

**Westmill Wind Farm
Performance Review**

Dec-2017

Actual Export	969,459
Budget	1,266,587
% of budget met	77%
Line Loss	3%

General		
Period	Dec-17 Days	31

	Sub-Total	Total
Operation		
Availability of Turbine Data	99.9	97.6 %
Period Hours	3,720.00	431,325 Hours
Turbine Ready	3,187.00	412,988 Hours
Turbine Not Ready	532.8	13,177 Hours
Generator Hours	2,710.60	327,791 Hours
Base Hours	3,719.20	425,901 Hours

Production at Turbines		
Net Energy Production	1,004,015	103,672,094 kWh
Potential Production	1,004,015	103,672,902 kWh
Average Production	370.4	316.3 kW

Production at SubStation		
Active Energy Import	3,525	698,489 kWh
Active Energy Export	969,459	9,558,779 kWh
Reactive Energy Import	367,341	1,852,360 kVArh
Reactive Energy Export	456	1,593,084 kVArh

Reliability		
Manufacture Availability	85.7	96.9 %
Standard Availability	85.7	96.6 %
Commercial Availability	85.7	95.7 %
Capacity Factor	20.3	18.1 %
Wind Farm Availability	85.7	97 %
Wind Availability	59.7	50.2 %
Actual / Potential energy	100	100 %

Summary	
T1	gear oil temperature warning several times.
T2	continues to suffer downtime due to hub communication fault. New hub cables on order. Excessive lead time to replace cable. Lost approx 102,000 kWh over the month.
T3	vibration nacelle & gear oil temperature warning.
T4	continues to suffer from a spurious generator over-speed fault, occurs when turbine stops for low winds. Pitch speed to be investigated. Lost approx 116,000 kWh.
T5	no errors.

**Daily output
Dec-17**

Export Active Energy Period	Total [kWh]	Period	Total [kWh]	T01 [kWh]	T02 [kWh]	T03 [kWh]	T04 [kWh]	T05 [kWh]	T2 lost output [kWh]	T4 lost output [kWh]
12/31/2017	94,927	12/31/2017	96,794	22,012	22,720	22,570	7,240	22,252		15,149
12/30/2017	92,959	12/30/2017	94,901	14,924	20,573	20,447	18,404	20,553		2,120
12/29/2017	58,016	12/29/2017	59,547	12,873	12,326	12,198	9,860	12,290		2,562
12/28/2017	13,801	12/28/2017	14,811	3,401	3,211	3,296	1,793	3,110		1,462
12/27/2017	49,469	12/27/2017	44,506	7,680	3,022	15,572	2,022	16,210	12,869	13,869
12/26/2017	15,296	12/26/2017	22,469	2,664	2,081	8,574	164	8,986	6,699	8,616
12/25/2017	50,475	12/25/2017	51,716	4,556	3,096	22,624	0	21,440	18,936	12,929
12/24/2017	51,315	12/24/2017	52,678	12,056	12,920	13,430	1,506	12,766		11,287
12/23/2017	29,218	12/23/2017	30,440	6,120	6,611	6,913	3,300	7,496		3,485
12/22/2017	1,919	12/22/2017	2,261	448	528	600	287	398		207
12/21/2017	20,930	12/21/2017	22,078	4,346	4,604	5,008	2,844	5,276		1,965
12/20/2017	5,340	12/20/2017	6,244	1,092	1,393	2,024	265	1,470		1,230
12/19/2017	8,112	12/19/2017	9,248	1,598	2,028	2,398	1,542	1,682		385
12/18/2017	1,421	12/18/2017	1,850	573	64	594	65	554		381
12/17/2017	33,920	12/17/2017	35,029	7,526	6,042	8,253	5,210	7,998		2,245
12/16/2017	5,935	12/16/2017	6,589	2,239	626	1,549	160	2,015	1,308	1,774
12/15/2017	40,537	12/15/2017	41,665	12,039	840	11,424	5,198	12,164	11,036	6,678
12/14/2017	48,597	12/14/2017	49,891	11,378	3,678	12,560	9,625	12,650	8,518	2,571
12/13/2017	51,743	12/13/2017	53,001	14,706	1,090	14,217	9,208	13,780	13,144	5,026
12/12/2017	13,395	12/12/2017	14,224	4,559	4,200	1,764	20	3,681	-865	3,315
12/11/2017	46,049	12/11/2017	47,322	11,112	4,468	11,500	9,070	11,172	6,793	2,191
12/10/2017	12,506	12/10/2017	13,334	2,162	1,585	3,899	1,282	4,406	1,904	2,207
12/09/2017	8,940	12/09/2017	9,895	2,799	2,375	1,468	856	2,397		1,668
12/08/2017	25,982	12/08/2017	27,155	8,275	2,580	6,038	3,489	6,773	5,695	3,540
12/07/2017	70,228	12/07/2017	71,862	18,590	4,256	15,720	15,300	17,996	14037	2,993
12/06/2017	58,680	12/06/2017	60,263	14,280	11,640	14,253	6,928	13,162	2,258	6,970
12/05/2017	8,054	12/05/2017	8,998	1,708	1,788	2,158	1,524	1,820		
12/04/2017	1,560	12/04/2017	1,940	842	258	390	38	412		
12/03/2017	6,850	12/03/2017	7,975	2,476	1,538	1,505	419	2,037		1,470
12/02/2017	1,663	12/02/2017	2,327	676	375	512	250	514		
12/01/2017	41,622	12/01/2017	43,002	9,092	6,232	10,114	7,610	9,954	3,488	2,110
Totals	Totals									
Average	31,273	Average	32,388	7,058	4,798	8,180	4,048	8,304		
Sum	969,459	Sum	1,004,015	218,802	148,748	253,572	125,479	257,414	105,821	120,402
			100.0%	21.8%	14.8%	25.3%	12.5%	25.6%		

WESTMILL YEAR TO DATE PRODUCTION

2017/2018						
PRODUCTION PER TURBINE						
	T1	T2	T3	T4	T5	Total
Nov-17	158,858	84,168	163,082	121,599	149,719	677,426
Dec-17	218,802	148,748	253,572	125,479	257,414	1,004,015
Jan-18						0
Feb-18						0
Mar-18						0
Apr-18						0
May-18						0
Jun-18						0
Jul-18						0
Aug-18						0
Sep-18						0
Oct-18						0
Total	377,660	232,916	416,654	247,078	407,133	1,681,441
%	22.5%	13.9%	24.8%	14.7%	24.2%	100.0%

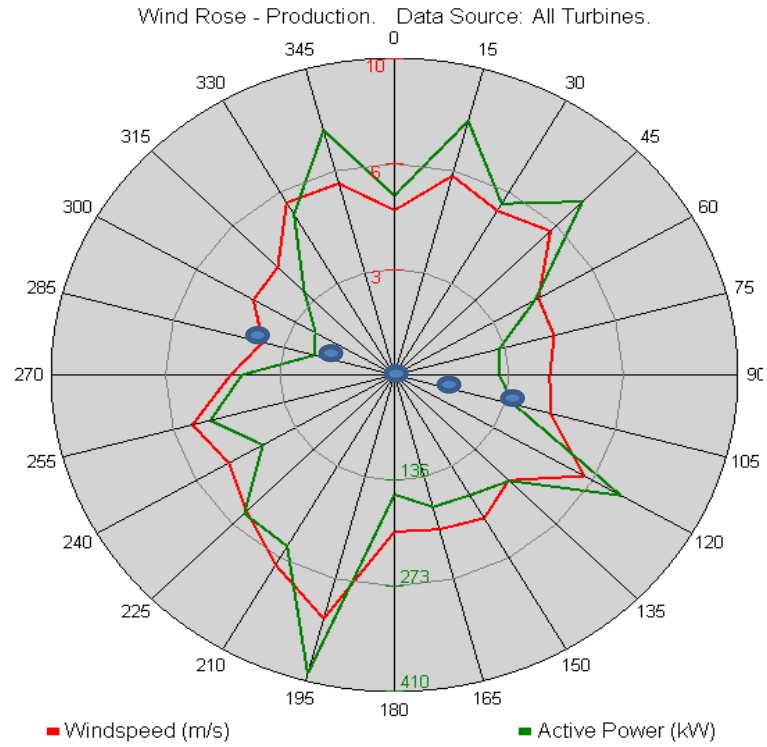
Estimated lost output in kWh due to mechanical failure and above 24 hours								Total after
	T1	T2	T3	T4	T5	Total	Line Loss	Line Loss
Nov-17		87,067		42,264		129,331	5,258.95	124,072
Dec-17		105,821		120,402		226,223	7,786	218,437
Jan-18						-	-	-
Feb-18						-	-	-
Mar-18						-	-	-
Apr-18						-	-	-
May-18						-	-	-
Jun-18						-	-	-
Jul-18						-	-	-
Aug-18						-	-	-
Sep-18						-	-	-
Oct-18						-	-	-

	YTD					Cumulative			Capacity Factor	Availability	Wind Speed m/s
	2017/2018					2017/2018					
	Actual Including Outages	Actual	Budget	Variance	Line Loss	Actual	Historic Average	Variance			
Nov-17	773,952	649,880	1,076,248	60.4%	4%	649,880	1,076,248	-40%	14.1%	89.8%	5.30
Dec-17	1,187,896	969,459	1,266,587	76.5%	3%	1,619,339	2,342,834	-31%	20.3%	85.7%	6.50
Jan-18			1,133,762	0.0%			3,476,597				
Feb-18			1,027,282	0.0%			4,503,878				
Mar-18			974,153	0.0%			5,478,031				
Apr-18			703,711	0.0%			6,181,741				
May-18			787,949	0.0%			6,969,690				
Jun-18			616,326	0.0%			7,586,016				
Jul-18			581,768	0.0%			8,167,784				
Aug-18			615,956	0.0%			8,783,740				
Sep-18			605,363	0.0%			9,389,103				
Oct-18			859,843	0.0%			10,248,946				
TOTAL	1,961,848	1,619,339	10,248,946	15.8%	3.75%				17.2%	87.8%	5.90

estimated figure

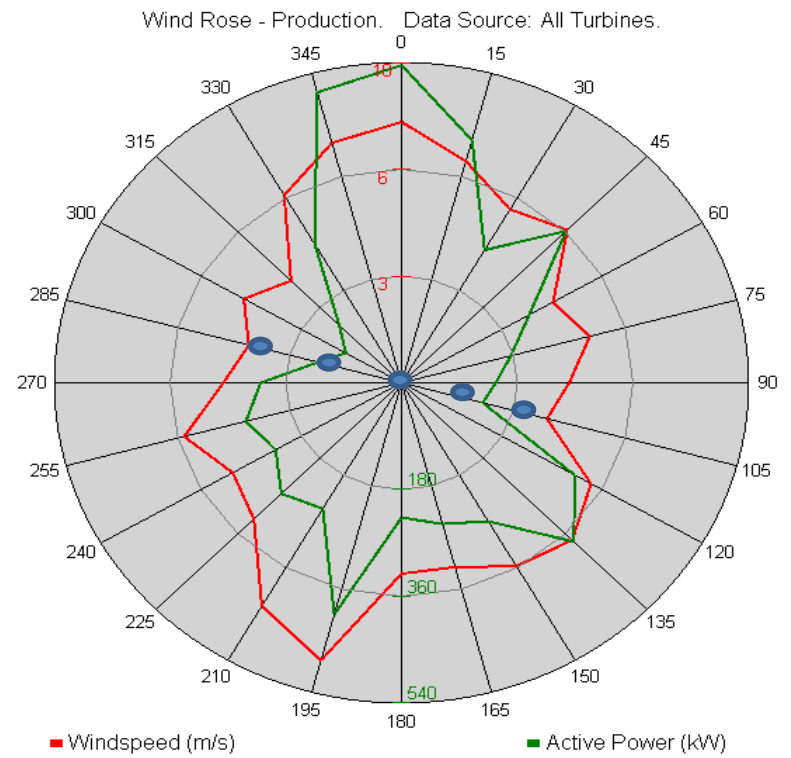
	Historic data										GH P90 Budget	
	Average	2016/2017	2015/2016	2014/2015	2013/2014	2012/2013	2011/2012	2010/2011	2009/2010	2008/2009		2007/2008
Nov	1,076,248	781,305	1,696,830	668,345	725,115	826,190	838,750	1,040,420	1,938,119	1,171,155		1,113,177
Dec	1,266,587	624,160	2,311,565	1,480,305	1,460,625	1,377,105	1,724,080	498,995	1,010,235	912,210		1,246,274
Jan	1,133,762	535,350	1,423,810	1,606,080	1,472,935	1,001,975	1,297,035	1,041,950	683,190	1,141,535		1,355,172
Feb	1,027,282	1,173,945	1,481,015	864,905	2,024,105	679,390	728,005	1,161,200	622,215	510,755	160,710	1,234,187
Mar	974,153	1,249,020	1,041,140	1,076,865	839,245	1,004,105	470,930	589,550	915,735	1,032,800	1,522,135	1,197,875
Apr	703,711	348,540	604,495	532,085	540,620	1,344,095	994,110	634,940	637,085	483,385	917,750	943,781
May	787,949	584,685	538,250	969,785	766,650	915,240	634,345	1,202,020	380,665	1,202,895	684,955	846,983
Jun	616,326	743,105	362,010	735,295	211,075	848,440	1,121,805	795,565	268,615	348,430	728,960	750,185
Jul	581,768	452,725	653,240	637,240	338,445	370,585	575,445	460,895	619,750	967,500	741,855	701,786
Aug	615,956	380,415	591,750	517,790	628,115	510,790	581,425	513,435	671,210	761,260	1,003,370	725,985
Sep	605,363	468,140	659,320	358,825	178,425	395,320	750,075	1,079,775	694,335	777,250	692,165	859,070
Oct	859,843	908,395	398,535	396,475	1,049,530	1,173,090	859,350	1,231,920	853,350	567,510	1,160,270	1,125,277
Total	10,248,946	8,249,785	11,761,960	9,843,995	10,234,885	10,446,285	10,575,355	10,250,665	9,294,504	9,876,685	7,612,170	12,099,750
		78.64%	112.12%	93.84%	97.56%	99.58%	100.81%	97.72%	88.60%	94.15%		

Wind Rose



YTD Wind Rose (from Nov 2017)

● Direction of Turbines



1st - 31st December 2017