

# REF

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## RENEWABLE ENERGY FOUNDATION

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### Information Note

28.06.11

#### ***Scottish Wind Power Constraint Payments Update***

##### **Introduction**

Following work on the high constraint payments made to Scottish wind power in April, and subsequent coverage in the press,<sup>1</sup> REF has continued to monitor the situation in May and June. The Department of Energy & Climate Change had described the events in early April as “unusual”,<sup>2</sup> and we were interested to determine whether this was in fact the case.

##### **Constraint Payments Made to Wind Power in April, May and June 2011**

At the end of April, total constraint payments to wind power generators, from the initial testing on 30 May 2010<sup>3</sup> to April 30, 2011, amounted to approximately £1 million.

Constraint payments in May 2011 totalled £2.6 million.

Constraint payments to wind power in June amount to £0.67 million.

At the time of writing (26.06.11) there have been no further constraint payments since 17.06.11. Wind farm constraint payments to date total £4.36 million.

The average price per MWh constrained amounted to £215, with the range being £150 to £800. These figures are high by any standards, and considerably in excess of the income

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<sup>1</sup> Jonathan Leake and Mark Macaskill, “Wind farms paid £900,000 to turn off”, *Sunday Times* (01.05.11). See: [http://www.thesundaytimes.co.uk/sto/news/uk\\_news/Environment/article616251.ece](http://www.thesundaytimes.co.uk/sto/news/uk_news/Environment/article616251.ece).

<sup>2</sup> <http://www.bbc.co.uk/news/uk-scotland-13253876>

<sup>3</sup> Robert Mendick, “Firms paid to shut down wind farms when the wind is blowing”, *The Telegraph* (19.06.10). See: <http://www.telegraph.co.uk/earth/energy/windpower/7840035/Firms-paid-to-shut-down-wind-farms-when-the-wind-is-blowing.html>

which the wind farm would lose through being unable to supply its electricity to the system, which would be approximately £55/MWh at most. This lost income comprises the Renewables Obligation Certificate (ROC) foregone, worth approximately £50 per MWh,<sup>4</sup> plus the Climate Change Levy Exemption Certificate (LEC), which is worth approximately £4.85.<sup>5</sup>

In respect of the actual electrical energy which would have been generated, a constrained off generator does not lose that income, and wind farms are treated no differently. The electricity system operator (National Grid) credits the generator's account with the missing MWhs, as if they had been generated, therefore no generation revenue is foregone.<sup>6</sup> Indeed, a conventional generator that is constrained off the system actually pays the system operator a sum that reflects the fuel saved by that generator.

Only a limited number of grid-connected wind farms submit bids that indicate they are prepared to be constrained off. Table 1 lists the sites and owners with their bid prices at the time of writing (26.06.11).<sup>7</sup> A map showing the location of these wind farms is at Appendix 1.

It would appear that the April 2011 constraint payments were not "unusual", as the Department of Energy and Climate Change at first suggested, but are an indication of an ongoing structural problem in the network, or a market flaw.

We note that between April and May 2011, for reasons that are unclear to us, Falck Renewables dropped its bid price from £800 per MWh to reduce output to £200 per MWh, which is welcome from the consumer perspective though the price still exceeds the income lost by a factor of nearly four.

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<sup>4</sup> The ROC value derives from the buy-out price plus the ROC recycle value which varies from year to year. For specific annual ROC values, see the Ofgem RO annual reports which are downloadable from <http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/Pages/RenewablObl.aspx>. ROCs are also tradeable and have a market value – for recent prices see <http://www.e-roc.co.uk/trackrecord.htm>

<sup>5</sup> With effect from 1 April 2011, a LEC is worth £4.85 per MWh see : <http://www.ofgem.gov.uk/Sustainability/Environment/cclrenexem/Pages/CCLRenewablesExemption.aspx>

<sup>6</sup> For an introduction to how the electricity balancing services work see : [http://www.elexon.co.uk/ELEXON%20Documents/electricity\\_trading\\_arrangements\\_a\\_beginners\\_guide.pdf](http://www.elexon.co.uk/ELEXON%20Documents/electricity_trading_arrangements_a_beginners_guide.pdf)

<sup>7</sup> See bid offer data on [http://www.bmreports.com/servlet/com.logica.neta.bwp\\_PanBMUData](http://www.bmreports.com/servlet/com.logica.neta.bwp_PanBMUData)

**Table 1:** Details of constraint payments. Bid price is as at 26.06.11, and with the total volumes and costs being for the period May 2010 to 26 June 2011.

Owner	Bid Price (£/MWh)	Wind Farm	Volume Constrained Off (MWh)	Cost (£,000)
Falck Renewables	£300	Kilbraur	355	107
		Millennium	786	205
RWE nPower	£200	An Suidhe	324	66
		Farr	3,213	847
Scottish Power	£180	Beinn Tharsuinn	952	170
		Black Law	1,860	332
		Dun Law,	-	-
		Mark Hill	-	-
		Whitelee	7,268	1298
SSE Renewables	£150	Hadyard Hill	8,990	1338
		Toddleburn	-	-
<b>Total</b>			<b>23,747</b>	<b>4,364</b>

## Wind Power Constraint and Energy Flows on the Anglo-Scottish Interconnector

Importantly, on the 23<sup>rd</sup> of May between 14:40 and 17:10 BST National Grid was simultaneously transferring English electricity to Scotland and also paying two Scottish wind farms to reduce generation.

The two wind farms, Hadyard Hill and An Suidhe 1, were paid approx £34,000 for that period. The volume of electricity in MWh imported from England appears to be approximately the same as that constrained off in Scotland.<sup>8</sup>

Strong westerly gales were experienced in Scotland on 23 May with power cuts, severe disruptions and wind speeds of up to 80mph (35m/s) being reported.<sup>9</sup> These wind speeds are in excess of the cut-out wind speeds for the safe operation of most wind turbines and, thus, it would be expected that some of the Scottish wind farms would have been shut down by their owners.

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<sup>8</sup> <http://www.nationalgrid.com/uk/Electricity/Data/Realtime/Demand>

<sup>9</sup> <http://www.bbc.co.uk/news/uk-scotland-highlands-islands-13499503>

That this is likely to have occurred can be detected by comparing the wind forecast by NG with the out-turn wind generation. UK wind was forecast to provide approximately 3 GW from midday onward on the 23<sup>rd</sup> of May. In fact, the generation was nearly 1 GW less than this and the generation fell by 892 MW between 08:30 and 14:30 when wind generation was at its lowest for the day.

This reduction in wind power output is illustrated in the latest National Grid Operational Forum note which shows the fall in output of five wind farms over the period of the most extreme weather conditions, followed by a gradual but uneven return to production.<sup>10</sup>

An enforced shut-down of Scottish wind farms would account for the necessity to import electricity from England, but it is difficult to understand why it was necessary to make constraint payments to reduce output from some Scottish wind farms at the same time.

Such situations also raise the question as to whether the system operator can have sufficient information to know when such constraint payments are in fact unnecessary because wind speeds are such as to require an emergency wind farm shut down in any event, thus removing the wind farm from the system at no cost.

### **Accuracy of Final Physical Notification (FPN)**

In order to balance the grid, National Grid relies on generators to provide accurate Final Physical Notifications (FPNs) of how much energy they expect to produce in the next half hour. It is likely that the high and gusty winds in Scotland in May will have caused wind farm generators to submit significantly inaccurate FPNs. In other words, wind farms may have both over- and under-delivered relative to their FPNs; indeed the NG operational forum note implies that indeed there were problems in this area.<sup>11</sup>

Inaccuracies in a generator's Final Physical Notification have a significant adverse impact on balancing costs because they can result in National Grid being forced to call on the most flexible generating plant to make up any shortfall, and such plant commands premium prices.

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<sup>10</sup> See page 14 of the latest NG Operational Update at : [http://www.nationalgrid.com/NR/ronlyres/4F36C90C-45E9-4178-B414-9B6B316EB8B7/47206/02\\_OperationalUpdate.pdf](http://www.nationalgrid.com/NR/ronlyres/4F36C90C-45E9-4178-B414-9B6B316EB8B7/47206/02_OperationalUpdate.pdf)

<sup>11</sup> See page 15 of [http://www.nationalgrid.com/NR/ronlyres/4F36C90C-45E9-4178-B414-9B6B316EB8B7/47206/02\\_OperationalUpdate.pdf](http://www.nationalgrid.com/NR/ronlyres/4F36C90C-45E9-4178-B414-9B6B316EB8B7/47206/02_OperationalUpdate.pdf)

## Conclusion

The volume of constraint payments in April and May, and early June 2011, together with the fact that Scotland had to import electricity at the same time as constraining some wind power off the system, suggests National Grid was struggling to balance the grid in Scotland at reasonable cost to the consumer. This prolonged period of difficulty raises several important questions:

- Were wind power generators acceptably accurate at times of system stress in delivering the electricity promised in their Final Physical Notifications.
- If wind power's Final Physical Notifications were not sufficiently accurate, how can this situation be improved?
- Did wind power generators exacerbate system operational problems?
- Why were constraint payments to wind power many times the subsidy lost?
- Is the electricity market functioning efficiently?

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## Appendix 1: Map

