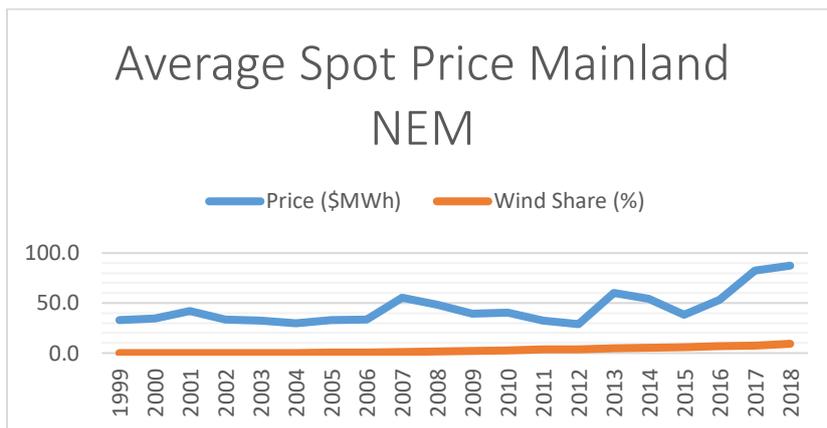


**Alan Moran, Regulation Economics**

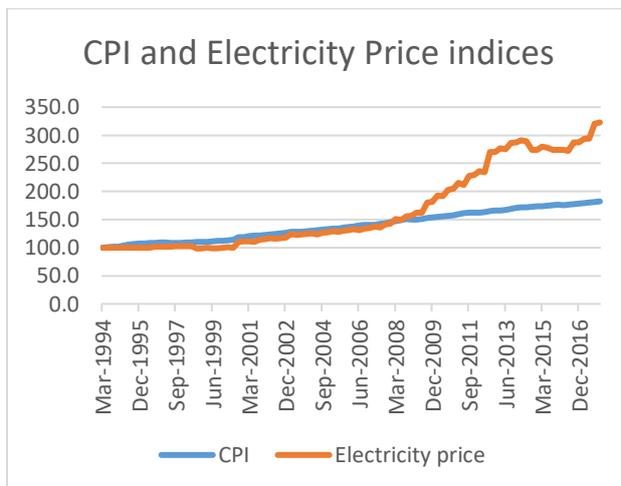
The future is less certain than the past but even with the past there are varying views about what has happened and what drove the developments.

We have seen the wholesale price for electricity rise from under \$40 per MWh with very little trend up until 2012, and was still \$40 in 2015, to its present level of around \$90 per MWh

Wind has risen from nothing in the early part of the century to a share of over 10 per cent today. All of that wind is dependent on subsidies currently around \$85 per MWh. In addition, there is the rooftop solar (subsidised at \$40 per MWh plus advantageous export tariffs). Rooftop solar is logged as a reduction in demand.



Here we have the breakout in electricity prices as the influence of government increased.



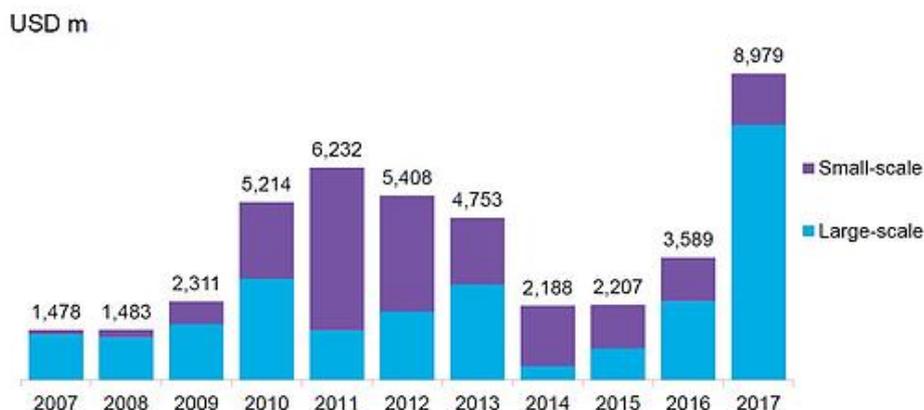
Subsidised renewables initially push the price down as they use their privileged position to out-compete commercially established supply (or in the case of rooftop solar, simply reduce demand). Previous, unsubsidised investments are, in effect, expropriated by government action (though like in the socialist countries, the people get little more than a whiff of the value of the seized assets).

The level of the subsidies is estimated here in terms of direct support, regulatory support, loans etc it amounts to some \$5 billion a year.

<b>Estimated greenhouse gas expenditures 2016</b>	
<b>Commonwealth Costs 2016 (\$M)</b>	
LRET (wind and large solar) costs 21,431,000 MWh at \$85	1822
SRES (roof top solar) costs 6,000,000 At \$40	240
Environment Departmental budget costs	
ARENA	154 <sup>1</sup>
CEFC	239 <sup>1</sup>
Clean Energy regulator	674 <sup>1</sup>
Other	69
Other Agencies (CSIRO, BoM, other depts)	~\$500
<b>Total Commonwealth</b>	<b>3698</b>
<b>State</b>	
Queensland Solar Bonus (\$276 per customer in 2015/6) <sup>1</sup>	350
NSW Climate Change Fund/Energy Savings	317 <sup>1</sup>
ACT	6 <sup>1</sup>
Victoria	439 <sup>1</sup>
SA	62 <sup>1</sup>
<b>State Schemes Total</b>	<b>1172</b>
<b>TOTAL</b>	<b>4870</b>

This subsidy regime is, in turn, attracting new spending on facilities that are intrinsically high cost. The spending on new wind and solar this last year was \$US9 billion

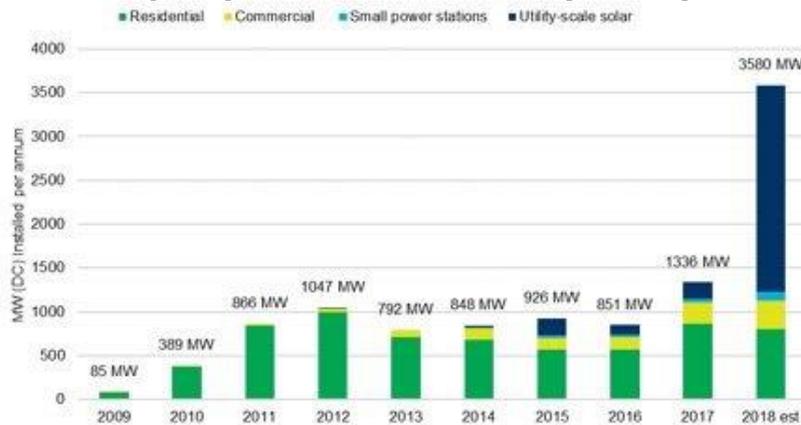
### Total New Clean Energy Investment in Australia



Source: Bloomberg New Energy Finance

This picture may be understating the increase in small scale renewables, the installations of which are not capped and which seem to be showing an explosive growth. In 2017 installations increased by 60 per cent due to higher grid prices, lower costs and increased ARENA subsidies. 2018 installations are projected to show more than a doubling on those of 2017.

## Solar PV capacity installed in Australia (MW DC)



<http://reneweconomy.com.au/australia-added-1-3gw-solar-2017-treble-2018/>

While the surplus supply has an effect in initially pushing down prices, this can only continue (remembering that wind in Australia has a full cost of ~\$100+ per MWh compared to new coal at maybe \$50) until the sunk costs of the established plant cease to be sunk and require replacement.

In that event the owner, seeing masses of red ink into the future, will elect to close the plant. This incentive to close is amplified in the case of AGL which sees its foreshadowed closing of the Liddell power station as driving up the general price to the benefit of its other assets. With Hazelwood, the owner, Engie, also had a global policy of exiting coal and was confronted with considerable Worksafe requirements to spend money to get rid of asbestos.

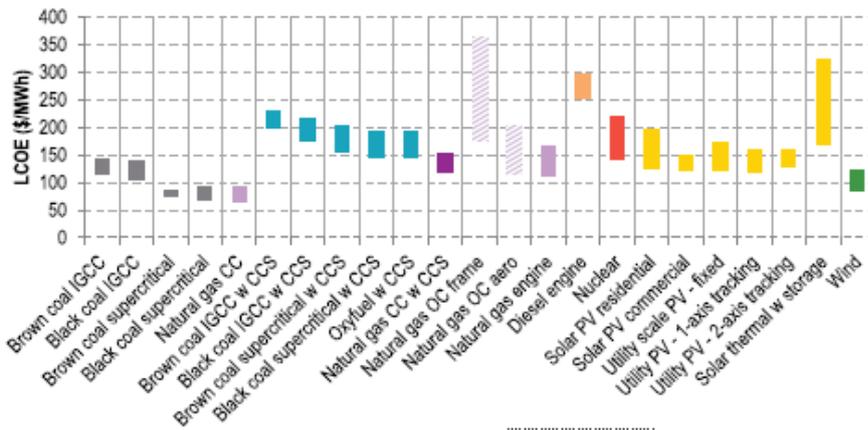
In both these cases, and more so for the SA Northern Power Station (previously owned by Alinta, then closed and dynamited by the state government) the variable supply of wind energy and that energy's grid priority stemming from its bidding advantages, forced a stop-start operational regime on the power stations which they were not designed to accommodate.

So, as long as the sunk costs can be waived, new supplies force down prices with the incumbents having to match bids. But once some considerable costs are required, the sunk costs are revealed as a long term form of operational costs that eventually need replacement and this will only be done if it is profitable.

Hence capacity is reduced, particularly the firm "dispatchable" power that comes from fossil or nuclear plant. Prices shoot up. This will remain the case, especially so if AGL is allowed to close its Liddell station thereby keeping reliable supplies tight.

In effect, the spending on subsidised generation capacity is as different from the notion of investment as is buying explosives to dynamite commercial businesses. Expenditure on subsidised renewables delivers negative value added. And it is inconceivable that the future costs of electricity will decline in response to the increase in renewables just as has proven to be the case in the previous periods when it was said we just have to give renewables a government leg-up to smooth the passage to their commerciality.

The claims that renewables are or soon will be cheaper than fossil supplies are no more credible now than those same claims were 30 years ago. We see estimates like these from the CRC showing wind is almost there

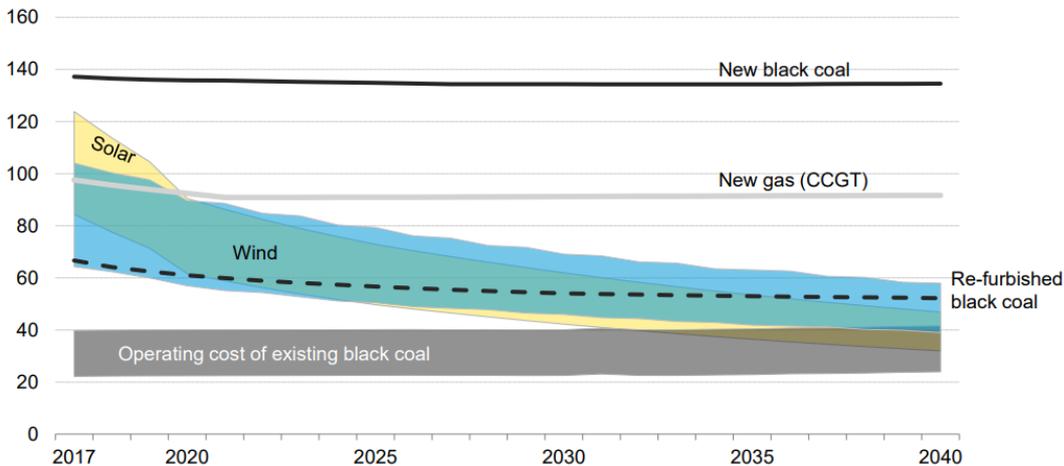


Or this from Bloomberg New Energy Finance

## By 2038 new wind should outcompete incumbent coal

Levelized cost of generation in Australia

Real 2016 A\$/MWh



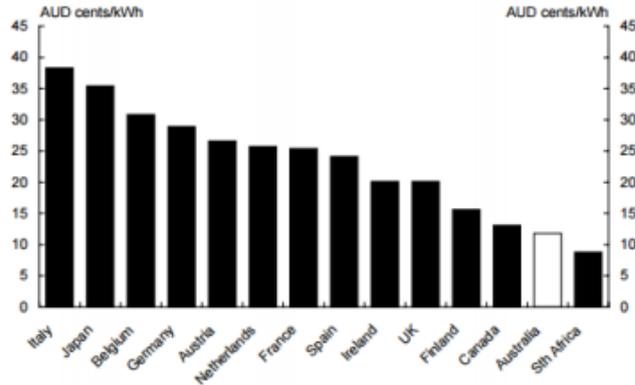
What you never see is the lobbyists calling for the corollary of this new found competitiveness of wind and solar – the elimination of subsidies. Funny about that!

In fact, with regard to the costs of new fossil fuel plant, nothing much has changed since the construction of the most recent Australian coal power station at Kogan Creek. That generator's owners in 2007 were offering long term contracts at under \$40 per MWh. Since then coal has become cheaper to mine and steel fabrication has fallen in cost, offsetting somewhat the 50 per cent increased costs of labour.

Work by Jacobs for the Climate Council in 2014 suggested new coal in Queensland was under \$60 LRMC while work commissioned by the Minerals Council put the cost of new coal in Queensland at under \$50 per MWh.

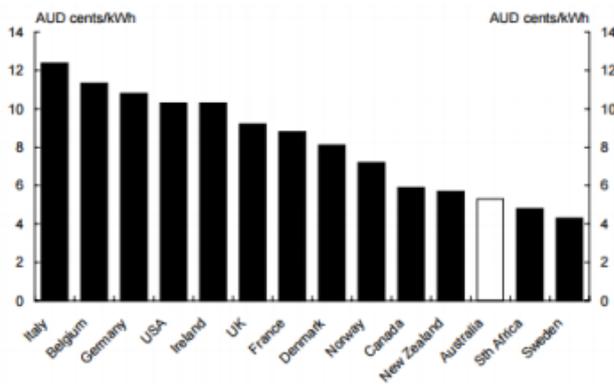
The upshot of the subsidies in Australia has been a disastrous deterioration in our relative competitiveness in power prices from this in 1999:

### Electricity prices to households



Source: ESAA, Electricity Australia 1999.

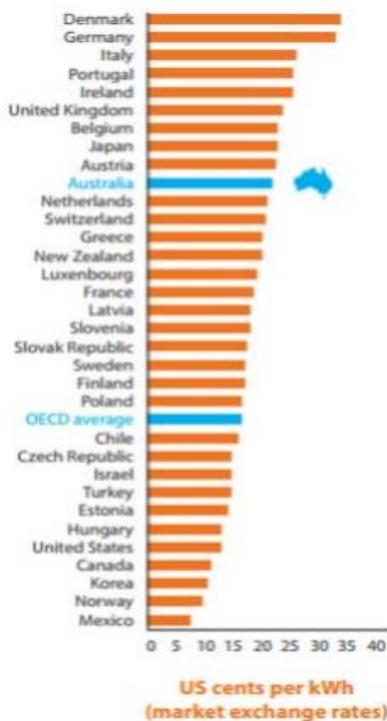
### Electricity prices to industry



Source: NUS International (1999).

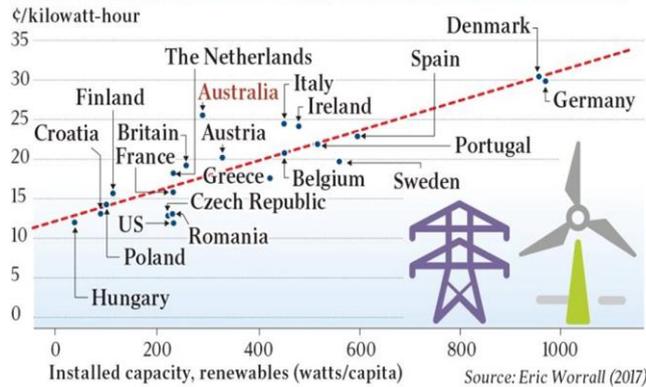
To this in 2016, before some of the major price hikes took effect.

### OECD household electricity prices



This interesting graphic is a global picture that shows some correlation between the penetration of subsidised wind – there is no other kind – and prices.

### COST OF ELECTRICITY VERSUS RENEWABLE CAPACITY



The high wind penetration countries – Germany, Spain, Denmark - have the highest prices; the countries with the lowest wind penetration– US, Hungary, Poland have the lowest prices.

Maybe it's just a coincidence!

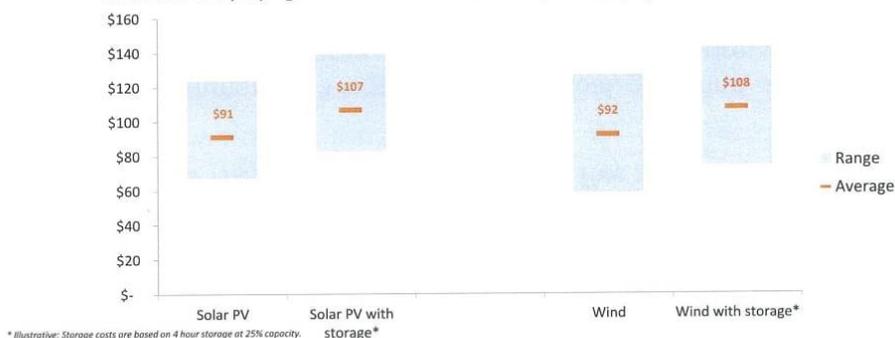
### Reliability

Wind tends to be episodic in its supply and there is a high degree of correlation in its output, at least in each region. The South Australian blackout in 2016, was initiated by abrupt changes in wind supply which could not at the time be accommodated by some of the wind generators.

Whether or not such problems are overcome the fact is that wind is intrinsically less reliable than other technologies.

## Finkel package – Generator reliability obligation

- Wind generates around 40% of the time and solar generates 20-30% of the time
- Finkel recommends mandatory storage and backup for new intermittent renewables
- This levels the playing field – renewables now required to pay for intermittency



19

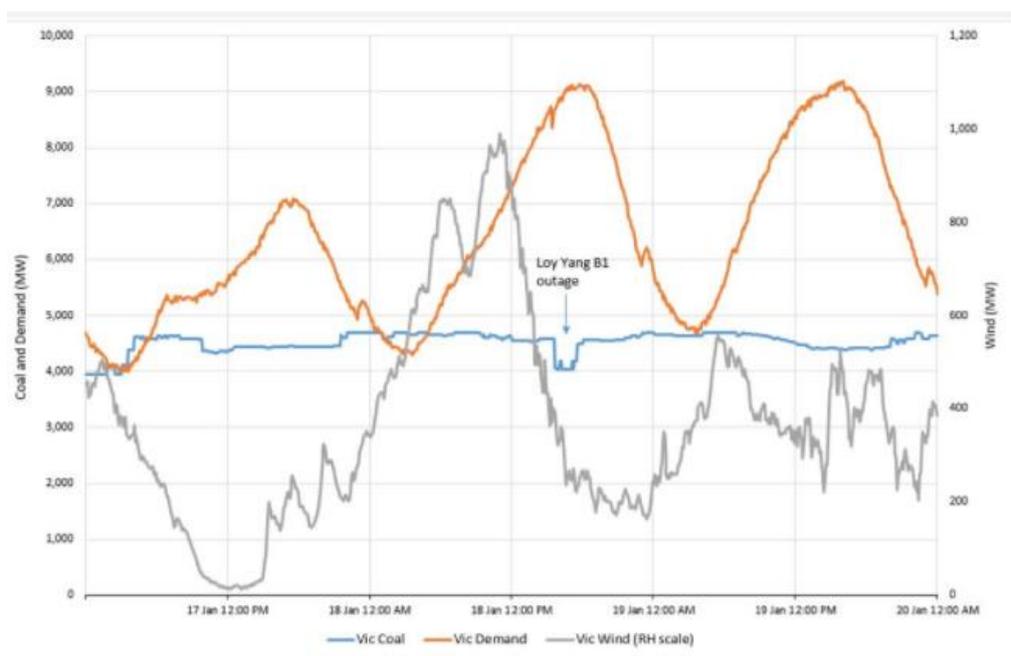
Minister Frydenberg recognised this when in June of last year he argued that wind should pay an extra \$16 per MWh to firm up its intermittency costs. This, though it is hopelessly inadequate, is likely to be a provision in the National Energy Guarantee (NEG).

The extent of wind's unreliability and need for back up is recognised by retailers' risk management staff who usually require very high levels of firm support – and count wind as only about 5 per cent firm in some cases.

Ben Skinner now with the Australian Energy Council has drawn from his long experience with AEMO to offer the view that the reliability of coal (its Forced Outage Rate) – in this case the Latrobe generators – is 97 per cent. Only a 3 per cent chance of three going down at the same time. In the case of wind its equivalent reliability to coal's 97 per cent would be 5-7 per cent.

Much was made of a sudden loss of a unit of Loy Yang B (528 MW) for two hours on 18 January this year as causing a price spike. Such outages are common but this is also the case wind, which fell 800 MW in a similar period.

The oscillations in the supply of wind very often run counter to demand as shown on this graphic for Victoria.



Much of the activity in energy policy now is concerned with accommodating the volatility and uncontrollability of wind and to a lesser degree solar. So we have batteries, the mooted Snowy 2 White Elephant, demand response, diesel back-up all to paper over the cracks of an electricity system that has been politically created so as to be both high in cost and low in reliability.

Australia's 2020 progression to 23.5 per cent renewable energy represents an increase in electricity market share for wind/solar to 16 per cent from zero at the turn of the century. It is actually more than this because of small scale solar. Goals 20 year hence are upwards of 42 per cent renewable share.

No significant existing installations of wind and solar would have been developed without subsidies, the main one providing \$85 per megawatt hour on top of the market price that was \$38 per megawatt hour in 2015 and is \$90 plus this year. This price increase has been brought about by subsidised renewable energy having a priority over coal based generation which is forced out of the market.

The increased renewable share also reduces the reliability of the system.

The Commonwealth's policy, the NEG, will allegedly provide us reliable energy at \$110-115 per MWh (a little over twice the price that would be available under the unsubsidised coal-based system now being destroyed). It will also provide a pathway to meeting Australia's targets under the Paris Climate Change Agreement which specify emission reductions of 26%-28% by 2030.

If the NEG could be designed in such a way that retailers/generators internalise all their costs, the outcome would be wind selling at a severe discount to dispatchable plant. It would bring incentives for firm power and fast start capacity perhaps even the Snowy2 White Elephant. This would go some way to offsetting the damage that subsidies have imposed onto the market. But AEMO seems more disposed to pursuing a centralised approach. This extends the notion of ancillary services by collective provision of market support, thereby smearing the costs across all generator sources rather than incentivising those that have low reliability either to exit or to invest in insurance that irons this out.

But that is of secondary significance. Politics has converted our low cost energy potential into a high cost reality. Only politics can undo this.

Grafted onto the policy as developed is a rationalisation based on Australia's accession to the Paris Climate Change Treaty and our ratification of this the day after Trump was elected President. The US economic success is now becoming evident. A key to this is low tax, low regulation and the abandonment of carbon taxes in their various forms.

Due to its abundant coal supplies, Australia had perhaps the cheapest electricity in the world ten years ago. As a result of the renewable subsidies it is now among the most expensive. Aside from increased direct costs to households, this has immense adverse consequences for the competitiveness of Australian industries and hence the nation's living standards.

We can reverse direction and perhaps the demonstration effect of the US will provide the catalyst.