Comments on the assumptions and methodologies outlined in the presentations delivered at the Nuclear Fuel Cycle Royal Commissions 6 October 2015 public hearings:
"Topic 5 - Workshop on estimating the costs and benefits of nuclear activities"

By Philip White
Clean Futures Collective
Friends of the Earth Adelaide
19 October 2015

1. Brian Gihm (Hatch Ltd Pty) "Assumptions and Methodology for Fuel Processing Facilities Study"

Power Point, Page 15:
This slide states, "Conversion, enrichment and fuel fabrication facilities modeled to process 10,000 tU/year … Based on average value of high and low IEA global nuclear power generation capacity projection in 2030 (37% increase from 2014) : 376.2 GW(e) to 518.6 GW(e)"

Comment:
This basis for calculation cannot be justified given the fact that pro-nuclear organisations like IEA and IAEA have routinely over-estimated future nuclear power generation. Jim Green of Friends of the Earth Australia has addressed this matter in detail in comments he sent the Royal Commission on 8 October. I support his comments.

Page 17
No convincing reason is given for believing that there would be a demand for facilities with the stated percentages of global capacity. Furthermore, as discussed above, the global nuclear generation assumptions based on IEA estimates are unrealistic. Calculations should therefore be expressed in terms of minimum production and minimum prices for the projects to be economically viable.

Pages 18. 20 & 26
The great uncertainty of capital costs and decommissioning costs should be clearly acknowledged. The possibility of total project failure should also be considered, given that not a few nuclear fuel cycle projects have failed totally. In that case, the cost to the South Australian public should be stated.

Page 27
The calculation specifically excludes several important elements, including:
- Cost for regulatory and legal framework setup
- Socio-political factors
- Inter government negotiation and treaties

When the report is presented, these exclusions should be highlighted, so that it is clearly recognisable that the estimated cost does not represent the full cost.

Additional comment
The listed objectives do not include the costs and benefits for the people of South Australia, but since this is the underlying purpose of the Royal Commission, presumably these will be alluded to in some way.
In this regard, the effect of foreign ownership and foreign technology on the economic outcome for South Australians should be clearly stated.
Given that the projects would inevitably be heavily dependent on foreign investment and technology, only a fraction of the value of the project would be received by South Australians. For example, any enrichment plant would be on a black box basis in which South Australia gains access to none of the sensitive technology.

2. Robert Riebolge/David Lenton (Carisway/DGA Consulting) "Quantitative Viability Analysis of Electricity Generation"

Power Point, Page 3:
This slide identifies the following as one of the study's project objectives:
"Compare the cost effectiveness of market entry using a nuclear generator against other generation options
• Small Nuclear
• Large Nuclear
• CCGT with CCS
• CCGT"

Comments:
The study should also compare the cost effectiveness of 100% renewables, with reference to the evidence presented to the Royal Commission by Mark Diesendorf.
The calculations should make allowance for a higher overall electricity demand if nuclear energy is introduced, compared to a 100% renewables scenario. This is because the political influence of nuclear power companies would be expected to have the effect of suppressing energy efficiency measures, as it has done in other countries and as the coal industry has done in Australia (refer my submission in lieu of an oral presentation sent 21 September).

Pages 25 & 43: Alternative demand growth scenarios should be used to compare the impact of more intensive energy efficiency measures (i.e. lower demand growth), particularly for a 100% renewables scenario.

Page 42: It is unclear how demand management is included in this analysis. The option of using demand management to address peak demand should be compared with the nuclear energy and fossil fuel responses that are shown in this slide.

Page 53: This slide says,
"Model includes the option for the user to assess impacts of:
• Budget Overruns

• Delay in project completion”

Comment:
In view of the problems encountered by overseas nuclear construction projects, I welcome the following component of the economic model.
Based on recent western experience with nuclear power plant construction, budget overruns and delays should be treated as the norm, not as exceptional.

Page 57: This slide states, "Assumption is that there are no carbon costs associated with nuclear fuel”.

Comment: The carbon cost of mining (both for uranium and other fuel) should be reflected in the cost of the fuel itself.
The carbon cost of decommissioning should also be included.

3. Dr Tim Johnson & Dr Darron Cook (Jacobs) "Radioactive Waste Storage and Disposal Facilities in SA – Quantitative Cost Analysis and Business Case"

There does not appear to be any consideration of risk, which is extraordinary given the high risk nature of the proposal. Risks associated with the projects should be identified and, where possible, included in the cost analysis.

For example:
1. Power Point Page 4 lists one of the assumptions as "'Willingness to pay' for the management of high and intermediate level wastes based on published holding costs”.
Consideration should be given to the costs of dealing with the case where, after radioactive waste is shipped to Australia, the owner of the waste reneges on its commitment to pay for the storage and/or disposal of the waste, or to take back temporarily stored waste.

2. The assumption that the international side of the shipping costs can be left out of the analysis is flawed (page 20 of the Transcript (P-493)). The costs of constructing the ships, setting up the infrastructure and the actual shipping will be huge and could impact on the viability of the proposal.

3. The "linkages with other NFCRC work streams” slide (Power Point Page 20) does not specifically mention the concept of using imported spent fuel to power Generation IV reactors in South Australia, but given that some people are arguing for this, it is important to recognise the risks involved. One economic risk is that in the (extremely unlikely) event that the concept works, other countries will start up their own Generation IV programs and stop sending us their spent fuel. South Australia will then be lumbered with an extremely expensive white elephant.

4. David Downing / Kenneth Green WSP (WSP | Parsons Brinckerhoff / Sargent & Lundy) "Power Plant & Systems"

Power Point Page 24 (Transcript Pages 15 & 16 (P. 486 & 487)): It seems that the assumed operating life is 60 years. Just because the advertised operating life of these plants is 60 years does not mean they will actually achieve that. Given that there is no track record for these plants because commercial plants have never been built, various operating lives should be considered (e.g. 30 years, 40 years, 50 years, 60 years).

In regard to construction time, Power Point Page 24 says, "Sensitivity to variation in pre-construction and construction durations to be studied". It is important not to put too much weight on the 5-year central figure for construction time for large reactors, given that, after just 2 years construction, construction times of the new Vogtle and Summer plants are already scheduled to be over 6 years.[1]
Construction times for small reactors are purely theoretical, so the 3 year figure in this study should not be credited as being any more realistic than twice that time.

Power Point Page 23 (Transcript Page 16 (P. 487)): A wider range of capacity factors should be considered. For example, the average capacity factor of Japanese reactors, even before the Fukushima accident, was well below 85 (the lower end of the sensitivity range for this study).[2]

---

[1] Construction start for Votle-3 and Summer-3&4 was March 2013 (IAEA's Power Reactor Information System). Commercial operation has been delayed to mid-2019 (Nuclear News Flashes, 2015, 'DOE finalizes loan guarantees for Vogtle partner MEAG', Platts, Jun 24; Nuclear News Flashes, 2015, 'SCE&G says Summer-2 completion slips by almost two months', Platts, May 15)

[2] (a) World Nuclear Association, 'Nuclear Power in Japan', (Updated 27 August 2015)
http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/Japan/
"Due to reliability problems with the earliest reactors they required long maintenance outages, with the average capacity factor averaging 46% over 1975-77 (by 2001, the average capacity factor had reached 79%) … The median capacity factor for Japanese nuclear plants is about 70%"
(b) Mark Fulton, Michael Carboy, Jane Cao, Lucy Cotter, 2011, 'Japan – The Peoples' Greener Choice', Deutsche Bank Group, August:
https://www.db.com/cr/en/docs/Japan-The_Peoples_Greener_Choice.pdf
According to the table on page 14 the average capacity factor for nuclear energy in Japan was 65.4%.
(c) Citizens' Nuclear Information Center, 2009, 'News Watch: 57.8% Capacity Factor in 2008' Nuke Info Tokyo, No. 129, March/April:
http://www.cnic.jp/english/?p=1982
http://www.cnic.jp/english/newsletter/nit129/nit129articles/nw129.html
"The capacity factor for Japan's 55 nuclear reactors (total 49,580 MW) fell to just 57.8% in 2008."

It must be recognised that when a problem is found in one reactor, often this has to be checked in all reactors of the same class. This can seriously impact on the overall capacity factor, even if it turns out that the problem was specific to one reactor.
No doubt nuclear proponents will argue that Gen 3 and Gen 4 reactors are more reliable, but there is limited (Gen 3) or no (Gen 4) track record to back up this claim.

Final Comment
I encourage the Royal Commission to take seriously the following recommendation in Friends of the Earth Adelaide's submission in response to Issues Paper 2:
"Given the nuclear industry's history of massive cost over-runs, extreme delays, and total failures, there is no sound basis for making cost estimates or predicting when new technologies might become commercially viable. No economic model can meaningfully address such unreliability."