

## Questions and answers for wind generation in Scotland by J Mark Gibson March 2010

1. What is Scotland's target for renewable energy?  
31% of electricity generation from renewables by 2011 and 50% by 2020. Also a reduction in greenhouse gas emissions of 50% by 2030 and 80% by 2050.
2. What steps is the Scottish Government taking to achieve this?  
Wind farms to produce electricity are overwhelmingly the largest stated means of achieving targets.  
Promotion of building insulation and measures to reduce vehicle exhausts and a not strong enough promotion of research into marine based renewables. At the moment, insufficient even to compensate for increases in energy demand.
3. Can wind power achieve 50% and 80% targets for reducing CO<sub>2</sub> emissions?  
No, for the reasons given below.
4. What is the percentage of global CO<sub>2</sub> emissions accounted for by Scotland?  
Less than 0.17%
5. What proportion of Scotland's CO<sub>2</sub> emissions is attributable to electricity generation?  
15%. So even if all electricity were to be produced by wind farms, the maximum reduction in CO<sub>2</sub> emissions would be 15%, very well short of the 50% and 80% targets.
6. What is the capacity factor of windfarms?  
25% - 30%. This means that the average output from say a 100 MW turbine would be equivalent to the output of a 30 MW turbine operating continuously at full power over the same period of time
7. Wind speeds within a broad range from below 15 mph and above 45mph are not useable. Due to the intermittency of wind blowing at the right speeds for the turbines to operate, what would happen if all of our electricity was produced by wind farms?  
At times, there would be no outputs from wind farms, which would cause disastrous power failure.
8. Given its intermittent output, how much electricity can be generated by wind farms without destabilising the National Grid or causing lengthy power cuts?  
15% - 20% at the maximum.
9. So how great a reduction in CO<sub>2</sub> emissions can be achieved by wind farms?  
15% of 15% = 2.25% or a possible maximum of 3%, compared with targets of 50% - 80%.

10. What would be Scotland's contribution to reducing global CO<sub>2</sub> emissions should this maximum electricity generation from wind farms occur?

2.25% of 0.17% (see 4 above) = 0.0038% In practice, transmission losses and other factors might reduce this to about 0.002%.

11. With CO<sub>2</sub> emissions from countries such as India and China increasing fast, how long would it be before Scotland's reduction would be eclipsed?

A matter of weeks at most.

12. Is Scotland self sufficient in terms of electricity generation?

Yes, we are a net exporter. In addition, wind farms are merely duplicating capacity that we already have and will continue to require for the times when there is no output from wind (see 8 above).

13. Is the British Wind Energy Association (BWEA) so greatly relied upon by the Government, an objective and scientifically based body?

No, it is the mouthpiece of the commercial wind farm developers.

14. Can claims from the BWEA be relied upon?

No. In December 2008, following a number of individual complaints, the Advertising Standards Agency censured the BWEA for falsely claiming that windfarms result in a reduction of 860 grams of CO<sub>2</sub> emission per kilowatt hour generated. The true figure is 430 grams. This exaggeration by 100% means that twice as many turbines than they claim would be needed to meet any CO<sub>2</sub> emissions targets. This exaggeration means that twice as many turbines would be needed to meet any CO<sub>2</sub> emissions targets.

15. If, as shown above, wind farms achieve nothing material in terms of CO<sub>2</sub> emissions reduction in or energy security, can they be justified in terms of setting an example?

No. They are a very bad example as they do not deliver, are very expensive for the consumer and disfigure our greatest natural asset – our landscape. They create very few jobs and imperil thousands through harm to tourism. In terms of reducing CO<sub>2</sub> they are hugely expensive and could be claimed to divert resources away from much more cost effective ways of reducing CO<sub>2</sub> such as better insulation, better public transport, more efficient cars.

16. Do wind farm create jobs?

Despite claims by developers, almost none once construction is complete. As the Sunday Times said in July this year, 'The huge increase in electricity prices resulting from wind farm support will force energy intensive industries to quit Britain for countries where energy is cheaper. That will wreck what is left of Britain's manufacturing, and destroy jobs and investment. This is worse than a futile gesture; it is immoral.'

17. Do scientists and independent engineers support wind farms?

No. In May this year Professor Steinberger, Nobel Prize winning director of the CERN particle physics laboratory in Geneva, said that European Governments, including Britain, should 'scrap their support for wind energy as soon as possible'.

18. Do wind farms pose any threat to the health of people living nearby?

A new study by Dr Nina Pierpont, a leading New York paediatrician shows that the low frequency noise produced by wind turbines can harm cognitive development in the young and cause heart disease, panic attacks and migraines. Professor Lord May, former Chief Scientific advisor to the Government, has described her study as 'impressive, interesting and important'.

Particularly when lit at night, turbines can induce epilepsy. While the speed of the blades of a single turbine may be slow enough not to cause epilepsy, the fact that a cluster of turbines may be moving at different speeds and different angles causes a stroboscopic effect which does indeed induce the condition.

19. What is the experience of countries that have developed the greatest amount of energy from wind turbines?

Denmark, which pioneered wind farms and which has the greatest density of turbines, stated in June 2009 that their experience with them had been 'an unmitigated disaster'.

Germany has spent billions on wind power and recently announced that it has found it 'unreliable, expensive and ineffective at cutting emissions'.

Does Britain really want to follow suit, in the teeth of the evidence?

20. Should billions of pounds be spent on subsidising wind farms to avoid climate change?

No. In addition to all the reasons given above, if global warming is indeed caused by increased CO<sub>2</sub> emissions, renewables such as wind will make nearly no difference. If climate change is happening, money should be spent on mitigation, not on a King Canute attempt to stop the unstoppable.

21. If the National Grid cannot cope with more than 15% of its requirements coming from wind what would happen with any extra amount of electricity generated by wind farms in Scotland?

They would hope to sell it to England or Ireland. That in itself would require huge new transmission investment and many more pylons. Those countries will have their own reliable and clean and cheaper nuclear produced electricity and will not want to buy intermittently produced power which they cannot rely upon. It may be difficult to give it away. This is the experience of Denmark.

22. Wind turbines only operate at 25% - 30% capacity. What effect does their intermittent supply have on oil, gas and coal power stations?

Oil, gas and coal power stations only operate efficiently at full capacity. Their output is reduced when wind generated electricity enters the grid. This results in greater CO<sub>2</sub> emissions. When conventional base-load stations are required to make up the difference between windpower output and load then their efficiency will fall, and they will require more fuel to produce each kWh with a consequent increase in CO<sub>2</sub>. This is the opposite to the way base-load stations operate now, where the shortfall is made up by gas stations and hydro or pumped storage which can be brought on line quickly.

23. If 100% back up is needed from non-renewable power stations, to cover periods when wind farms are idle, what will happen if we don't replace our ageing conventional stations and rely on renewables during anti-cyclones? From 29/12/09 – 06/01/10 and 11/02/10 – 15/02/10 the Met Office's wind speeds taken together with turbine manufacturers data indicate that a UK wide installation would deliver less than 5% of its rated output for days on end with minima of 1%  
In these circumstances Scotland would be faced with importing, largely nuclear generated, power from England. This would be somewhat hypocritical, as well as requiring massive transmission line upgrades which would further desecrate our landscapes. The existing import capacity could not cope. The result would be blackouts or a huge investment in new transmission.

All of the facts given in this brief paper have been independently checked.

Simon Jenkins, the Chairman of the National Trust, has put it so well,  
“On-shore wind turbines are the most inefficient source of renewable energy and will spoil some of the most beautiful parts of the British countryside”.

A well meaning public and the Government have been duped by the commercial wind industry. It is time to face up to this and move on.