Submission to Federal Senate inquiry into the 'Social and economic impact of rural wind farms'.

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Efficacy of Wind farms

The discussion on the efficacy of wind farms has focussed on a number of claims. These are:

1. They cannot provide base load power
2. The capacity factor is lower than claimed
3. They do not reduce greenhouse gas emissions
4. The emissions from building a wind farm will never be reclaimed.
5. The reliability is poor
6. The lifetime is short.
7. They can never replace fossil fuels because power is not available when the wind is not blowing

To take these points in turn:

Base load power

At present the typical load on the Australian electricity grid is between 18,000 and 30,000 MW, a range of about 12,000 MW. The short term fluctuations within a working day are around 5,000 MW and over a 24 hour period, up to 10,000MW. At present the average output of wind turbines across Australia is about 550 MW and fluctuates by 1200 MW. Thus the variability of wind farm output is only about a quarter of the within-day load variation. As far as the generators are concerned, the load variations and wind turbine output variations are indistinguishable. The power system is built to deal with this fluctuation and the only effect is that the average load, and hence the greenhouse gas emissions, are lower.

Capacity factor

Critics claim that the capacity factor is as low as 19% or zero in the case of defunct turbines. Across Australia however the mean capacity factor for the year 2010 was 30%. This factor includes breakdowns, maintenance as well as the variable wind.

Greenhouse gas emission reduction

Any power fed into a large grid is indistinguishable from a load reduction. So there is a commensurate reduction in fuel required to generate the required electricity.

CO2 payback time

The emissions from building a wind farm can be estimated from the cost of building. In Australia, on average, $2000 of GDP results in the production of 1 tonne of CO2. So a $12 M wind farm such as

the Hepburn Wind community project will result in the production of approximately 6,000 tonnes of CO2. However such a project produces some 12,000 MWh per year of electricity. The Australian average CO2 emissions per MWh is 1 tonne. Based on the Australian average, 12,000 tonnes of CO2 will be saved per year. The payback period is therefore 6 months. This includes the manufacture of the turbines, transport, road building, installation, power lines, substation, commissioning and even the knock-on emissions of the workers employed on the project. For more information see *Australian Sustainable Energy – by the numbers*, downloadable from the Melbourne Energy Institute website:

http://energy.unimelb.edu.au/uploads/Australian_Sustainable_Energy-by_the_numbers3.pdf

Reliability

Turbine reliability is reflected in the overall capacity factor of the Australian wind farm industry – 30%. The factor includes downtime and repairs to all the turbines installed.

Turbine life

The design life of modern turbines is 25 years. The industry is now a mature industry and experience is sufficient to have confidence in this figure. The turbines for Hepburn Wind are guaranteed for 25 years.

When the wind doesn't blow

The penetration of renewable energy is limited without storage. However Hydro power can be used to store electricity when there is excess available by pumping water uphill, using the same turbines that are used to generate power. Although the potential for doing this is limited when there is insufficient water, the alternative is to build seawater reservoirs on the top of coastal cliffs. The water from the sea can then be pumped up and the energy can be drawn off when necessary and at the exact rate required. This is by far the most flexible form of power. It can be turned off and on in seconds.

For further information on seawater pumped storage refer to the submission to ACRE, attached. This information is also available in *Australian Sustainable Energy – by the numbers.*