THE WIND FARM SCAM

In the early 1980s, I was a Green believer – especially when it came to alternate power sources. I eagerly watched the progress of both wind and solar panel power generation. The Greens and an uncritical media had the average citizen believing that these technologies, although not competitive, were very close to competing with conventional power sources. The sales of solar hot water systems were booming, and I believed we had started the transition from the old to the new sources of electricity.

At the time I lived in Canberra which had, on average, 237 sunny days each year. My house faced north and more importantly, it had a flat unshaded roof that would allow me to position solar panels out of sight at the optimum angle and position to maximise their performance. With a family of five, I decided to buy a solar hot water system. The Green salesman pointed out the initial cost was four to five times more than a conventional hot water system, but the returns were phenomenal and I should break even within three years.

The system was installed by experts and worked well. I measured the savings year after year, and after eight years I could say with confidence that I would break even after twenty years not the three years I had been told. This of course assumed that the system would not require any maintenance in that time. Even minor maintenance would drive the breakeven point out to twenty five years. With my uncritical acceptance of a Green myth, I had been conned by the Greens and the Media!

Thirty years later, the same Green propaganda is selling the same message and most of the citizens still believe that the new technology is very near to competing with conventional power sources. From 1987, there were solar powered car races driven over 3,000 kilometres through the centre of Australia from Darwin to Adelaide. The improvements we saw from race to race, in both the technology and the car's performance reinforced the idea of the competitiveness of alternate power.

It is now time for a cold shower and a reality check. Alternate power is not competitive, nor close to competitive (e.g. within 20-50% of conventional power), but it is very, very, expensive. Although the figures will differ in different locations throughout the world, two examples will show you how expensive these technologies are. In 2011, in Canberra, alternate energy costs four times more than conventional power[1]. In Spain, their mix of modern solar and wind energy was eight times the cost of electricity produced by a modern conventional power plant[2].

Undeterred by the history and such facts, the Greens in Australia are planning to replace all conventional power generation with Green power within a few decades. Presently, their favoured choice is wind power. This Handout looks

at the reasons why this will never happen and discusses what Etherington[3] calls the "the wind farm scam".

UNDERSTANDING POWER REQUIREMENTS.

Many forget that there is still no effective way of storing large quantities of electric power (e.g. in large batteries). Consequently, a power station is continually responding to changes in demand for electricity. What is supplied has to be used straight away. In effect, the consumer as he turns on his kettle or heater has a direct connection with the power station and it reacts to this new demand nearly instantaneously.

If it cannot respond to this new demand, initially poor quality power is fed to everyone throughout the grid and then, if the unmet demand continues to rise, it will 'trip' the grid causing a widespread blackout. To prevent this occurring, operators in the power station will generally intervene, and shed power to one section of the community (a brownout) to minimise the number of people affected by this 'power failure'.

On buying generators for a power station, this fluctuating demand for power is the primary factor considered. The 'rated power' or 'installed power' is the maximum power a generator can supply working perfectly at its maximum rate. On buying a generator the 'rated power' for the generator must comfortably exceed the expected peak power loads for now, and for the remainder of the generator's life. To prevent occasional power blackouts, a safety margin is added to deal with the few but extraordinary power peaks in demand (e.g. air conditioners used in a heat wave).

Three other concepts need to be understood to discuss the requirements of power generation. Although power demands fluctuate there is always a 'baseload' for any generation supply system which is a continuous demand level below which the system never falls. This baseload level is a demand that is met 24/7 for months without failing.

The second is 'load-following ability'. This is the ability of the generators to be turned both up and down to meet all the demand fluctuations that occur above the baseload level and below the 'rated power' level. Without this ability, the power system would fail.

Finally, one measure of the efficiency of a generator system, or how well it is being used, is the 'load factor' (in the US this is called the 'capacity factor'). This is the amount of electricity that is generated over a significant amount of time, measured as a percentage of the power that could be generated in the same time at the 'rated power' level of use (i.e. maximum level). Most conventional power stations have a 'load factor' of 90%.

With the Greens' aim of replacing all conventional power generation with wind farms, we will now look at the problems this will cause.

WIND FARMS

A wind farm is made up of hundreds of wind turbines, each of which has its own generator providing electricity. The early wind turbines built in the 1980s produced little electricity and are now considered inefficient. There are two factors that govern the amount of energy that can be harvested from the wind. Wind speed which is a cubic function. That is, a doubling of wind speed will provide eight times more energy. Second, is the size of the rotor's sweep area. Doubling this area will double the energy being captured.

Consequently, as detailed in the following table, modern wind turbines now have a rotor diameter of 114 metres compared to the earlier models with a nine metre rotor diameter. This has resulted in the height of wind turbines growing from 15 metres to 198 metres. The size of a modern wind turbine dwarfs the size of a Boeing 747 jumbo jet aircraft standing on its tail (70 metre). These are not small structures.

Table 1 – Growth of Wind Turbines

SIZE	**Very Large**	**Large**	**Small Farm**	**Small Domestic**
E.g. Manufacturer - Model	Enercon E 112	Vesta V 80	Proven WT 15000	Windsave 1000
Rated Power (Installed Capacity)	4.5 – 6.0 MW	2.0 MW	15kW	1.25kW
Rotor Diameter **mtr.** (feet)	**114** (374)	**80** (262)	**9** (29.5)	**1.75** (5.7)
Total Max Height **mtr** (feet)	**198** (650)	**140** (459)	**15** (49)	
Rotor Speed rpm	Variable 8-13	Variable 9-19		
Blade Tip Speed **kph** (mph)	**173-281** (112-175)	**137-288** (84-176)		
Cut-in Wind Speed **kph** (mph)	**9** (5.6)	**14.5** (9)	**9** (5.6)	
Peak Output Wind Speed **kph** (mph)	**43** (27)	**54** (34)	**43** (27)	
Cut-Out Wind Speed **kph** (mph)	**100-122** (63-76)	**90** (56)	**43** (27)	**50** (31)

Source: Etherington, John, "*The Wind Farm Scam"*, Stacey International, London, 2009, p. 25. Speeds changed from m/s to kph by author.

With a rated power output of 5MW, you might think you would have to provide 200 modern wind turbines to replace just one conventional power station with a rated power output of 1GW. You would be wrong. Because the operators of a wind farm have no control over the wind, the average 'load factor' of wind farms

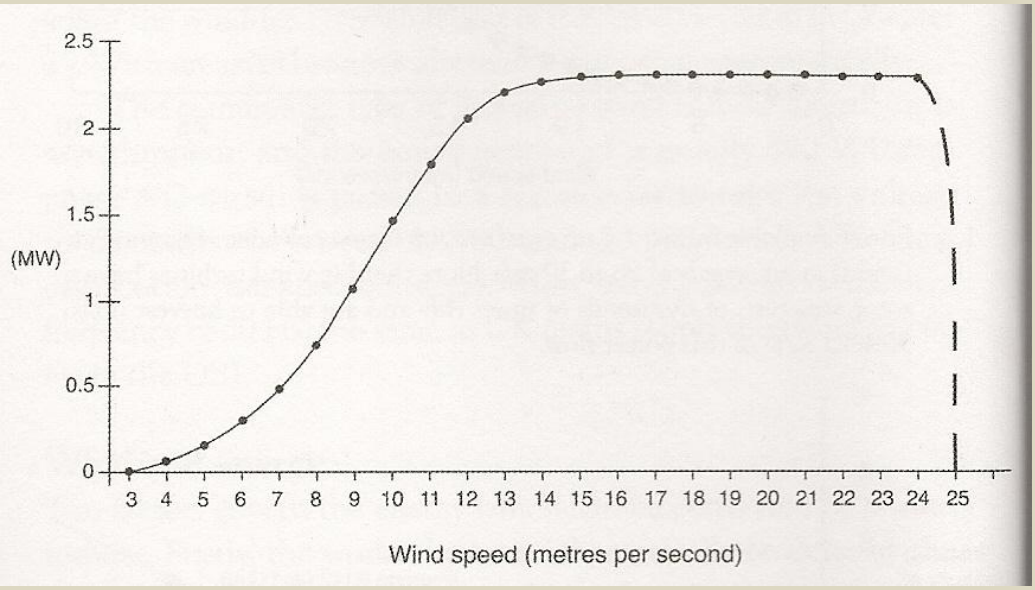
world-wide is 25-30%, compared to the 90% load factor of a modern conventional power station[4]. So to have any chance of replacing a modern power station your wind farm must have at least 670-800 wind turbines, not 200.

So out there in the country side you have up to 800 wind turbines larger than 800 Boeing 747 aircraft standing on their tails trying to generate electricity. However there is another major problem – no electricity will be produced if the wind speed drops below 9 kph and not much electricity will be generated until the wind speed at least doubles this speed.

Even if you finally generate the 'baseload' power, your problems are not over because a wind farm has no 'load following' ability. As demand increases the operators cannot increase the generated power to match increasing demand unless they happen to be God who apparently controls the wind. If the operators are lucky, and there is a near gale force wind producing 'rated power' from the farm, then they will be able to reduce the power generated to meet fluctuating demand. Table 2 shows how dependent a wind farm is on wind speed.

A little time should be taken to appreciate the strength of the wind that is needed before any significant power can be produced, and then how strong the wind is (Beaufort scale 7 – near gale force winds) to provide optimum output from the wind farm.

Table 2 – Energy Produced with Increasing Wind Speeds



Source: Etherington, John, "*The Wind Farm Scam"*, Stacey International, London, 2009, p. 32. Negligible power produced below 18 kph or 5m/s speed or. Peak power reached at 54kph or 15 m/s, and safety cut out at 86 kph or 24m/s.

What does this mean to the consumer? As far as the provision of power is concerned he is moving back into the Dark Ages (apologies for the pun).

I was lucky to live in Malaysia for eight years in a period where economic growth was rapid, taking the Malaysians from a third to first world country.

Understandably, demand for electricity rose rapidly, outpacing the country's ability to provide the required power infrastructure. In any 24 hour period, there would be four to five blackouts. If unplanned, these might last 30 minutes, but the planned 'brownouts' would last several hours as power was shared around the country.

The day to day, and work activities happen in slow motion. You could depend on nothing. Unless you were willing to wait hours, you might not be able to have a hot meal. At night you had to be prepared to read by a torch or go to bed early. You lost reliable access to all electrical appliances. Your life rotated around the availability of power, rather than power facilitating your life. Heating, cooling, lighting, cooking, and using any electrical appliance became limited.

In today's world with computers, telephones, printers, faxes, copiers, TVs, audio and visual devices, vacuum cleaners, fridges, freezers, washing machines, tumbler dryers, all electric tools, we are even more vulnerable when power is lost. You only have to see how much work is completed in a modern office after the IT system is down for more than a day to understand only a small measure of what our society loses when it does not have cheap and reliable power.

Yet here we are with the Greens, a small section of our community, planning to force such deprivation on the majority of citizens while pretending there will be no ill effects in losing cheap and reliable power.

SO HOW IS IT WORKING NOW?

Even if they could provide competitively priced power, no wind farm operator could survive commercially because he cannot tell in advance how much power he could provide, nor when it might be available. The existence of the wind farms today is built on large taxpayer funded subsidies and draconian legislation that forces power utilities to not only pay the highest prices for the electricity, but forces them to buy it whenever the wind farms can provide it.

With only a very small amount of power provided by wind farms (1.5% in the US) the 'load following' ability of conventional power stations is used to overcome the reliability problems of wind power. In other words wind power is using up the safety margin of the conventional power stations. As the percentage of wind power grows it will exceed this safety margin and, progressively, we will see all of the problems associated with wind farms emerge. At the moment these problems are being hidden.

To avoid this situation and maintain the reliability of power (the safety margin), for each MW provided by wind farms we will need to take the foolish step of building conventional power stations to provide a matching MW of power for back-up when the wind farms fail. Taken to the extreme when we have theoretically replaced all conventional power stations with wind farms, we will have had to build

conventional power stations to provide the same capacity of wind power as a back-up. By then our politicians and the Greens would have given these power stations a different name in the hope that such 'spin' might hide this foolishness.

CONCLUSION

As citizens in the western world, we have come to expect that power should be both reliable and cheap. Power produced by wind farms, fails on both counts. For any Green romantics who plan to force our society to totally replace conventional power stations with wind farms, a rude shock awaits them. When the citizens realise they are being forced back into the Dark Ages of power generation, they will rebel.

With no reliable baseload capacity and no 'load-following' ability, wind farms will need conventional power stations to back them up and redress these shortcomings. The folly of being forced to use very expensive power that is unreliable while forsaking cheap and reliable electricity will not be lost on the consumers. The salt in this wound will be felt when they see the very efficient power stations being built, then deliberately being used inefficiently to backup wind farms to provide some reliability.

Apart from these two fatal problems, wind farms have many other drawbacks which will be discussed in Handout 21-1-2.

Notes:

1. Handout 3-3 Invisible taxes 1
2. TBA
3. Etherington, John, "The Wind Farm Scam", Stacey International, London, 2009.
4. Etherington, John, "The Wind Farm Scam", Stacey International, London, 2009, p. 59-60.