Kurri Kurri Lateral Pipeline Project (SSI-22338205)
Submission by Ted Woodley – 10 May 2022

I wish to oppose the Kurri Kurri Lateral Pipeline Project, as proposed by APA Transmission, the design and build contractor for Snowy Hydro Ltd.

I previously registered my opposition to the Kurri Kurri Power Station ("Power Station" or "Station") - see box for summary[1] – on 10 June 2021. I wish to re-submit those reasons as they are all relevant for the lateral pipeline project ("Lateral EIS").

Additionally, there are four aspects that I wish to highlight:

i) the Power Station is not needed in 2023 as claimed, and hence nor is the lateral and storage
ii) the Station will not be 'hydrogen-ready' as claimed. In fact Snowy Hydro has instructed APA to not build the storage pipeline to be able to store hydrogen blended fuel. If the government intends to approve the project, then a condition of approval must be that the lateral and storage are built to ensure they are hydrogen-ready, in accordance with Snowy Hydro's claims and the various Commonwealth and NSW government hydrogen policies
iii) the Station cannot run continuously on gas (10 hours maximum) and therefore will be incapable of performing the normal continuous dispatch function of a gas power station
iv) with the cost of the lateral now being revealed (together with other excluded costs), the cost of the project has almost doubled from the initial estimate ($610m), making it even more uneconomic and a waste of taxpayer funds

For these reasons the project should be rejected.

Summary of Ted Woodley's Submission on the Hunter Power Project EIS[1]
"not needed, and can only run on gas for a few hours anyway"

The Submission contends that the proposed Kurri Kurri Power Station would:

- not be needed – there is no supply gap when Liddell closes in 2023
- be incapable of providing dispatchable capacity over extended periods - the fundamental function of a gas-fired power station
- run out of gas after a few hours, even if storage is added, and take a day to recharge, due to its poor location beyond the end of the heavily constrained Sydney-Newcastle gas pipeline
- only be capable of generating at capacity for two days using all its diesel storage as well
- be unlikely to attain its claimed capacity factor of 2% (only)
- 'compete' with Snowy Hydro's nearby Colongra Gas Power Station (capacity factor 0.4%)
- be in the same market as, and be comprehensively outcompeted by, batteries
- cost around $1 billion, not $600 million, all at taxpayer's expense
- have a market value of less than Colongra's purchase price ($234 million), with no possibility of a financial return
- not reduce electricity prices (as claimed) and put upward pressure on Hunter gas prices
- involve just 125 jobs (average) over its two-year construction (not up to 600 jobs as claimed), and 10 operational jobs
- emit pollutants over the Hunter/Newcastle region, with a greenhouse gas emission intensity more than 60% that of Liddell, the coal-fired station it is allegedly 'partly replacing'

The Submission drew extensively from a Victoria Energy Policy Centre Research Paper "Kurri Kurri Power Station: charging taxpayers for hot air", which I co-authored."

[1] https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=EXH-18128779%2120210610T053319.555%20GMT

1 Not needed

Despite the claims by the Commonwealth Government and Snowy Hydro, there will be no electricity supply gap when Liddell closes in 2023.

As referenced in my previous Power Station EIS submission, that was clear in the AEMO 2020 ESOO. It has been reaffirmed in the recent AEMO update to the 2021 ESOO.

If at some time in the future a need for additional peaking plant emerges, the Kurri Kurri Power Station could be considered then. It has a relatively short lead time and could be constructed in two or so years (as is the case now).

As the power station is not needed for the intermediate future (if ever), neither is the gas lateral and storage.

2 Not hydrogen-ready

Snowy Hydro and the Commonwealth Government claim that the Power Station will be 'hydrogen-ready'. Most people would interpret that term to mean that the Station is standing ready to be operated on hydrogen (i.e. up to 100%), with minimal modifications, when hydrogen becomes available.

This is reflected in Labor's back-flip support for Kurri Kurri based on the expectation that the power station will be converted to run on a 30% green hydrogen blend when commissioned in 2023 and then entirely on hydrogen by 2030. Labor was even prepared to kick in another $700m.

However, it is now clear that the claims of hydrogen-readiness are misleading, even deceptive. In fact, it seems that the Station cannot be converted to hydrogen, and certainly not 100%.

Snowy Hydro has made numerous confusing and conflicting statements on the percentage of hydrogen that the Station will be ready for, as demonstrated by the following samples:

Turbines:

- the turbines will be capable of operating with up to a 10% blend initially and then up to 30% with modifications[2]
- the gas turbines can use a 10-15% hydrogen blend, with the potential to be extended to 30% hydrogen[3]

[2] **Snowy Hydro website**
"The power station will comprise two heavy-duty, open cycle gas turbines (OCGT) and are the latest and most efficient turbines that the world's best manufacturers can offer for the site.
The OCGTs will operate on natural gas and will be hydrogen-ready. Diesel is available on-site as back-up for the extreme and rare cases where the NSW power grid needs it to keep the lights on. Over the power station's life, diesel usage is negligible.
This means the OCGTs will be capable of running initially on up to 10% hydrogen and with some minor additional investment they will be capable of up to 30%, subject to fuel logistics."

[3] **Hunter Power Project Response to Submissions 4 August 2021 Section 5 Issue 5**
"Accordingly, the Proposal is being designed to accept a 10% mix of hydrogen in natural gas, with the potential to be upgraded to higher hydrogen mixes. The 10% is premised on the expected capability of the Jemena Gas Networks Northern Trunk transmission pipeline to store and transport the hydrogen and gas blend, this being the transmission pipeline from which the gas lateral to the Proposal would connect into and draw gas, and the gas/hydrogen specification for the transmission pipeline. If the gas network specification increased to 15% hydrogen, we expect that the power station will be capable of accepting this mix.

- the turbines will be capable of a 15% blend from day one, then up to 30% quite easily and then up to 100% in theory[4]

Pipelines:

- the gas lateral piping and compressor station is to be designed to enable the same capability as the power station, being a 10-15% hydrogen blend[3]
- the lateral will be designed in accordance with the code[5]
- on Snowy Hydro's instructions the storage pipeline will not be built to enable the storage of hydrogen blended fuel[6]
- land has been allocated to build a new storage for hydrogen[7]

The case set out above is considered very likely however it is yet to be finalised with the equipment manufacturer in terms of a final contractual position. Based on this hydrogen and gas blend, the preferred equipment supplier's gas turbines have been assessed and can use a 10-15% hydrogen blend.
The turbines' capability has the potential to be extended to a 30% hydrogen mix with changes to the internal equipment of the turbines, including the fuel gas burners and fuel supply valves and piping. To enable any hydrogen mix capability, additional costs would also be incurred for equipment outside the power station, particularly to the gas lateral piping and compressor station being installed by the pipeline owner and operator. As such, this equipment is to be designed to enable the same capability as the power station, being a 10-15% hydrogen blend."

[4] **Senate Estimates Environment and Communications Legislation Committee 25 Oct 2021 page 58**
Senator SMALL: You mentioned that Kurri Kurri has a role to play in firming renewables in the grid. What consideration has been given to making Kurri Kurri hydrogen ready?
Mr Broad: It was hydrogen ready from day one, up to 15 per cent. Mitsubishi tells us they can take it up to 30 per cent quite easily. Beyond that, we can get it up further, but that would need some upgrades in the burners. So we're ready.
Mr Whitby: It can take, in theory, up to 100 per cent with the burner modifications.
Senator SMALL: So, effectively, the input energy into the generator can be, without upgrade, 30 per cent hydrogen, and, with upgrade, 100 per cent hydrogen?
Mr Broad: Yes, and that goes back to Senator McAllister's question about our considerations or the reason we delayed. We need to do all that against the alternatives without giving away what the alternatives away or saying bad things about them; we don't wish that at all. It was not the most compelling offer when we first got it. It got more compelling and the business case got better and better because of that. The connection agreements—you will appreciate, it is one thing to have a gas plant but you have to connect it to the networks. All that process of connecting, they sold it in a heartbeat for us. That is how that evolved. The total life benefits of the units improved significantly.
Senator SMALL: To be really clear on that, the proposition of having a hydrogen-ready gas-fired plant now has changed significantly over what period of time?
Mr Broad: It was over the last couple of years that, really, it has come more into its own."

[5] **Gas Lateral EIS Sec 2.3.3**
"The transmission pipeline will be designed, constructed and commissioned in accordance with the requirements of ASME B31.12-ASME Design code for Hydrogen Piping and Pipelines, in order to maintain readiness for potential use of hydrogen in the east coast gas network."

[6] **Gas Lateral EIS Sec 2.3.3**
"With regards to the gas storage pipeline, a significant increase in capital expenditure would be required to construct the storage pipeline for it to be capable of storing a hydrogen blended fuel. This is due to the dimensions of the gas storage pipeline, and construction materials and methods required to mitigate the increased embrittlement of pipeline material when storing a hydrogen blended fuel.
Snowy Hydro have advised that the associated level of capital expenditure would be uneconomic, and consequently the storage pipeline will not be built to specifications that would enable it to store hydrogen blended fuel."

[7] **Gas Lateral EIS Sec 2.3.3**
"Snowy Hydro have also advised that the HPP will remain hydrogen ready through the allocation of sufficient land for the looping of the storage bottle using design and construction methods in accordance with the requirements of ASME B31.12-ASME Design code for Hydrogen Piping and Pipelines, together with the transmission pipeline already constructed to this standard. This modification to the storage bottle would be

It would appear that the Station is being designed to accept a 10% mix of hydrogen, with potential for that to be increased to 30%, after modification. But the lateral will not be able to transmit more than a 10-15% blend and the storage cannot store hydrogen at all.

As stated in the Lateral EIS, "*Snowy Hydro have advised that … the storage pipeline will not be built to specifications that would enable it to store hydrogen blended fuel."*

Obviously, if any component cannot operate on a hydrogen blend, then the Power Station will be incapable of doing so.

Clarification is required from Snowy Hydro as it would seem that the Power Station will not be hydrogen-ready at all.

2.1 Land for hydrogen storage pipeline

The Lateral EIS states that *"sufficient land will be allocated for the looping of the storage bottle for hydrogen*[7]*."*

It is noted that 24 kilometres of 1067mm diameter pipe is required to store sufficient natural gas to run the station for (just) 10 hours. Significantly more pipes will be required to store sufficient hydrogen to run the station for 10 hours, due to hydrogen's lower energy intensity – possibly up to three times the length and therefore land and cost.

Clarification is required on the hydrogen percentage to be stored, where this land is located, how much storage is envisaged and the maximum run-time of the Station.

If the lateral and storage are approved it needs to be on the condition that the pipelines are capable of handling 100% hydrogen from day one, otherwise Snowy Hydro's stated claim of hydrogen-readiness cannot be viewed as serious. There is just no case to build another fossil-fuelled power station, lateral and storage.

2.2 Conformance with government hydrogen policies

The Secretary's Environmental Assessment Requirements (SEARs) state that:

> *"The EIS must include the strategic need and justification for the project, in regard to its role in supplying gas to the Hunter Power (Kurri Kurri Power Station), relevant NSW and national policies and guidelines on electricity and gas supply and security including the NSW Future of Future of Gas Statement, Australia's National Hydrogen Strategy, and NSW Government policy development on use of hydrogen."*

The EIS fails to address this requirement in explaining how the lateral and storage support hydrogen-readiness in accordance with the various government hydrogen policies, especially if the storage cannot store hydrogen blended fuel.

3 Incapable of long-duration generation

The Power Station EIS and RTS laud the advantages of gas power stations, particularly compared to batteries, as being capable of providing dispatchable capacity continuously:

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subject to a later submission for planning approval, initiated when the economics of delivering a hydrogen blended gas fuel allow, and when hydrogen blended fuel is received from the SNP."

"Gas-powered generation has considerable advantages over longer periods, providing dispatchable capacity over days and weeks, in comparison to intra-day firming typically available from battery storage. Large volumes of gas may be stored in the gas network and in dedicated gas storages for very long periods in time, and the gas network supports continuous ongoing operation of gas generation on an unrestricted basis within the constraints of Project and environmental approvals. Gas powered generation makes use of existing infrastructure to cost-effectively manage energy balances over long periods, which is a particularly useful complement to battery and pumped hydro storages. This is particularly well suited to managing prolonged periods of low wind generation, which may last for weeks or months.

The Proposal has been put forward to provide flexible and longer duration firming capacity that batteries currently do not provide. The Proposal is complementary to battery storage and as such batteries are not a viable alternative to the Proposal."

Hunter Power Project Response to Submissions Sec 5 Issue 3

Such statements are highly misleading, as Kurri Kurri Power Station cannot perform this basic function of normal gas powered stations – Kurri Kurri cannot provide *"dispatchable capacity over days and weeks ... or months"*.

Gas industry insiders knew that gas supply to the power station would be a trickle, being near the end of the notoriously overloaded trunkline from Sydney, and that a massive storage system would be needed.

Snowy Hydro initially proposed a storage sized to power the generators for six to seven hours at full output. This ridiculously short duration was universally criticised for a power station to be run supposedly over lengthy periods when 'the sun isn't shining or the wind blowing', *"which may last for weeks or months"*.

The Lateral EIS now proposes a storage of ten hours, still of limited value. Most gas power stations have sufficient gas supply to generate continuously. Kurri Kurri will be outcompeted by such stations and emerging batteries.

To add to Kurri Kurri's crippling limitations, whenever its storage is emptied it will take more than a day to refill, assuming gas is available.

If another gas power station is urgently needed for the National Electricity Market, which it isn't, why locate it 20 km from a (limited) gas supply, needing $300m of pipelines just to attain 10 hours operation, and be incapable of generating on-demand, long-duration, dispatchable power?

4 Project cost has blown out

My previous submission questioned the claimed capital cost of the $610 million and predicted *"the full cost of the project is likely to add up to $1 billion or more".*

The Lateral EIS estimates its cost to be approximately $264m. It is noted that Snowy Hydro management advised Senate Estimates, when pressed, that the cost of the lateral was 'around $100m'[8].

[8] **Senate Estimates Environment and Communications Legislation Committee 25 Oct 2021 page 63**
Senator McALLISTER: Back on the capex, the high-level overview document says that the $600 million doesn't include the gas lateral. Some experts have said that the cost of that would be around $100 million. Is that about right?

When the lateral cost is added to the $610m, together with the cost of other excluded components - such as the land, gas offtake, APA's profit margin, the electricity substation, financing, and contingencies - the total project exceeds $1bn, almost double the initial estimate.

The VEPC Paper "Kurri Kurri Power Station: charging taxpayers for hot air" concludes that *"there is at best a tiny market for the sort of service that KKPS can offer and so it has no prospect of earning anywhere near the revenues needed to recover its outlay."*

As Kurri Kurri is to be fully funded by the Commonwealth Government, the project will result in a loss of $1+bn of taxpayers' funds.

5 Summary

Kurri Kurri Gas Power Station and its associated lateral pipeline and storage is not needed, will not be hydrogen-ready, will be incapable of providing continuous dispatchable power and will cost over $1 billion, almost twice its initial estimate.

The Lateral EIS should be rejected.

If however it is approved, the lateral and storage must be built hydrogen-ready.

Mr Wymer: That is a process that is currently being negotiated with the constructor of the pipeline. That's certainly a ballpark figure. That isn't capex. We have a spend, just to be clear. The builder of the pipeline charges us a lease, which Snowy Hydro will pay annually to pay off that pipeline.
Senator McALLISTER: Right, but if that was capitalised, it would be around $100 million roughly?
Mr Wymer: That's not totally out of the money, no.
Senator McALLISTER: I understand that there is around $200 million in inspection costs forecast.
Mr Wymer: Are you talking about the 25-year lifetime gas path inspection profile? Probably. When you run one of these things over 25 years it gets very expensive because you've got to keep going through and maintain them. So in the business case, the O&M cost, which includes gas path inspections, is a very large part of the total NPV of the opex of the plant.