Submission No 89

SUSTAINABILITY OF ENERGY SUPPLY AND RESOURCES IN NSW

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Sustainability of energy supply and resources in NSW

The Terms of Reference of the inquiry are:

That the Committee on Environment and Planning inquire into and report on the sustainability of energy supply and resources in NSW, including:

1. The capacity and economic opportunities of renewable energy.
2. Emerging trends in energy supply and exports, including investment and other financial arrangements.
3. The status of and forecasts for energy and resource markets.
4. Effects on regional communities, water security, the environment and public health.
5. Opportunities to support sustainable economic development in regional and other communities likely to be affected by changing energy and resource markets, including the role of government policies.
6. Any other related matters.

This submission primarily addresses point 1, primarily, and the other points only parenthetically.

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Mr Chairman, Ms Wilson, Gentlemen

The terms of reference of this inquiry are written in words that imply that "renewable energy" is accepted as the way of the future; that intermittent power from solar and wind is a plausible, economic and reliable alternative to dispatchable power from thermal stations – coal, gas, diesel, or even nuclear.

Perhaps I have read too much into the words, and the intention of the inquiry is to tease out the implications for NSW of what may happen in a scenario where intermittent power widely replaces dispatchable power, rather than prejudging the outcome. I shall assume that is the case.

ANALYSIS

Let me start with a question. *What are our (NSW's and Australia's) objectives for power generation?* Because if we don't know what we're trying to achieve then we are likely to end up wasting lots of money doing things we do not need to do, not doing things we ought to do, or doing things that conflict with other things that we are doing.

My answer: NSW/Australia's policies *ought* to be:

1 Providing our domestic and industrial customers with cheap, reliable power 24/7; because without cheap, reliable power the country's productivity will be compromised, and our standard of living will fall.

2 Prevent individual States and Territories adopting policies which conflict with the agreed, national objectives.

3 Prevent energy generation rent-seekers profiting at the expense of the nation.

4 Prevent energy price signals distorting the market and introducing economic inefficiencies.

5 Reducing NSW/Australia's CO2 emissions from energy generation, just in case climate alarmists are correct and CO2 increases will have a significant adverse effect on the planet. (*I'm not saying that it will, but we'd be crazy not to assume it might, so that must be included as a goal*).

6 Acknowledging that Australia is a small emitter of greenhouses gases, and that even bankrupting our State or our nation to signal our moral worth will have a negligible physical effect on outcomes at a global level.

7 Avoid environmental degradation being introduced by changes to methods of energy generation.

8 As a corollary of goals 1-4, providing a solution that the nation, the State and individuals can afford.

These may not be a set of goals with which everyone would agree. Some people will doubtless say that goal 5 is the only important one and that the other goals are entirely subservient to that. Others would say that despite claims that "*the science is settled and we're all doomed unless we*……" that the science is not settled, and alarmists are confusing short-term weather changes with long-term climate changes.

However, unless we – as a State and as a nation – have an agreed set of goals, we will continue down the road we have found ourselves on for the last twenty years; with strident climate activists demanding immediate CO2 reductions and conflating that with the close-down of fossil fuel generation and a switch to "renewable" generation; along with virtue signalling by federal parties and State governments, and without considering the effects on the State and the nation of such policies.

Looking at these goals individually:

Goal 1 the most efficient method of generation for Australia would be to invest in a set of new coal-fired baseload power stations, with more expensive/flexible gas being used for peaking demand. The technology is known and understood. The nation has energy security from coal stocks, and gas stocks too (if the Victorian gas fields were to be brought into production). The downside of this approach is that it conflicts with goal 5.

An alternative is to introduce nuclear power for the baseload power stations. The experience of France has shown that in a country with minimal earthquakes / volcanoes / susceptibility to tsunamis, and with proper management of the power stations, that nuclear can be used safely. Three Mile Island and Chernobyl were characterised by ill chosen actions taken by poorly trained staff. This has not happened in France. I surmise this is because the power stations are owned by EDF which is in turn 85% owned by the French government (https://en.wikipedia.org/wiki/Nuclear_power_in_France) and which should therefore be less susceptible to commercial pressures to minimise staff / training costs – a lesson for Australia.

France has a nuclear reprocessing industry, which it operates at a profit (ibid).

Australia – if it had politicians with foresight – could aspire to make Australia a player in the world energy market:

1. We will mine the uranium for you
2. We will process and export it to you
3. We will reprocess it after you have used it
4. We will store the processed waste for you – we have a big landmass, no volcanoes and few earthquakes

Australia could generate jobs, make a profit and help the world reduce CO2 generation. All it needs is a political party with vision. NSW might be short on uranium mines, but our State can – and should – position itself as the State in which steps 2 and 3 should be carried out. South Australia is probably a better State to handle step 4 (and would doubtless complain if it were not included somehow in a future nuclear industry), so not making a play for that step is probably prudent.

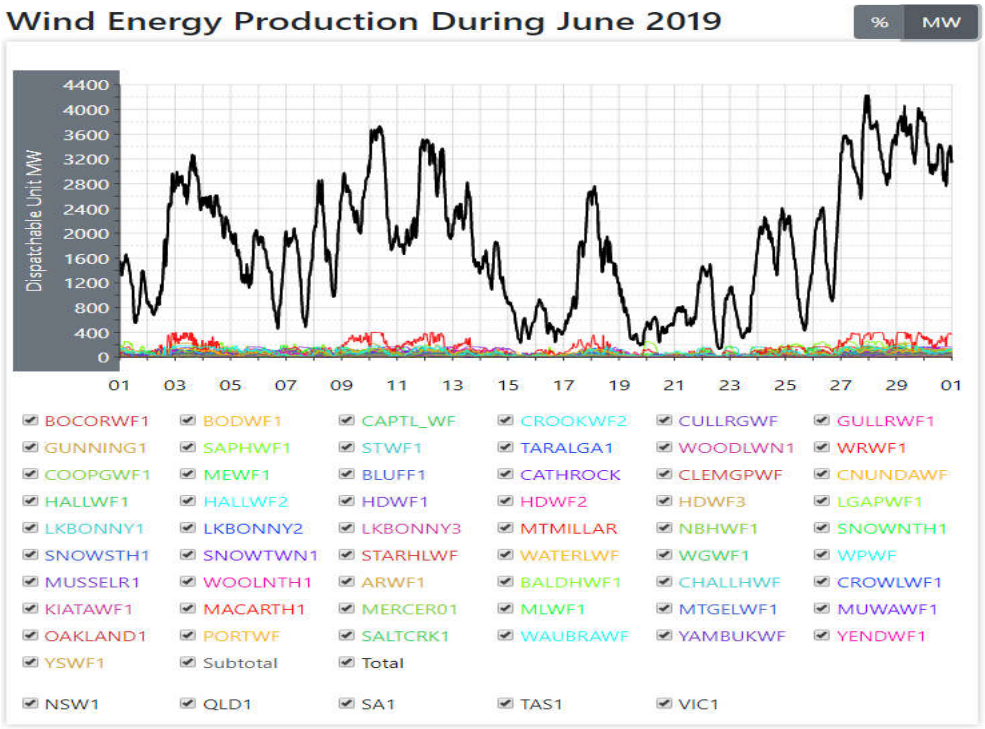
Wind and solar are not viable alternatives for baseload power stations, on economic terms. Because these are intermittent generators, they need substantial back-up, (battery or hydro) to store sufficient electricity to power the grid on those days when no wind blows and on the 12 hours a day that the sun does not shine.

The chart following, reproduced from https://anero.id/energy/wind-energy, shows wind generation for a recent month. It is typical of every month, showing wild fluctuations between a maximum of 63% of installed nameplate capacity (6700 MW) on 28-06-2019 and a minimum of 1.5% on 23-06-2019.

When the sun shines and the wind blows, solar and wind operators make money. When it is night or still air, baseload generators are expected to provide all the power.

More to the point, because they are not required to *store* the power that they produce – for later use by the grid – solar and wind operators can operate at negligible marginal cost in favourable climatic conditions, and shrug their shoulders when the sun goes down and the wind stops, confident that (at the moment) dispatchable power stations will take up the slack. This state of affairs can continue as long as the penetration of grid power from renewables is kept to a small percentage, but the greater their penetration, the greater the probability that baseload stations will be bankrupted and have to close.

What will be the impact on the rural communities of NSW ? It will be nearly as bad as the impact on what remains of our State's manufacturing capacity. The biggest energy users are near our cities (metal smelters, cement works , etc) and some of these experience extremely costly disruption when power goes down or its price goes up. The rural communities have fewer high energy-intensive plants, but increased costs of energy and other inputs (made more expensive in turn by the increased cost of the energy to make them) will have a similar impact.



Can renewable energy producers store their power, technically and economically? Calculations of the cost of the batteries required to store commercial quantities of power are available on the internet. They can be roughly estimated from the AU$90 million paid to Tesla for the 129MWh battery in South Australia – a battery which famously could supply only 4 minutes power for the state – even if all that power were available to prop up the grid, and not reserved for Frequency Control Ancillary Services, which is most of its primary use)

AU$90 million for **4 minutes** power for South Australia translates to AU$32,400 million for a **day's** power for the state.

Let's be generous and assume that for a big order NSW could get them for half the price (after all, the 129MWh battery came with a price premium because it had to be installed within 100 days). On that heroic assumption the cost would fall from AU$32 billion to just AU$16 billion for a day's power. However we would need more than 1 day's power. We would need more like **five** or **ten** day's power, to cover for winter periods when the wind just doesn't blow and night time comes early.

So we would need to budget **AU$80 billion** to **AU$160billion** just for South Australia. NSW will need more because our energy consumption is higher, and **all** the eastern States will need the same level of backup because they are **all** connected to a single grid.

From these simple calculations we see that at current prices it would cost too much for any nation – let alone NSW in isolation – to afford the quantities of batteries required to guarantee supply for a typical period when wind generation is inadequate.

Is this likely to change? I believe that this is unlikely to change because there are **no** order-of-magnitude gains in efficiency possible with either solar or wind technology (https://www.manhattan-institute.org/green-energy-revolution-near-impossible):

- The physics limit for solar photovoltaic (PV) cells, the Shockley-Queisser limit, is the maximum conversion of 34% of photons to electrons. (https://www.manhattan-institute.org/green-energy-revolution-near-impossible). Commercial PV cells are already operating at 26%, so the economic improvement from solar can come only from economies of scale in production, and minor gains in efficiency. China is already knocking these panels out very efficiently – don't expect many further economies of scale.
- The physics limit for a wind turbine, the Betz limit, is the maximum capture of the kinetic energy in air. The limit is 60% and commercial windmills are already operating at >40% (https://en.wikipedia.org/wiki/Betz%27s_law).
- No order of magnitude gains will be possible for batteries: the maximum theoretical energy in a kilogram of oil is 1,500% greater than maximum theoretical energy in a kilogram of the best battery chemicals.

Gas is not a viable alternative to baseload power stations, on economic terms, simply because in Australia gas costs more than coal.

Australia's transmission grid has been designed and built to transmit power from a small number of large power-stations. Problems of voltage stabilisation with a small number of generators are significantly less than with a large number of small generators, particularly if they are *intermittent* like rooftop PV and wind-farms. Building new coal, nuclear or gas units on the site of existing power stations should minimise the cost of transmission network upgrades needed.

My conclusion is that to meet Goal 1, coal or nuclear power should be used for baseload stations. What does this mean for rural NSW communities? It means the same as far the rest of NSW; the cheapest possible baseload power and the most reliable supply.

Goal 2 is the problem that has bedevilled Australia for the last twenty years. Successive State and Territory parties and governments have attempted to out-do each other in their attempts to gain/retain office by making ever-increasing commitments to reduce CO2 generation by closing 24/7 thermal power stations and switching to intermittent renewables. They have been concerned only with idealism and votes in their own back-yards, and not with the requirements of the nation as a whole. Critically, they have not considered what might be possible in a single State might be impractical if scaled to the entire country. The most obvious example is the South Australian demolition of thermal plants and increasing reliance on intermittents and on importing power from Victoria and from NSW through an as-yet-to-be-built cross boarder interconnection.

As long as NSW and Victoria have reliable power, South Australia can survive, but if NSW and Victoria were to follow the same path then there would inevitably be days when the wind would not blow and the interconnections would be worthless because no State would have any power to share with any other.

In 2018 the government of Victoria announced its intention to increase the Victoria Energy Renewable Target (VRET) to 50% by 2030 (previously 40% by 2025) https://www.energy.vic.gov.au/renewable-energy/victorias-renewable-energy-targets to "*generate billions of dollars of additional economic activity in Victoria, create thousands of jobs, put downward pressure on electricity prices and reduce emissions from electricity generation, contributing to Victoria's long-term target of net zero emissions by 2050*". The Victorian government has not produced any cost-benefit or risk analysis (that I can find) to indicate that its plans are technically (let alone commercially) achievable, and that adding more intermittent power will increase the level of system reliability, or even maintain the existing levels.

My conclusion is that – as responsible parliamentarians – the government of NSW should recommend to the federal government that it takes complete responsibility for management of power generation through the country. There are various ways in which this could be carried out. One way would be for the federal government to legislate that:

1. every organisation which proposes to generate and export power to the grid must be licensed by a federal body (ie effectively by the federal government)
2. Territory and State governments shall not be able to deny (through the Planning process) an organisation's application to build a generator if it has a licence application that has been approved by the federal body.
3. Territory and State governments shall no longer be able to subsidise generators, other than rooftop PV generators. Subsidizing roof top PV generators will be limited the State government helping households to buy batteries to store their power and stop exporting it to the grid (ie reducing the increasing voltage stabilisation problems)

An alternative to the first point is for the federal government to simply re-nationalise the existing generators, (analogous to the renationalisation of telecom networks to enable the National Broadband Network).

Goal 3 In economic theory, rent seeking is defined as seeking to increase one's share of existing wealth without creating new wealth. It is tied with "gaming the system"; exploiting the rules and structure of a system for personal gain at the expense of the integrity of the system itself.

Examples are:

- "Foreign companies dominate ownership of Australia's wind farm developments, taking an estimated $1.7 billion a year in renewable energy subsidies offshore. Sixty per cent of existing wind farms are owned by foreign firms." (https://www.theaustralian.com.au/subscribe/news/1/?sourceCode=TAWEB_WRE170_a_GGL&dest=https%3A%2F%2Fwww.theaustralian.com.au%2Fbusiness%2Fmining-energy%2Fforeign-owners-dominate-australian-wind-farm-developments%2Fnews-story%2F1b3a83bde7868ef4a70efa9a8c04af81&memtype=anonymous&mode=premium)
- The well-known 129MWh Tesla battery supplied to South Australia. This was purchased by Neoen, owners of the Horsdale Power Reserve wind farm, and funded in part by the South Australian government. Neoen owns and maintains the battery and can use most of the capacity for its own purposes. (The South Australian government can direct up 70% of output be used to prevent load-shedding). AEMO pays Neoen AU$4.2 million per year for this service. (https://reneweconomy.com.au/tesla-big-battery-pulled-in-29-million-in-revenue-in-2018-2018/)

  In 2018 Neoen made an additional AU$24 million profits on the battery by

  - arbitrage - charging it up when prices were low and selling the power during the day when prices were high,
  - carrying out Frequency Control Ancillary Services (FCAS) for AEMO. The source of the FCAS revenue is not as clear as it might be, but https://reneweconomy.com.au/tesla-big-battery-claims-its-first-major-fossil-fuel-victim-30614/ suggests that much of this has come from owners of gas-fired generators which had been themselves gaming the system.

  Regardless, Neoen making AU$28 million over 12 months from a low-risk (State government-backed) investment of less than AU$90 million suggests that there are large profits being made, ultimately paid for by industrial/domestic consumers.

Economically, non-dispatchable wind and solar are not commercially viable without the massive (and seemingly endless) subsidies; whether they be in the form of Renewable Energy Certificates, soft loans, AEMO preferential selection for generation, straight out cash grants, or the requirement for Australia's energy retailers to be buy 30% of their power from "renewable" generation. Remove the subsidies and the wind, solar and battery industries would disappear overnight.

As with any business system, the simpler it is, the fewer the opportunities for gaming it. With a set of new baseload stations funded, owned and operated by the federal government, with gas for peaking production and government-owned batteries for voltage stabilisation, the opportunities for rent-seeking would be significantly reduced. Australia would have to pay out the contracts our State leaders have entered into unwisely, but after that we will have our head above water.

I believe that such a proposal from the government of NSW – particularly if both major parties support it – would improve the credibility of our parliament, would be supported by a majority of votes, and would be taken seriously by the federal government.

Goal 4 One of the reasons that there has been no investment in new thermal baseload stations is the policies of the AEMO. When the wind blows, the wind farms (the construction of which has been subsidised from public funds) can bid a low price because their marginal cost of operation is effectively zero, and price out of the market the baseload stations. This increases the Levelized Cost Of Electricity from these thermal stations by reducing their utilization rates, without reducing their fixed costs ie it becomes less economic to continue to operate them.

What is worse is that because output from thermal power stations cannot be ramped up or ramped down in five minute intervals, operators are faced with prospect of generating power that they cannot sell. Finally, there is the uncertainty that this government (or the next one) will change the tax basis, or simply introduce legislation to end coal-fired power generation.

Price signals distort the market even at the rooftop solar PV level. Increasing the Feed In Tariff encourages more people to buy solar – and then wonder why the power they export does not match what they had expected. This is in part due to the voltage rise caused by too many people trying to export power – so their inverters throttle back the export. One solution would be to upgrade the transformers (https://www.solarquotes.com.au/blog/grid-voltage-rise-solar/?utm_campaign=sq_news_weekly&utm_content=190827+weekly+newsletter&utm_medium=email&utm_source=getresponse) A better option would be to reduce (or scrap) the Feed-In Tariff and encourage/subsidise rooftop PV owners to buy a battery to save their excess generation and avoid putting stress on the grid.

A representative description of the current pricing signals at a wholesale level comes from this article in the AFR on 05-09-2019 https://www.afr.com/companies/energy/the-winners-from-negative-electricity-prices-20190905-p52o7r.

> The combination of ample generation from rooftop solar and utility-scale solar farms, combined with constraints on a transmission line, drove prices down to the lowest price of minus $1000 in Queensland and South Australia on Thursday.
>
> The volatility in prices is causing some solar plants to switch off to avoid losses, but for the developers of storage projects – whether pumped hydro or lithium-ion – it underscores the opportunity to charge plants at cheap or negative prices to be able to release power at peak periods.
>
> "Having batteries, whether pumped hydro or lithium-ion, operating in terms of arbitrage is clearly a very good business case today," he said, while acknowledging the market will be very different when Genex's Kidston plant is due to come online in 3½ years. "It just makes it clear that there is a transition under way."
>
> Prices in Queensland were in negative territory or zero from quarter-to-eight in the morning on Thursday until 2:20pm, according to data from the Australian Energy Market Operator. That followed at least 6½ hours of negative prices on Wednesday.
>
> In South Australia, where negative pricing has long been a regular feature of the wholesale market, the Tesla/Neoen Horsndale battery is paid for charging when the market price signal is negative.
>
> "*Our HPR* [Hornsdale Power Reserve] *charged exclusively from negative pricing today whilst providing FCAS in all markets, being paid in preparation for the inevitable higher price discharge this afternoon*," Tesla Energy senior engineering manager Josef Tadich said in a LinkedIn post last week.
>
> "*Expensive day to be a high marginal cost baseload generator. Zero is definitely the new black!*"

The last sentence is the most revealing. None of this gaming and profiteering would be possible without the existence of dispatchable baseload power.

Goal 5 Reducing Australia's CO2 emissions from energy generation, just in case climate alarmists are correct and CO2 increases will have an adverse effect on the planet.

Yes, it's a sensible thing to do as long as the cost and effort matches the perceived risk. Climate sceptics point out that hysteria does not constitute proof.

I make no apology for this extended quote from https://notalotofpeopleknowthat.wordpress.com/2019/09/02/summer-heatwaves-it-was-hotter-in-1707/

The UK is home to the longest single running temperature series in the world. Two hundred years before the first coal fired power plant opened, the summer of 1666 was hotter than the summer of 2019 in the centre of the UK.

Global warming is "still within the noise". There's a warming trend there, but this invaluable long dataset rather puts it in perspective. Even though the 1680 – 1700 period is regarded as the depths of the Little Ice Age, even then, there was still the odd hot summer.

Paul Homewood was responding to the headlines of "Hottest late August Bank Holiday Monday on record!" The only thing that's extreme about this summer in the UK is the climate propaganda.

With 2,000 possible permutations and combinations of records at that inane level, there's a new record somewhere every day of the year, not to mention that there weren't too many air conditioners, tarmacs or concrete towers back in 1700 to warm the thermometers then.

Summer Heatwaves? It Was Hotter In 1707!!

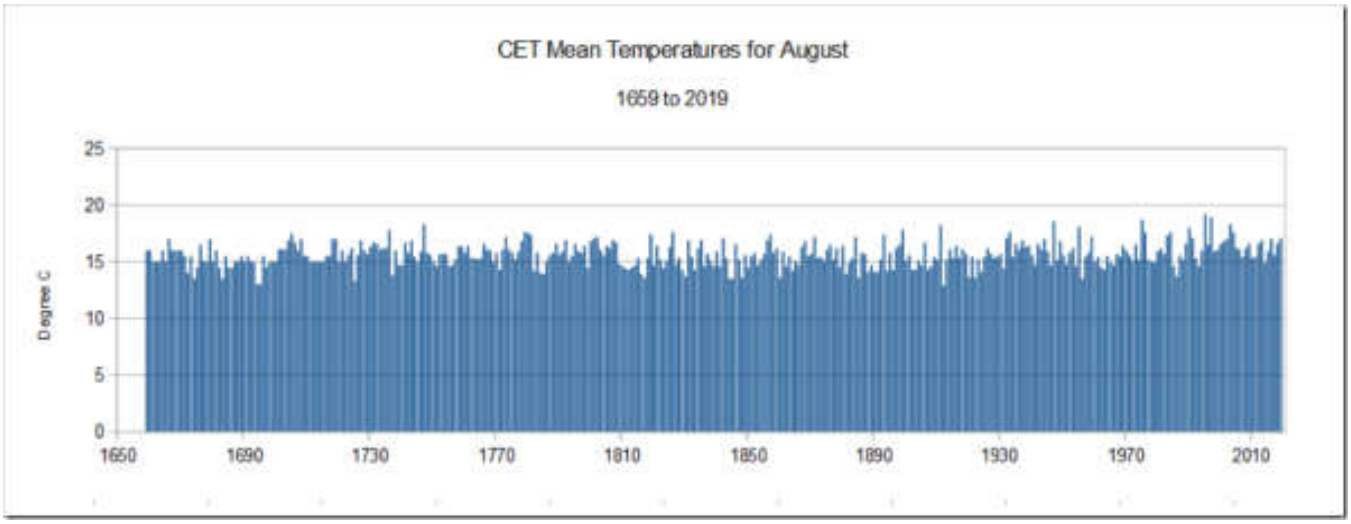
To read the headlines in the last month or two, you would think we had been having a Mediterranean summer. The truth is much more mundane however.

The numbers for last month's CET are now out. August ended up at 17.1C, meaning that there have been 32 Augusts as warm or warmer.

Last month was no warmer than 1801, 1842 and 1932.

Summer as a whole ranked 48th hottest, tied with 1935. Last month was no warmer than 1801, 1842 and 1932. The summer of 1976 still remains top of the list, but second hottest was way back in 1826.

Indeed there have been warmer summers on 28 occasions prior to 1900. Notably, one such summer was 1666, the 18th warmest. That was, of course, the year of the Great Fire of London, which swept through London between the 2nd and 6th of September.



https://www.metoffice.gov.uk/hadobs/hadcet/data/download.html

So, the message here is simple. The science is ***not*** settled. There may be less to Climate Change than you may have been lead to believe. Just in case, let's try to reduce our CO2 emissions – but let's not kill ourselves doing it!

Goal 6 Acknowledging that Australia is a small emitter of greenhouses gases, and that bankrupting the nation to signal our moral worth will have a negligible physical effect on outcomes at a global level.

Good luck finding a politician of any party who is prepared to stand up and say that, unequivocally! Perhaps the best we will see from our elected representatives is that one of them will stand up and say that China is not a developing country, and should not claim exemption from the Paris Accord on that basis. China is one of the two largest economies in the world and should behave responsibly. But don't hold your breath waiting for one of our politicians to say that, or for China's leader to even acknowledge it.

Finally, India is on a path to provide electricity to all rural homes by 2022, based principally on coal-fired power stations. https://stopthesethings.com/2019/08/27/poverty-eradication-program-india-dials-up-reliable-affordable-coal-fired-power/ The CO2 emissions from those are set to dwarf any reductions in Australian CO2, even if Australia were to close all it's thermal generation. It may be an unpleasant fact for many to stomach, but whatever Australia does will have no impact on world CO2 levels. Those levels will determined by policies of India and China. Australia's contribution is just a rounding error

Goal 7 Avoid environmental degradation being introduced by changes to methods of energy generation.

Nuclear: Objections to nuclear focus on:

- if something goes wrong with the plant, everyone around could be killed in a nuclear explosion, or poisoned by radiation, or have to evacuate the area for ever.
- The need for handling nuclear waste (end-of-life planning).

These objections have been raised for many years and as a result they have been acknowledged, and plans put in place to avoid catastrophes, and to explicitly plan for end-of-life. Their high visibility has ensured that the issues have been thought through. Contrast this with objections to wind farms, where the existence of some of the environmental problems have actually been denied (particularly the impact on nearby residents of the sound generated by wind-farm turbines).

Coal, gas: Nothing new.

Hydro: There is irony here. In 1978 the Hydro Electricity Commission of Tasmania proposed building a dam at the confluence of the Gordon and Franklin Rivers to provide 180MW generation capability. This led to Bob Brown, the Wilderness Society, and eventually to the formation of the Greens as a political party

Wind: In 2019, Bob Brown opposed a wind-farm, saying he "had been contacted by 'very anguished' people near the wind farm site concerned about its impact on several bird species including wedge-tailed eagles and the critically endangered swift and orange-bellied parrots. 'The proponents of this wind farm have zero idea of the impact on migratory birds', he said." https://www.theguardian.com/australia-news/2019/jul/15/bob-brown-rebukes-tasmanian-windfarm-project-as-the-new-franklin-dam

Objections to Wind farms focus on:

- the high death toll of birds and bats by turbine blades, with the threat of species extinction. See The Impact of Wind Energy on Wildlife and the Environment https://www.thegwpf.org/content/uploads/2019/07/wind-impact-1.pdf
- ecological effects of undersea power cables (ibid)
- sleep deprivation from audible and inaudible turbine noise https://stopthesethings.com/2016/11/24/unmitigated-wind-industry-torture-wind-farm-neighbours-driven-to-insanity-by-screeching-wind-turbines/
- the industrialisation of rural landscapes, by turbines of up to 240 metres high (ibid) with consequent detrimental effects on reduction of natural amenity for people who live in sight of turbines, and loss of tourism sites / income.
- interference with radar signals (false target position or ghosting, lost plots, target masking etc) https://windeurope.org/summit2018/files/downloads/aviation/Maurice-Dixon-Wind-Turbine-Impact-on-Military-Radars.pdf
- lack of acknowledgement of the need for end-of-life planning and site-remediation

Solar:

Objections to (large scale) solar focus on:

- reduction in available farming land
- lack of acknowledgement of the need for end-of-life planning and site-remediation

Goal 8 Providing a solution that the nation, NSW and individuals can afford. This should be self-evident, but in case it is not:

- Just last week, the news filtered through that the electricity-hungry aluminium smelter in Portland, in the southwest of Victoria, is in financial trouble because of power issues. Direct employment at the smelter is about 600, with a further 150 contractors. (Judith Sloan, The Australian, 29-08-2019)
- BlueScope Steel could give the green light to a $US700 million ($1.03 billion) expansion of its prized North Star steel mill in Ohio as early as Monday. The low cost of energy in the United States has been previously cited by (BlueScope Chief Executive) Mark Vassella as a big plus in why a US expansion made more sense than in other parts of the world, including Australia. https://www.afr.com/companies/manufacturing/bluescope-eyes-1b-us-steel-plant-expansion-20190815-p52hli
- When the eastern states' National Electricity Market was formed in the late 1990s, Australia had the lowest retail prices in the world along with the United States and Canada. https://www.afr.com/politics/australian-households-pay-highest-power-prices-in-world-20170804-gxp58a

A figure that is quoted in several places on the internet (eg https://stopthesethings.com/2019/07/20/total-flop-20-years-60-billion-in-subsidies-wind-solar-deliver-risible-7-of-australias-power-demand/) and in the print media is the amount of money that Australia has spent subsidising renewables. A recurrent figure is $AU18 billion to date for Renewable Energy Certificates from LRET, and AU$60 billion by the end of the LRET in 2031 (ibid).

If Australia had no national debt and ran its budget in surplus, and had no other pressing demands for its national funds, then spending AU$60 billion would be less of an issue.

If Australia were to spend AU$60 billion developing a manufacturing and export industry for Renewables products, then the figure might be more defensible. As it is; the products are bought in from China and the US, and the "industry" in Australia is limited to installing panels on roofs, turbines on green-fields, and erecting transmission lines.

It is worth reflecting on the opportunity cost of that money. What would be better uses for it? Aboriginal families living in third-world conditions might be a legitimate recipient of a chunk of it.

Finally, let me apologise again and give you my last extended quote.

> This year, the world will spend $US162 billion ($230bn) subsidising renewable energy, propping up inefficient industries and supporting middle-class homeowners to erect solar panels, according to the International Energy Agency. In addition, the Paris Agreement on climate change will cost the world from $US1 trillion to $US2 trillion a year by 2030. Astonishingly, neither of these hugely expensive policies will have any measurable impact on temperatures by the end of the century.
>
> Climate campaigners want to convince us that not only should we maintain these staggering costs, but that we should spend a fortune more on climate change, since our very survival is allegedly at stake. But they are mostly wrong, and we're likely to end up wasting trillions during the coming decades.
>
> Over-the-top environmental activists are not only out of synch with the science but they also are out of touch with mainstream concerns. A global poll by the UN of nearly 10 million people found that climate change was the lowest priority of all 16 challenges considered. At the very top, unsurprisingly, are issues such as better education, better healthcare and access to nutritious food. We need to address climate change effectively — but we should remember that there are many other issues that people want fixed more urgently.
>
> The present approach to climate change isn't working. If fully implemented, analysis of the leading climate-economic models shows that the Paris Agreement will cost $US1 trillion to $US2 trillion every year in slowed economic growth. Our response to climate change is so expensive because alternative energy sources remain expensive and inefficient in most scenarios. It is still very expensive to switch from fossil fuels — hence the fortune being spent on subsidies, to little overall effect.
>
> Leading global energy researcher Vaclav Smil says: "The great hope for a quick and sweeping transition to renewable energy is wishful thinking." Former US vice-president Al Gore's chief scientific adviser, Jim Hansen, who put global warming on the agenda in 1988, agrees: "*Suggesting that renewables will let us phase rapidly off fossil fuels in the United States, China, India or the world as a whole is almost the equivalent of believing in the Easter Bunny and Tooth Fairy*."
>
> Despite costing a fortune, the Paris Agreement will have virtually no impact on global temperatures. The UN Framework Convention on Climate Change has estimated that even if every country makes every single carbon cut suggested in the Paris treaty to the fullest extent, CO2 emissions would be cut by only 1 per cent of what would be needed to keep temperature rises under 2C. Incurring an annual $US1 trillion cost while failing to rein in temperature rises is a very poor idea.

(Bjorn Lomborg, The Australian, 20-07-2019)

RECOMMENDATIONS

The actions that I recommend the federal government takes – and which the parliament of NSW should propose to it – are:

Goal 1 Cheap, reliable power 24/7

Announce the intention to build two new large (Bayswater size) High Efficiency coal powered baseload stations. One each will be NSW and Queensland.

Announce that a referendum will be held on the introduction of nuclear energy for further baseload stations, with intention of building two (with one earmarked for the replacement of the lignite burning Loy Yang power station in Victoria, and the other in South Australia. If the referendum is successful, the government will introduce legislation to;

- repeal S140A of the (Commonwealth) *Environment Protection and Biodiversity Conservation Act 1999*
- provide the federal government with the power to deprive the States and Territories of the power enact any legislation relating to the use of nuclear energy or nuclear material
- repeal the South Australian *Nuclear Waste Storage Facility (Prohibition) Act 2000* and the Victorian *Nuclear Activities (Prohibitions) Act 1983*
- deprive the States and Territories of the power to withhold planning permission for any new thermal or nuclear power station that is to built on the site of an existing (or previous) thermal power station.
- deprive the States and Territories of the power to subsidise, or penalise, any form of power production

These five points are necessary to deprive opponents of the plan the opportunity to delay the implementation of the plans through "lawfare" of the sort that delayed the final approval of the Adani mine in Queensland for nearly ten years.

If the referendum is unsuccessful, the federal government should announce that the two power stations that were to be nuclear will now be High Efficiency coal powered stations (sites to be determined).

To cover the period while the new power stations are being built, the government will direct AEMO to change its operational model to ensure that existing thermal power stations are not disadvantaged, as they currently (September 2019) are. The government may also need to change legislation on the purchase of RECs by retailers, to prevent them being *forced* to purchase them at prices which increase end-user electricity prices. This is necessary to ensure short-term 24/7 power availability, and ensure it is available without increase in price.

The above steps are mere outlines of the policy that will need to be implemented. There will be other ways of achieving the same end, but it must be recognised that the problem Australia faces is primarily a **political** problem not a **technological** problem, and needs to be treated as such.

Note also that there are multiple ways to skin this cat. The use of multiple small nuclear generators (of the size the US navy puts into its submarines, or the bigger ones it puts into its carriers) might provide a quicker implementation pathway. For the purposes of this submission, I merely raise the possibility of their use and emphasise the principles of moving to nuclear generation for dispatchable power.

Goal 2 Prevent the States and Territories implementing their own energy policies

This goal would be met by the five points identified as a solution to Goal 1

Goal 3 Minimise rent seeking and profiteering

- take into public ownership all Australian-owned commercial generation assets, at the values at which they are carried in the companies' balance sheets (not the value of expected profits).

Goal 4 Prevent existing thermal power stations being priced out of the market

- give AEMO direction to adjust its operations to remove policies which penalise thermal power stations.

  Again, this is a **political** problem. Changing the AEMO policies to , *say,* require bidders to bid for 30 minute increments not five minute increments – and penalise them if they fail to supply contracted power for all of that increment – would force wind and solar operators to invest in storage capable of supporting whatever they are envisaging bidding. This would reduce the *intermittency* of wind and solar (albeit at a huge short term cost to those operators) and stop them penalising thermal stations.

  Similarly, stopping prices going negative – for coal power stations, only – would prevent them being penalised by not being able to turn on and off at will in response to five-minute (or 30 minute) demand fluctuations.

  To supply specific proposals, you need someone who knows a lot more than I do about the pricing operations of the AEMO but the *principle* should be clear.

Goal 5 Reducing CO2 emissions

The introduction of nuclear power stations (especially as a Loy Yang replacement) would reduce Australia's CO2 emissions.

Forcing operators of wind and solar generation (even if these are nationalised by the government) to have adequate storage would also enable the speedier retirement of old coal power stations.

"Demand Management" - driving large commercial users of power out business by ever-increasing prices and supply intermittency, is not a (politically) viable long-term strategy.

Goal 6 Public acknowledgement of Australia's miniscule contribution to world-wide CO2, and acceptance that bankrupting ourselves will do no good.

This ought to fall out of the actions from addressing the other goals, but in case it does not, the government should embark on its own publicity / information campaign.

Goal 7 Avoid environmental degradation being introduced by changes to methods of energy generation.

Stopping the introduction of further wind farms will be a bonus outcome of a move to nuclear power for generation. If Australia makes a serious effort to become a "nuclear fuel" power, by building an industry focused on mining, refining, reprocessing and safely storing the residue of nuclear fuels, the environmental degradation here will be minimised because the industry will all be in the public eye, and subject to scrutiny.

The environmental degradation from wind farms will persist until they reach their economic end of life, and that is a legacy with which we will have to live for a couple of decades, probably.

Goal 8 Providing a solution that the nation and individuals can afford.

In one word, "nuclear". I see this as the only economically viable strategy to meet the goals I have identified, and which I believe should be the goals of New South Wales and of the Commonwealth of Australia.

Committee members may feel that this submission is focused on federal-level issues, not on NSW-specific issues; and that the submission hardly touches on the terms of reference of the enquiry.

To an extent, that might be a reasonable criticism, however I believe that NSW needs to ensure that its overarching energy stance is in line with that of the federal government.

I note that the Australian Parliament House of Representatives Standing Committee on the Environment and Energy is holding an "Inquiry into the prerequisites for nuclear energy in Australia". I note also that 44% of the Australian population is in favour of nuclear power (*Australian 05-09-2019*) I expect that over the course of this federal parliament the government will take steps to repeal the ukase against the use of nuclear power in Australia.

If the government of NSW does not want to find itself out of line with federal government and community sentiment, it will be prudent to start considering nuclear energy as an alternative to wind and solar farms.

That is the reason why this submission has the form and content that it has.

11 September 2019