



# Gaia-Wind GW133-11 kW Summary Report for UK MCS

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**Gaia-Wind Technical Report: GWTD0018**

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**7<sup>th</sup> October 2010**

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Revision	Date	Description
1.0	7 <sup>th</sup> Oct 2010	First Issue
1.1	20 <sup>th</sup> Sept 2013	Introduction; Wording updated Sect 2.1; Resolution table improved (contents unchanged) Sect 2.3; 'BWEA Reference Power' added

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## **1 Introduction**

For the purpose of MCS certification for the Gaia-Wind turbine 'GW 133-11', Gaia-Wind has commissioned several test reports in accordance with:

British Wind Energy Association, Small Wind Turbine Performance and Safety Standard, 29 Feb 2008.

These tests were carried out in accordance with the applicable standards and the main results of these tests are summarized in this report.

## 2 Power Performance

The Power Performance measurements on the GW 133-11 wind turbine are done by TUV NEL and reported in: TUV NEL Cert Report 2010-204.

### 2.1 Power Curve

The report gives the Noise Power Performance Results in table 6:

**TABLE 6 POWER PERFORMANCE RESULTS (DATABASE B)**

Measured power curve (database B)							
Reference air density: 1.225 kg/m <sup>3</sup>					Category A	Category B	Combined uncertainty
Bin no.	Hub Height Wind Speed m/s	Power output kW	Cp	No. of data sets (1 min. Avg.)	Standard uncertainty $s_i$ kW	Standard uncertainty $u_i$ kW	Standard uncertainty $u_{ij}$ kW
1	0.64	-0.03	-1.40	23	0.0001	0.1300	0.1300
2	1.06	-0.03	-0.30	150	0.0002	0.1299	0.1299
3	1.53	-0.03	-0.10	404	0.0001	0.1299	0.1299
4	2.02	-0.03	-0.05	826	0.0010	0.1299	0.1299
5	2.50	-0.05	-0.04	1316	0.0028	0.1300	0.1300
6	3.01	-0.12	-0.05	1499	0.0050	0.1312	0.1313
7	3.51	0.08	0.02	1767	0.0099	0.1427	0.1430
8	4.00	0.71	0.14	1983	0.0153	0.2372	0.2377
9	4.49	1.56	0.21	2055	0.0187	0.3170	0.3176
10	4.99	2.46	0.24	1777	0.0226	0.3386	0.3393
11	5.49	3.44	0.26	1467	0.0256	0.3824	0.3833
12	5.99	4.43	0.25	1261	0.0310	0.3979	0.3991
13	6.49	5.44	0.24	1034	0.0329	0.4254	0.4267
14	6.98	6.30	0.23	793	0.0353	0.3943	0.3959
15	7.48	7.14	0.21	596	0.0383	0.4006	0.4024
16	7.98	7.91	0.19	380	0.0458	0.3805	0.3833
17	8.49	8.61	0.17	248	0.0561	0.3674	0.3717
18	8.98	9.16	0.16	165	0.0607	0.3177	0.3234
19	9.46	9.67	0.14	105	0.0677	0.3131	0.3203
20	9.99	10.29	0.13	73	0.0813	0.3549	0.3641
21	10.50	10.51	0.11	67	0.0677	0.2022	0.2132
22	11.02	10.69	0.10	39	0.0682	0.1888	0.2007
23	11.51	10.81	0.09	42	0.0791	0.1791	0.1958
24	12.02	10.93	0.08	41	0.0629	0.1762	0.1871
25	12.51	10.67	0.07	45	0.1287	0.2302	0.2637
26	12.97	10.74	0.06	29	0.0779	0.1675	0.1848
27	13.52	10.47	0.05	32	0.0761	0.2309	0.2432
28	14.06	10.26	0.05	36	0.0657	0.2132	0.2231
29	14.53	9.82	0.04	47	0.0669	0.3766	0.3825
30	14.98	9.54	0.03	50	0.1331	0.2841	0.3137
31	15.52	9.42	0.03	35	0.1062	0.1757	0.2053
32	16.00	8.79	0.03	17	0.3461	0.5527	0.6521
33	16.50	9.07	0.02	22	0.1154	0.2836	0.3061
34	16.98	8.76	0.02	15	0.1102	0.3165	0.3351
35	17.50	8.69	0.02	6	0.0000	0.1620	0.1620
36	17.89	7.91	0.02	3	0.0000	0.8911	0.8911
37	18.42	8.69	0.02	4	0.0000	0.6871	0.6871
38	19.24	8.12	0.01	1	0.0000	0.3612	0.3612
39	19.50	0.00	0.00	0	0.0000	0.1299	0.1299
40	20.00	0.00	0.00	0	0.0000	0.1299	0.1299
41	20.50	0.00	0.00	0	0.0000	0.1299	0.1299
42	21.00	0.00	0.00	0	0.0000	0.1299	0.1299
43	21.50	0.00	0.00	0	0.0000	0.1299	0.1299
44	22.00	0.00	0.00	0	0.0000	0.1299	0.1299
45	22.50	0.00	0.00	0	0.0000	0.1299	0.1299
46	23.00	0.00	0.00	0	0.0000	0.1299	0.1299
47	23.50	0.00	0.00	0	0.0000	0.1299	0.1299
48	24.00	0.00	0.00	0	0.0000	0.1299	0.1299
49	24.50	0.00	0.00	0	0.0000	0.1299	0.1299
50	25.00	0.00	0.00	0	0.0000	0.1299	0.1299

The power curve resulting from this date is given in Figure 11:

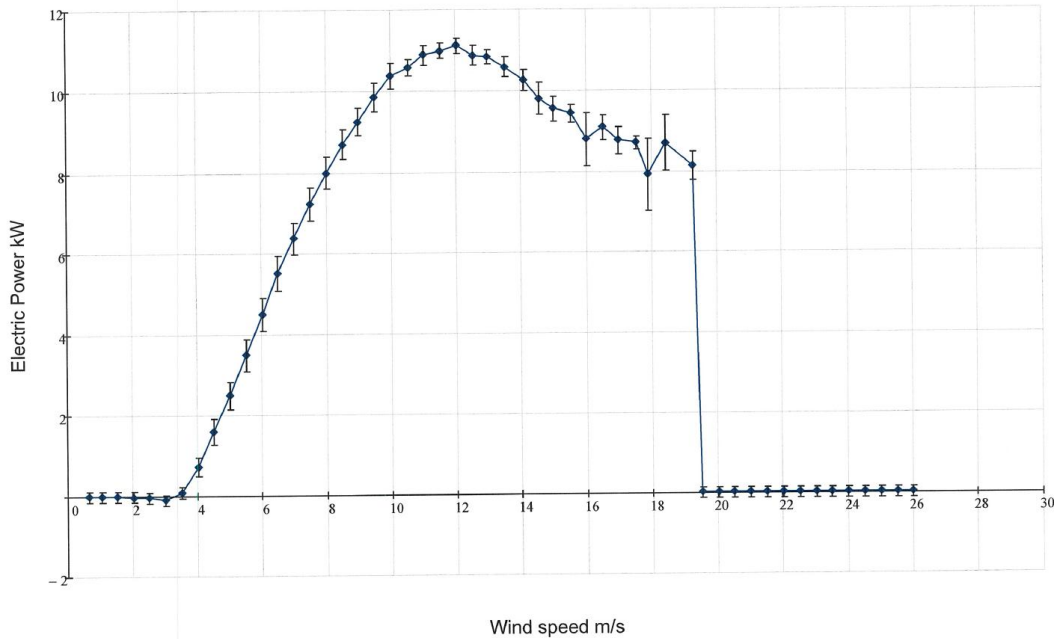


FIGURE 11 MEASURED POWER CURVE BASED ON BIN-AVERAGED RESULTS (DATABASE B)

## 2.2 Annual Electricity Production, AEP

The report gives the Estimated Annual Electricity Production in table 8:

TABLE 8 ESTIMATED ANNUAL ENERGY PRODUCTION (DATABASE B)

Estimated Annual Energy Production (database B) Reference Air density: 1.225 kg/m <sup>3</sup> Cut-out windspeed: 25 m/s (extrapolation by constant power from last bin)				
Hub height annual average wind speed (Rayleigh) m/s	AEP-measured (measured power curve) kWh	Standard uncertainty in AEP kWh	Standard uncertainty in AEP %	AEP- extrapolated (extrapolated power curve) kWh
4	16220	2069	12.8	16220
5	27502	2345	8.5	27502
6	37959	2471	6.5	37959
7	46527	2519	5.4	46527
8	52783	2537	4.8	52783
9	56709	2541	4.5	56709
10	58567	2529	4.3	58567
11	58764	2498	4.3	58764

### **2.3 BWEA Reference power**

The BWEA Reference Power is defined as: The wind turbine's power output at 11.0 m/s (24.6 mph) per the power curve from BS EN 61400-12-1. From the table in section 2.1 it can now be read:

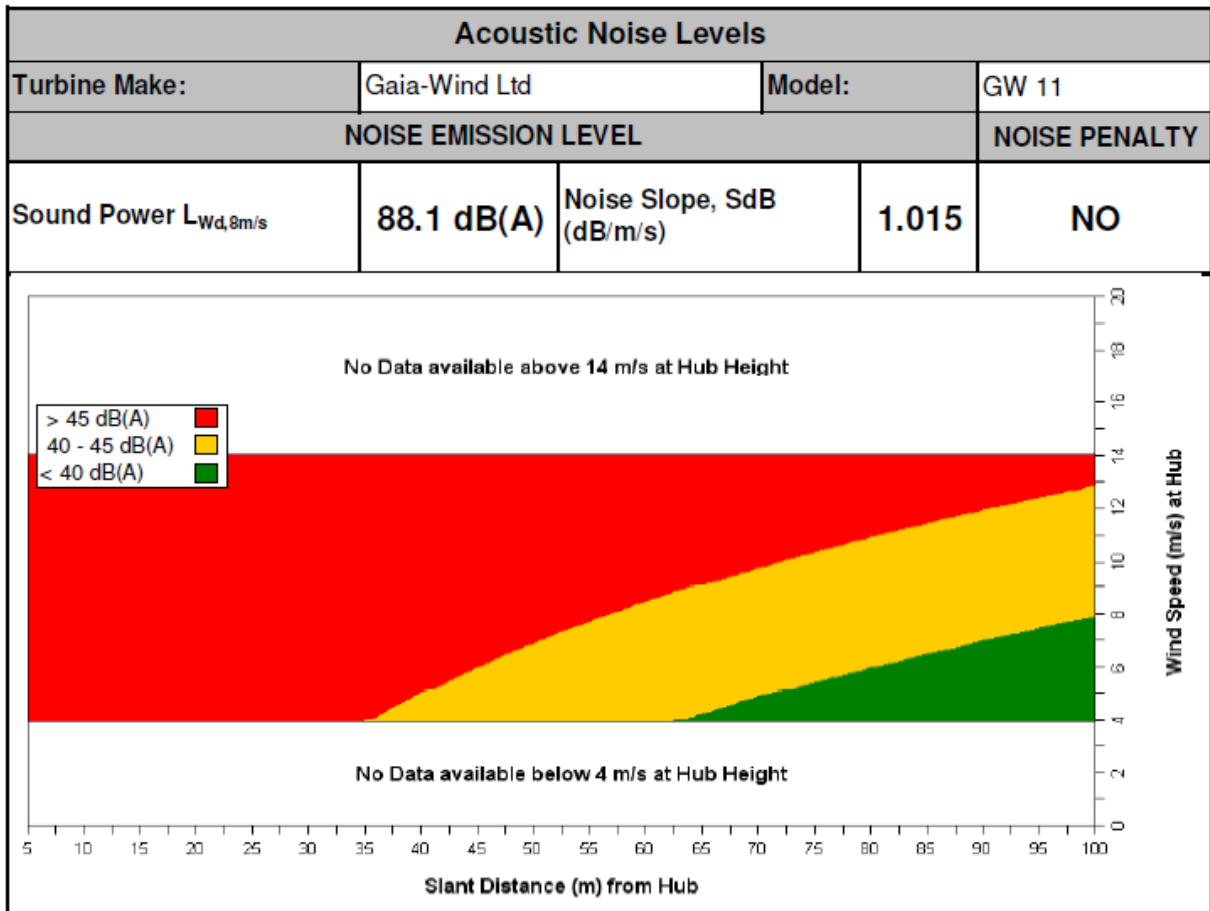
BWEA Reference Power for GW 133-11 turbine is 10.69 kW.

### 3 Noise Immission

The noise measurements on the GW 133-11 wind turbine (previously called the Gaia Wind 11 kW) are done by Hayes McKenzie partnership and reported in: HM 2064/R1.

#### 3.1 Noise Label

The report gives the Noise label in Appendix F:



#### 3.2 Measured Sound Power Levels

The report in section 8.1, gives the following Immission Sound Pressure Levels at given Distance for a reference wind speed of 8 m/s:

at 60 m	$L_{p,60m}$	44.6 dB(A)
at 25 m	$L_{p,25m}$	52.1 dB(A)