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Addressing Claims Regarding Frontier Economics Reports

The following newsletter examines a report titled 'Lies and Deceptions Summary Report – Frontier Economics Reports 1 and 2', by Ian Nichols, 29 March 2025 [1]. It's important to avoid inflammatory language in order to achieve consensus and be open minded to a range of options, when considering out energy future. I have attempted to do both.

A summary of the findings from a review of the Ian Nichols Report [1] is provided in Table 1, below, with overall results as follows:

- Total number of alleged flaws from Nichols Report - **23**
- Number of alleged flaws that are not actually flaws – **17** (1, 2, 3, 6, 8, 10, 12, 13 to 19)
- Number of alleged flaws that have been repeated – **3** (9, 11 and 21)
- Number of alleged flaws that are addressed below – **7** (4, 5, 6, 7, 22, 23)

In determining whether an alleged flaw is valid, if it is addressed through reference to Frontiers economics reports 1 or 2 [2,3] or the interview with Danny Price [4], then it is not classified as a flaw, the reasons for these findings are listed in Table 1.

KEY FINDINGS BY FRONTIER ECONOMICS

1 - Many commentators simply and erroneously compared the cost of a renewable generator (wind or solar) plus the costs of back-up generation to the capacity and operating costs of a nuclear power station.

2 - Such a crude assessment is an incorrect and misleading basis of comparison because it does not account for the fact that much more renewable capacity is required to produce the same amount of electricity compared to a nuclear power station.

3 - Nor does it account for the requirement to store surplus electricity from renewable sources as well as the back-up generation.

4 - Such simple comparisons also neglect to take into account the enormous amount of investment required to connect renewable generators located in areas where there is presently no or inadequate transmission network capacity.

5 - There is also an enormous cost to rural and regional Australians who have to bear a disproportionate burden of the energy… Consideration of these externalities is beyond the scope of this report…

6 - The ISP therefore provides an excellent base case against which a scenario that includes nuclear capacity, which AEMO does not analyse, can be used to estimate the cost differences between AEMO's preferred energy future with a future that includes nuclear power.

Table 1 – Comparison of Ian Nichols and Frontier Economics Reports 1 and 2

Ian Nichols	Frontier Reports 1 and 2	C2N Comments
Flaw 1 - Not declaring a discount rate of 3% for nuclear, when the discount rate for renewables was 7% is dishonest. Renewables should have been assessed by Frontier Economics using the same discount rate.	The discount rate for renewables of 7% is reflective of investment market expectations and Labor policy. Whereas nuclear energy pricing was based a long-term sovereign investment and discount rate of 3%.	Frontier have based their assessment on the actual renewables policies, together with the Dutton nuclear proposal. ***This isn't a Flaw.*** This is not dishonest, but it does highlight the benefits of public sector investment in long term infrastructure projects.
Flaw 2 – a construction cost for nuclear power plants of $10,000/kW is based on zero references or analysis by Frontier Economics.	The $10,000/kW was conservative and higher than what was used in GenCost 24, being $9,217/kW.	The $10,000/kW rounding up from the CSIRO figure. ***This isn't a Flaw.*** IEA quote nuclear costs of US$2700/kW to US$16,000/kW for Hinkley Point. There are lots of reports on problem projects and the Dutton plan minimizes a number of these [2].
Flaw 3 – that $10,000/kW is higher than CSIRO estimates and both are for FOAK costs. The $10,000/kW is discussed in the alleged Flaw 2.	The Frontier Report - Section 2.2 states: "These costs reflect a reasonable cost equilibrium (i.e. not the costs associated with first of a kind)." Further assumptions have also been outlined.	It's clear that both CSIRO and Frontier assumed the projects were NOAK and Frontier went further to explain that there would be learning improvements. ***This isn't a Flaw.***
Flaw 4 – CSIRO state that costs are Overnight Construction Costs (OCC's) that finance costs add to these and are of the order of 25% to 50% depending on the construction period and project overruns.	Financing costs occur for private sector project funding, this is overcome through having government funded projects.	The government funding of nuclear projects allows them to take project financing risks, and to avoid excessive financing costs, and they will have financing cost, but these will be a lot lower than for the private sector. ***I agree if this is omitted then it's a Flaw, but not nearly as severe as suggested based on sovereign vs. private sector financing.***

Flaw 5 – Nuclear operations and fuel costs alone are about $30 /MWh in USD, this information is readily available.	According to Danny Price in his interview, the total price of A$30/MWh comprises of fuel at around A$6/MWh and A$24/MWh covers operation, maintenance, waste management and decommissioning.	There is a significant difference in both sets of data. World Nuclear Association Economics of Nuclear Power 29 Sept 2023 [3]: Fuel US 0.46c/kWh Generation US 1.42c/kWh Waste disposal US 0.1c/kWh Decommissioning US 0.1-0.2c/kWh US 2.18c/kWh = A$34.6/MWh ***Slightly higher than Frontier Economics, continue to review – but not a Flaw.***
Flaw 6 – omission of significant sustaining capital costs for nuclear plants particularly during mid-life overhauls and major equipment replacements. This data is also readily available. A total operating cost of $A45 per MWh is assumed in the reconstructed model bit is still a conservatively low estimate.	Regular maintenance has been allowed for in the operating cost /MWh and would typically include pipe, pump and electrical works. This is relevant for the 50 year modelling period.	There are significant costs associated with Steam Generator Replacement (SGR) that occur at 40-50 years. This is needed to achieve 80-to-100-year operating life. It is not relevant here as Frontier only considered the first 50 years of operation. ***This isn't a Flaw – in future modelling 80 to 100 years will favour nuclear further over renewables as most remains operable.***
Flaw 7 - an annual cost efficiency improvement in the capital cost of nuclear generators of 1% per annum in these costs from 2024 onwards." This is invalid as once a contract is signed for the construction of a nuclear plant the costs will not continue to reduce while the plant is being constructed.	Confirmed that the 1% annual learning cost efficiency is based on savings with other technologies, including renewables.	Improvements will occur between the seven separate projects, but it's agreed this is unlikely to be realized once a contract is let. ***This can be verified in FE modelling, noting it is a minor item only.***
Flaw 8 - The author has completely ignored; the historical data, the likely increasing forced outage rates, the increasing unavailability of aging coal plants, and the	Danny Price confirmed that planning was based on discussions with the coal power station operators and the sequence was based on maintaining coal plant operations and 65% baseload.	Coal power stations need to be funded for both renewables and nuclear options based on realistic programs (not the 82% renewables 2030). In both cases they should be subsidized for damage caused by stepping

realistic economic end of life for coal plants.		output, due to intermittent renewables. This will be higher for the 100% renewables option, but the timeline is likely to be longer for nuclear. ***This isn't a Flaw – analysis of both 100% renewables and nuclear will be needed in consultation with coal operators***
Flaw 9 - The large costs that will be required to refurbish and replace major components of coal generation plant which is above what is termed operations and maintenance costs has been ignored.	Repeat of alleged Flaw 8 – nothing new in this item.	Repeat of alleged Flaw 8 – nothing new in this item.
Flaw 10 - Report 2 only addresses the scope required to meet energy supply reliability but does not address scope requirements to ensure system security. AEMO's modelling for the renewables plan addresses all fundamental requirements of both energy supply reliability and system security.	Danny Price confirmed modelling was for 54% renewables and 38% nuclear, less gas and less batteries / storage.	Nuclear energy in France is used to backup less reliable renewables in Germany – opposite to what is suggested by Ian Nichols. ***This isn't a Flaw – the 24/7 nature of nuclear provides far better supply reliability and system security than 100% renewables***
Flaw 11 - The consequences of ageing coal-fired power stations and unavailability levels also completely ignores the additional capacity needed to ensure system reliability.	Repeat of alleged Flaw 8 – nothing new in this item.	Repeat of alleged Flaw 8 – nothing new in this item.
Flaw 12 - Even if the LNP secures the balance of power in the next Federal election, the challenges are enormous and just the concept of constructing 13.2 GW of nuclear generation over 14 years is "certain" to be unachievable.	FE Report 2 Figure 1 shows nuclear power stations rate of connection. The initial 1.5GW is completed ahead of a full rollout of projects from 2039 to 2049. This provides upskilling, repetition of systems and identifying efficiencies.	The timeframe would be from 2025 to 2050, so 25 years, not 14 years. Also, project phases can overlap at various sites, and using one design will allow a lot of repetition to be achieved. ***This isn't a Flaw – and is easily achievable provided the anti-nuclear movement is contained.***

Flaw 13 - The project development phase is "almost certain" to take longer than 5 years and may never be Achieved.	Danny Price allowed 11 years for the first nuclear power station to be designed and built. This would overlap with legal and authority activities.	***This isn't a Flaw – there is a risk that the entrenched anti-nuclear movement, academics and bureaucrats could deliberately attempt to sabotage nuclear energy projects.***
Flaw 14 - Project construction barriers and risks: • Workforce capability Risks - Australia would need to recruit or train a large pool of qualifed engineers, scientists, and technicians to design and build a workforce of 45,000 at its peak.	This isn't an economic modelling issue so not relevant to the FE reports.	Nuclear engineering consultancies, contractors and suppliers are operating in a global market and move resources to suit projects. Many of the largest of these companies are already in Austraila: Bechel, Fluor, Egis, AECOM, etc... ***This isn't a Flaw***
Flaw 15 - Report 2 completely omits any mention or costs for the establishment of the nuclear power industry and the broader frameworks and common infrastructure required for a nuclear power industry.	This isn't an economic modelling issue so not relevant to the FE reports.	Government and industry costs will be needed for both 100% renewables and nuclear options. The renewables cover a huge area and will require environmental, local council workers, roads workers etc... whereas nuclear will require a scaling of ARPANZA and Separate nuclear energy authority. ***This isn't a Flaw – both options have government & industry costs.***
Flaw 16 - There was no mention of costs for managing waste and waste facilities in Report 2.	The cost of managing waste and waste facilities was addressed in Danny Price interview and is incorporated in the A$30/MWh.	This was already addressed in alleged Flaw 5. ***This isn't a Flaw – and was addressed in #5 above.***
Flaw 17 - The author of Report 2 ...suggest that the nuclear plan is not that much more expensive than renewables. However, this is a grossly flawed method to truly compare costs as most costs for nuclear have simply been deferred until after 2051.	Danny Price explained how costs were considered through the application of A$30/MWh for fuel, management, maintenance, waste and decommissioning.	The nuclear option is lower cost than renewables + batteries + gas. Costs haven't been deferred until after 2051, but instead have been addressed in the operating cost of A$30/MWh. ***This isn't a Flaw***
Flaw 18 - Appendix B summarises the deception in Report 1 and 2. In Report 1 it is implied that	Danny Price in his interview indicated that AEMO had trouble in forecasting energy demand, and this needs to be revisited,	This isn't included but it's noted that the increased electrification of the grid for EVs etc... note that the 100%

"significant costs in the low voltage distribution sector and consumer energy resources (CER)" will apply to renewables whilst in Report 2 there is no mention of the fact that the "significant costs" of CER are even more applicable to the nuclear plan.	for example EV sales are way below assumed levels in the AEMO ISP.	renewables Step Change assumptions need updating as EV sales don't match expectations ***This isn't a Flaw – but better energy demand projections are needed.***
Flaw 19 - Appendix D summarises the flawed use of amortisation and net present value methods in Section 4.5.3 of Report 2. The author applies the Net Present Value (NPV) method to the annualised costs for the nuclear and renewables plans. This is an economically invalid use of NPV calculations.	Danny Price provided both annualized and NPV assessments that showed the nuclear proposal was significantly cheaper than 100% renewables.	Each model has a lot of limitations and assumptions. More resources and modelling are needed plus updated renewables roll-out programs are needed to firm up the costs of each option. ***This isn't a Flaw – more detailed costing and options studies can be carried out.***
Flaw 20 - The 500kV Supergrid is equally needed if large scale nuclear plants are connected to the system for system stability requirements. All large-scale nuclear plants installed on grids overseas are at voltages 500kV and above.	The transmission costs for the two options are very different due to the geographical footprint and need to move intermittent power around. Refer to cost assumptions.	The 500kV Supergrid is only needed to move a highly dispersed intermittent renewable energy, it won't be needed if the renewables are more concentrated, and the grid incorporates the nuclear plants as proposed with a coal to nuclear transitioning of power. ***This isn't a Flaw – it isn't necessary.***
Flaw 21 - The 500kV Supergrid is required to support demand growth for either the Progressive or Step Change Scenarios	Repeat of alleged Flaw 20 – nothing new in this item.	Repeat of alleged Flaw 20 – nothing new in this item.
Flaw 22 - The nuclear plan consists of around 65% of renewable energy supply. The majority of REZ connections will still be required with less supply capacity within each zone. Very little cost savings could be expected with lower capacity transmission connections.	According to Danny Price there is 54% intermittent renewables and 38% nuclear with the nuclear providing baseload and not curtailed by excess renewables.	The higher proportion of nuclear baseload means transmission is able to match
Flaw 23 - The author has also conveniently applied annualised costs for generation	Danny Price has outlined the assumptions in Report 2 with only a lump sum allocated to	It's reasonable to assume that transmission projects proceed ahead of generation and

costs but applied actual upfront costs to transmission and then adds these costs together in Report 2.	transmission costs for both 100% renewables and the nuclear option.	operation. ***This item can be considered when the design of each option is bet.***

[1] 'Lies and Deceptions Summary Report', by Ian Nichols, 29 March 2025 available on LinkedIn 30 March 2025

[2] https://www.frontier-economics.com.au/wp-content/uploads/2024/11/Report-1-Base-case-report-Nov-14-2024_v2.pdf

[3] https://www.frontier-economics.com.au/economic-analysis-of-including-nuclear-power-in-the-nem/

[4] https://www.youtube.com/watch?v=8vqdTORIf2U&t=2s