0	$0	$237	$4,572	$45,511
17	$2,402	$2,453	$4,855	$83,553	$121	$120	$0	$0	$241	$4,614	$50,124
18	$2,450	$2,453	$4,903	$88,456	$124	$123	$0	$0	$246	$4,657	$54,782
19	$2,499	$2,453	$4,952	$93,408	$126	$125	$0	$0	$251	$4,701	$59,483
20	$2,549	$2,453	$5,002	$98,411	$129	$127	$0	$0	$256	$4,746	$71,729

Appendix C

Summary of Financial Incentives and Rebates

Financial Incentives and Rebates

There are a number of local, state, and federal initiatives and rebates offered for the installation of renewable energy systems. Some of the initiatives that the Town may qualify for are listed below.

The Community Solar Lending Program provides low interest loans to schools for the installation of solar water heating and photovoltaic. Loan rates vary from 0 to 5%.

The Community Based Renewable Energy Production Incentive Program provides long term contracts for energy, capacity resources, or RECs produced by both large (1 MW or greater) and small (less than 1 MW) solar PV systems. The contract price for small solar PV systems is $0.10/kWh. Through the REC multiplier program, RECs are worth 150% of the amount of the electricity, but must be accounted for when they are used to satisfy Maine's Renewable Energy Portfolio Standard.

The Sales and Use Tax Refund for Qualified Community Wind Generators provides refunds for sales and use tax for community wind generating projects that have a nameplate capacity of 10 MW or less.

The Voluntary Renewable Resources Grants provides $50,000 grants for funding of small-scale demonstrative solar thermal electric, solar PV, and wind projects, designed to educate communities on the value and cost-effectiveness of renewable energy. The grants are generally available to schools, and community-based action programs.

The Solar and Wind Energy Rebate Program provides schools and local governments who purchase renewable energy systems rebates. Purchasers of PV systems may qualify for a rebate of $2 per Watt (AC), with a maximum incentive of $2,000. Purchasers of commercial solar thermal systems may qualify for up to 25% of the project cost or $1,000, whichever is less. Non-residential purchasers of wind energy systems may qualify for a rebate of $500 per 500 Watts, up to 4,000 Watts, but not to exceed $4,000.

Qualified Energy Conservation Bonds (QREBs) are issued to finance certain types of energy projects including wind and solar photovoltaic. QREBs are qualified tax credit bonds. The bonds have a theoretical 0% interest rate. The borrower pays back only the principal of the bond, and the bondholder receives federal tax credits in lieu of the traditional bond interest.

Clean Renewable Energy Bonds (CREBs) may be used to finance renewable energy projects including wind and solar. CREBs are issued. The bonds have a theoretical 0% interest rate. The borrower pays back only the principal of the bond, and the bondholder receives federal tax credits in lieu of the traditional bond interest.

The Loan Guarantee Program provides loans to renewable energy projects including wind, solar thermal and photovoltaic, with a focus on projects with a total cost over $25 million. Full payment is required over a period not to exceed 30 years or 90% of the projects useful life.

The Renewable Energy Production Incentive (REPI) provides incentive payments for electricity generated and sold produced by renewable energy systems including wind and solar photovoltaic. Qualified systems are eligible to receive an annual incentive payment of 1.5¢ per kWh in 1993 dollars (indexed for inflation) for the first 10 years of operation.

The Rural Energy for America Program (REAP) Grants provides up to 25% of renewable project costs including solar thermal electric, solar PV, and wind in order to promote energy efficiency and renewable energy.

The High Energy Cost Grant Program provides grants ranging from $75,000 to $5 million to renewable energy projects in communities that have energy costs at least 275% above the national average.

Appendix D

Energy Bills Provided by the Town of Bar Harbor

Bangor Hydro
ELECTRIC COMPANY

Bangor [illegible] Customer Service Center
207-[illegible]
1-800-[illegible]
Email [illegible]@bhe.com
Pay [illegible]@bhe.com

Account Information

Account Number:	000086685-0076185-1
Service Address:	KIDS CORNER INC 81 MT DESERT ST BAR HARBOR
Read Cycle:	08M
Next Planned Meter Read:	08-NOV-2010

Customer Account Summary

Previous Statement Balance	Payments [illegible] Thank [illegible]	Adjustments (+/-)	Balance Before New Charges	New Charges	Current Account Balance	Total Now Due
$335.22	[illegible]	$0.00	$0.00	$291.17	$291.17	$291.17

Energy Comparison

	This Month	[illegible]	[illegible] Ago
KWH	1711		581
Service Days	29		29
KWH Per Day	59.0	[illegible]	58.0
Cost Per Day	10.04	[illegible]	9.49

Gen Serv-Sm Commercial (Service 1)

Meter Number	Units	For Service From	For Service To	Days	Meter Reading Current	Meter Reading Previous	Constant	KWH
007162758	1	09/07/10	10/06/10	29	22195	20484	1	1711

Message from Bangor Hydro

Bangor Hydro Delivery (Service 1 Rate Code B000)

Distribution Energy	1711 kWh @ 0.0478000	$81.79
Transmission	1711 kWh @ 0.0269100	$46.04
Customer Charge		$13.08
Balance Forward		**$0.00**
Total Bangor Hydro Delivery Charges Due		**$140.91**

Message from your Supplier

Your electricity price for Standard Offer service for the period of March 1, 2010 through Feb 28, 2011 is $.0878204 per kWh. For information on buying green power go to www.mine.gov/greenpower

Standard Offer Supply (Service 1 Rate Code 2000 Class S)

Electricity Supply	[illegible]	[illegible]
Balance Forward		**$0.00**
Total Standard Offer Supply Charges Due		**$150.26**

PAID
10.18.10

Received Time Dec. 13. 3:55PM

Bangor Hydro
ELECTRIC COMPANY

Bangor Hydro Customer Service Center
207-947-2414
1-800-499-6600
Email: custserv@bhe.com
Pay Online at www.bhe.com

Account Information

Account Number:	000001709-0001742-2
Service Address:	TOWN OF BAR HARBOR UNIT TPLANT LEDGELAWN AVE BAR HARBOR
Read Cycle:	05M
Next Planned Meter Read:	03 NOV-2010

Customer Account Summary

Previous Statement Balance	Payments (-) Thank You	Adjustments (+/-)	Balance Before New Charges	New Charges	Current Account Balance	Total Now Due
$2,788.80	$2,788.80	$0.00	$0.00	$2,821.42	$2,821.42	$2,821.42

Energy Comparison

	This Month	Last Month	One Year Ago
KWH			
Service Days			
KWH Per Day			
Cost Per Day			

Med Commercial Secondary (Service 2)

Meter Number	Units	For Service From	To	Days	Meter Reading Current	Previous	Constant	KWH
005612334	1	09/02/10	09/16/10	14	18422	18072	80	28000
007701135	1	09/16/10	10/04/10	18	379	0	80	30320

Message from Bangor Hydro

Bangor Hydro Delivery (Service 2 Rate Code C000)

Distribution Demand	135.36 kW @ 6.6700000	$902.85
Distribution Energy	58320 kWh @ 0.0134300	$783.24
Transmission	135.36 kW @ 8.0900000	$1,095.06
Customer Charge		$40.27
Balance Forward		**$0.00**
Total Bangor Hydro Delivery Charges Due		**$2,821.42**

WASTEWATER DIVISION
Account _____
Vendor _____
OK to Pay _____

Bangor Hydro
ELECTRIC COMPANY

Bangor Hydro Customer Service Center
207-947-2414
1-800-499-6600
Email: custserv@bhe.com
Pay Online at www.bhe.com

Account Information

Account Number:	000012575-0057163-2
Service Address:	TOWN OF BAR HARBOR UNIT FIRE FIREFLY LN BAR HARBOR
Read Cycle:	01M
Next Planned Meter Read:	30-NOV-2010

Customer Account Summary

Previous Statement Balance	Payments (-) Thank You	Adjustments (+/-)	Balance Before New Charges	New Charges	Current Account Balance	Total Now Due
$996.72	$0.00	$0.00	$996.72	$916.21	$1,912.93	$1,912.93

Energy Comparison

	This Month	Last Month	One Year Ago
KWH			
Service Days			
KWH Per Day			
Cost Per Day			

Gen Serv-Sm Com (Service 1)

Meter Number	Units	For Service From	For Service To	Days	Meter Reading Current	Meter Reading Previous	Constant	KWH
007500404	1	09/27/10	10/26/10	29	12847	7296	1	5551

Message from Bangor Hydro

Bangor Hydro Delivery (Service 1 Rate Code B006)

Distribution Energy	5551 kWh @ 0.0478000	$265.34
Transmission	5551 kWh @ 0.0269100	$149.38
Customer Charge		$13.08
Late Charge		$0.43
Balance Forward		**$465.23**
Total Bangor Hydro Delivery Charges Due		**$893.46**

Message from your Supplier

Your electricity price for Standard Offer service for the period of March 1, 2010 through Feb 28, 2011 is $ 0878204 per kWh
For information on buying green power go to www.maine.gov/greenpower

Standard Offer Supply (Service 1 Rate Code 2006 Class S)

Electricity Supply	5551 kWh @ 0.0878204	$487.49
ST Late Charge		$0.49
Balance Forward		**$531.49**
Total Standard Offer Supply Charges Due		**$1,019.47**

49-5504
25 26C
LTK

Bangor Hydro
ELECTRIC COMPANY

Bangor Hydro Customer Service Center
207-947-2414
1-800-499-6600
Email: custserv@bhe.com
Pay Online at www.bhe.com

Account Information

Account Number:	000012575-0050433-8
Service Address:	TOWN OF BAR HARBOR BLDG MUNCPL 93 COTTAGE ST BAR HARBOR
Read Cycle:	01M
Next Planned Meter Read:	30-NOV-2010

Customer Account Summary

Previous Statement Balance	Payments (-) Thank You	Adjustments (+/-)	Balance Before New Charges	New Charges	Current Account Balance	Total Now Due
$1,329.76	$1,329.76	$0.00	$0.00	$1,285.55	$1,285.55	$1,285.55

Energy Comparison

	This Month	Last Month	One Year Ago
KWH			
Service Days			
KWH Per Day			
Cost Per Day			

Med Commercial Secondary (Service 1)

Meter Number	Units	For Service From	To	Days	Meter Reading Current	Previous	Constant	KWH
007700350	1	09/28/10	10/26/10	28	18079	7272	1	10807

Message from Bangor Hydro

Bangor Hydro Delivery (Service 1 Rate Code C000)

Distribution Demand	28.21 kW @ 6.6700000	$188.16
Distribution Energy	10807 kWh @ 0.0134300	$145.14
Transmission	28.21 kW @ 8.0900000	$228.22
Customer Charge		$40.27
Balance Forward		**$0.00**
Total Bangor Hydro Delivery Charges Due		**$601.79**

Message from your Supplier

Your electricity price for Standard Offer service has changed for the period of November 1, 2010 through November 30, 2010. The old price was $.0632700 per kWh; the new price is $.0655200 per kWh.
For information on buying green power go to www.maine.gov/greenpower

Standard Offer Supply (Service 1 Rate Code 3000 Class M)

Electricity Supply	771.927 kWh @ 0.0632700	$48.84
Electricity Supply	10035.071 kWh @ 0.0632700	$634.92
Balance Forward		**$0.00**
Total Standard Offer Supply Charges Due		**$683.76**

1024-5504

NOV - 4 2010

Bangor Hydro Electric Company

Bangor Hydro Customer Service Center
207-947-2414
1-800-499-6600
Email: custserv@bhe.com
Pay Online at www.bhe.com

Account Number:	000001665-0001979-2
Service Address:	MDI REGIONAL HIGH SCHOOL 1081 EAGLE LAKE RD BAR HARBOR
Read Cycle:	14M
Next Planned Meter Read:	17-NOV-2010

Customer Account Summary

Previous Statement Balance	Payments (-) Thank You	Adjustments (+/-)	Balance Before New Charges	New Charges	Current Account Balance	Total Now Due
$6,278.55	$6,278.55	$0.00	$0.00	$3,432.24	$3,432.24	$3,432.24

Energy Comparison

	This Month	Last Month	One Year Ago
KWH			
Service Days			
KWH Per Day			
Cost Per Day			

Med Commercial Secondary (Service 1)

Meter Number	Units	For Service From	For Service To	Days	Meter Reading Current	Meter Reading Previous	Constant	KWH
007700963	1	09/20/10	10/15/10	25	1120	0	40	44800

Message from Bangor Hydro

Bangor Hydro Delivery (Service 1 Rate Code C000)

Distribution Demand	183.2 kW @ 6.6700000	$1,221.94
Distribution Energy	44800 kWh @ 0.0134300	$601.66
Transmission	183.2 kW @ 8.0900000	$1,482.09
Customer Charge		$40.27

Energy Comparison

	This Month	Last Month	One Year Ago
KWH			
Service Days			
KWH Per Day			
Cost Per Day			

Light-HPS 250 W Monthly (Service 4)

Meter Number	Units	For Service From	For Service To	Days	Meter Reading Current	Meter Reading Previous	Constant	KWH
	4	09/22/10	10/21/10	29				111

Received Time Dec. 14. 10:26AM

Bangor Hydro Customer Service Center
207-947-2414
1-800-499-6600
Email: custserv@bhe.com
Pay Online at www.bhe.com

Account Information	
Account Number:	000001665-0001979-2
Service Address:	MDI REGIONAL HIGH SCHOOL 1081 EAGLE LAKE RD BAR HARBOR
Read Cycle:	14M
Next Planned Meter Read:	17-NOV-2010

Message from Bangor Hydro	Bangor Hydro Delivery (Service 4 Rate Code D008)	
	Customer Charge	$86.28
	Balance Forward	$1,362.30
	Total Bangor Hydro Delivery Charges Due	$4,794.54

Message from your Supplier	Constellation NewEnergy INC. Supply (Service 1 Rate Code PP11)

Message from your Supplier	Constellation NewEnergy INC. Supply (Service 4 Rate Code PP74)	
	Balance Forward	-$1,359.25
	Total Standard Offer Supply Charges Due	-$1,359.25

Received Time Dec. 16. 10:26AM

Constellation NewEnergy

The way energy works. for your business

Invoice

CNE ACCOUNT ID	1-M5J-1777
CNE CUSTOMER ID	NE_2375
STATEMENT NO.	0002446389
STATEMENT DATE	11/30/2010
DUE DATE	**12/30/2010**

Mount Desert Island (ME), Regional HS
PO BOX 60
DESERT, ME 04660

Additional charges per the terms of your contract will be applied to the **Total Amount Due** if payment is not received on or before the due date

PREVIOUS STATEMENT DATE	10/01/2010
PREVIOUS BALANCE	$10,598.65
PAYMENTS SINCE LAST INVOICE	$-10,598.65
DEBITS/CREDITS SINCE LAST INVOICE	$0.00
LATE/FINANCE FEE	$0.00
CURRENT CHARGES	$5,712.83
TOTAL AMOUNT DUE	**$5,712.83**

1000-0000-2600-562260-320

WIRE TRANSFER INFORMATION:
Constellation NewEnergy, Inc.
ABA-ACH #111000012, ABA-WIRE #026009593
ACCT #4426223690
BANK: Bank of America

REMITTANCE ADDRESS:
Constellation NewEnergy, Inc.
14217 Collections Center Dr.

Chicago, IL 60693

6142 0008 RBG 000 07 101201 PAGE 1 of 4 COLR630E 1186

(PLEASE RETURN THIS PORTION WITH PAYMENT, AND MAKE ALL CHECKS PAYABLE TO: Constellation NewEnergy Inc.)

Constellation NewEnergy

If billing address is incorrect, please fax the new complete billing address to (877) 243-4968.

The way energy works. for your business

CNE ACCOUNT ID	1-M5J-1777
CNE CUSTOMER ID	NE_2375
STATEMENT NO.	0002446389
STATEMENT DATE	11/30/2010
DUE DATE	12/30/2010

Additional charges per the terms of your contract will be applied to the Total Amount Due if payment is not received on or before the due date

HOWARD COTTER
MDI Regional High School 0000016650001979
PO BOX 60 1186
DESERT, ME 04660

AMOUNT DUE	$5,712.83
AMOUNT ENCLOSED	$

Received Time Dec. 14. 10:26AM

Constellation NewEnergy®

The way energy **works.** for your business

Mount Desert Island (ME), Regional HS — Fixed Price Solutions

SITE NAME	MDI Regional High School - 0000016650001979		
SERVICE LOCATION	Eagle Lake Road	kWh	56,244.00
BHE ACCOUNT ID	0000016650001979	SERVICE PERIOD	05/22/2010 to 06/15/2010
INVOICE ID	0002446389-0001		
METER NO(S).	0000016650001979_UM 015553280		

Contract Charges						
Energy Charge Non TOU	56,244.00 kWh at	0.0889000	$/kWh	$5,000.09		
Subtotal Contract Charges					$5,000.09	
Market Charges						
Capacity Charge $/kW Day 05/22/2010 - 05/31/2010 (Capacity Tag 143.004 kW x Reserve Margin 1.47869 x 10 Days x Capacity Price)	2,114.58 kW Days at	0.1366667	$/kW Days	$288.99		
Capacity Charge $/kW Day 06/01/2010 - 06/15/2010 (Capacity Tag 145.585 kW x Reserve Margin 1.36973 x 15 Days x Capacity Price)	2,991.18 kW Days at	0.1416667	$/kW Days	$423.75		
Subtotal Market Charges					$712.74	
Subtotal Charges from Constellation NewEnergy						$5,712.83
Total Amount Due To Constellation NewEnergy						$5,712.83

1221 Lamar St., Suite 750, Houston, TX 77010
FOR CUSTOMER SERVICE CALL (888) 635 0827

Received Time Dec. 14. 10:26AM PAGE 3 of 4 COLR630E 1185

Bangor Hydro
ELECTRIC COMPANY

Bangor Hydro Customer Service Center
207-947-2414
1-800-499-6600
Email: custserv@bhe.com
Pay Online at www.bhe.com

Account Information

Account Number:	000001708-0001756-1
Service Address:	TOWN OF BAR HARBOR UNIT JR HIG EAGLE LAKE RD BAR HARBOR
Read Cycle:	03M
Next Planned Meter Read:	02-DEC-2010

Customer Account Summary

Previous Statement Balance	Payments (-) Thank You	Adjustments (+/-)	Balance Before New Charges	New Charges	Current Account Balance	Total Now Due
$1,873.37	$1,873.37	$0.00	$0.00	$1,136.20	$1,136.20	$1,136.20

Energy Comparison

	This Month	Last Month	One Year Ago
KWH			
Service Days			
KWH Per Day			
Cost Per Day			

Med Commercial Secondary (Service 1)

Meter Number	Units	For Service From	To	Days	Meter Reading Current	Previous	Constant	KWH
007701396	1	09/29/10	10/30/10	31	2534	1685	20	16980

Message from Bangor Hydro

Bangor Hydro Delivery (Service 1 Rate Code C000)

Distribution Demand	58.8 kW @ 6.6700000	$392.20
Distribution Energy	16980 kWh @ 0.0134300	$228.04
Transmission	58.8 kW @ 8.0900000	$475.69
Customer Charge		$40.27
Balance Forward		$0.00
Total Bangor Hydro Delivery Charges Due		$1,136.20

Received Time Dec. 14. 10:26AM

Bangor Hydro Customer Service Center
207-947-2414
1-800-499-6600
Email: custserv@bhe.com
Pay Online at www.bhe.com

Account Information

Account Number:	000001708-0001755-9
Service Address:	TOWN OF BAR HARBOR. UNIT ELEM EAGLE LAKE RD BAR HARBOR
Read Cycle:	03M
Next Planned Meter Read:	02-DEC-2010

Customer Account Summary

Previous Statement Balance	Payments (-) Thank You	Adjustments (+/-)	Balance Before New Charges	New Charges	Current Account Balance	Total Now Due
$1,579.08	$1,579.08	$0.00	$0.00	$880.71	$880.71	$880.71

Energy Comparison

	This Month	Last Month	One Year Ago
KWH			
Service Days			
KWH Per Day			
Cost Per Day			

Med Commercial Secondary (Service 1)

Meter Number	Units	For Service From	To	Days	Meter Reading Current	Previous	Constant	KWH
007701397	1	09/29/10	10/30/10	31	851	557	40	11760

Message from Bangor Hydro

Bangor Hydro Delivery (Service 1 Rate Code C000)

Distribution Demand	46.24 kW @ 6.6700000	$308.42
Distribution Energy	11760 kWh @ 0.0134300	$157.94
Transmission	46.24 kW @ 8.0900000	$374.08
Customer Charge		$40.27
Balance Forward		$0.00
Total Bangor Hydro Delivery Charges Due		$880.71

Constellation NewEnergy®

The way energy **works.** for your business

Invoice

ACCOUNT ID.	1-M5J-910	Conners Emerson School
CUSTOMER NO.	NE_1811	PO BOX 60
STATEMENT NO.	0002238553	DESERT, ME 04660
STATEMENT DATE	10/07/2010	
DUE DATE	**11/06/2010**	

Additional charges per the terms of your contract will be applied to the **Total Amount Due** if payment is not received on or before the due date.

PREVIOUS STATEMENT DATE	09/08/2010	
PREVIOUS BALANCE		$2,912.65
PAYMENTS SINCE LAST INVOICE		$-1,448.88
DEBITS/CREDITS SINCE LAST INVOICE		$0.00
LATE/FINANCE FEE		$0.00
CURRENT CHARGES		$1,627.13
TOTAL AMOUNT DUE		**$3,090.90**

1000-0000-2600-562200-030

WIRE TRANSFER INFORMATION:
Constellation NewEnergy, Inc.
ABA-ACH #111000012, ABA-WIRE #026009593
ACCT #4426223690
BANK: Bank of America

REMITTANCE ADDRESS:
Constellation NewEnergy, Inc.
14217 Collections Center Dr.
Chicago, IL 60693

1221 Lamar St., Suite 750, Houston, TX 77010
FOR CUSTOMER SERVICE CALL (888) 635 0827

Received Time Dec. 14. 10:26AM

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Conners Emerson School

Fixed Price Solutions

SITE NAME	Town of Bar Harbor - School Union 98 - 0000017080001756		
SERVICE LOCATION	Eagle Lake Road	kWh	16,020.00
BHE ACCOUNT NO.	0000017080001756	SERVICE PERIOD	08/31/2010 to 09/29/2010
INVOICE DETAIL NO.	0002238553-0001		
METER NO(S).	083959340		

Contract Charges						
Energy Charge Non TOU	16,020.00	kWh at	0.0889000	$/kWh	$1,424.18	
Subtotal Contract Charges						$1,424.18
Market Charges						
Capacity Charge $/kW Day 08/31/2010 - 08/31/2010 (Capacity Tag 34.902kW x Reserve Margin 1.369728 x 1 Days x Capacity Price)	47.81	kW Days at	0.1370968	$/kW Days	$6.55	
Capacity Charge $/kW Day 09/01/2010 - 09/29/2010 (Capacity Tag 34.902kW x Reserve Margin 1.369728 x 29 Days x Capacity Price)	1,386.38	kW Days at	0.1416667	$/kW Days	$196.40	
Subtotal Market Charges						$202.95
Subtotal Charges from Constellation NewEnergy						$1,627.13
Total Amount Due To Constellation NewEnergy						$1,627.13

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Received Tue Dec 14 10:26AM 101008 PAGE 3 of 4 COLN6508 653

Constellation NewEnergy®

The way energy **works.** for your business

Invoice

ACCOUNT ID.	1-M5J-909
CUSTOMER NO.	NE_1811
STATEMENT NO.	0002238557
STATEMENT DATE	10/07/2010
DUE DATE	**11/06/2010**

Conners Emerson School
EAGLE LAKE ROAD
DESERT, ME 04660

Additional charges per the terms of your contract will be applied to the **Total Amount Due** if payment is not received on or before the due date

PREVIOUS STATEMENT DATE	09/08/2010
PREVIOUS BALANCE	$1,905.45
PAYMENTS SINCE LAST INVOICE	$-1,028.37
DEBITS/CREDITS SINCE LAST INVOICE	$0.00
LATE/FINANCE FEE	$0.00
CURRENT CHARGES	$1,126.73
TOTAL AMOUNT DUE	**$2,003.81**

WIRE TRANSFER INFORMATION:
Constellation NewEnergy, Inc.
ABA-ACH #111000012, ABA-WIRE #026009593
ACCT #4426223690
BANK: Bank of America

REMITTANCE ADDRESS:
Constellation NewEnergy, Inc.
14217 Collections Center Dr.

Chicago, IL 60693

6142 0007 RBG 900 07 101008 PAGE 1 of 4 COLR630E 771

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Received Time Dec. 14. 10:26AM 01008 PAGE 3 of 4 COLR630E 771

Constellation NewEnergy®

The way energy works. for your business

Conners Emerson School — Fixed Price Solutions

SITE NAME	Town of Bar Harbor - School Union 98 - 0000017080001755		
SERVICE LOCATION	Eagle Lake Road	kWh	10,920.00
BHE ACCOUNT NO.	0000017080001755	SERVICE PERIOD	08/31/2010 to 09/29/2010
INVOICE DETAIL NO.	0002238557-0001		
METER NO(S).	017190596		

Contract Charges						
Energy Charge Non TOU	10,920.00 kWh at	0.0889000	$/kWh	$970.79		
Subtotal Contract Charges					$970.79	
Market Charges						
Capacity Charge $/kW Day 08/31/2010 - 08/31/2010 (Capacity Tag 26.815kW x Reserve Margin 1.369728 x 1 Days x Capacity Price)	36.73 kW Days at	0.1370968	$/kW Days	$5.04		
Capacity Charge $/kW Day 09/01/2010 - 09/29/2010 (Capacity Tag 26.815kW x Reserve Margin 1.369728 x 29 Days x Capacity Price)	1,065.15 kW Days at	0.1416667	$/kW Days	$150.90		
Subtotal Market Charges					$155.94	
Subtotal Charges from Constellation NewEnergy						$1,126.73
Total Amount Due To Constellation NewEnergy						$1,126.73

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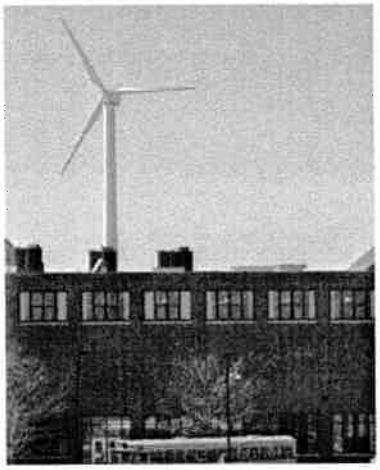
PAGE 3 of 4 COLR6538E 771

Appendix E

Selected Material Specifications

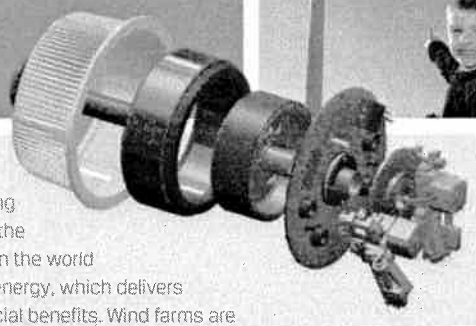


Northwind® 100

Community Scale Wind Turbine

Direct.

To Communities Everywhere.



All turbines capture wind.
The **Northwind** 100 is designed to do it better.

Around the world, turbines are sprouting out of the ground making wind one of the fastest growing sources of electricity in the world today. Wind provides clean domestic energy, which delivers clear economic environmental and social benefits. Wind farms are not the only answer. The space and investment required for utility-scale development precludes many from participating in the wind power revolution. Thus the growing demand for community wind projects...and our drive to meet our customers where they live and work.

The Right Fit For Your Community

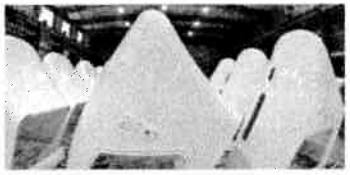
At 100 kilowatts of rated power, the Northwind 100 can match the power needs of many local applications, whether they are municipalities, schools and universities, commercial farms, or business campuses. Its physical size fits within most constraints inherent in highly populated areas and the low-maintenance design ensures that you can "fly it and forget it." Discover the Northwind 100 and harness the most advanced technology, in its simplest form, for your clean energy solution.

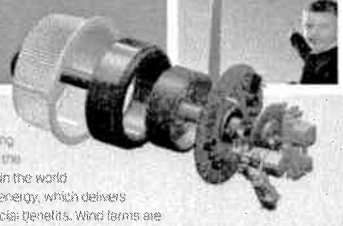
Public Schools • Small Businesses • Farms & Dairies • Municipal Buildings

Greenhouses • Universities • Corporations • Hotels & Resorts • Libraries

Direct.

To Communities Everywhere.





Around the world, turbines are sprouting out of the ground making wind one of the fastest growing sources of electricity in the world today. Wind provides clean domestic energy, which delivers clear economic environmental and social benefits. Wind farms are not the only answer. The space and investment required for utility scale development precludes many from participating in the wind power revolution. Thus the growing demand for community wind projects...and our drive to meet our customers where they live and work.

Our Design

The Northwind 100 is a state-of-the-art technology machine that delivers with its innovative operating design and best in class reliability. What this means for your application is more energy and less risk, so more revenue.

Designed and tested with a NASA-grade and managed for remote and isolated sites, the Northwind 100 put reliability at a premium. Regular and easily scheduled maintenance over ice, snow or water for installations located at the South Pole or in the Indian Ocean—let alone your farm, school or business.

- Our Northwind 100 is optimized for **low winds**, so you don't have to be in a windy turn to benefit from wind power. Our turbines can begin making power at wind speeds as low as 8 miles per hour (typical breeze), and can provide clear economic benefits at a fraction of some competitors.
- As a pioneering active component in simplicity and reliability, **our generator driven drive technology** minimizes energy capture and outperforms competitors at peak demands.
- Our **stall and the air power dynamic** design provides an easy, clean power in excess of the wind. Simplified and streamlined and active stall stability, keeping the blades and the blade chord like a carrot or apple corer.
- Our **efficient blades** are fabricated from wood and use a unique aerodynamic design optimized by our Northwind engineers specifically for the Northwind 100.

Your Solution

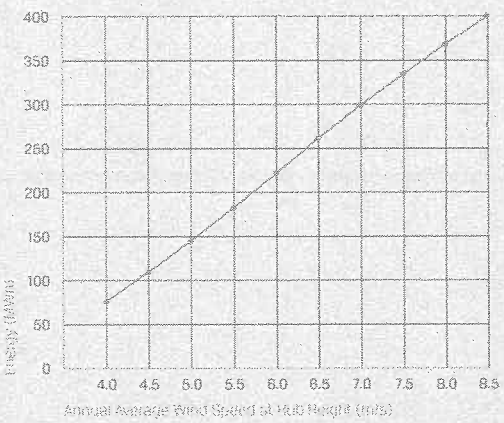
The Northwind 100 is the ideal choice for community applications that favor a low height profile, easy clearances, low noise and, just like everything

- **The Northwind 100 makes economic sense**. Even at modest speeds, the Northwind 100 can produce enough energy to be economically viable and savings in utility costs depending on your need. You can be sure that the Northwind 100 will provide long term benefits and more than pay for itself over time.
- **The right amount of power**. The Northwind 100 is a blend of many of the best features of the energy needs to drive communities, schools and small and rural sites.
- **Turn it on and go back to work**. The Northwind 100 is designed for ultimate reliability, so you don't have to be concerned about it take a break or shut down.
- **Ready for utility interconnect**. Both as a stand-alone and in conjunction with other sources, the Northwind 100 can easily connect to a utility grid.
- **Low height profile, sleek design**. Fitting on a standard 12 meter tower, the visually designed Northwind 100 is ready and extremely versatile.
- **Quiet operation**. Our quiet design, advanced blades and optimized fly engineered blades ensure that the Northwind 100 is the most quiet wind turbine in its class.

Public Schools • Small Businesses • Farms & Dairies • Municipal Buildings • Malls • Island Communities • Ski Resorts • Churches • Town Offices • Rural Utilities • Manufacturing Facilities • Remote Villages • Hospitals • Sports Facilities

Annual Energy Production*: 21-Meter Rotor

Standard Air Density, Rayleigh Wind Speed Distribution



Specifications

Model	Northwind 100
Design Class	IEC IIA (air density 1.225 kg/m³, average annual wind below 8.5 m/s, 50-yr peak gust below 59.5 m/s)
Design Life	20 years
Hub Height	37 m (121 ft)
Rotor Diameter	21 m (69 ft)
Rated Electrical Power	100 kW, 3 Phase, 480 VAC, 60 Hz
Cut-In Wind Speed	3.5 m/s (7.8 mph)
Gearbox Type	No gearbox (direct drive)
Generator Type	Permanent magnet, passively cooled
Apparent Noise Level	55 dBA at 40m (131 ft)

For more detailed information, see the Northwind 100 Specifications Sheet. All Specifications subject to change without notice.

Northern
POWER SYSTEMS

29 Pitman Road, Barre, VT 05641
1 877 90 NORTH +01 802 461 2955

WWW.NORTHERNPOWER.COM

Northern Power Systems has over 30 years of experience in developing advanced, innovative wind turbines. The company's next generation wind turbine technology is based on a vastly simplified architecture that utilizes a unique combination of permanent magnet generators and direct-drive design. This revolutionary new approach delivers higher energy capture, eliminates drive-train noise, and significantly reduces maintenance and downtime costs. Northern Power Systems is a fully integrated company that designs, manufactures, and sells wind turbines into the global marketplace from its headquarters in Vermont, USA.

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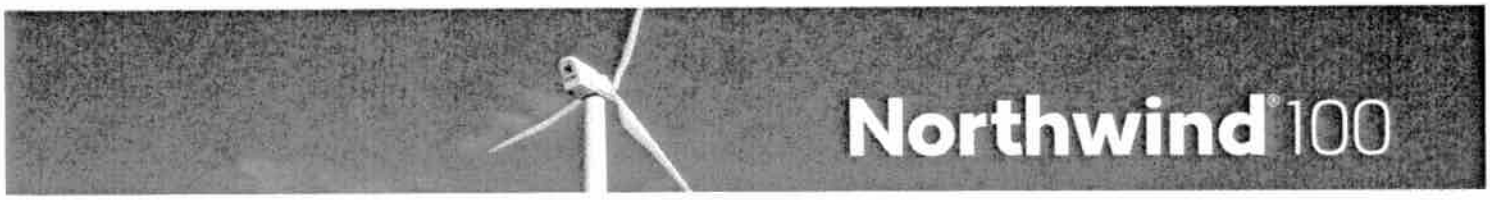
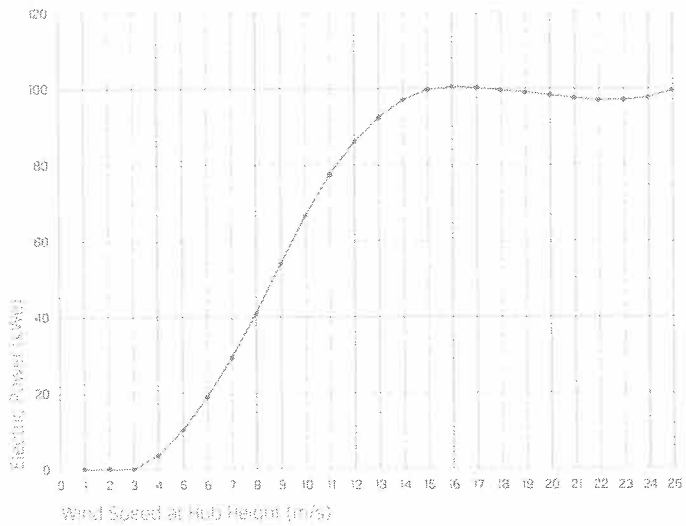
Printed in the USA with soy based inks on recycled paper containing post consumer fiber
Printed by Phoenix Press, proud owner of a Northwind 100 wind turbine.

NW-0409-01


Northwind®100

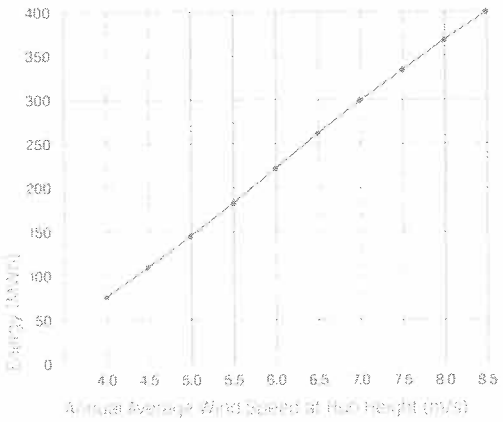
Power Curve: 21-Meter Rotor Standard Air Density (1.225 kg/m³)



Wind Speed (m/s)	Power (kWe)	Wind Speed (m/s)	Power (kWe)
1	0	14	97.3
2	0	15	100.0
3	0	16	100.8
4	3.7	17	100.6
5	10.5	18	99.8
6	19.0	19	99.4
7	29.4	20	98.6
8	41.0	21	97.8
9	54.3	22	97.3
10	66.8	23	97.3
11	77.7	24	98.0
12	86.4	25	99.7
13	92.8		

1 m/s = 2.24 mph

Annual Energy Production*: 21-Meter Rotor Standard Air Density, Rayleigh Wind Speed Distribution



Average Annual Wind Speed (mph)	Average Annual Wind Speed (m/s)	Annual Energy Output (MWh/yr)
8.9	4.0	77
10	4.5	110
11	5.0	145
12	5.5	183
13	6.0	222
15	6.5	260
16	7.0	298
17	7.5	334
18	8.0	368
19	8.5	400

*Annual energy production estimates assume standard conditions, 100% availability and no losses

Northern POWER SYSTEMS

Specifications

GENERAL CONFIGURATION	DESCRIPTION
Model	Northwind 100
Design Class	IEC IIA (air density 1.225 kg/m³, average annual wind below 8.5 m/s, 50-yr peak gust below 59.5 m/s)
Design Life	20 years
Hub Height	37 m (121 ft) / 30 m (98 ft)
Tower Type	Tubular steel monopole
Orientation	Upwind
Rotor Diameter	21 m (69 ft)
Power Regulation	Variable speed, stall control
Certifications	UL1741, UL1004-4, CSA C22.2 No.107.1-01, CSA C22.2 No. 100.04, and CE compliant

PERFORMANCE	DESCRIPTION (standard conditions: air density of 1.225 kg/m³, equivalent to 15°C (59°F) at sea level)
Rated Electrical Power	100 kW, 3 Phase, 480 VAC, 60/50 Hz
Rated Wind Speed	14.5 m/s (32.4 mph)
Maximum Rotation Speed	59 rpm
Cut-In Wind Speed	3.5 m/s (7.8 mph)
Cut-Out Wind Speed	25 m/s (56 mph)
Extreme Wind Speed	59.5 m/s (133 mph)

WEIGHT	DESCRIPTION
Rotor (21-meter)	1,400 kg (3,100 lbs)
Nacelle (standard)	5,800 kg (13,000 lbs)
Tower (37-meter)	13,800 kg (30,000 lbs)

DRIVE TRAIN	DESCRIPTION
Gearbox Type	No gearbox (direct drive)
Generator Type	Permanent magnet, passively cooled

BRAKING SYSTEM	DESCRIPTION
Service Brake Type	Two motor-controlled calipers
Normal Shutdown Brake	Generator dynamic brake and two motor-controlled calipers
Emergency Shutdown Brake	Generator dynamic brake and two spring-applied calipers

YAW SYSTEM	DESCRIPTION
Controls	Active, electromechanically driven with wind direction/speed sensors and automatic cable unwind

CONTROL/ELECTRICAL SYSTEM	DESCRIPTION
Controller Type	DSP-based multiprocessor embedded platform
Converter Type	Pulse-width modulated IGBT frequency converter
Monitoring System	SmartView remote monitoring system, ModBus TCP over ethernet
Power Factor	Set point adjustable between 0.9 lagging and 0.9 leading
Reactive Power	+/- 45 kVAR

NOISE	DESCRIPTION
Apparent Noise Level	Less than 55 dBA at the base of the tower

ENVIRONMENTAL SPECIFICATIONS	DESCRIPTION
Temperature Range: Operational	-20°C to 50°C (-4°F to 122°F)
Temperature Range: Storage	-40°C to 55°C (-40°F to 131°F)
IP Class: Generator/Nacelle	IP55/IP54
Lightning Protection	Receptors in blades; nacelle lightning rod and electrical surge protection
Icing Protection	Turbine designed in accordance with Germanischer Lloyd Wind Guidelines Edition 2003

All Specifications subject to change without notice.

SS-050301-01

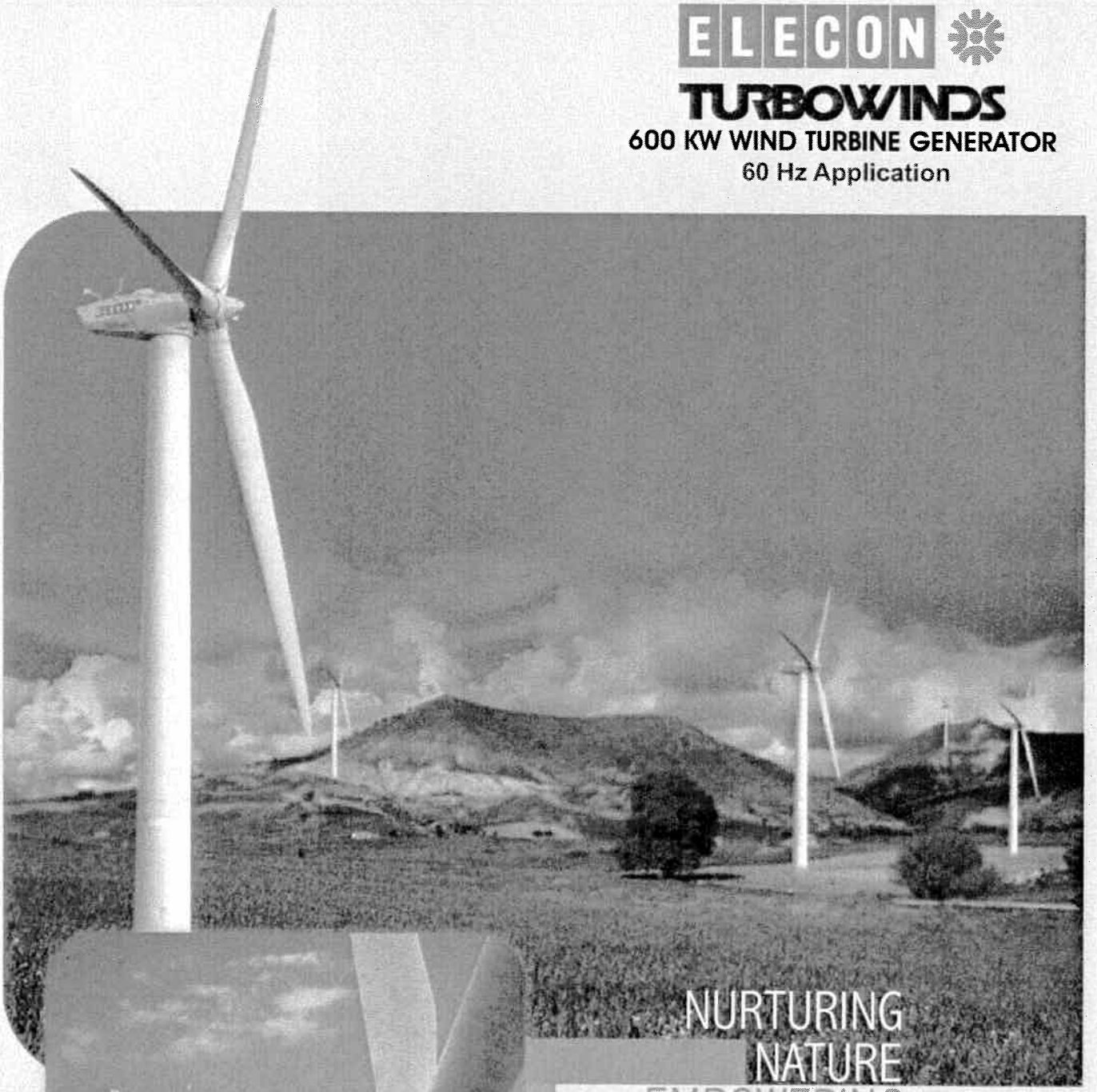
Northwind is a registered trademark of Northern Power Systems.

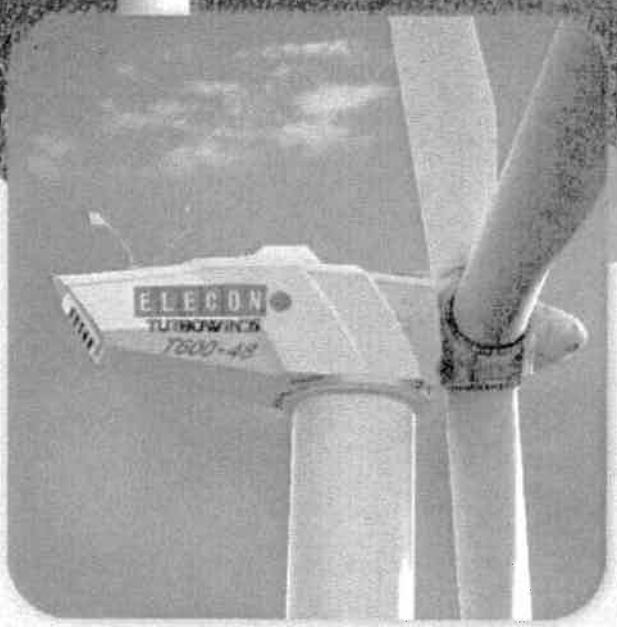
ELECON

TURBOWINDS

600 KW WIND TURBINE GENERATOR

60 Hz Application





NURTURING
NATURE
EMPOWERING
FUTURE

Catalogue No.: 186/AE/03/09/INT

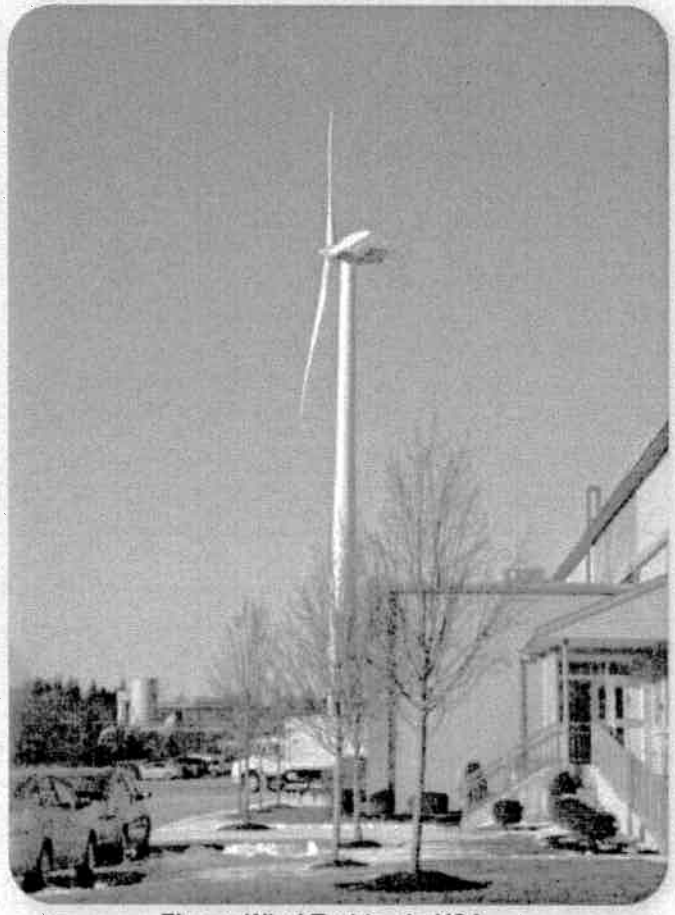
ELECON TURBOWINDS

INTRODUCTION

Elecon Engineering Company Ltd., a publically traded company, has been a pioneer in the design and manufacturing of Material Handling and Power Transmission (Gearbox) Equipment since 1951. Over a decade ago, Elecon successfully diversified into the quality manufacturing of Wind Turbine Generators.

Elecon Alternate Energy Division Offices

Elecon-Turbowinds T600-48DS

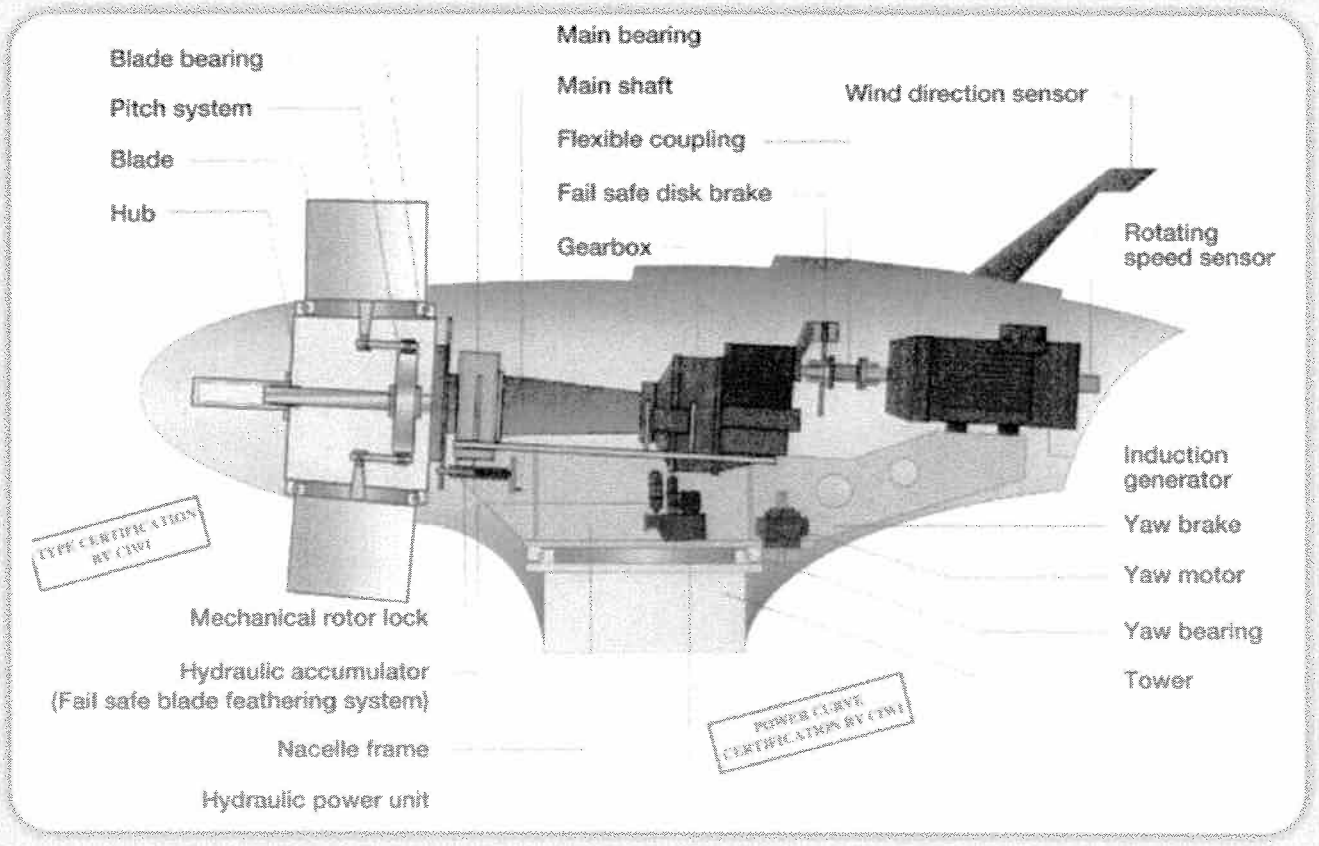


Elecon Wind Turbine in USA

Elecon, a MNRE/C-WET approved manufacturer, now offers dual speed and active stall hydraulically pitch controlled Wind Turbine Generators of 600 kw rating, manufactured under the technical collaboration of M/s TURBOWINDS n.v. Belgium.

Elecon's Alternate Energy Division is currently focusing on the manufacturing of a dual speed 600 kw Wind Turbine Generator, T600-48DS. The hydraulically controlled active stall T600 is manufactured with the technical collaboration of Turbowinds N.V. Belgium.

For nearly two decades, Turbowinds has designed and manufactured high output wind turbines for installations around the world. This experience has allowed Turbowinds to positively contribute to the reduction of Co_2 emissions and environmental preservation worldwide.



T600 - 48DS FEATURES:

- The Elecon - Turbowinds T600-48DS has been optimized for Class II and lower wind conditions as well as a wide range of climatic environments.
- The T600-48DS is provided with dual speed generator, allowing the wind turbine to effectively produce higher energy output even in low wind conditions.
- A heavy duty 3-stage Elecon gearbox, specifically designed and manufactured for the T600, contributes to the high level of operational dependability.
- The blades supplied with the T600-48DS are manufactured by the world's foremost supplier of wind turbine blades and have been robustly designed for both reliability and superior aerodynamic characteristics.
- The T600 Active Pitch Controls are hydraulically operated to harness optimum wind at all times.
- A unique safety feature of the T600 is the failsafe blade feathering in the event of grid loss or elevated wind conditions to prevent damage to the drive train.
- The T600 also features independent over-speed trips, which activate a disc braking safety system to prevent damage to the turbine.

TECHNICAL SPECIFICATION

Turbine type : **T600-48 Dual speed**

General :

Rated power	600 kw
Rotor diameter	48m
Hub height	50m/55m/60m

Rotor :

Number of blades	3
Rotor speed	15 / 23 pm
Blade construction	FRP
Aerofoil	DU97-W-300, DU91-W2-250 FFA-W3-211, NACA63418
Control	Active stall
Pitch actuation	Hydraulic
Hub type	Rigid
Cone angle	-2 Degree
Tilt angle	-4 Degree

Transmission : (Gearbox)

Type	1-stage planetary 2-stage parallel
Rating -	600 kw
Gear Ratio	1:78.26

Brake :

Type	Fail-Safe disk brake
Position	High speed shaft

Generator :

Type	Dual speed Induction generator
Rating	120 kw/600 kw
Rotation speed	1200 / 1800 rpm
Voltage/Frequency	690 Volt/60Hz*

Nacelle :

Frame	Welded high strength steel structure
Housing	FRP

Tower :

Material	Welded steel
Type	Tapered cylinder
	Paint / Hot Dip Galvanized

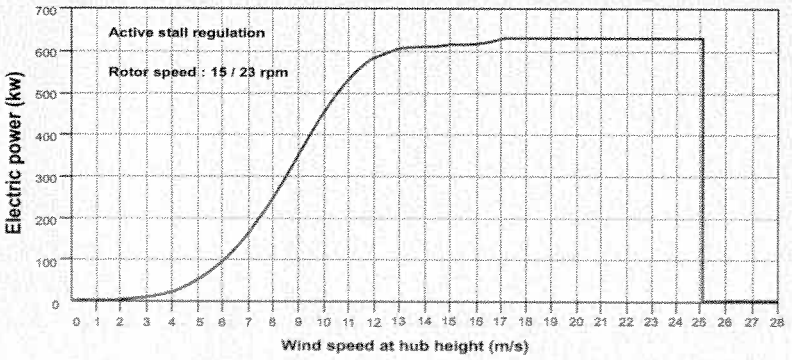
Performance :

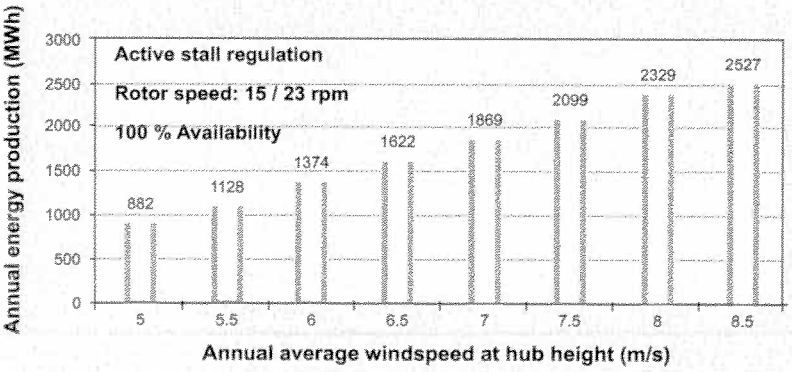
Rated power	600 kw
Rated wind speed	12.5 m/s
Cut in	3.5 m/s
Cut out	25 m/s
Survival	60 m/s

Weights :

Nacelle including rotor	35,000 Kgs
Rotor (Hub & 3 Blades)	14,500 kgs
Tower (50 Mt)	56,000 Kgs
Tower (55 Mt)	65,000 Kgs
Tower (60 Mt)	68,000 Kgs

* T600 Options available include cold weather package and 50 Hz compatibility

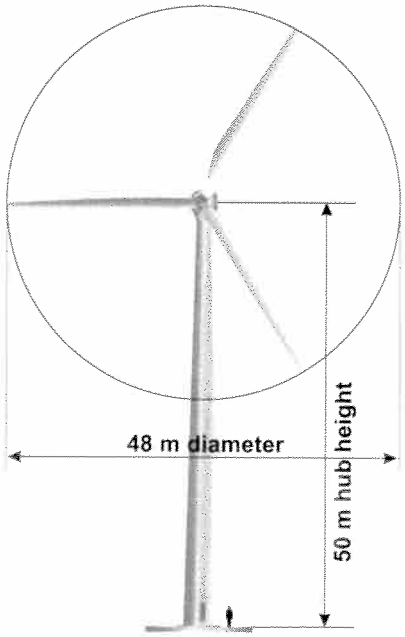




* Estimate based on Weibull Distribution

ELECON TURBOWINDS

T600-48

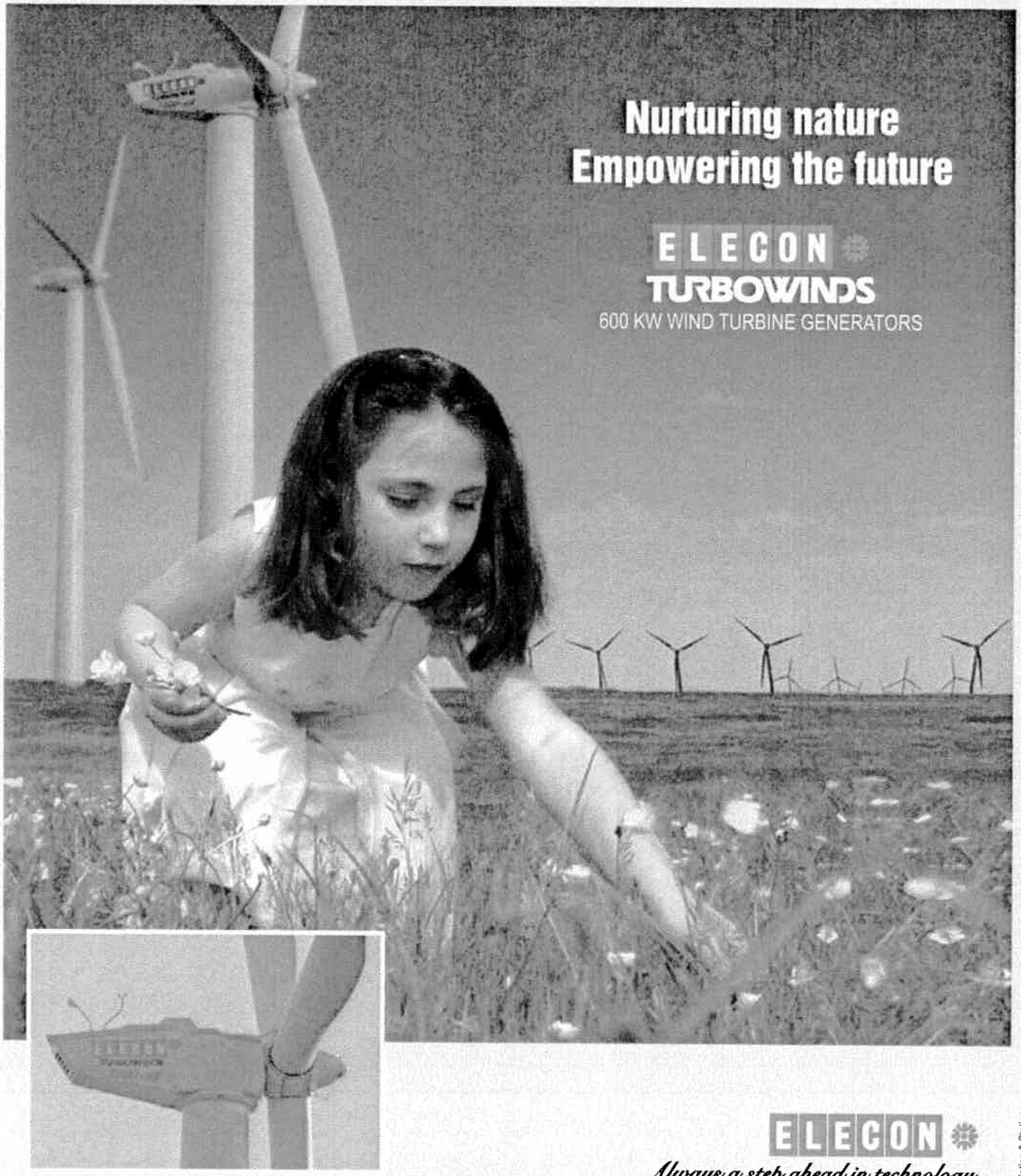


ELECON Wind Turbine GEAR BOX

The T600 Gearbox is
a combination of Planetary
and Helical with
shaft mount and torque arm
support.

Wind Turbine Gearboxes
up to 2MW can be manufactured in
Elecon Facilities

For further details contact :
GEAR DIVN. : Tel. : +91 (2692) 236469,236513,236516,
Fax : +91 (2692) 236527
Email : infogear@gear.elecon.com



ELECON

Always a step ahead in technology

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GE Power & Water
Renewable Energy

1.5 MW
Wind Turbine Series

imagination at work

a product of
ecomagination

1996
First 1.5 MW installed ... still operating today

2002
GE enters wind industry

2003
LVRT introduced; 1,000th unit shipped

2004
First 1.5-77 installed; First GE designed 37 meter blade

2005
First 1.5-82.5 installed; GE introduces HALT testing

CONTINUAL 1.5 MW

GE's 1.5 MW Wind Turbine Series

Changing and growing energy needs are driving new opportunities for a more reliable, affordable and efficient supply of electric power with zero greenhouse gas emissions. That is why GE continues to drive investments in cutting-edge wind turbine technology. GE's strategy is built around differentiating ourselves with leading technology in production, efficiency and reliability. Trusting in our deep, rich heritage in power generation, GE pulls in expertise from our core business to drive product strategy, product leadership and product value. Every initiative we pursue bears our uncompromising commitment to quality and product innovation.

Building on a strong power generation heritage spanning more than a century, our 1.5 MW wind turbine series—known as the industry workhorse—delivers proven performance and reliability, creating more value for our customers. Our reputation for excellence can be seen in everything we do. GE's commitment to customer value and technology evolution is demonstrated in our ongoing investment in product development. Since entering the wind business in 2002, GE has invested more than $1 billion in driving reliable and efficient renewable energy technology.

2006
GE designed pitch system introduced; 5,000th unit shipped

2007
First GE designed 40 meter blade; GE launches Mark* VIe controller for wind

2008
10,000th unit shipped

2009
First 1.6-82.5 uprate in TC II

2010
1.6-82.5 100 meter tower for TC I; 13,000+ units shipped

2011
On schedule for 15,000th unit shipped

SERIES INVESTMENT

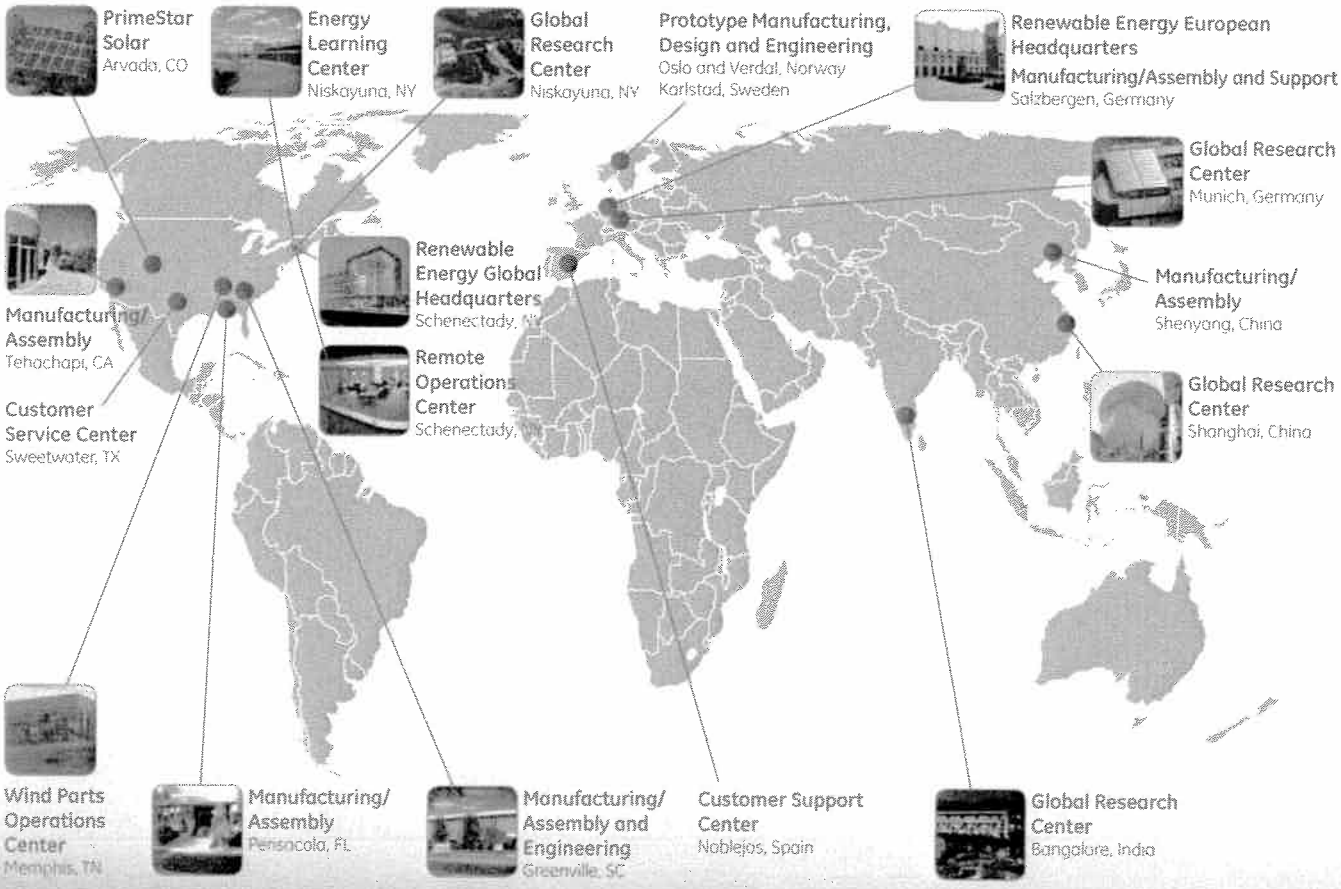
The Industry Workhorse

- Continual investment ...
  focused on increasing customer value
- Product evolution...
  world's best running fleet
- Provide portfolio flexibility ...
  value where you need it

Global Footprint

GE Energy is one of the world's leading suppliers of power generation and energy delivery technologies—providing comprehensive solutions for coal, oil, natural gas and nuclear energy; renewable resources such as wind, solar and biogas, and other alternative fuels. As a part of GE Energy—which includes the Power & Water, Oil & Gas, and Energy Services businesses—we have the worldwide resources and experience to help customers meet their needs for cleaner, more reliable and efficient energy.

GE has 11 global locations specifically devoted to wind technology. Our facilities are registered to ISO 9001:2000 and our Quality Management System, which incorporates our rigorous Six Sigma methodologies, provides our customers with quality assurance backed by the strength of GE. We believe wind power will be an integral part of the world energy mix throughout the 21st century and we are committed to helping our customers design and implement energy solutions for their unique energy needs.



Advancing Wind Capture Performance

As a leading global provider of energy products and services, GE continues to invest in advancing its 1.5 MW wind turbine series with a core focus on enhancing efficiency, reliability and site flexibility. GE understands what customers value and responds with technology enhancements aimed at capturing maximum wind energy for greater return on investment.

Launched in 2004, the 1.5-77 model has earned the reputation for being the industry workhorse and delivers exceptional turbine performance and reliability. Relying on proven technology and experience, GE continues to differentiate its product leadership with evolutionary advancements in blade, drive train and controls technology.

With the use of advanced load controls the 1.5-77 can now be sited in IEC Class I wind regimes. GE advanced its original Class I wind turbine, the 1.5-70.5, with increased rotor length and controls technology resulting in a greater annual energy production. GE's 1.5-77 wind turbine is available in both 50 and 60 Hz for use in IEC Class I environments.

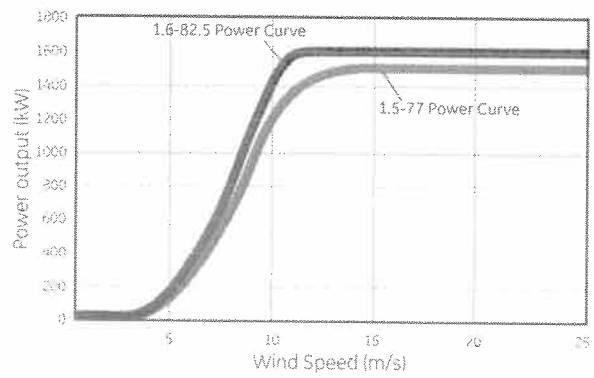
Advancing the Industry Workhorse

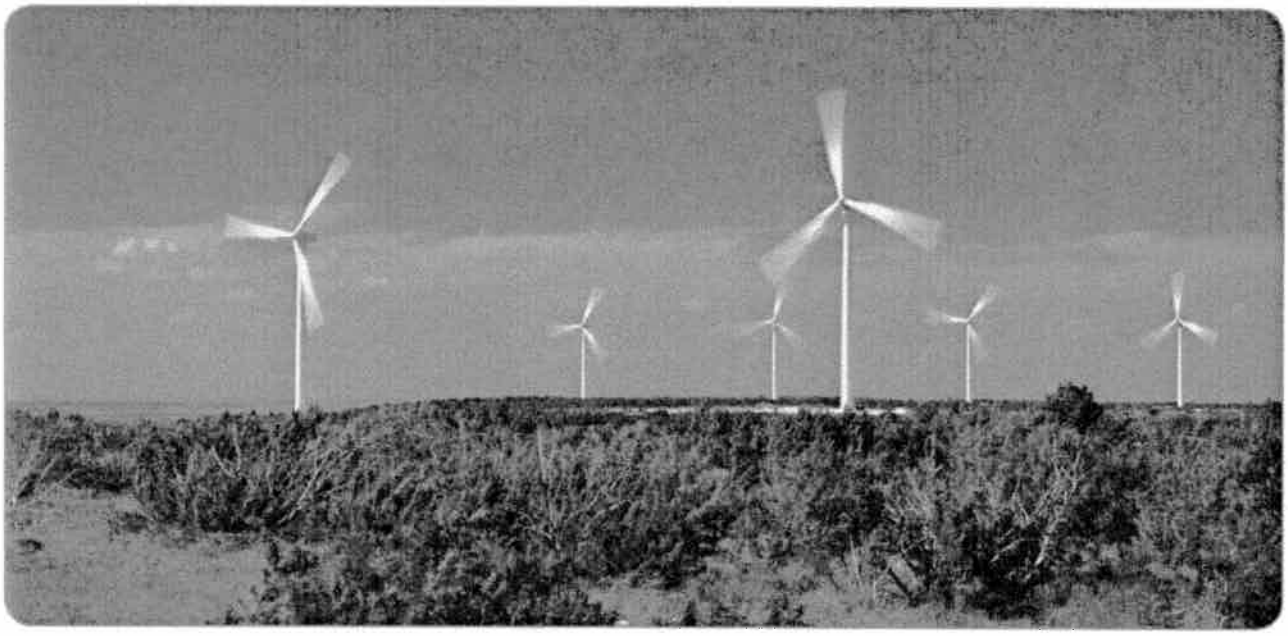
GE's 1.6-82.5 model was designed and built on the success of the 1.5-77, changing only what was required to increase customer value. The 1.6-82.5 model provides a 15% increase in swept area relative to the 1.5-77 and greater energy capture providing a strong return on investment. With the use of advanced load controls, the 1.6-82.5 can be sited in IEC Class II wind regimes.

Enhancements to GE's 1.6-82.5 wind turbine include an improved gearbox design and an upgraded pitch system. GE's 1.6-82.5 wind turbine utilizes GE Energy's proven Mark* VIe controller and advanced diagnostic capability to increase troubleshooting efficiency.

1.5 MW	2002	2009
Rotor Diameter (m)	70	82.5 (+12.5 m)
Capacity Factor (%)	39	52 (+13 pts)
Reliability (%)	85	98 (+13 pts)

Improving the 1.5-77... 1.6-82.5

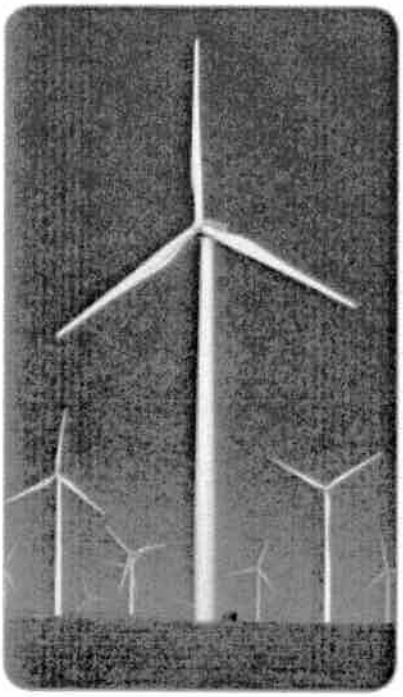




GE's 1.5 MW wind turbine series models are designed to maximize customer value by providing proven performance and reliability. Our commitment to customer satisfaction drives our continuous investment in the evolution of the 1.5 MW wind turbine series. The models described below provide flexibility for customer wind site conditions and optimization of wind turbine placement.

1.5 MW Wind Turbine Series Models

	1.6-82.5	1.5-77
Rotor Diameter (m)	82.5	77
Hub Heights (m)	80/100	65/80
Frequency (Hz)	50/60	50/60
Vavg (m/s)	8.5	10.0
Vref (m/s)	40.0	45.0
Ve50 (m/s)	56.0	70.0
Cut-In (m/s)	3.5	3.5
Cut-Out (m/s)	25	25
IEC Wind Class	IEC TC IIB	IEC TC IB



Improved Flexibility

Reinforced Tower

GE's investment in a reinforced tower design opens up new potential wind sites for our customers, enabling us to deliver reliable and safe products that meet product and regulatory compliance expectations. GE's reinforced tower sections have the same length and external diameter as the standard GE North American modular system, but are specially built to handle seismic loads.

- Allows wind farms to be located in designated seismic prone areas with good wind resources
- GE provides an evaluation to determine if the site requires reinforced tower due to seismic activity

Increased Reliability

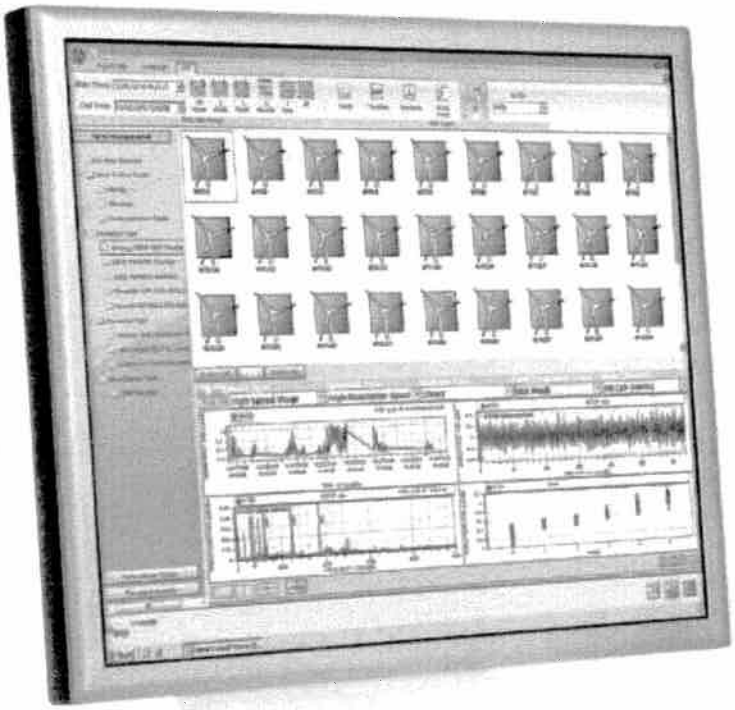
Condition Based Maintenance (CBM)

GE Energy's integrated Condition Based Maintenance (CBM) offering proactively detects potential drive train issues, enabling increased performance and decreased maintenance expenses. Factory or field installed and tested, the CBM solution can improve reliability on a single wind farm or multiple wind farms. GE's CBM allows operators to understand an issue weeks in advance.

The CBM offering could allow wind farm operators to:

- Continue to produce power while parts, crane, and labor are resourced
- Plan multiple maintenance events with the same resources
- Reduce or limit the extent of damage to the drive train and reduce repair costs

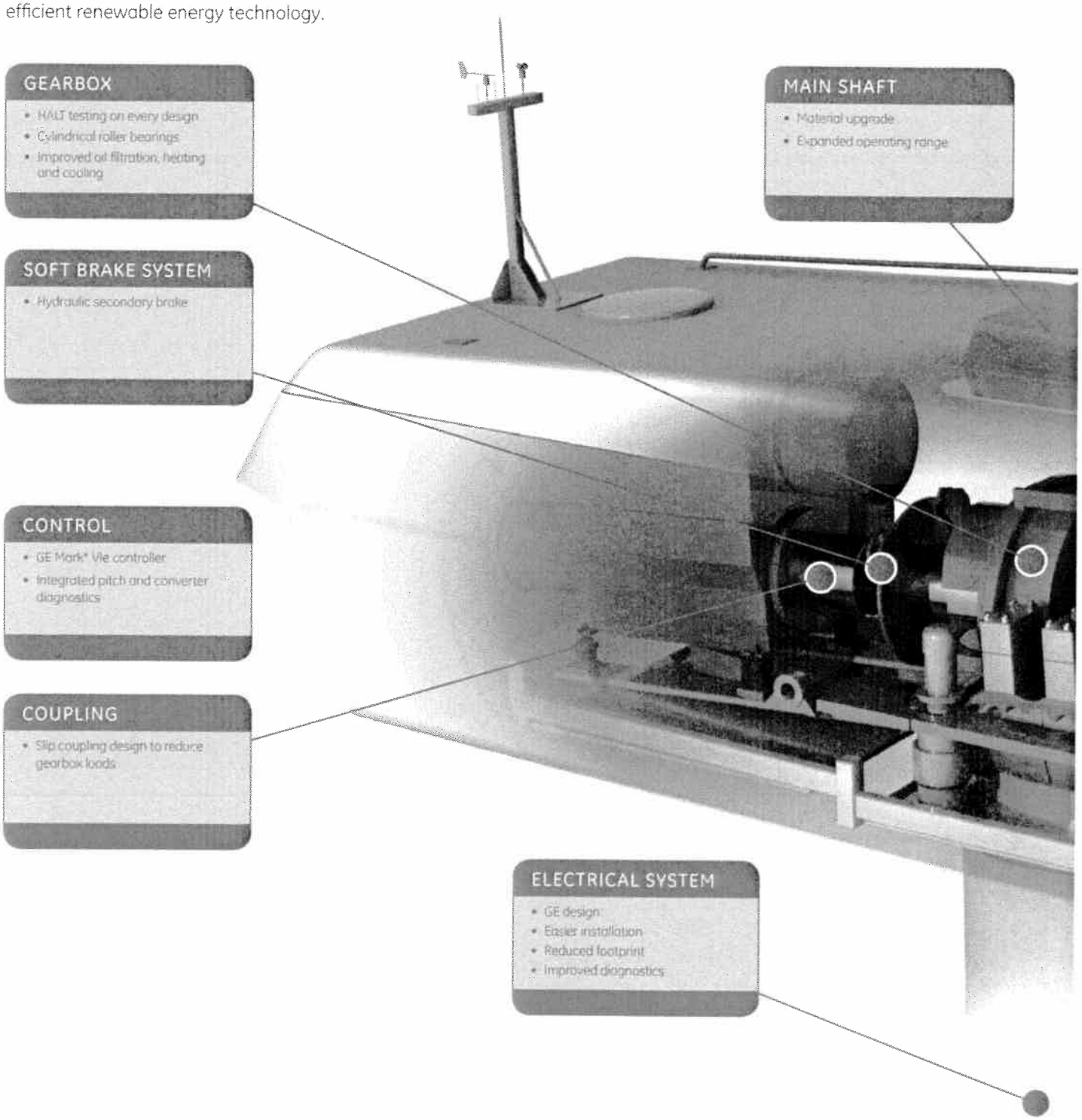
Coupling our design expertise and Mark* VIe control technology, based on GE Bently world leading vibration monitoring technology, enables all these system offerings.



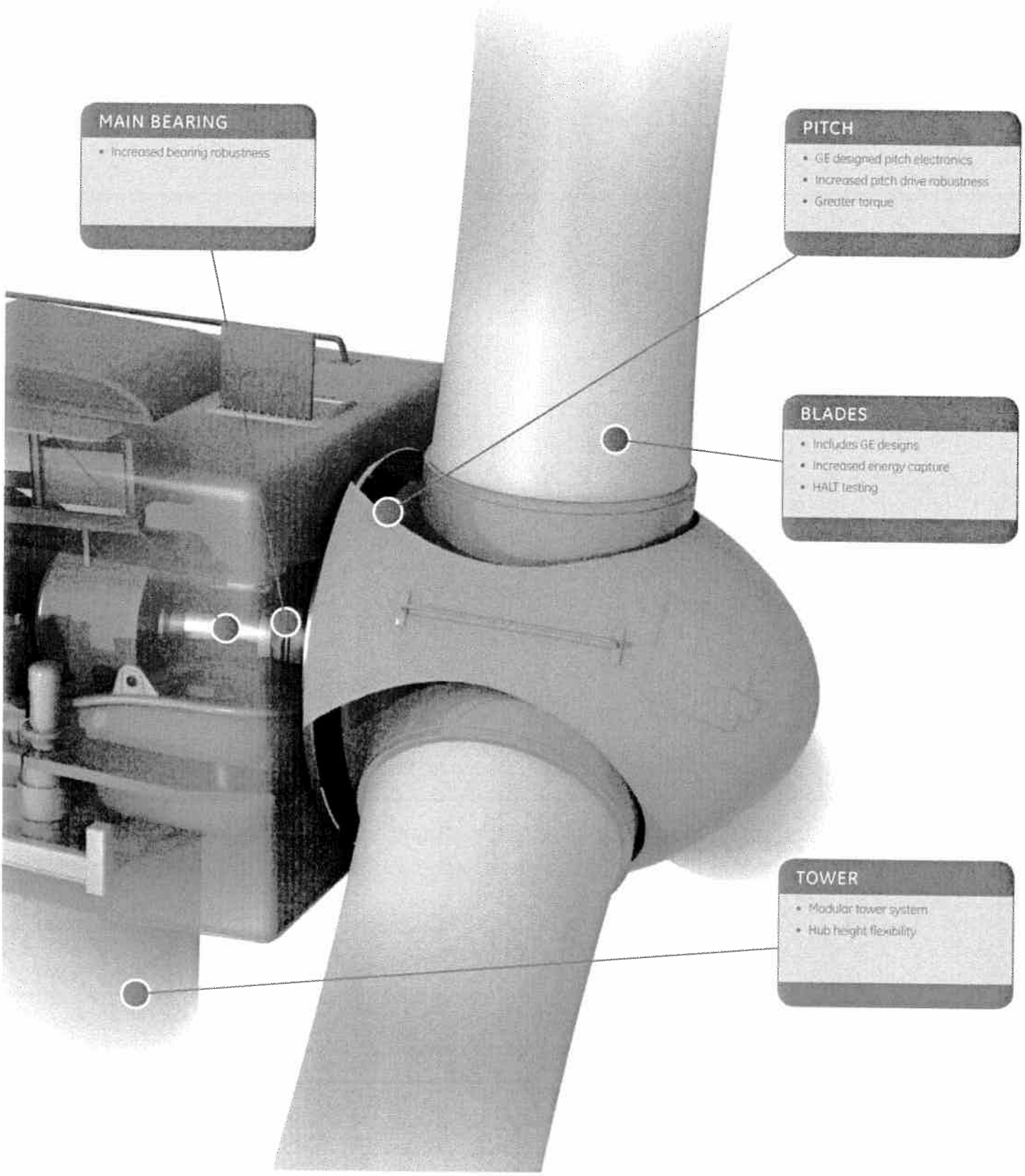
Inside the Industry Workhorse

With technology centers of excellence in the United States, Europe, India and China, our teams of engineers and scientists use Six Sigma methodology, coupled with the latest computational modeling and power electronic analysis tools to manufacture wind turbines with the reliability, efficiency and maintainability necessary to meet the challenges our customers face in today's energy environment.

GE's commitment to customer value and technology evolution is demonstrated by our ongoing investment in product development. Since entering the wind business in 2002, GE has invested more than $1 billion in driving reliable and efficient renewable energy technology.



To optimize turbine reliability and availability, GE focuses on reducing the number of downtime faults, and providing faster Return-to-Service (RTS). Our rigorous design and testing process—including specialized 20-year fatigue testing and Highly Accelerated Life Testing (HALT)—reflects our ongoing investment in key turbine components.

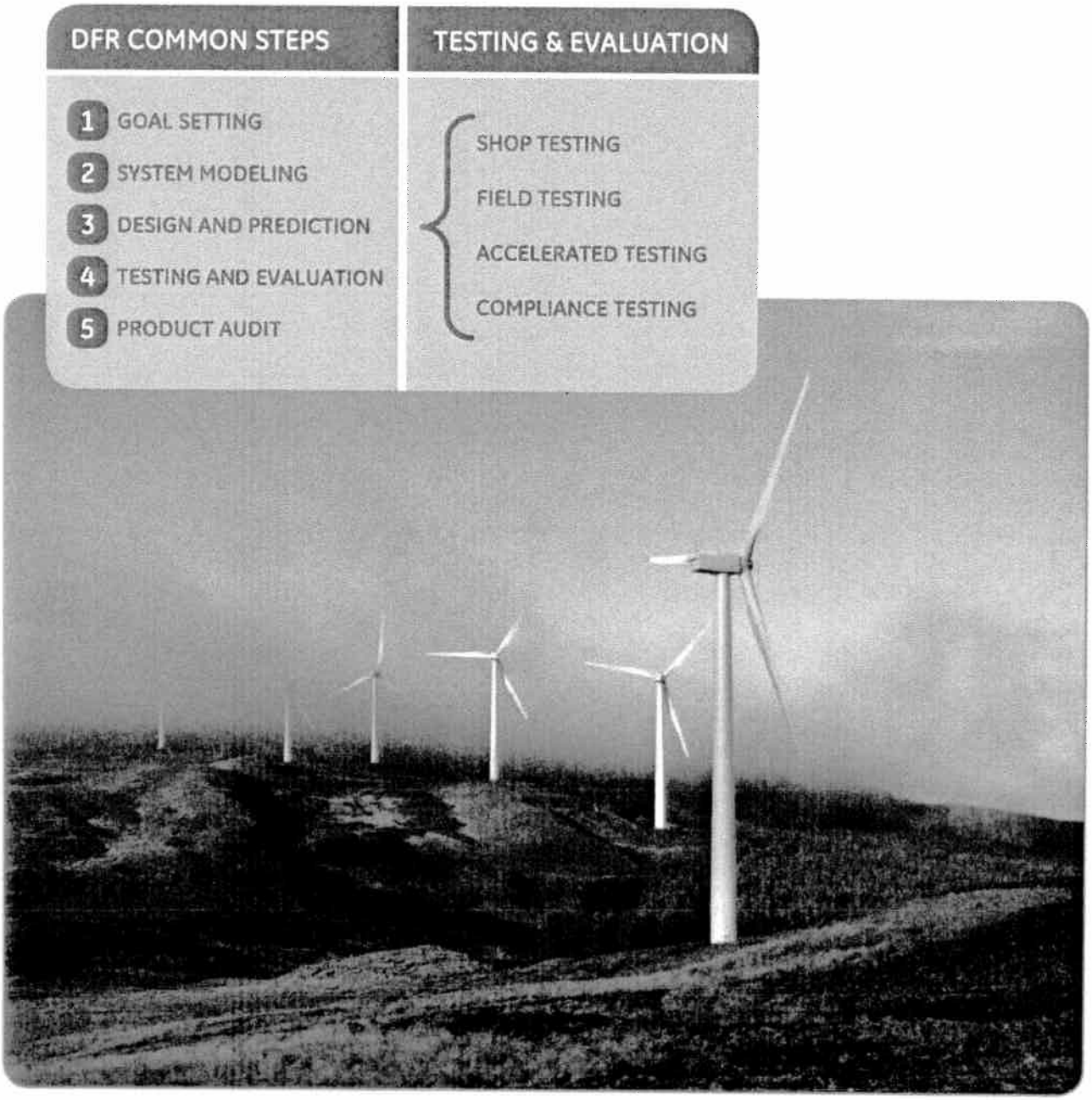


Reliability by Design

The 1.5 MW wind turbine is designed according to our Design for Reliability (DFR) methodology. DFR starts with the definition of reliability goals and the environmental conditions in which the wind turbine components must operate. The reliability targets are applied to component level models that are developed to predict reliability.

A key step in the DFR process is validating design assumptions on both component levels and system levels. GE conducts extensive product validation, including climate chamber testing, compliance testing and Highly Accelerated Life Testing (HALT). In the test, components are subjected to loads of the entire design life in a very short time frame.

The last step of the DFR methodology is production auditing. While validation is focused on ensuring that the design is free of flaws, the production audit is focused on ensuring that each unit is delivered with consistent quality by understanding the impact of manufacturing variability.



Combined Strength

GE's 1.5 MW wind turbine series utilizes expertise from many areas of GE as well as from our four global research centers. The result of this combined strength is a reliable and efficient product line that is based on proven technology.

GE Energy

GE Energy Financial Services

GE Oil & Gas

GE Transportation

GE Aviation

GE Global Research Centers

$1 Billion and Growing Renewable Energy Technology Investment

Blade Innovation

- Aero elastic sweep – bend twist
- Advanced materials-carbon

Power Conversion

- Increased power density and reliability with higher voltage
- Control for integration with weak grids

Drive Train

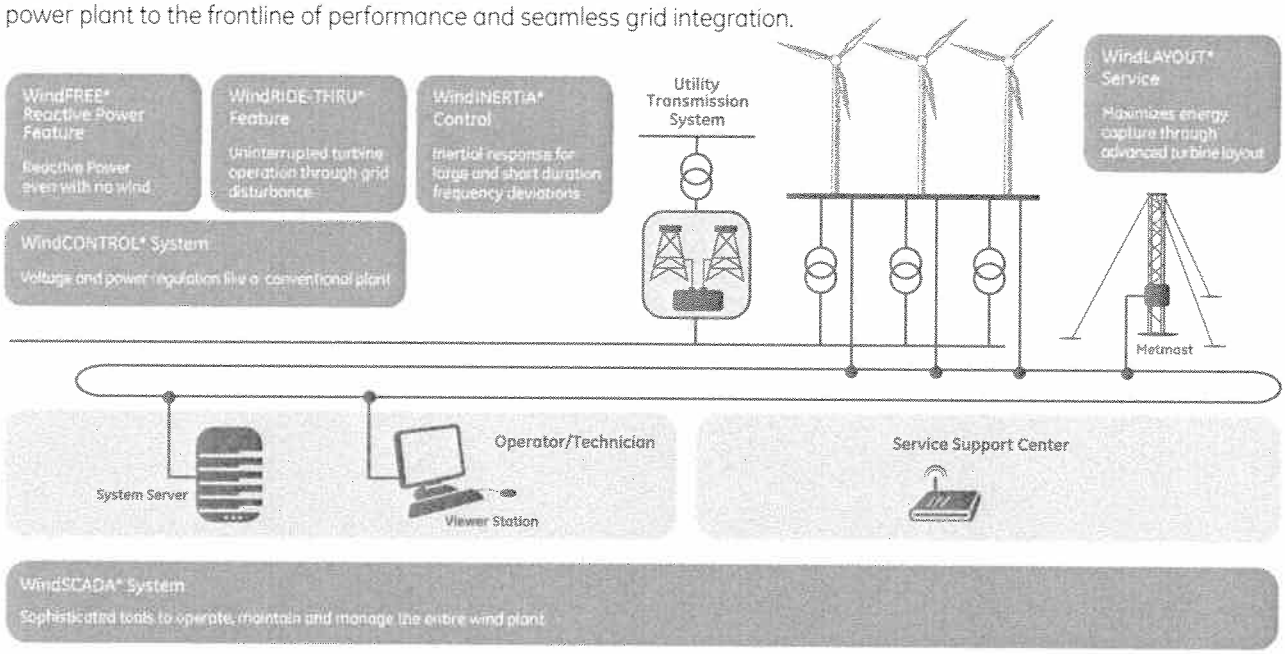
- Direct drive ... 50% greater output at the same weight
- Compact drive ... 25% less weight

Solar

- Thin film technology leadership through PrimeStar
- Differentiated utility-scale Brilliance* inverter

Optimized Wind Power Plant Performance

Wind turbine performance is a critical issue in light of increasingly stringent grid requirements. Our unrivaled experience in power generation makes us the industry leader in grid connection. By providing a sophisticated set of grid-friendly offerings similar to conventional power plants, GE's patented integrated suite of controls and electronics take your wind power plant to the frontline of performance and seamless grid integration.



Feature	Description	Benefits
WindCONTROL* System	Voltage and power regulation like a conventional power plant	Ability to supply and regulate reactive and active power to the grid Additional features include power frequency droop, power ramp rate limiters and integrated capacitor/reactor bank control
WindFREE* Reactive Power Feature	Provides reactive power even with no wind	Provides smooth fast voltage regulation by delivering controlled reactive power through all operating conditions Eliminates the need for grid reinforcements specifically designed for no-wind conditions
WindRIDE-THRU* Feature	Low voltage, zero voltage and high voltage ride-through of grid disturbances	Uninterrupted turbine operation through grid disturbances Meets present and emerging transmission reliability standards
WindINERTIA* Control	Provides temporary boost in power for under-frequency grid events	Provides inertial response capability to wind turbines that is similar to conventional synchronous generators without additional hardware
WindLAYOUT* Service	Service to optimize turbine layout for a site	Opportunity to increase annual energy production for a site
WindSCADA System	Tools to operate, maintain and manage wind power plant	Real-time data visualization, reporting on historical data, alarm management and secure user access

Flexible Wind Service Solutions

Global Resources, Local Support ...

GE's wind turbine fleet is one of the fastest growing and best-run fleets in the world. GE provides state-of-the-art solutions built from our extensive global resources, expertise, and regional capability, helping to ensure that your wind turbine assets are operating at peak performance.

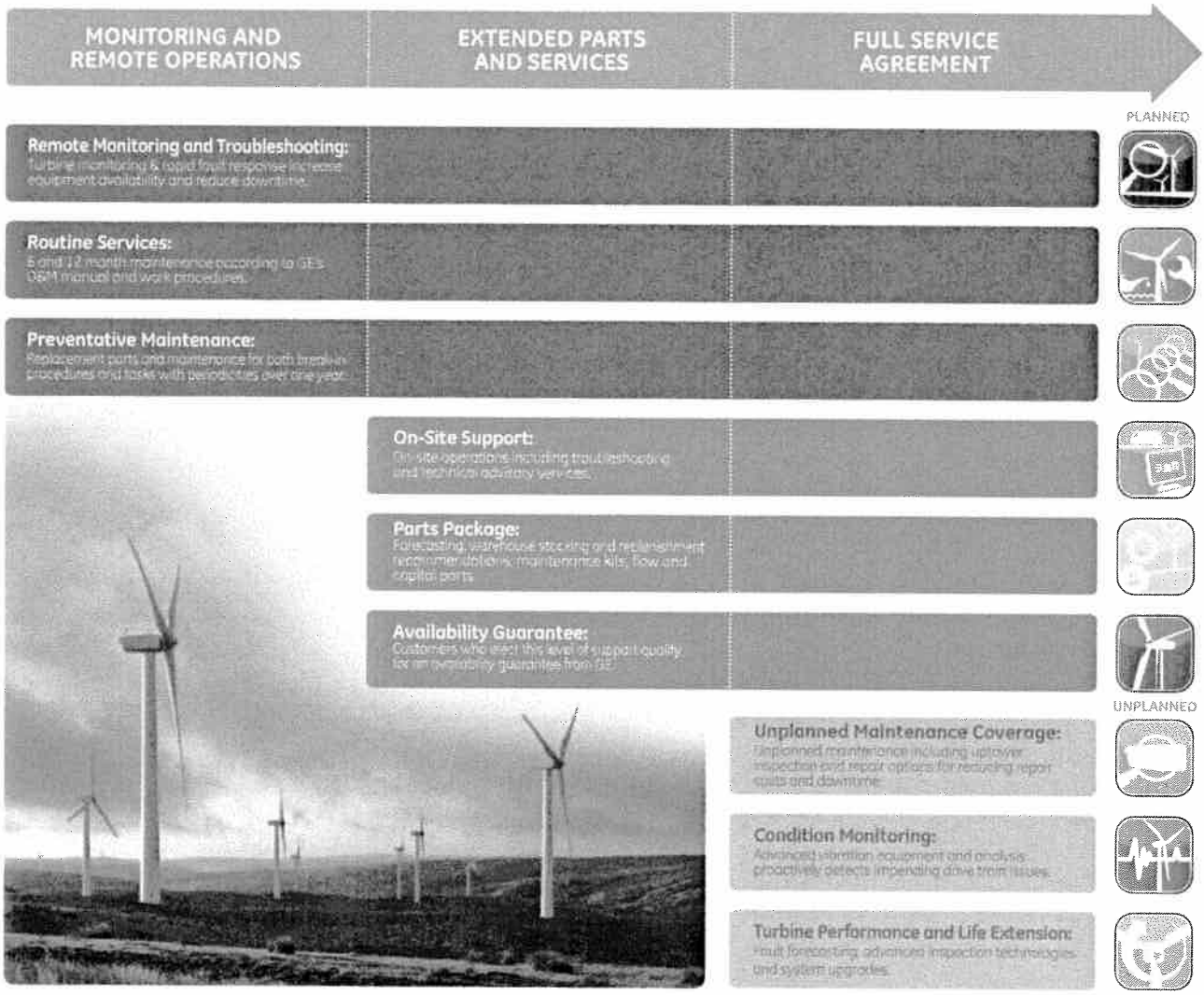
24/7 Remote Monitoring and Troubleshooting:
GE's customer support and remote operations centers in Schenectady, New York, and Salzbergen, Germany provide continuous monitoring and diagnostics services 24 hours a day, 365 days a year. These centers offer capabilities developed using our in-depth product knowledge, service engineering expertise and years of successful fleet operation, helping us to respond quickly and accurately to your needs.

Dedicated Regional Support:
GE-trained regional technicians are available to ensure a timely resolution—whenever and wherever you need us. GE's technicians are equipped to perform procedures such as fault inspections and technical advisory services and manual resets in a timely and efficient manner. If an issue is detected, you can rely on our top-of-the-line repair and replacement capabilities and our highly skilled team to fix the issue immediately.

Wind Parts Center of Excellence:
Availability of parts is critical to wind power plant operations. GE's Wind Parts Center of Excellence provides a full range of offerings for all parts and refurbishment needs from routine maintenance kits, wear and tear, and flow parts, to vital capital parts such as gearboxes and blades.

With the launch of our 24/7 parts call center (877-956-3778), and the development of online ordering tools, we are increasing the channels that our wind plant operators can utilize to order required wind turbine parts, including emergency requests for down-turbine needs.

GE's Wind Service Packages



Monitoring and Remote Operations (MRO):

This package brings GE's technical expertise to provide a defined scope of planned maintenance, including routine inspections, consumable parts replacement, and labor required in the replacement of wear and tear parts—as well as improved availability and reliability with remote operation services including 24/7 remote monitoring (with remote reset capability).

Extended Parts and Services Agreement (EPSA):

Adding coverage for manual resets, initial trouble shooting, competitive parts pricing and inventory management, and a limited availability guarantee together with performance analysis reports, the EPSA ensures the highest standards of operation for the project while offering customers competitive solutions to unplanned service events.

Full Service Agreement (FSA):

Maximize turbine operating performance and life by adding predictive Condition Monitoring services, unplanned maintenance with advanced services and uptower repairs, as well as options for turbine performance and life extension enhancement. Under this comprehensive package GE provides the customer with worry-free operation and maintenance with the highest level of performance.

Project Execution

GE understands that grid compatibility, site flexibility, and on-time delivery are critical to the economics of a wind project. That's why the 1.5 MW wind turbine series has been engineered for ease of integration and delivery to a wide range of locations, including those with challenging site conditions.

Our global project management and fulfillment expertise offer customers on-time delivery and schedule certainty. Regardless of where wind turbine components are delivered, GE's integrated logistics team retains ownership and responsibility for this critical step. Utilizing the GE Energy Power Answer Center, our engineering and supply chain teams are ready to respond to any technical, mechanical or electrical questions that may arise.

As one of the world's largest power plant system providers, GE is uniquely positioned to provide customers with full-service project management solutions. With offices in North America, Europe, and Asia, our world class Global Projects Organization utilizes decades of fulfillment expertise in project management, logistics, plant start-up and integration from Gas Turbine, Combined Cycle, Hydro, and Aero plants.

Here are some examples of how GE has worked with customers to solve project challenges and maximize their value through on-time delivery and advanced logistic capabilities:

Challenge:
Site with late grid availability due to project location change

GE's solution:
Pre-commissioning service: GE can utilize portable generators on site and pre-commission turbines even without back feed power

Customer benefit:
Faster commissioning once grid became available

Challenge:
Project site with difficult geographic access

GE's solution:
Well-choreographed team with challenging terrain transportation expertise

Customer benefit:
More site flexibility; schedule target met

Environmental Health and Safety, a GE commitment

Maintaining high Environmental Health and Safety (EHS) standards is more than simply a good business practice; it is a fundamental responsibility to our employees, customers, contractors, and the environment we all share.

GE is committed to maintaining a safe work environment. We incorporate these values into every product, service and process, driving EHS processes to the highest standards.

Powering the world...responsibly.

For more information please visit www.ge-energy.com/wind.

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GEA14954D (05/2010)

GE Energy

WORLDWIDE PARTNER

1.5 MW Wind Turbine Technical Specifications

1.5 MW Wind Turbine Technical Specifications

		TC3+			TC2		TCI
		1.5xle	**1.6xle**	**1.6sle**	**1.5sle**	**1.5xle**	**1.5se**
Rotor Diameter	m	82.5	82.5	77	77	82.5	70.5
Hub Heights	M	80/100	80/100	80	64.7, 80	80	64.7
Frequency	Hz	50/60	60	50/60	50/60	60	60
	Vavg; m/s	8.0	8.0	8.0	8.5	8.5	10.0
	Vref; m/s	37.1	40.0	39.1	39.1	40.0	50.0
	Ve50; m/s	52.5	56.0	55.0	55.0	56.0	70.0
	Cut-In; m/s	3.5	3.5	3.5	3.5	3.5	4.0
	Cut-Out; m/s	20	25	25	25	25	25
	IEC Wind Class	IEC TC III+	IEC TC III+	IEC TC III+	IEC TC IIA	IEC TC IIB	IEC TC Ib

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SOLECTRIA RENEWABLES

Smart-Grid/PV Inverters

SGI 225 SGI 250 SGI 266 SGI 300 SGI 500

a breakthrough for utility PV

Intertek

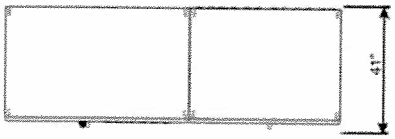
Best-in-class SGI 225, SGI 250, SGI 266, SGI 300 and SGI 500 inverters: exceptional quality and efficiency with advanced features

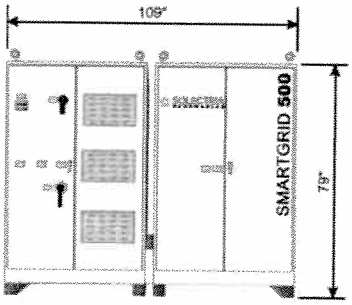
Product Information

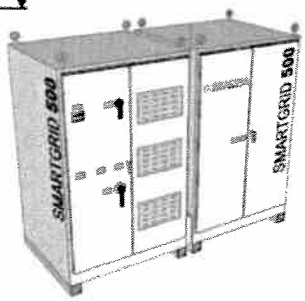
UTILITY SCALE PV INVERTERS

- SmartGrid features for utilities
- Fully integrated unit with transformer
- Low height, minimum array shade set back
- User navigable LCD display
- Preventative maintenance option
- Premium efficiency
- Smallest footprint
- Uptime guarantee option

The Solectria Renewables SGI 225, SGI 250, SGI 266, SGI 300 and SGI 500 are rugged, DSP-controlled, premium efficient PV inverters for grid-connected commercial and utility 3-phase PV and storage systems. With peak inverter power electronics efficiency over 98.5% (over 97% including the transformer and filters) and fully integrated packaging, these inverters set a new industry standard for efficiency, ease of installation and use, reliability and installed cost. Made in USA.







APPLICATIONS

- 225-500kWAC, 60Hz, 480VAC (600VAC option), 3-phase, grid-tied commercial PV systems (200-600kWDC STC array)
- Multiple inverters can be used together in any combination for 750kW, 1MW and multi-MW PV systems
- Conveniently designed for mounting in full sun, driving rain and drifting snow: rooftop/ground or indoors, low height

FEATURES & OPTIONS

- Fully-integrated design includes transformer, filters, integrated AC & DC disconnects
- Industry-leading overall efficiency including isolation transformer
- Simple set-up and connections (connect DC from PV combiners and 3-phase AC connections)
- Precision DSP-controlled Maximum Power Tracking Algorithm
- High-reliability design, based on 20 years of power electronics development, includes modular, sealed power and signal electronics unit and high-efficiency magnetics
- Fused DC sub-combiner (6-32 fuses, 70-400A)
- Optional SOLZONE sub-array current monitoring
- Optional integrated revenue-grade metering
- Optional positive grounded version

SMARTGRID FEATURES FOR ELECTRIC UTILITIES

- VAR support to minimize transmission losses
- Low-voltage ride-through capability
- Remote control and command

CONNECTIVITY

- RS485, MODBUS RTU standard for communication with SCADA system
- User-navigable LCD display
- SolrenView Inverter-Direct data monitoring option; compatible with other web-monitoring services

SAFETY FEATURES

- Electronic temperature protection
- DC ground-fault detection and interrupt
- Current limit protections
- Specifications: UL-1741, IEEE-1547, CSA 22.2 #107.1, IEEE62.45, FCC-15 Part A

Specifications	SGI 225	SGI 250	SGI 266	SGI 300	SGI 500
Output					
Continuous AC Power	225 kW	250 kW	266 kW	300 kW	500 kW
CEC Eligible AC Power (480VAC)	225 kW	250 kW	266 kW	300 kW	500 kW
Power Factor	> 0.99				
Voltage (L-L), ±10%	480 VAC, 3-Ph (600VAC option)				
Rated Current (480VAC)	271A	301A	320A	360A	600A
Rated Current (600VAC)	217A	241A	256A	288A	480A
Current Distortion	< 3% THD, Nom power				
Frequency	60 Hz				
CEC Efficiency (estimated)	97.0%				
Overall Peak Efficiency [1]	97.4%				
Input					
Array Configuration:	Monopole, negative grounded (pos ground opt)				
Max V_{OC}	625 VDC				
Maximum DC Current	780A	864A	918A	1,036A	1,727A
CEC Eligible DC Current	780A	864A	918A	1,036A	1,727A
MPT Voltage Range	300-500 VDC (285VDC option)				
CEC Full Power Voltage Range	300-480 VDC				
Protection [2]					
AC Grid-connection (Standards Compliance: See "Safety Features")	Over/Under Voltage, Over Current Over/Under Freq., DC Ground Fault (GFDI)				
AC Circuit Breaker (Integral)	NEMA 3R				
DC Sub-Combiner w/Fuses	70A-400A fuses available, 6-32 pole, NEMA 3R, TVSS				
DC Circuit Breaker (Integral)	Break load rated, NEMA 3R				
Environmental					
Ambient Temperature	-40 to 50 deg C (full power)				
Storage Temperature	-40 to 70 deg C				
Cooling	Automatic Forced Convection				
Enclosure	Rain Proof (UL1741)				
Electronics Enclosures	Sealed (IP62)				
General					
Weight lb [kg] (add 150 lb pallet)	5170 [2350]	5170 [2350]	5170 [2350]	5650 [2568]	6980 [3173]
Dimensions: inch [mm] (Height w/o lifting eyes)	79[2007] H x 109[2769] W x 41[1041] D				
Communications, Optional Data Acquisition	RS485 Modbus RTU, Ethernet, SolrenView web-based monitoring & rev. grade metering				
Warranty	5 years. Optional extensions to 10, 15, 20yr, Preventative Maintenance and Uptime Guarantee				

[1] Fully Integrated Package: Includes premium efficient transformer, filters, high-efficiency smart brushless blower, AC & DC disconnects.
[2] Complies with grid connection and safety standards ("Safety Features")

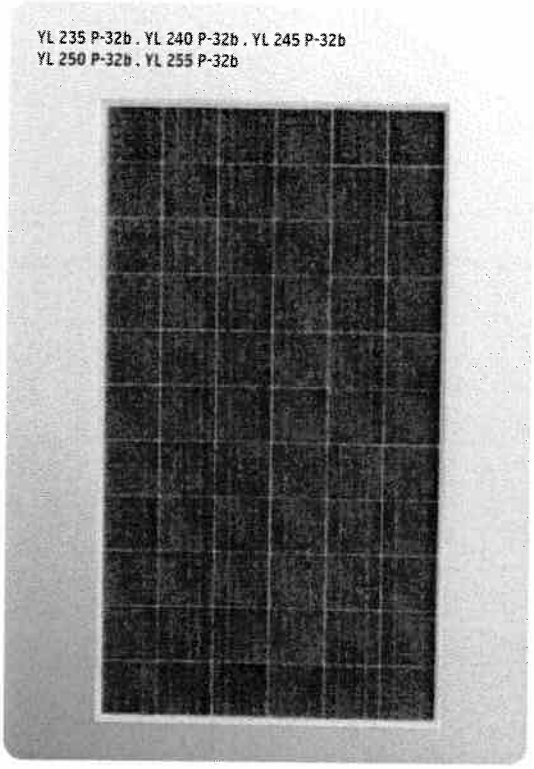
360 Merrimack Street, Building 9, Lawrence MA 01843 USA Tel 978.683.9700 Fax 978.683.9702 inverters@solren.com www.solren.com

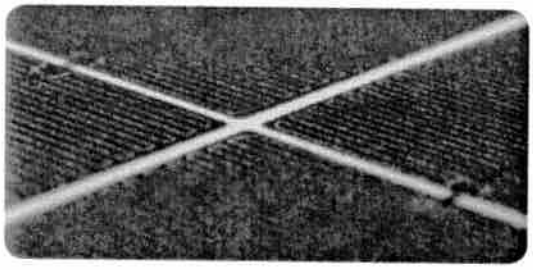
All information subject to change without notice

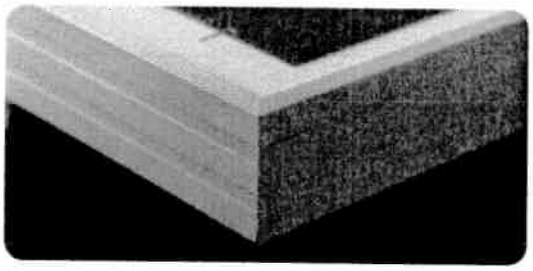
SOLECTRIA RENEWABLES

YINGLI SOLAR
Power Your Life

YL 255 P-32b / 1810x990 SERIES







* In compliance with our Warranty Terms and Conditions

ABOUT YINGLI SOLAR

Yingli Solar is a vertically integrated manufacturer of solar photovoltaic modules. Under one roof we manufacture our ingots, wafers, cells and modules. This ensures that we can tightly control our material and production quality, offering our customers leading product durability and sustainable performance backed by our 25 year limited power warranty*.

PERFORMANCE

>> High efficiency, polycrystalline solar cells with high transmission and textured glass delivering a module series efficiency of up to 14.2%, minimising installation costs and maximising the kWh output of your system per unit area.

>> Power tolerance of +/-3% minimising PV system mismatch losses.

QUALITY & RELIABILITY

>> Robust, corrosion resistant aluminium frame independently tested to withstand wind loads of 2.4KPa and snow loads of 5.4KPa ensuring a stable mechanical life for your modules.

>> Take confidence in our modules with a 5 year limited product warranty and a 25 year limited power warranty*.

>> Modules protected by box during transportation and with 21 modules in a box on-site waste is minimised.

>> Modules independently tested to ensure conformance with certification and regulatory standards.

>> Manufacturing facility certified to ISO 9001 Quality Management System standards.

WARRANTIES

5-year limited product warranty*
Limited power warranty*: 10 years at 90% of the minimal rated power output, 25 years at 80% of the minimal rated power output

QUALIFICATIONS AND CERTIFICATES

IEC 61215 Edition 2, IEC 61730 Class A, CE, ISO 9001

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- Qualified, IEC 61215
- Safety tested, IEC 61730
- Periodic Inspection

IEC CE

YL 255 P-32b / 1810x990 SERIES

ELECTRICAL PARAMETERS

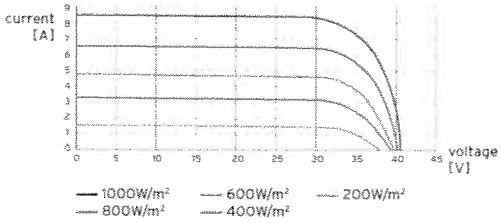
Electrical parameters at STC (1,000 W/m², 25°C, AM 1.5 according to EN 60904-3)

Module type		YL 235 P-32b	YL 240 P-32b	YL 245 P-32b	YL 250 P-32b	YL 255 P-32b
Power output	[W]	235.0	240.0	245.0	250.0	255.0
Power output tolerances	[%]	+/- 3	+/- 3	+/- 3	+/- 3	+/- 3
Module Efficiency	[%]	13.1	13.4	13.7	14.0	14.2
Voltage at Pmax, V_{mpp}	[V]	32.0	32.2	32.2	32.3	32.5
Current at Pmax, I_{mpp}	[A]	7.34	7.45	7.61	7.74	7.85
Open circuit voltage V_{oc}	[V]	40.5	40.5	40.8	40.9	41.0
Short circuit current I_{sc}	[A]	8.00	8.15	8.22	8.33	8.40
Max. system Voltage	[V]			1,000 VDC		

Parameters of the thermal characteristics

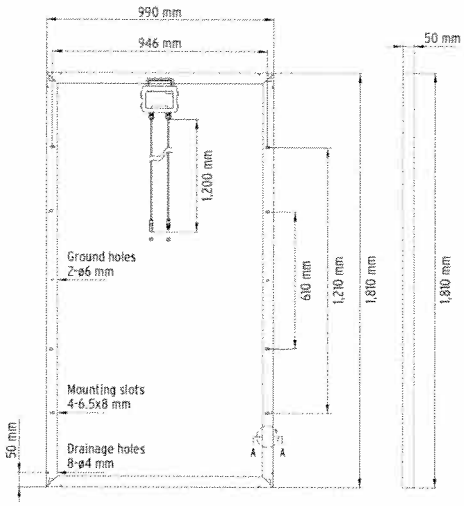
NOCT (Nominal Operating Cell Temperature)	[°C]	46 +/- 2
Temperature coefficient beta of I_{sc}	[1/K]	+ 0.0006
Temperature coefficient alpha of V_{oc}	[1/K]	- 0.0037
Temperature coefficient gamma of P_{mpp}	[1/K]	- 0.0045

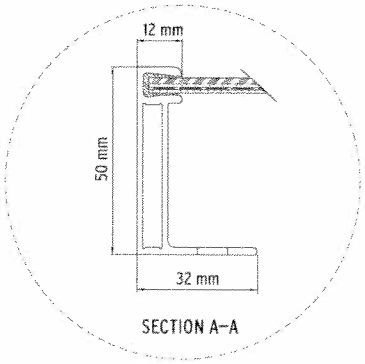
IV CURVES



MECHANICAL PARAMETERS

Dimensions (length [mm] / width [mm] / thickness [mm])	1,810 / 990 / 50
Thickness with junction box [mm]	50
Weight [kg]	22.5
Junction box (manufacturer / protection degree / number of diodes)	CIXI / IP65 / 6
Junction box dimensions (length / width / thickness [mm])	151 / 122 / 25
Positive cable & negative cable (manufacturer / length [mm] / cable cross-section [mm²])	CIXI / 1,200 / 4.0
Plug connector (manufacturer / type / protection degree)	MC4 / UV resistance and self-locking / IP67
Front cover (material / thickness [mm])	Tempered Glass, 4.0mm
Cell type (quantity / technology)	66 / polycrystalline / 156 x 156
Encapsulation materials	Ethylene Vinyl Acetate (EVA)
Rear cover (material / thickness [mm])	Le - PET - PVDF / 0.287
Frame (material)	robust anodized aluminum alloy





OPERATING CONDITIONS

Operating temperature [°C]	- 40 to + 85
Max. wind load / Max. snow load [Pa]	2.4K / 5.4K

Electrical equipment, check with your installer

PACKAGING

Number of modules per box	21
Box size (length [mm] / width [mm] / depth [mm])	1,835 / 1,130 / 1,131
Box Gross weight in kg	512
Boxes per pallet	1

* The data does not refer to a single module and they are not part of the offer, they serve for comparison only to different module types.

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Subject to modifications and errors

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