20.1 The Choke Point Briefing Paper

Purpose. To provide supporting information and speech dot points to explain the choke point problem.

We have an unprecedented situation in SE Australia with virtually no spare capacity to handle peak demands when they coincide with “choke points” in the supply of wind and solar power.
“Choke point” conveys the urgency of the situation when there is next to no sun and wind feeding the electricity grid. For comparison, we mostly breathe air with 20.9% oxygen and we can get by with less but when we get to zero caused by choking or drowning then very soon we are dead.

If the grid depends on sun and wind power then parts of it will die at the choke points.

That situation occurred in January last year when some coal-fired capacity was off line in NSW and the lights had to be turned off in parts of Melbourne. The Victorian Minister for Energy blamed the **deficiencies** of coal power stations but it really demonstrated that they are **indispensable**.

We know the sun is off duty at night and we know from the records that the wind supply drops very low many times every month.

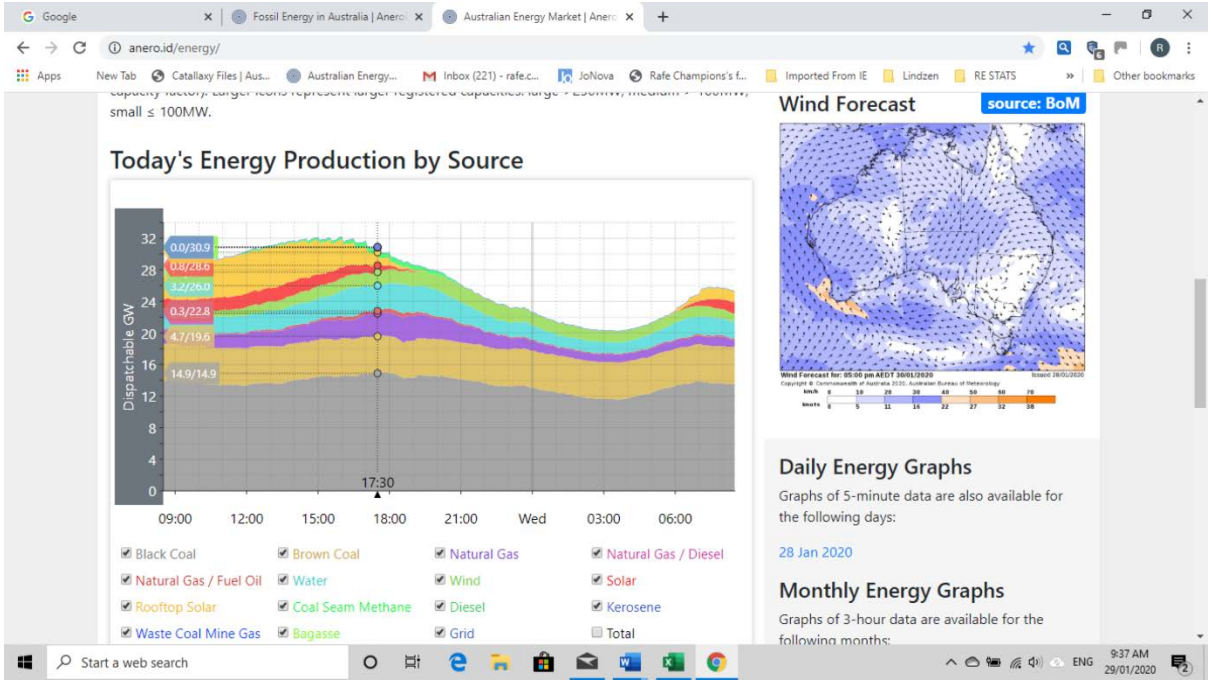
Key features of the situation.

No spare capacity. With the loss of several coal fired power stations in recent years there is no spare capacity in the system. This has been signalled by the Australian Energy Market Operator (AEMO).

Liddell coal fired power station in NSW is scheduled to close in 2023 taking 1.8GW out of the system.

Without additional power to replace Liddell many lights will go out at times of high demand on summer evenings and probably winter evenings as well (see Victoria in January 2019).

This chart shows the situation at 6.30pm EST (5.30 Qld) on Wed 29 January, a normal weekday evening for that time of year. SOURCE https://anero.id/energy/



Coal (black and brown) provided 20GW to account for **two thirds** of the demand.
Natural gas (purple) and Hydro (blue) each contributed about 3GW. **10% each**.
The RE components are **Wind (green) 1.7GW, 5.7%**
Field Solar (red) 0.8, **2.7%**
Rooftop solar (yellow) 1.4, **4.7%**
Solar is fading rapidly at that time of day.

1.7GW from wind represented 5.7% of the total demand at the time and 25% of the plated capacity, not far below the average expected from 7GW of installed capacity.

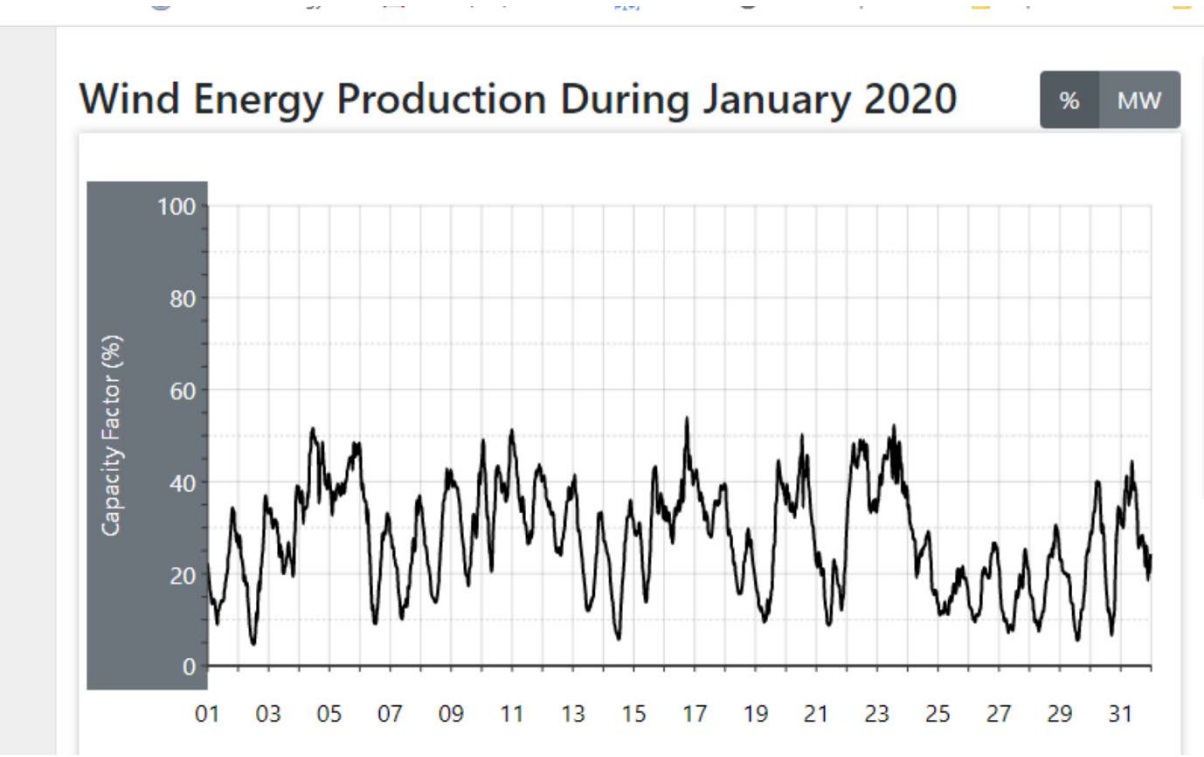
The immediate and short-term capacity of wind power. Natural Gas and Hydro can contribute more for short periods but **the critical question is the capacity of Wind to replace Coal**.

We now have almost 7GW of Installed or "plated capacity" of wind power in SE Australia. The best that anyone expects is 30% to 35% of the plated capacity over a year. **That reduces 7GW to a little over 2GW.**

Adding some 7GW of wind power that is under construction doubles the capacity to approach 4.5GW.

Enter the choke-point. This is the lowest level of supply, **the worst case that we have to anticipate if we are depending on wind to make a significant contribution**.

This chart shows the wind supply for the month of January measured as the per cent of the plated capacity being delivered at 3 hour intervals.



SOURCE https://anero.id/energy/wind-energy

It is unlikely that the expected 30-35% was achieved and needle only hit 50% four times in the month. **At the bottom the return was at 10% or less on nine occasions. The lowest figure was 4.7%.**

Wind supply at 10% of plated capacity. **7 GW translates into 0.7, 14GW translates into 1.4.**

For comparison Liddell delivers 1.7GW.

Halve those numbers for the lowest point in the month (4.7%).
What about batteries and pumped hydro? Check the arithmetic for the first Musk battery in SA. It cost $60Million to substitute for one wind farm for 20 minutes and that is equivalent to some 4 minutes for the whole of the state. For pumped hydro, consider the capital cost, the timescale of construction and the waste of 30% of the power (to pump water back uphill!).

The current contribution of wind power is approaching 10% but the supply is very uneven, ranging from near zero to 20%.

In the worst-case scenarios at the very lowest level of wind the contribution from the windmills is effectively zero regardless of the installed capacity.

Conclusion. In the foreseeable future there is no way that wind power can replace coal fired power. Any loss of coal-fired capacity will become critical unless some other cost-effective and reliable substitute can be found before 2023.

Recommendation. That the problem of the choke point in wind power be explained to politicians and the public so it becomes a topic of serious discussion in political party rooms and elsewhere.