

# ANEXO VII

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## CÁLCULO DE PRODUCCIÓN DE ENERGÍA DE LOS AEROGENERADORS

## Resumen aerogeneradores a 50 m

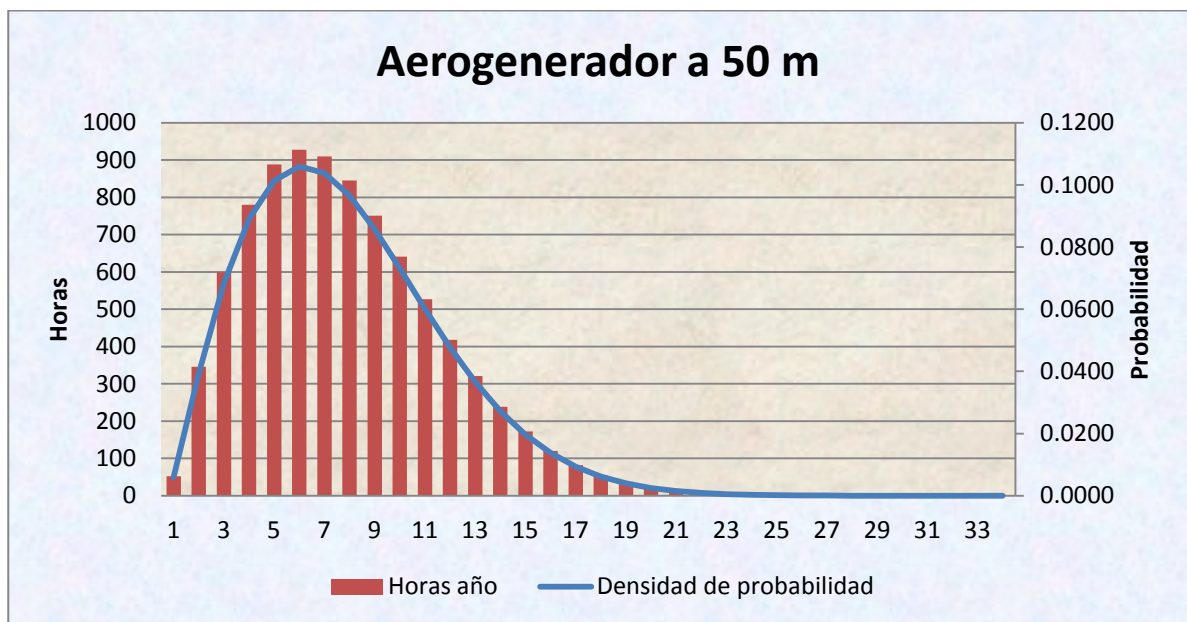
Tipos	Potencia	Producción (MWh-año)	Horas equivalentes (horas)	Factor utilización
E-33	330	895.8107367	2674.06	0.305258208
E-44	900	1818.274042	1998.10	0.228093989
E-48	800	1965.229563	2426.21	0.276964536

## Distribución de probabilidad de Weibull a 50 m

Elevación	1075	m
Hbujes	50	m
Hfinal	1125	m
Weibull C	7.74	
Weibull K	1.87	
T	11	Cº
Den ref.	1.225	Kg/m3
Densidad	1.09	Kg/m3

Vel (m/s)	Vel calculo	Probabilidad acumulada	Densidad f(%)	Horas año
0	0.5	0.005940666	0.005940666	52.04023081
1	1.5	0.045424413	0.039483748	345.8776296
2	2.5	0.113822169	0.068397755	599.1643361
3	3.5	0.202844319	0.089022151	779.8340411
4	4.5	0.304213139	0.10136882	887.9908614
5	5.5	0.410144018	0.105930879	927.9544975
6	6.5	0.513949909	0.103805891	909.3396055
7	7.5	0.610463879	0.09651397	845.4623762
8	8.5	0.696212847	0.085748969	751.1609654
9	9.5	0.769358332	0.073145484	640.7544405
10	10.5	0.829462255	0.060103923	526.5103696
11	11.5	0.877152482	0.047690227	417.7663847
12	12.5	0.913759974	0.036607492	320.6816342
13	13.5	0.940984114	0.02722414	238.4834676
14	14.5	0.960621697	0.019637583	172.0252289
15	15.5	0.974374366	0.013752669	120.4733786
16	16.5	0.983732691	0.009358325	81.97892479
17	17.5	0.989924477	0.006191786	54.24004663
18	18.5	0.993910078	0.003985601	34.9138612
19	19.5	0.99640727	0.002497192	21.87540397
20	20.5	0.997930917	0.001523647	13.34714598
21	21.5	0.998836571	0.000905655	7.933535685
22	22.5	0.999361187	0.000524615	4.595629165
23	23.5	0.999657436	0.000296249	2.595144764

24	24.5	0.999820568	0.000163132	1.429033232
25	25.5	0.999908187	8.76189E-05	0.767541579
26	26.5	0.9999541	4.59136E-05	0.402203257
27	27.5	0.999977578	2.34783E-05	0.205669728
28	28.5	0.999989297	1.17182E-05	0.102651699
29	29.5	0.999995006	5.70969E-06	0.050016862
30	30.5	0.999997723	2.71641E-06	0.023795742
31	31.5	0.999998985	1.26207E-06	0.011055734
32	32.5	0.999999558	5.72725E-07	0.005017069
33	33.5	0.999999812	2.53891E-07	0.002224085
			Suma	8760



## Producción de los aerogeneradores a 50 m

<b>ENERCON</b>	
Modelo	E-33
Clase viento	I A y II A
Potencia (KW)	330
H buje	49
Diam. Rotor	33.4
Área barrida	876.2
Densidad	1.09

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f	
0			0		0
1	0	0	0		0.03948375
2	0	0	0		0.13679551
3	5	4.432383016	3456.523159		0.26706645
4	13.7	12.14472946	10784.40878		0.40547528
5	30	26.5942981	24678.29853		0.52965439
6	55	48.75621318	44335.95565		0.62283535
7	92	81.5558475	68952.40062		0.67559779
8	138	122.3337712	91892.3537		0.68599175
9	196	173.7494142	111330.7087		0.65830936
10	250	221.6191508	116684.781		0.60103923
11	292.8	259.5603494	108435.5888		0.52459249
12	320	283.672513	90968.56505		0.43928991
13	335	296.9696621	70822.35479		0.35391382
14	335	296.9696621	51086.27408		0.27492616
15	335	296.9696621	35776.93855		0.20629003
16	335	296.9696621	24345.25359		0.1497332
17	335	296.9696621	16107.64832		0.10526036
18	335	296.9696621	10368.35756		0.07174081
19	335	296.9696621	6496.331326		0.04744665
20	335	296.9696621	3963.697432		0.03047294
21	335	296.9696621	2356.019411		0.01901875
22	335	296.9696621	1364.76244		0.01154153
23	335	296.9696621	770.6792635		0.00681374
24	335	296.9696621	424.379516		0.00391516
25	335	296.9696621	227.9365633		0.00219047
26	335	296.9696621	119.4421652		0.00119375
27	335	296.9696621	61.07766975		0.00063391
28	0	0	0		0.00032811
29	0	0	0		0.00016558
30	0	0	0		8.1492E-05
31	0	0	0		3.9124E-05
32	0	0	0		1.8327E-05
33	0	0	0		8.3784E-06
Max	335	296.9696621	895810.7367	KWh-año	6.87
			895.8107367	MWh-año	m/s

# ENERCON

Modelo E-33  
Clase viento I A y II A

Potencia (KW)	330
H buje	49
Diam. Rotor	33.4
Área barrida	876.2
Densidad	1.09

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0
1	0	0	0	0.03948375
2	0	0	0	0.13679551
3	5	4.432383016	3456.523159	0.26706645
4	13.7	12.14472946	10784.40878	0.40547528
5	30	26.5942981	24678.29853	0.52965439
6	55	48.75621318	44335.95565	0.62283535
7	92	81.5558475	68952.40062	0.67559779
8	138	122.3337712	91892.3537	0.68599175
9	196	173.7494142	111330.7087	0.65830936
10	250	221.6191508	116684.781	0.60103923
11	292.8	259.5603494	108435.5888	0.52459249
12	320	283.672513	90968.56505	0.43928991
13	335	296.9696621	70822.35479	0.35391382
14	335	296.9696621	51086.27408	0.27492616
15	335	296.9696621	35776.93855	0.20629003
16	335	296.9696621	24345.25359	0.1497332
17	335	296.9696621	16107.64832	0.10526036
18	335	296.9696621	10368.35756	0.07174081
19	335	296.9696621	6496.331326	0.04744665
20	335	296.9696621	3963.697432	0.03047294
21	335	296.9696621	2356.019411	0.01901875
22	335	296.9696621	1364.76244	0.01154153
23	335	296.9696621	770.6792635	0.00681374
24	335	296.9696621	424.379516	0.00391516
25	335	296.9696621	227.9365633	0.00219047
26	335	296.9696621	119.4421652	0.00119375
27	335	296.9696621	61.07766975	0.00063391
28	0	0	0	0.00032811

29	0	0	0	0.00016558
30	0	0	0	8.1492E-05
31	0	0	0	3.9124E-05
32	0	0	0	1.8327E-05
33	0	0	0	8.3784E-06
Max	335	296.9696621	895810.7367 KWh-año	6.87
			895.8107367 MWh-año	m/s

### ENERCON

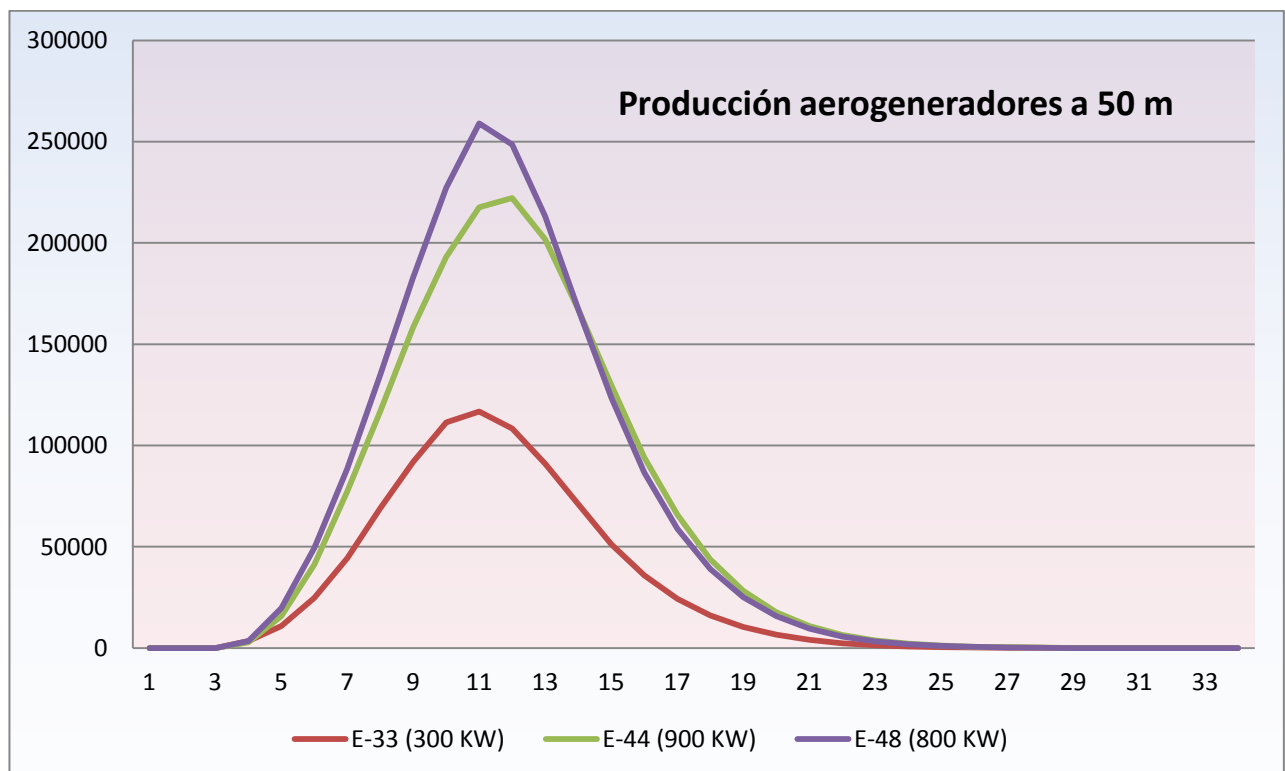
Modelo E-44

Clase viento IA

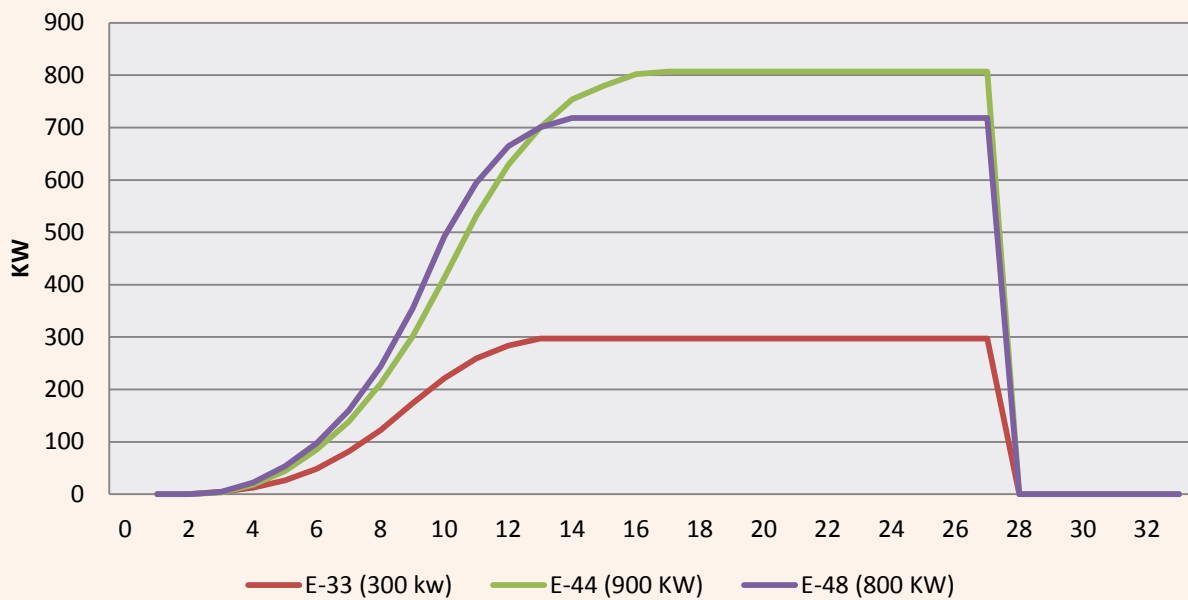
Potencia (KW)	900
H buje	45
Diam. Rotor	44
Área barrida	1521
Densidad	1.09

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0
1	0	0	0	0.03948375
2	0	0	0	0.13679551
3	4	3.545906413	2765.218527	0.26706645
4	20	17.72953206	15743.66245	0.40547528
5	50	44.32383016	41130.49754	0.52965439
6	96	85.10175391	77386.39532	0.62283535
7	156	138.2903501	116919.288	0.67559779
8	238	210.9814316	158481.0158	0.68599175
9	340	301.4020451	193124.6988	0.65830936
10	466	413.0980971	217500.4318	0.60103923
11	600	531.8859619	222204.0754	0.52459249
12	710	629.3983883	201836.5037	0.43928991
13	790	700.3165165	167013.9113	0.35391382
14	850	753.5051127	129621.8895	0.27492616
15	880	780.0994108	93981.2117	0.20629003
16	905	802.2613259	65768.5209	0.1497332
17	910	806.6937089	43755.10439	0.10526036
18	910	806.6937089	28164.79218	0.07174081
19	910	806.6937089	17646.75077	0.04744665
20	910	806.6937089	10767.0587	0.03047294

21	910	806.6937089	6399.933326	0.01901875	
22	910	806.6937089	3707.265136	0.01154153	
23	910	806.6937089	2093.486954	0.00681374	
24	910	806.6937089	1152.792118	0.00391516	
25	910	806.6937089	619.1709629	0.00219047	
26	910	806.6937089	324.4548369	0.00119375	
27	910	806.6937089	165.912476	0.00063391	
28	0	0	0	0.00032811	
29	0	0	0	0.00016558	
30	0	0	0	8.1492E-05	
31	0	0	0	3.9124E-05	
32	0	0	0	1.8327E-05	
33	0	0	0	8.3784E-06	
Max	910	806.6937089	1818274.042	KWh-año	6.87
			1818.274042	MWh-año	m/s



## Aerogeneradores a 50 m (Curvas de potencias corregidas)





## Resumen aerogeneradores a 75 m

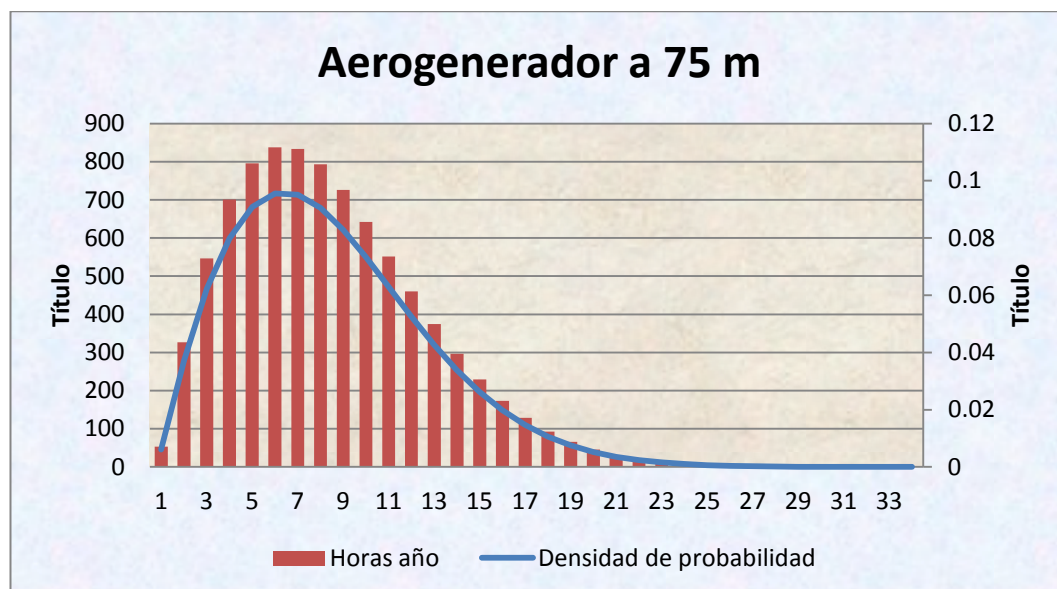
Tipos:	Potencia(KW)	Producción (MWh-año)	Horas equivalentes (horas)	Factor utilización
E-48	800	2262.952670	2793.77	0.318923371
E-53	800	2524.279857	3116.39	0.355752841
E-82 E2 (1)	2000	6193.669701	3021.30	0.344897522
E-82 E2 (2)	2300	6536.321633	2781.41	0.317512952
E-82 E3	3000	7026.042201	2326.50	0.265582653

## Distribución de probabilidad de Weibull a 75 m

Elevación	1075	m
Hbujes	75	m
Hfinal	1150	m
Weibull C	8.39	
Weibull K	1.81	
T	11	Cº
Den ref.	1.225	Kg/m3
Densidad	1.08	Kg/m3

Vel (m/s)	Vel calculo	Probabilidad acumulada	Densidad f(%)	Horas año
0	0.5	0.006047168	0.006047168	52.97319201
1	1.5	0.043338378	0.03729121	326.6709975
2	2.5	0.105676223	0.062337845	546.0795234
3	3.5	0.185638233	0.07996201	700.4672113
4	4.5	0.276481379	0.090843146	795.7859548
5	5.5	0.372091112	0.095609734	837.541266
6	6.5	0.467226968	0.095135856	833.3900954
7	7.5	0.557722918	0.09049595	792.7445255
8	8.5	0.640574479	0.082851561	725.7796741
9	9.5	0.713909508	0.073335029	642.4148538
10	10.5	0.77686533	0.062955821	551.492995
11	11.5	0.829404931	0.052539601	460.2469047
12	12.5	0.872105934	0.042701003	374.0607869
13	13.5	0.905951289	0.033845356	296.4853155
14	14.5	0.932142847	0.026191557	229.4380436
15	15.5	0.951950346	0.019807499	173.5136953
16	16.5	0.966600543	0.014650196	128.3357188
17	17.5	0.977205075	0.010604533	92.89570512
18	18.5	0.984721702	0.007516627	65.84565326
19	19.5	0.989941518	0.005219816	45.72558483
20	20.5	0.993494389	0.003552871	31.12315415

21	21.5	0.995865579	0.00237119	20.77162116
22	22.5	0.997417852	0.001552273	13.59791316
23	23.5	0.998414916	0.000997064	8.734277788
24	24.5	0.999043489	0.000628573	5.506299014
25	25.5	0.999432517	0.000389028	3.407885844
26	26.5	0.999668948	0.000236431	2.071132257
27	27.5	0.999810078	0.000141131	1.236303708
28	28.5	0.999892839	8.27605E-05	0.724981578
29	29.5	0.999940525	4.76862E-05	0.417731196
30	30.5	0.999967528	2.70028E-05	0.236544656
31	31.5	0.999982557	1.50295E-05	0.1316585
32	32.5	0.999990781	8.22373E-06	0.072039889
33	33.5	0.999995205	4.42432E-06	0.038757025
Suma				8760



## Producción de los aerogeneradores a 75 m

<b>ENERCON</b>	
Modelo	E-48
Clase viento	II A
Potencia (KW)	800
H buje	75
Diam. Rotor	48
Área barrida	1809.6
Densidad	1.08

Viento [m/s]	Potencia [W]	Curva potencia corregida (KW)	Producción (KWh)	v*f	
0			0	0	
1	0	0	0	0.03729121	
2	0	0	0	0.12467569	
3	5	4.419433355	3095.668158	0.23988603	
4	25	22.09716677	17584.61496	0.36337258	
5	60	53.03320026	44417.49369	0.47804867	
6	110	97.22753381	81028.46367	0.57081513	
7	180	159.0996008	126125.3375	0.63347165	
8	275	243.0688345	176414.4195	0.66281249	
9	400	353.5546684	227128.7706	0.66001526	
10	555	490.5571024	270538.8056	0.62955821	
11	671	593.0879562	272966.8961	0.57793561	
12	750	662.9150032	247970.5078	0.51241204	
13	790	698.2704701	207026.9406	0.43998962	
14	810	715.9482035	164265.7551	0.3666818	
15	810	715.9482035	124226.8184	0.29711249	
16	810	715.9482035	91881.72735	0.23440314	
17	810	715.9482035	66508.51319	0.18027705	
18	810	715.9482035	47142.07716	0.13529929	
19	810	715.9482035	32737.15031	0.0991765	
20	810	715.9482035	22282.5663	0.07105743	
21	810	715.9482035	14871.40485	0.04979498	
22	810	715.9482035	9735.401501	0.03415001	
23	810	715.9482035	6253.290491	0.02293246	
24	810	715.9482035	3942.224887	0.01508575	
25	810	715.9482035	2439.869748	0.0097257	
26	810	715.9482035	1482.823418	0.0061472	
27	810	715.9482035	885.1294188	0.00381053	
28	0	0	0	0.00231729	
29	0	0	0	0.0013829	
30	0	0	0	0.00081008	
31	0	0	0	0.00046591	
32	0	0	0	0.00026316	
33	0	0	0	0.000146	
Max	810	715.9482035	2262952.67	KWh-año	7.46
			2262.95267	MWh-año	m/s

**ENERCON**

Modelo E-53

Clase viento I

Potencia (KW)	800
H buje	73
Diam. Rotor	52.9
Área barrida	2197.9
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0
1	0	0	0	0.03729121
2	2	1.767773342	965.3448241	0.12467569
3	14	12.37441339	8667.870842	0.23988603
4	38	33.5876935	26728.61474	0.36337258
5	77	68.05927367	57002.45023	0.47804867
6	141	124.6280206	103863.758	0.57081513
7	228	201.526161	159758.7609	0.63347165
8	336	296.9859215	215546.3453	0.66281249
9	480	424.2656021	272554.5247	0.66001526
10	645	570.1069028	314409.9633	0.62955821
11	744	657.6116832	302663.7417	0.57793561
12	790	698.2704701	261195.6015	0.51241204
13	810	715.9482035	212268.129	0.43998962
14	810	715.9482035	164265.7551	0.3666818
15	810	715.9482035	124226.8184	0.29711249
16	810	715.9482035	91881.72735	0.23440314
17	810	715.9482035	66508.51319	0.18027705
18	810	715.9482035	47142.07716	0.13529929
19	810	715.9482035	32737.15031	0.0991765
20	810	715.9482035	22282.5663	0.07105743
21	810	715.9482035	14871.40485	0.04979498
22	810	715.9482035	9735.401501	0.03415001
23	810	715.9482035	6253.290491	0.02293246
24	810	715.9482035	3942.224887	0.01508575
25	810	715.9482035	2439.869748	0.0097257
26	810	715.9482035	1482.823418	0.0061472
27	810	715.9482035	885.1294188	0.00381053
28	0	0	0	0.00231729

29	0	0	0	0.0013829	
30	0	0	0	0.00081008	
31	0	0	0	0.00046591	
32	0	0	0	0.00026316	
33	0	0	0	0.000146	
Max	810	715.9482035	2524279.857	KWh-año	7.46
			2524.279857	MWh-año	m/s

<b>ENERCON</b>	
Modelo	E-82 E2 (1)
Clase viento	I y II A
Potencia (KW)	2000
H buje	78
Diam. Rotor	82
Área barrida	5281.0
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0
1	0	0	0	0.03729121
2	3	2.651660013	1448.017236	0.12467569
3	25	22.09716677	15478.34079	0.23988603
4	82	72.47870702	57677.53707	0.36337258
5	174	153.7962808	128810.7317	0.47804867
6	321	283.7276214	236455.7895	0.57081513
7	532	470.227709	372770.442	0.63347165
8	815	720.3676369	522828.1887	0.66281249
9	1180	1042.986272	670029.8733	0.66001526
10	1580	1396.54094	770182.5457	0.62955821
11	1810	1599.834875	736319.0491	0.57793561
12	1980	1750.095609	654642.1405	0.51241204
13	2050	1811.967676	537221.8079	0.43998962
14	2050	1811.967676	415734.3186	0.3666818
15	2050	1811.967676	314401.2072	0.29711249
16	2050	1811.967676	232540.1742	0.23440314
17	2050	1811.967676	168324.0149	0.18027705
18	2050	1811.967676	119310.1953	0.13529929
19	2050	1811.967676	82853.28166	0.0991765
20	2050	1811.967676	56394.14928	0.07105743

21	2050	1811.967676	37637.50611	0.04979498	
22	2050	1811.967676	24638.97911	0.03415001	
23	2050	1811.967676	15826.22902	0.02293246	
24	2050	1811.967676	9977.235825	0.01508575	
25	2050	1811.967676	6174.978992	0.0097257	
26	2050	1811.967676	3752.824701	0.0061472	
27	2050	1811.967676	2240.142356	0.00381053	
28	0	0	0	0.00231729	
29	0	0	0	0.0013829	
30	0	0	0	0.00081008	
31	0	0	0	0.00046591	
32	0	0	0	0.00026316	
33	0	0	0	0.000146	
Max	2050	1811.967676	6193669.701	KWh-año	7.46
			6193.669701	MWh-año	m/s

<b>ENERCON</b>	
Modelo	E-82 E2 (2)
Clase viento	I A y II A
Potencia (KW)	2300
H buje	78
Diam. Rotor	82
Área barrida	5281.0
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0
1	0	0	0	0.03729121
2	3	2.651660013	1448.017236	0.12467569
3	25	22.09716677	15478.34079	0.239886031
4	82	72.47870702	57677.53707	0.363372582
5	174	153.7962808	128810.7317	0.478048668
6	321	283.7276214	236455.7895	0.570815134
7	532	470.227709	372770.442	0.633471653
8	815	720.3676369	522828.1887	0.662812488
9	1180	1042.986272	670029.8733	0.660015261
10	1580	1396.54094	770182.5457	0.629558213
11	1890	1670.545808	768863.5374	0.577935611
12	2100	1856.162009	694317.4218	0.512412037

13	2250	1988.74501	589633.6916	0.439989623	
14	2350	2077.133677	476573.4872	0.366681805	
15	2350	2077.133677	360411.1399	0.297112492	
16	2350	2077.133677	266570.4436	0.234403139	
17	2350	2077.133677	192956.7975	0.180277053	
18	2350	2077.133677	136770.2239	0.135299288	
19	2350	2077.133677	94978.15214	0.099176497	
20	2350	2077.133677	64646.95162	0.07105743	
21	2350	2077.133677	43145.43383	0.049794982	
22	2350	2077.133677	28244.68337	0.03415001	
23	2350	2077.133677	18142.26254	0.022932465	
24	2350	2077.133677	11437.31912	0.015085751	
25	2350	2077.133677	7078.634454	0.009725702	
26	2350	2077.133677	4302.01856	0.006147196	
27	2350	2077.133677	2567.968067	0.003810525	
28	0	0	0	0.002317293	
29	0	0	0	0.0013829	
30	0	0	0	0.000810084	
31	0	0	0	0.000465915	
32	0	0	0	0.000263159	
33	0	0	0	0.000146002	
Max	2350	2077.133677	6536321.633	KWh-año	7.46
			6536.321633	MWh-año	m/s

### ENERCON

Modelo E-82 E3

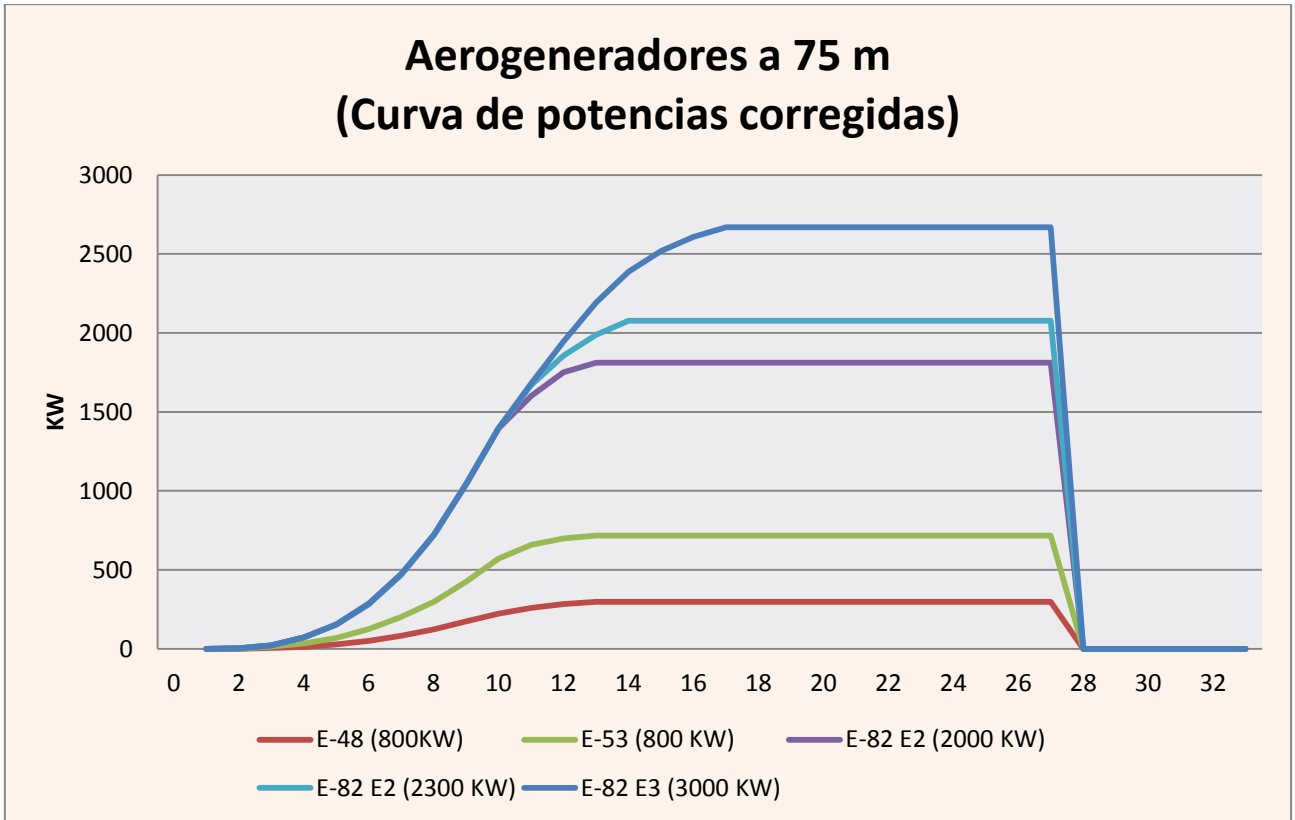
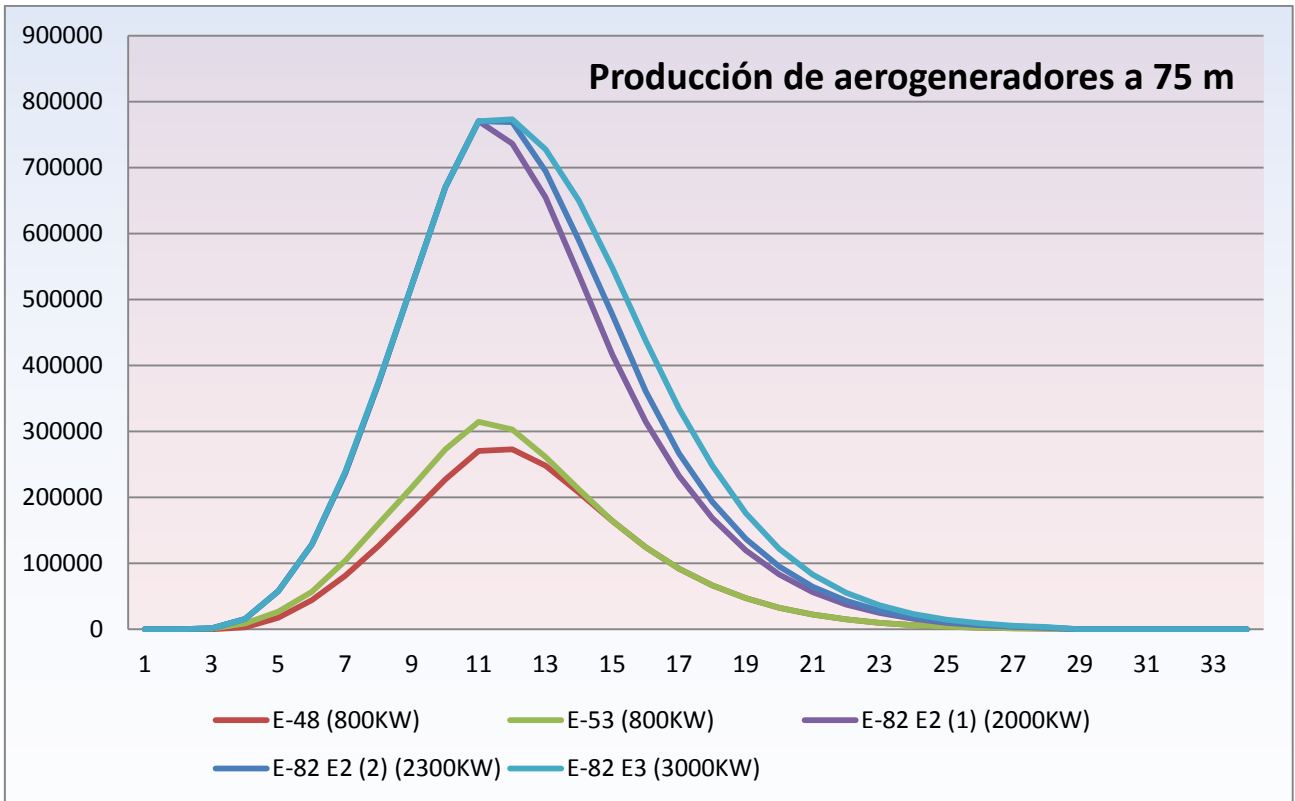
Clase viento IA y IIA

Potencia (KW)	3000
H buje	78
Diam. Rotor	82
Área barrida	5281.0
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0
1	0	0	0	0.03729121
2	3	2.651660013	1448.017236	0.12467569
3	25	22.09716677	15478.34079	0.23988603

4	82	72.47870702	57677.53707	0.36337258	
5	174	153.7962808	128810.7317	0.47804867	
6	324	286.3792814	238665.6566	0.57081513	
7	535	472.879369	374872.531	0.63347165	
8	815	720.3676369	522828.1887	0.66281249	
9	1180	1042.986272	670029.8733	0.66001526	
10	1580	1396.54094	770182.5457	0.62955821	
11	1900	1679.384675	772931.5985	0.57793561	
12	2200	1944.550676	727380.1561	0.51241204	
13	2480	2192.038944	649907.3578	0.43998962	
14	2700	2386.494012	547552.5172	0.3666818	
15	2850	2519.077012	437094.3612	0.29711249	
16	2950	2607.465679	334630.9823	0.23440314	
17	3020	2669.337746	247970.0122	0.18027705	
18	3020	2669.337746	175764.2877	0.13529929	
19	3020	2669.337746	122057.0296	0.0991765	
20	3020	2669.337746	83078.21016	0.07105743	
21	3020	2669.337746	55446.47241	0.04979498	
22	3020	2669.337746	36297.42288	0.03415001	
23	3020	2669.337746	23314.73739	0.02293246	
24	3020	2669.337746	14698.1718	0.01508575	
25	3020	2669.337746	9096.79832	0.0097257	
26	3020	2669.337746	5528.551511	0.0061472	
27	3020	2669.337746	3300.112154	0.00381053	
28	0	0	0	0.00231729	
29	0	0	0	0.0013829	
30	0	0	0	0.00081008	
31	0	0	0	0.00046591	
32	0	0	0	0.00026316	
33	0	0	0	0.000146	
Max	3020	2669.337746	7026042.201	KWh-año	7.46
			7026.042201	MWh-año	m/s





## Resumen aerogeneradores a 100 m

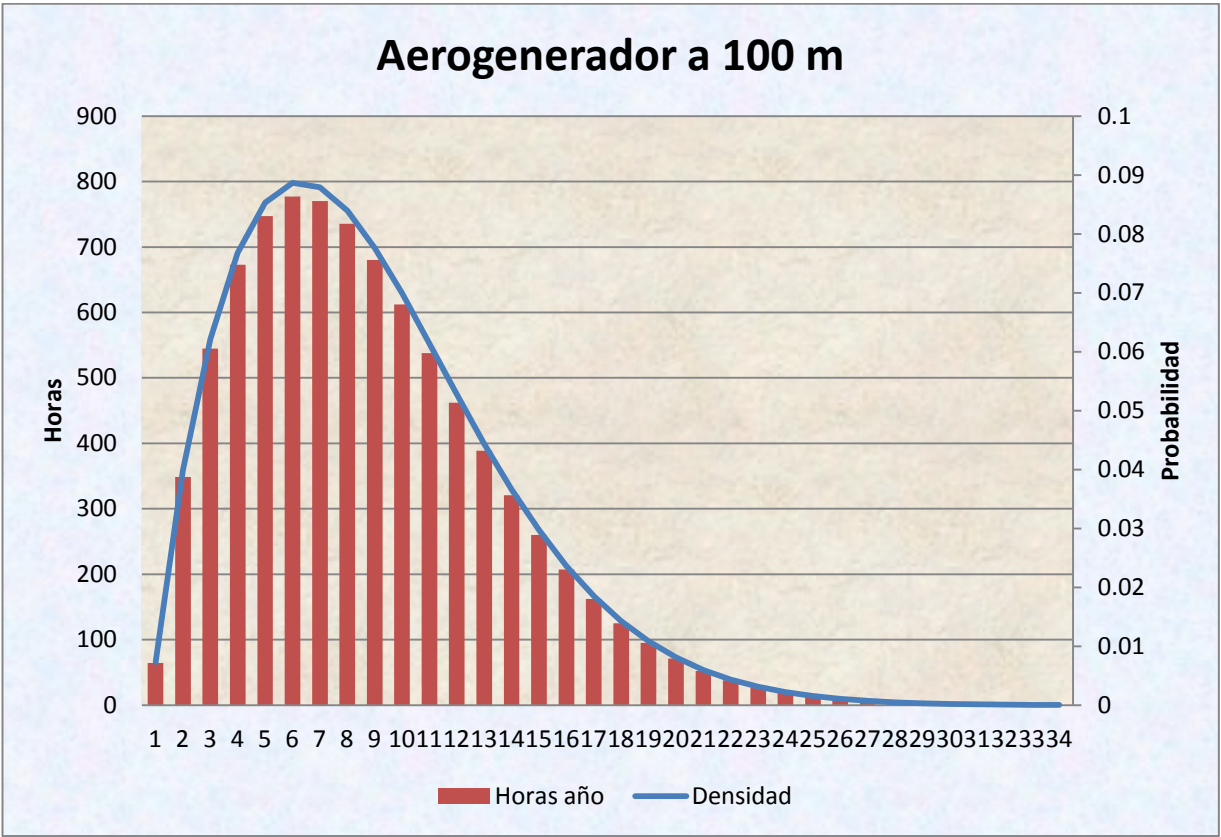
Tipos:	Potencia	Producción (MWh-año)	Horas equivalentes (horas)	Factor utilización
E-70 E4	2300	6080.328382	2632.18	0.300476802
E-82 E2 (1)	2000	6591.553144	3215.39	0.367053856
E-82 E2 (2)	2300	7010.095460	2983.02	0.340527322
E-82 E3	3000	7642.944405	2530.78	0.288901403
E-101	3000	9866.725025	3234.99	0.369291303

## Distribución de probabilidad de Weibull a 100 m

Elevación	1075	m
Hbujes	100	m
Hfinal	1175	m
Weibull C	8.81	
Weibull K	1.712	
T	11	Cº
Den ref.	1.225	Kg/m3
Densidad	1.08	Kg/m3

Vel (m/s)	Vel calculo	Probabilidad acumulada	Densidad f(%)	Horas año
0	0.5	0.00733231	0.00733231	64.23103522
1	1.5	0.047122696	0.039790386	348.5637841
2	2.5	0.109291101	0.062168405	544.5952282
3	3.5	0.186081442	0.076790341	672.6833865
4	4.5	0.271372627	0.085291184	747.1507744
5	5.5	0.360057769	0.088685142	776.8818446
6	6.5	0.447978081	0.087920312	770.1819369
7	7.5	0.531918322	0.083940241	735.3165145
8	8.5	0.609573894	0.077655572	680.2628096
9	9.5	0.67947503	0.069901135	612.3339443
10	10.5	0.740875417	0.061400387	537.8673936
11	11.5	0.79361925	0.052743833	462.0359774
12	12.5	0.838001272	0.044382022	388.7865107
13	13.5	0.874632198	0.036630926	320.8869157
14	14.5	0.904318542	0.029686344	260.052374
15	15.5	0.927962283	0.023643741	207.1191704
16	16.5	0.946482599	0.018520316	162.2379707

17	17.5	0.96075932	0.01427672	125.0640681
18	18.5	0.971595952	0.010836632	94.92890043
19	19.5	0.97969911	0.008103158	70.98366793
20	20.5	0.985670733	0.005971623	52.31141704
21	21.5	0.990009561	0.004338828	38.00813379
22	22.5	0.993118712	0.003109151	27.23615889
23	23.5	0.995316741	0.002198029	19.25473564
24	24.5	0.996850188	0.001533447	13.43299272
25	25.5	0.997906174	0.001055986	9.250438771
26	26.5	0.99862414	0.000717966	6.289384004
27	27.5	0.999106199	0.000482059	4.222836104
28	28.5	0.999425893	0.000319694	2.800515355
29	29.5	0.999635346	0.000209453	1.834807747
30	30.5	0.999770938	0.000135592	1.187785325
31	31.5	0.999857683	8.67455E-05	0.759890937
32	32.5	0.999912535	5.48521E-05	0.480504382
33	33.5	0.999946823	3.42874E-05	0.300358017
Suma				8760



## Producción de los aerogeneradores a 100 m

<b>ENERCON</b>	
Modelo	E-70 E4
Clase viento	I A y II A
Potencia (KW)	2300
H buje	98
Diam. Rotor	71
Área barrida	3959.2
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0
1	0	0	0	0.039790386
2	2	1.762608807	959.9083456	0.12433681
3	18	15.86347926	10671.09895	0.230371023
4	56	49.3530466	36874.16699	0.341164737
5	127	111.9256593	86953.01261	0.44342571
6	240	211.5130569	162903.5358	0.527521875
7	400	352.5217614	259215.0729	0.58758169
8	626	551.6965566	375298.6497	0.621244575
9	892	786.123528	481370.1206	0.629110217
10	1223	1077.835286	579732.4557	0.614003874
11	1590	1401.274002	647439.003	0.580182163
12	1900	1674.478367	651014.6015	0.532584261
13	2080	1833.113159	588222.0279	0.476202044
14	2230	1965.30882	511083.2242	0.415608817
15	2300	2027.000128	419830.5849	0.354656114
16	2310	2035.813172	330286.1978	0.296325061
17	2310	2035.813172	254607.0772	0.242704242
18	2310	2035.813172	193257.5059	0.195059384
19	2310	2035.813172	144509.4862	0.15396001
20	2310	2035.813172	106496.2719	0.119432459
21	2310	2035.813172	77377.45942	0.091115389
22	2310	2035.813172	55447.73103	0.068401312
23	2310	2035.813172	39199.04445	0.050554671
24	2310	2035.813172	27347.06352	0.03680272
25	2310	2035.813172	18832.1651	0.026399654
26	2310	2035.813172	12804.0108	0.018667121

27	2310	2035.813172	8596.905364	0.013015591
28	0	0	0	0.008951419
29	0	0	0	0.006074135
30	0	0	0	0.004067758
31	0	0	0	0.002689112
32	0	0	0	0.001755267
33	0	0	0	0.001131486
Max	2310	2035.813172	6080328.382 KWh-año	7.85
			6080.328382 MWh-año	m/s

ENERCON	
Modelo	E-82 E2
Clase viento	I A y II A
Potencia (KW)	2000
H buje	98
Diam. Rotor	82
Área barrida	5281.0
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f (m/s)
0			0.00	0.0000
1	0	0.00	0.00	0.0398
2	3	2.64	1439.86	0.1243
3	25	22.03	14820.97	0.2304
4	82	72.27	53994.32	0.3412
5	174	153.35	119132.47	0.4434
6	321	282.90	217883.48	0.5275
7	532	468.85	344756.05	0.5876
8	815	718.26	488607.67	0.6212
9	1180	1039.94	636790.07	0.6291
10	1580	1392.46	748959.35	0.6140
11	1810	1595.16	737021.76	0.5802
12	1980	1744.98	678425.74	0.5326
13	2050	1806.67	579738.06	0.4762
14	2050	1806.67	469829.87	0.4156
15	2050	1806.67	374196.83	0.3547
16	2050	1806.67	293111.13	0.2963
17	2050	1806.67	225950.00	0.2427

18	2050	1806.67	171505.58	0.1951	
19	2050	1806.67	128244.35	0.1540	
20	2050	1806.67	94509.68	0.1194	
21	2050	1806.67	68668.31	0.0911	
22	2050	1806.67	49206.86	0.0684	
23	2050	1806.67	34787.03	0.0506	
24	2050	1806.67	24269.04	0.0368	
25	2050	1806.67	16712.53	0.0264	
26	2050	1806.67	11362.87	0.0187	
27	2050	1806.67	7629.29	0.0130	
28	0	0.00	0.00	0.0090	
29	0	0.00	0.00	0.0061	
30	0	0.00	0.00	0.0041	
31	0	0.00	0.00	0.0027	
32	0	0.00	0.00	0.0018	
33	0	0.00	0.00	0.0011	
Max	2050	1806.67	6591553.144	KWh-año	7.85
			6591.553144	MWh-año	

<b>ENERCON</b>	
Modelo	E-82 E2 (2)
Clase viento	I A y II A
Potencia (KW)	2300
H buje	98
Diam. Rotor	82
Área barrida	5281
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0.0000
1	0	0	0	0.039790386
2	3	2.643913211	1439.862518	0.12433681
3	25	22.03261009	14820.97077	0.230371023
4	82	72.26696109	53994.31594	0.341164737
5	174	153.3469662	119132.474	0.44342571
6	321	282.8987135	217883.4792	0.527521875
7	532	468.8539427	344756.047	0.58758169

8	815	718.2630889	488607.6669	0.621244575	
9	1180	1039.939196	636790.0698	0.629110217	
10	1580	1392.460958	748959.3459	0.614003874	
11	1890	1665.665323	769597.3054	0.580182163	
12	2100	1850.739247	719542.4543	0.532584261	
13	2250	1982.934908	636297.8667	0.476202044	
14	2350	2071.065348	538585.4605	0.415608817	
15	2350	2071.065348	428957.3368	0.354656114	
16	2350	2071.065348	336005.4393	0.296325061	
17	2350	2071.065348	259015.8578	0.242704242	
18	2350	2071.065348	196603.9562	0.195059384	
19	2350	2071.065348	147011.815	0.15396001	
20	2350	2071.065348	108340.3632	0.119432459	
21	2350	2071.065348	78717.32885	0.091115389	
22	2350	2071.065348	56407.8649	0.068401312	
23	2350	2071.065348	39877.81578	0.050554671	
24	2350	2071.065348	27820.60574	0.03680272	
25	2350	2071.065348	19158.2632	0.026399654	
26	2350	2071.065348	13025.72527	0.018667121	
27	2350	2071.065348	8745.769526	0.013015591	
28	0	0	0	0.008951419	
29	0	0	0	0.006074135	
30	0	0	0	0.004067758	
31	0	0	0	0.002689112	
32	0	0	0	0.001755267	
33	0	0	0	0.001131486	
Max	2350	2071.065348	7010095.46	KWh-año	7.85
			7010.09546	MWh-año	m/s

ENERCON	
Modelo	E-82 E3
Clase viento	I A y II A
Potencia (KW)	3000
H buje	98
Diam. Rotor	82
Área barrida	5281
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)		v*f
0			0		0
1	0	0	0		0.039790386
2	3	2.643913211	1439.862518		0.12433681
3	25	22.03261009	14820.97077		0.230371023
4	82	72.26696109	53994.31594		0.341164737
5	174	153.3469662	119132.474		0.44342571
6	321	282.8987135	217883.4792		0.527521875
7	532	468.8539427	344756.047		0.58758169
8	815	718.2630889	488607.6669		0.621244575
9	1180	1039.939196	636790.0698		0.629110217
10	1580	1392.460958	748959.3459		0.614003874
11	1900	1674.478367	773669.2489		0.580182163
12	2200	1938.869688	753806.3807		0.532584261
13	2480	2185.634921	701341.6486		0.476202044
14	2700	2379.52189	618800.3164		0.415608817
15	2850	2511.71755	520224.8552		0.354656114
16	2950	2599.847991	421794.0621		0.296325061
17	3020	2661.539299	332862.9322		0.242704242
18	3020	2661.539299	252656.9991		0.195059384
19	3020	2661.539299	188925.8218		0.15396001
20	3020	2661.539299	139228.8922		0.119432459
21	3020	2661.539299	101160.1418		0.091115389
22	3020	2661.539299	72490.10723		0.068401312
23	3020	2661.539299	51247.2356		0.050554671
24	3020	2661.539299	35752.43802		0.03680272
25	3020	2661.539299	24620.40632		0.026399654
26	3020	2661.539299	16739.44269		0.018667121
27	3020	2661.539299	11239.24424		0.013015591
28	0	0	0		0.008951419
29	0	0	0		0.006074135
30	0	0	0		0.004067758
31	0	0	0		0.002689112
32	0	0	0		0.001755267
33	0	0	0		0.001131486
Max	3020	2661.539299	7642944.405	KWh-año	7.85
			7642.94	MWh-año	m/s



<b>ENERCON</b>	
Modelo	E-101
Clase viento	I A y II A
Potencia (KW)	3000
H buje	99
Diam. Rotor	101
Área barrida	8012
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0
1	0	0	0	0.03979039
2	3	2.643913211	1439.862518	0.12433681
3	37	32.60826293	21935.03674	0.23037102
4	118	103.9939196	77699.13758	0.34116474
5	258	227.3765361	176644.7028	0.44342571
6	479	422.1448093	325128.3069	0.52752187
7	790	696.2304788	511949.769	0.58758169
8	1200	1057.565284	719422.3317	0.62124458
9	1710	1507.03053	922805.9487	0.62911022
10	2340	2062.252304	1109218.272	0.61400387
11	2867	2526.699725	1167426.177	0.58018216
12	3034	2673.87756	1039567.527	0.53258426
13	3050	2687.978431	862537.1082	0.47620204
14	3050	2687.978431	699015.1722	0.41560882
15	3050	2687.978431	556731.8626	0.35465611
16	3050	2687.978431	436092.1659	0.29632506
17	3050	2687.978431	336169.5176	0.24270424
18	3050	2687.978431	255166.8368	0.19505938
19	3050	2687.978431	190802.5683	0.15396001
20	3050	2687.978431	140611.9607	0.11943246
21	3050	2687.978431	102165.0438	0.09111539
22	3050	2687.978431	73210.20764	0.06840131
23	3050	2687.978431	51756.3141	0.05055467
24	3050	2687.978431	36107.59469	0.03680272
25	3050	2687.978431	24864.97989	0.02639965
26	3050	2687.978431	16905.72855	0.01866712
27	3050	2687.978431	11350.89236	0.01301559
28	0	0	0	0.00895142

29	0	0	0	0.00607414
30	0	0	0	0.00406776
31	0	0	0	0.00268911
32	0	0	0	0.00175527
33	0	0	0	0.00113149
	3050	2687.978431	9866725.025	KWh-año
			9866.725025	MWh-año
				m/s

### Resumen aerogeneradores a 135 m

Tipos:	Potencia	Producción (MWh-año)	Horas equivalentes (horas)	Factor utilización
E-82 E2 (1)	2000	7103.220644	3464.99	0.3955463
E-82 E2 (2)	2300	7605.625335	3236.44	0.3694562
E-82 E3	3000	8401.825414	3236.44	0.3694562
E-101	3000	10631.975604	3485.89	0.3979331
E-126	7500	20957.515731	2764.84	0.3156214

### Distribución de probabilidad de Weibull a 135 m

Desarrollada en el apartado 3.4.1. "Cálculo de la producción de energía de los aerogeneradores y del parque".

### Producción de los aerogeneradores a 135 m

Calcularemos todos los aerogeneradores posibles excepto el E-101, también exceptuaremos el cálculo del gráfico de producción y el de las curvas de potencia corregidas. Todas estas gráficas y tablas se han calculado ya en el apartado 3.4.1. "Cálculo de la producción de energía de los aerogeneradores y del parque". Por tanto procederemos a calcular la producción numérica de los demás aerogeneradores con altura de buje 135 m.

ENERCON	
Modelo	E-82 E2
Clase viento	I A y II A
Potencia (KW)	2000
H buje	138
Diam. Rotor	82
Área barrida	5281
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f	
0			0	0	
1	0	0	0	0.03810037	
2	3	2.633106188	1338.731292	0.11607827	
3	25	21.94255157	13632.9344	0.2127744	
4	82	71.97156915	49524.02794	0.3142034	
5	174	152.7201589	109572.9791	0.409518	
6	321	281.7423622	201887.617	0.49080014	
7	532	466.9374974	323125.5309	0.55297622	
8	815	715.3271812	464947.2136	0.59358758	
9	1180	1035.688434	617349.5607	0.61240739	
10	1580	1386.769259	742195.8802	0.61095641	
11	1810	1588.640734	748935.8119	0.59198061	
12	1980	1737.850084	709097.3016	0.55894704	
13	2050	1799.289229	625136.4425	0.51560021	
14	2050	1799.289229	524196.8992	0.46560474	
15	2050	1799.289229	433223.0837	0.41228522	
16	2050	1799.289229	353124.0085	0.35846119	
17	2050	1799.289229	284052.17	0.30636697	
18	2050	1799.289229	225603.5359	0.25764002	
19	2050	1799.289229	176996.3307	0.21335989	
20	2050	1799.289229	137222.0755	0.17412009	
21	2050	1799.289229	105166.3989	0.14011712	
22	2050	1799.289229	79700.22214	0.11124414	
23	2050	1799.289229	59744.03103	0.08718008	
24	2050	1799.289229	44309.17278	0.0674683	
25	2050	1799.289229	32520.62466	0.05158148	
26	2050	1799.289229	23625.65424	0.03897195	
27	2050	1799.289229	16992.40513	0.02910808	
28	0	0	0	0.02149833	
29	0	0	0	0.01570515	
30	0	0	0	0.01135094	
31	0	0	0	0.00811846	
32	0	0	0	0.00574722	
33	0	0	0	0.00402783	
Max	2050	1799.289229	7103220.644	KWh-año	8.40
			7103.220644	MWh-año	m/s

**ENERCON**

Modelo E-82 E2 (2)

Clase viento I A y II A

Potencia (KW)	2300
H buje	138
Diam. Rotor	82
Área barrida	5281
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0
1	0	0	0	0.03810037
2	3	2.633106188	1338.731292	0.11607827
3	25	21.94255157	13632.9344	0.2127744
4	82	71.97156915	49524.02794	0.3142034
5	174	152.7201589	109572.9791	0.409518
6	321	281.7423622	201887.617	0.49080014
7	532	466.9374974	323125.5309	0.55297622
8	815	715.3271812	464947.2136	0.59358758
9	1180	1035.688434	617349.5607	0.61240739
10	1580	1386.769259	742195.8802	0.61095641
11	1890	1658.856899	782037.9472	0.59198061
12	2100	1843.174332	752072.8956	0.55894704
13	2250	1974.829641	686125.3638	0.51560021
14	2350	2062.599848	600908.6406	0.46560474
15	2350	2062.599848	496621.5838	0.41228522
16	2350	2062.599848	404800.6927	0.35846119
17	2350	2062.599848	325620.7803	0.30636697
18	2350	2062.599848	258618.6875	0.25764002
19	2350	2062.599848	202898.2327	0.21335989
20	2350	2062.599848	157303.3549	0.17412009
21	2350	2062.599848	120556.6036	0.14011712
22	2350	2062.599848	91363.66928	0.11124414
23	2350	2062.599848	68487.05996	0.08718008
24	2350	2062.599848	50793.44197	0.0674683
25	2350	2062.599848	37279.74046	0.05158148
26	2350	2062.599848	27083.06706	0.03897195
27	2350	2062.599848	19479.09856	0.02910808
28	0	0	0	0.02149833

29	0	0	0	0.01570515	
30	0	0	0	0.01135094	
31	0	0	0	0.00811846	
32	0	0	0	0.00574722	
33	0	0	0	0.00402783	
Max	2350	2062.599848	7605625.335	KWh-año	8.40
			7605.625335	MWh-año	m/s

### ENERCON

Modelo E-82 E3

Clase viento I A y II A

Potencia (KW)	3000
H buje	138
Diam. Rotor	82
Área barrida	5281
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0
1	0	0	0	0.03810037
2	3	2.633106188	1338.731292	0.11607827
3	25	21.94255157	13632.9344	0.2127744
4	82	71.97156915	49524.02794	0.3142034
5	174	152.7201589	109572.9791	0.409518
6	321	281.7423622	201887.617	0.49080014
7	532	466.9374974	323125.5309	0.55297622
8	815	715.3271812	464947.2136	0.59358758
9	1180	1035.688434	617349.5607	0.61240739
10	1580	1386.769259	742195.8802	0.61095641
11	1900	1667.633919	786175.7141	0.59198061
12	2200	1930.944538	787885.8906	0.55894704
13	2480	2176.701116	756262.6232	0.51560021
14	2700	2369.79557	690405.6721	0.46560474
15	2850	2501.450879	602285.7505	0.41228522
16	2950	2589.221085	508154.061	0.35846119
17	3020	2650.66023	418457.3432	0.30636697
18	3020	2650.66023	332352.5261	0.25764002

19	3020	2650.66023	260745.814	0.21335989	
20	3020	2650.66023	202151.5454	0.17412009	
21	3020	2650.66023	154928.0608	0.14011712	
22	3020	2650.66023	117412.0346	0.11124414	
23	3020	2650.66023	88013.1579	0.08718008	
24	3020	2650.66023	65274.97649	0.0674683	
25	3020	2650.66023	47908.43242	0.05158148	
26	3020	2650.66023	34804.62234	0.03897195	
27	3020	2650.66023	25032.7139	0.02910808	
28	0	0	0	0.02149833	
29	0	0	0	0.01570515	
30	0	0	0	0.01135094	
31	0	0	0	0.00811846	
32	0	0	0	0.00574722	
33	0	0	0	0.00402783	
3020		2650.66023	8401825.414	KWh-año	8.40
			8401.825414	MWh-año	m/s

ENERCON	
Modelo	E-126
Clase viento	I A y II A
Potencia (KW)	7500
H buje	135
Diam. Rotor	127
Área barrida	12668
Densidad	1.08

Viento [m/s]	Potencia [KW]	Curva potencia corregida (KW)	Producción (KWh)	v*f
0			0	0
1	0	0	0	0.03810037
2	0	0	0	0.11607827
3	55	48.27361346	29992.45569	0.2127744
4	175	153.597861	105691.523	0.3142034
5	410	359.8578458	258189.2037	0.409518
6	760	667.0535677	477989.3737	0.49080014

7	1250	1097.127579	759223.5219	0.55297622	
8	1900	1667.633919	1083926.019	0.59358758	
9	2700	2369.79557	1412579.503	0.61240739	
10	3750	3291.382736	1761540.855	0.61095641	
11	4850	4256.855005	2006816.955	0.59198061	
12	5750	5046.786861	2059247.214	0.55894704	
13	6500	5705.063408	1982139.94	0.51560021	
14	7000	6143.91444	1789940.631	0.46560474	
15	7350	6451.110162	1553263.251	0.41228522	
16	7500	6582.765471	1291917.104	0.35846119	
17	7580	6652.981636	1050300.219	0.30636697	
18	7580	6652.981636	834182.8304	0.25764002	
19	7580	6652.981636	654454.7252	0.21335989	
20	7580	6652.981636	507386.9914	0.17412009	
21	7580	6652.981636	388859.1725	0.14011712	
22	7580	6652.981636	294696.4311	0.11124414	
23	7580	6652.981636	220907.1977	0.08718008	
24	7580	6652.981636	163835.8681	0.0674683	
25	7580	6652.981636	120246.9926	0.05158148	
26	7580	6652.981636	87357.29714	0.03897195	
27	7580	6652.981636	62830.45409	0.02910808	
28	0	0	0	0.02149833	
29	0	0	0	0.01570515	
30	0	0	0	0.01135094	
31	0	0	0	0.00811846	
32	0	0	0	0.00574722	
33	0	0	0	0.00402783	
7580		6652.981636	20957515.73	KWh-año	8.40
			20957.51573	MWh-año	m/s

