

Submission to : **Federal House Select Committee Inquiry into nuclear power generation in Australia.**

Submission by : **Gary Rowbottom,**

Preamble / Conclusion Summary

I make this submission to the Federal Australian Parliament's Select Committee on Nuclear Energy Inquiry into nuclear power generation in Australia for the following reasons:

- It matters a lot to me that Australia and the rest of the world makes a good transition to renewable, or rather emission free or as low as possible emission sources, as part of the wider decarbonisation effort that science has determined needs to happen to avoid the worst effects of climate change.
- I have worked for over two decades in coal fired power stations in Australia as a mechanical technical officer, so I have a good understanding of that technology and industry, and bear no malice towards it at all, it is simply necessary to move away from coal and gas power generation, and the science indicates as quickly as possible.
- I was involved for about 6 years between 2012 and 2017 in the "Repower Port Augusta" campaign to build concentrating solar thermal power generation electricity generating facilities in the Port Augusta region, principally as I could see the need for decent scale energy storage, and the jobs involved in the construction, operation and maintenance of such facilities would be good for our region, and to some way replace the jobs that in 2012 had already been lost from the Sir Thomas Playford B Power station in Port Augusta. Of course that didn't play out as desired, though that story is not yet over, and Port Augusta has transformed itself into a decent renewable energy zone, albeit with thus far no storage capability. My involvement in that campaign forced me into many hours of research into not only various forms of power generation technology but also the economics, and the political circumstances surrounding our decarbonisation attempts, and to some degree the mysterious world of project development where many projects are announced and few come to fruition.
- In 2015 the SA Government Royal Commission into the nuclear fuel cycle forced me to also consider nuclear power, taking considerable hours to obtain and digest information. I authored my own submission into that Royal commission and I attach that submission to this enquiry, as an exhibit, being a previously published document. I note that the final Commission findings in regard to nuclear power generation were quite closely aligned to my own position.

- I live in Port Augusta, and thus have “skin in the game”. I am very keen on Port Augusta being a leading low emission power generation hub. If it made sense to me to include nuclear in that portfolio I would be happy for that to be included, but it doesn’t, and thus I do not support introduction of nuclear power generation in Australia, for reasons as detailed further on.
 - Finally, I would like to add that I understand you would find most people would have an opinion on whether nuclear power generation should be introduced into Australia or not. I also understand a good many would be all for it, including in Port Augusta and including a good number of my former colleagues at the now demolished Augusta Power stations. But you need to very carefully consider what knowledge underpins those opinions. The technical, commercial and political nuances in power generation (and decarbonisation generally) are extremely complex, and most people will not have taken the time to learn what is needed to have a properly informed opinion, not helped by the difficulty in obtaining unbiased information. And I would further say that just because someone has worked in power stations or power industry for a long time, that in itself does not mean you understand all the above mentioned nuances, and thus can claim an informed opinion. I think it is unfortunate in the extreme that this issue has resolved itself as yet another political battle ground in the seemingly endless political climate war, rather than being determined on the basis of how can we do the best job of a good, quick, cheap energy transition. Unfortunately, now that this issue has become a political division point, whether nuclear generation begins in Australia or not may be decided by the aggregate of opinions, informed or otherwise. I know the hours of research I have done, in part evidenced by my computer hard drive being awash in energy and climate related documentation, and am happy to put that evidence up in support of the validity of my opinion.
 - Having spent considerable time investigating and thinking about nuclear generation due to the 2015 SA Royal Commission into the nuclear fuel cycle has saved me some time both in considering the pros and cons of the current push by the coalition government to commence nuclear power generation and in preparing input into this inquiry, as it would have been a challenge to meet the current House enquiry deadline in time otherwise. Seems a somewhat hasty exercise, given its gravitas.
 - In the week following the announcement of the 7 sites proposed for nuclear power generation, I thought about it all again, and noted initially 11 or 12 reasons I considered nuclear power generation on Australia a bad path to move down, since expanded to 14, which I present briefly following this preamble. And more hours of research on this issue has restarted. I note this Select Committee has a hearing scheduled for 6th December, and will endeavour to attend and am happy to present in person to the committee at that hearing.
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14 Reasons why nuclear power generation in Australia / Port Augusta is a bad idea

1. Too Slow

Introduction of nuclear power generation into Australia would take too long to achieve and the policy as thus far outlined would result in releasing more harmful emissions into the atmosphere as compared to continuing (and accelerating as planned) the transition to solar wind and storage path that we are currently on.

The coalition policy is to slow the uptake of solar, wind and storage, extend the life of existing coal and gas power stations and wait for nuclear, and that will result in Net Zero by 2050 being achieved. The coalition plan states that nuclear power would start to come on line by 2035. That timeframe is widely refuted by most sources, including in the existing power generation companies, and is evidenced as such by empirical results from recent projects (eg Hinkley Point C, Flamanville, Vogtle, Olkiluoto) in a number of countries that already had established nuclear generation industries. Most authorities seem to place the earliest we could achieve nuclear power to start to be online would be into the 2040's.

Even by 2035, if Australia continues what is already happening, Australia will have gotten a lot closer to net zero, and been steadily lowering emissions the whole time. By going slow on renewables waiting for nuclear, we will not lower emissions as much in that time (ie we will emit more environment damaging emissions, and send the wrong message to rest of world).

It is not in essence meeting a net zero status at any arbitrary point in time that is actually most important. What is important, is the total greenhouse gas that is emitted into the atmosphere – essentially the lower the better. The carbon budget model is perhaps the easiest way to get your head around that. We (Australia, and the world) are not tracking particularly well on that. Yet the coalition policy of slowing renewables to wait for nuclear clearly would result in considerably more total emissions by a date in the future, use 2050 for convenience as compared to the current government, and global, commitment of continuing or accelerating our current emissions reduction trajectory. If both strategies were to notionally achieve “Net Zero” by 2050, then the coalition approach would result in a significantly greater total emissions between now and then. If you graphed the emissions from the 2 approaches you can clearly see that the coalition policy results in more emissions. This is in my view the most serious problem with the coalition policy.

2. Too costly

It is too expensive. SMR's are most expensive form of nuclear. All the data sources relied on to provide costs of various power generation technologies ie. CSIRO Gencost, Lazard, AEMO, Bloomberg NEF, all place nuclear as the most expensive form of utility

power. So why on earth would we want to implement the most costly form of emission free electricity generation technology?

In a business case evaluation, a push for nuclear would end there, but the coalition seems determined to push through with this and attempted to create a smokescreen of doubt about the relative cost evaluations, as if they would know better than organisations that do this type of cost analysis for their livelihoods.

It should be noted too that a hallmark feature of recent nuclear power builds all feature massive cost overruns and long delayed completions, and that is in countries with established nuclear power industries. The examples I gave previously, Hinkley Point C, Flammanville, Vogtle and Olkiluoto are cases in point.

Even more notable is that the coalition sketchy plan includes constructing two SMR's , but SMR's do not exist yet, none have achieved planning approval, and no one in the western world has a licence to build one. So the chances of delays and cost overruns there are enormous. I am not keen for my home town of Port Augusta to be the site of a failed project.

Two slow and too costly. Two fatal blows to that plan right there.

3. No improvement in nuclear power status since SA Royal Commission

Nothing has fundamentally changed in nuclear's favour since SA Royal Commission into nuclear fuel cycle. It is still expensive, still takes a long time. SMR's still have not been deployed on any type of scale, and large "traditional" nuclear is in decline.

At one time I did think SMR's looked a good way to go, That was in about 2006, before I had really started my self education in all things, energy, power and climate. I read a small snippet in my National Geographic at that time that said SMR's, built in modules in factories and assembled on site, common design, easily permitted and constructed in the 60 to 80 MW module range, at that time. Even cited a manufacturer, Toshiba. Good idea I thought, that would be a way to replace the old Playford B Power station, keep us all employed in the power industry. What the snippet didn't say was that these didn't exist then, in 2006. And guess what, roll forward 18 years and they still don't, only the same theory I read about in that magazine in 2006, and in concept models like I recently saw in London, in the Science Museum's "Adani Green Energy Revolution" Hall.

The SA Royal Commission into the Nuclear Fuel cycle was not a minor exercise. It took around 2 years and cost \$7.2 million.. It doesn't take too long to see that not enough has changed in the intervening 8-9 years since then to warrant either another large scale costly enquiry nor implementation of the technology, determined inadvisable by that Royal Commission final report.

4. Nuclear power is a poor fit for our grid, especially in SA

"Always on" nuclear, even SMR, is a poor fit now for our grid (particularly SA), and that will only get more of a mismatch as more renewables are added. SA is already at 72% approx. If The SA target is met SA will be at net zero by 2027 - so what use would expensive nuclear be? In SA now, renewables relatively often caters for 100% of state need. That scenario will flow on to other states too in a short/medium time frame, with various forms of storage using up excesses (to be used at times of low RE output). So an always on generation type is not a good fit for our grid, SA in particular. What is needed in SA now and surely later for other states is flexible generation that doesn't mind (or cost) to be turned on and off as needed. Always on nuclear would push free fuel grid scale renewable and domestic/commercial solar off line. It is blatantly obvious that as more RE and storage rolls out across SA/Aust that by the time nuclear did roll out this situation would be much much more evident even in 2035, if you happen to accept the coalitions bizarrely optimistic and unrealistic time frame. At realistic time frames for a nuclear adoption, even more evident. Even with the part of the coalition plan to slow the renewable / storage path we are on, it is likely enough will still be added to expose that nuclear doesn't fit the grid very well, in all states, and particularly SA.

5. Yet another issue dividing the Port Augusta community

The last thing Port Augusta needs is another issue to cause in division in our community. Port Augusta had a few major setbacks to its socio-economic heartbeat with the privatization and associated job losses in the railways and power stations in the mid to late 90's. Since then a fair number of "town saving" projects came in flurries of announcements but very few happened, and of course the final closure of the coal fired power stations and coal line in 2015/16 was another blow, followed only by more project announcements that again have mostly been phantoms. All this bit deeply into the community and caused a degree of division, and more recent happenings such as the Voice and youth crime have further polarized and divided our community. The nuclear plan will, and already has caused, further community division, and has potential to be the grand daddy of our divisive issues. As I said, the last thing Port August needs.

Maybe the other sites don't have the same history and baggage as ours, but I suspect they will be a significant cause of community division in all of the sites nominated to host the reactors planned, and for that matter a cause of division through all of Australia.

6. Job potential for locals not as good as touted

Probably not a whole lot of local jobs in it, some labouring, trade type jobs in construction mostly, and these jobs wouldn't start for many years. Will be a lot of specialist workers needed to be brought in from overseas. Some work in construction

for trades, earthwork, civil construction. Components would be very largely if not exclusively brought in from overseas, including reactor fuel. I am not convinced that nuclear would create more jobs (especially local jobs) than continuing/accelerating the path we are on with wind, solar and storage.

7. **Popular perhaps, but not prudent**

I suspect the proposed nuclear option will have a fair bit of popularity, with locals, even ex power station people that may understand the power system we used to have, but not necessarily the nuances of the necessary transition we (in SA) are well on the way with. But those people don't have real skin in the game, it won't be them in charge of making nuclear a reality. Some will put on their rose coloured glasses and say "think of the jobs", for others nuclear simply fits better with their tough guy/gal "I'm not 'fraid of anything, bugger girly renewables" personas they prefer to project for themselves.

Dot point 6 in the preamble / conclusion summary also speaks to the disconnect between having an opinion (that we all can have) and having a valid, informed opinion.

Also if someone doesn't accept the need for the energy transition in the first place, what basis is there to accept any opinions from that someone on what we should do?

8. **Damaging to current and future renewable projects through creating uncertainty**

The nuclear plan will result in a serious derailment of investors that are needed to continue and accelerate the transition path we are on. It will hamper current and future progress, even if the coalition doesn't win power. It will be a deterrent for new renewable market entrants.

A lot of damage has been done already by this policy, just by letting this cat out the bag at all, even without winning power. Creating more FUD (fear, uncertainty and doubt), will hamper the energy transition path we are on.

9. **Increased curtailment of domestic and commercial solar PV and wind installations**

"Nearly always on" nuclear will push rooftop solar off the grid more often, depriving thousands of particularly South Australians of the benefits of installing solar on their roofs to lower their bills. Not keen on my solar output being curtailed more. And it will similarly affect utility scale wind and solar installations through increased curtailment.

10. Limited transmission distribution infrastructure available in some selected sites

Is there even room for this without new transmission lines/infrastructure? The limited detail in the plan unveiled indicates the sites chosen for the proposed reactors have the advantage of being able to tap into the existing transmission lines that were built in those regions for the former coal fired power stations. To be sure utilizing those transmission lines is a distinct advantage, but at least in the case of SA that space has already been utilized by a number of renewable energy projects – who also recognize the economic advantage in utilizing those infrastructure assets. There is currently approx 730 MW of peak capacity in RE installations in the Port Augusta area alone. (The former Northern and Playford B Power stations had a nameplate joint maximum capacity of 784 MW). Plus a lot of rooftop solar, inputting into the grid that wasn't there in 2016 when NPS was taken out of system. More is slated to be added in our region in the near horizon, further taking up any available capacity of the transmission network

I have heard the SA Energy Minister, Tom Koutsantonis also mentioned this factor. He says there is not sufficient room. He also confirmed the SA government was not consulted on the one page coalition nuclear plan/policy and the minimal detail that has accompanied it, before announcing it.

11. Difficult to finance, taxpayers likely to foot massive cost

Even if the coalition is elected and try to enact this policy, investors and financial institutions, and insurance companies, who do understand the financial risk, may not be willing to finance or insure this nuclear dream.

However, it seems like investors may not be called upon. If I have understood correctly, the Government, aka all of us, look like we will be paying for this and possibly taking the risk if the venture is self-insured. I am not happy at all about that! In mine and others opinions, external investors and insurers are not likely to back nuclear.

12. Massive public education needed, public are ill equipped for informed decision

Being properly informed on this, takes a lot of work and research. A lot of people won't bother, even though they should, this is important to all of us.

I personally invested a lot of time for the 2015/16 SA Royal Commission into the nuclear fuel cycle, little has changed since then (nothing in nuclear's favour). I would rather spend my time on many many other things rather than more research, thinking and engaging on this. I am already at least up to 20 hours engaged with this issue since this policy announcement. Our local and higher tiers of government, that have a duty to be fully informed on this, really do need to properly inform themselves on this issue, and is that the best use of their time? Are there are things they would rather do, and things that they could be doing that would benefit Australia and locals better?

Continuing the path we are already on (wind, solar, pumped hydro and storage, requires comparatively much less time input from an enormous number of people. Same goes for those whose job entails managing the electricity supply system or advising on it - they now need to spend time thinking about how nuclear changes things, in addition to thinking about what to do for a good transition we are well on the path to achieving.

13. The waste problem

The waste. Don't know I trust humanity to be able to look after the waste for 10,000 to 100,000 years or so.

Wouldn't like to commit say 5 generations of my family for life careers as nuclear waste guards - how about you? That actually would need about 30 generations to get that job done. Nuclear power station waste (and I think SMR waste in particular), are long lived high level waste types that need very long duration care. Australia currently has not produced any high level radioactive waste. That may change with nuclear submarines, and Australia does have some intermediate level waste (ILW) that needs secure isolation for 10's of thousands of years. That was 656 cubic metres of ILW at time of Royal Commission in 2015/16, as I recall.

The decommissioning of nuclear plants also looks fun. I recall from a National Geographic article, quite a few years back, showing a worker from one of the German nuclear power station decommissioning projects. They'd been at that for 20 years, the guy (presumably) shown was all kitted out in what looked like a rubber suit and full mask. Perhaps it was lead lined, I don't know. Anyway, as I said, that looked like it would be fun, especially in a Port Augusta summer. I wish I still had that photo.

14. Creates tempting and dangerous target for potential enemies and subversives

Nuclear facilities in general, would be potential targets for any potential hostile invaders, with the added disruption through forced release of radioactive material, adding to the damage caused by an attack. Perhaps Port Augusta would make an extra attractive target due to its strategic geographic position on the road/rail network, the Crossroads of Australia. This perhaps holds true for small subversive groups or even lone wolf crazies, as well as potential hostile nations.

Not very likely, and nuclear facilities have generally not been targeted in conflict (eg Ukraine war), but that doesn't mean it couldn't happen, and again I don't think I trust humanity wouldn't try such a diabolical act. I wouldn't claim the world is stable and will remain that way for even 50 years..

Conclusion / Wrap up.

So in summary I cannot recommend that Australia proceed with the implementation, as the reasons above outweigh significantly the comparatively few advantages of nuclear power. Indeed I strongly urge the Government (of whatever stripe) not to proceed down the nuclear path. Too slow (and thus more emissions) and too expensive, and the poor match to our grid's current and future characteristics are the big 3 reasons out of the fourteen I have outlined to not implement nuclear power. My other reason and accompanying host of higher risks and negative externalities (such as educating the public, pre-election and pre implementation) also tip the scale further in the No direction.

As mentioned in my preamble, I note this Select Committee has a hearing scheduled for 6th December, and will endeavour to attend and am happy to present in person to the committee at that hearing.

I thank the Committee for their time in accepting and reviewing mine and the other submissions received for this enquiry, and look with anticipation to reviewing their report.

Authored and submitted by:

Gary Rowbottom

Attachments:

- Submission from Gary Rowbottom to the SA Royal Commission on the Nuclear Fuel cycle, (Issue Paper 3) in 2015.
- Cover sheet for above submission to SA Royal Commission into the nuclear fuel cycle.