Is wind power in the UK struggling to blow?

The Express and Daily Mail last week reported that UK wind power is failing to perform; citing research commissioned by the John Muir Trust. Full Fact looked further into the focus and conclusions of the report.

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"THE unreliability of wind power in Britain was exposed yesterday in a shock report issued by – environmentalists... Over the past two years UK wind turbines metered by the National Grid ran at just 10 per cent of capacity for more than one-third of the time." **The Express, 7th of April.**

"A lot of hot air: Wind farms 'working at just 21 per cent of capacity'... A damning report from the John Muir Trust found the UK's heavily subsidised wind farms were working at just 21 per cent of capacity last year." **The Daily Mail, 7th of April.**

With the government looking to ramp up renewable energy generation in the UK to meet its carbon reduction targets, wind power has emerged as a favoured, but contentious, solution.

However, following the publication last week of a report on wind power commissioned by conservation group the John Muir Trust, the Express and the Daily Mail reported that the technology was failing to deliver.

The main conclusions reported in the papers, are that wind power is not producing the promised average levels of power and "cannot be relied upon" when electricity is most needed.

The Express and Mail reported that wind turbines only run at 10 per cent of capacity for more than one-third of the time, and at less than 20 per cent of their capacity for more than half the time. The Express goes on: "It said that once a week on average the wind dropped so low that the turbines produced enough energy for 'a mere 6,667 households to boil their kettles for a cup of tea.'"

Interested in understanding these findings better Full Fact decided to investigate further.

Analysis

The report, 'Analysis of UK Wind Power Generation', was researched by Stuart Young Consulting for the John Muir Trust.

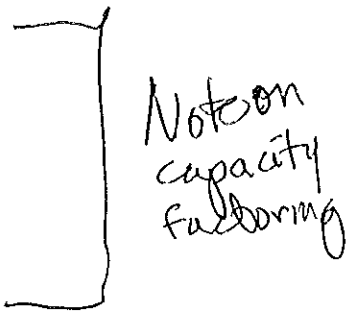
It is based on analysis of hard data from the national grid from November 2008 to December 2010. This detailed data records metered electricity at 5 minute intervals. National grid current data is accessible from BMRS reports, and historical data can be found at ELEXON.

Around 50 per cent of UK wind energy is 'visible' to the national grid, passing through metered stations, of which a majority comes from onshore wind farms in the Scottish Highlands.

From this data, the report is able to calculate average output as a percentage of installed capacity. It puts output from wind at 27.18% of metered capacity in 2009, 21.14% in 2010, and 24.08% between November 2008 and December 2010 inclusive.

Over the whole data period, wind power capacity was:

- below 20% of capacity more than half the time.
- below 10% of capacity over one third of the time.
- below 1.25% capacity for the equivalent of just under one day a month.



These figures are based on official hard data that is independently verifiable; however, the conclusions reached by the report need to be considered alongside a number of points of context.

The report was looking solely at wind power that is 'visible' and metered by the national grid, which accounts for around half of total UK wind power generation. Offshore wind farms and some onshore farms that are connected onto the distribution network are not metered.

The report is therefore only representative of the performance of onshore wind, with a strong geographical focus on Scotland.

This geographical limitation means that conclusions on the performance and variability of wind generation cannot be generalised across the UK. Variability at a UK wide level would be 'smoothed' by the wider geographical spread of all wind farms.

An issue also surrounds the calculation of the total installed capacity of metered wind farms. The national grid updates this figure several times a year; yet, each period's figure will include capacity expected to come online, but not yet generating power. Further, new turbines may also come online before they are included in the total capacity figure. These differences between actual and stated capacity will distort calculated wind performance to appear better or worse than reality.

We asked Stuart Young Consulting about the issue. In a statement they said that they believed this distortion weighed more heavily towards new turbines generating power that are not included in the total capacity figure yet. However, we have no way of independently verifying this.

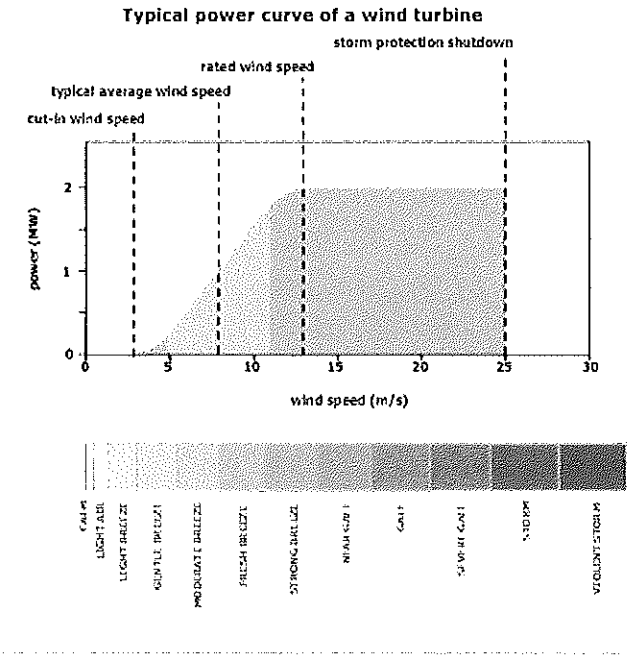
A further important issue arises from network constraints due to inadequate transmission circuitry. Because wind farms are a recent addition to the UK national grid, the infrastructure connected them to power distribution is not yet capable of accepting generation beyond certain levels.

Therefore when generation is too high wind turbines may be shut down temporarily, thus reducing their metered performance figures. This is most frequently a problem for onshore Scottish wind farms.

Because the Daily Mail and Express both suggest that the performance of the turbines relative to their full capacity casts doubts on its viability, it is worth looking at this issue of capacity in more detail. While operating at 20-30 per cent capacity may seem low, it is not the case that these turbines are ever expected to come close to operating at 100 per cent capacity.

Wind power capacity performance looks at achieved capacity as a percentage of a theoretical 100 per cent maximum of continual wind at the strongest levels for a turbine.

In reality, 100 per cent capacity is achieved infrequently. According to UK Renewables: "most wind turbines start generating electricity at wind speeds of around 3-4 metres per second (8 miles per hour); generate maximum 'rated' power at around 15 m/s (30mph); and shut down to prevent storm damage at 25 m/s or above (50mph).



According to the House of Lords Science and Technology Committee, in the UK capacity performance is predicted to stand at around 30 per cent. This is in comparison to an average of under 20 per cent in Germany and around 20 per cent in Denmark.

Data on the performance of all wind power across the UK is compiled by the Department for Energy and Climate Change. This data is averaged and adjusted to only include capacity that has been generating for the full period.

The table below shows the percentage of potential capacity achieved for all UK wind power:

Year	2005	2006	2007	2008	2009

Onshore wind % capacity	28.1	26.7	27.3	29.4	26.9
Offshore wind % capacity	-	27.5	28.3	34.9	33.7

The 2010 Energy statistics also note that 2010 saw onshore wind speeds below the ten year wind speed average; explaining the lower 2010 figures found by the Stuart Young report.

Conclusion

The data on wind power reported by the Express and the Daily Mail does accurately reflect a report that in turn is based on official data.

However, the reporting in both papers fail to point out that the report can only be seen to reflect the performance of wind farms mostly situated onshore in Scotland.

Further, issues around measuring the installed capacity and grid infrastructure limitations make it difficult to measure metered wind turbine performance with certainty.

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A more comprehensive UK data set of wind turbine performance is produced by the Department for Energy and Climate.

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