Nuclear Fuel Cycle Royal Commission

Comments on the Cost Analysis, Business Case and Risks of Management for Storage and Disposal of Nuclear Waste in South Australia

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Introduction

One of the Key Tentative Findings of the Nuclear Fuel Cycle Royal Commission (2016, p.3) is that

> The storage and disposal of used nuclear fuel in South Australia is likely to deliver substantial economic benefits to the South Australian community. An integrated storage and disposal facility would be commercially viable and the storage facility could be operational in the late 2020s.

The Tentative Finding summarised above is given in more detail in Findings 81-94 on pp.17-20. These findings appear to be based to a large degree upon a report by Jacobs MCM (2016) that had not been available for public scrutiny until February 2016, around the time of the release of the Commission's Tentative Findings. The following comments examine critically some of the assumptions underlying the Tentative Findings and Jacobs MCM (2016), especially the latter's Paper 5. They also discuss the financial risks of the proposed project. The comments focus on the storage and management of high and intermediate level wastes.

Understanding the scenarios

Both the Tentative Findings and Jacobs MCM (2016) lack a detailed account of the scenarios and their assumptions. They do not even discuss the form(s) in which the wastes would arrive at the port. The only scenario in the Tentative Findings is the very brief Finding 89. In Paper 5 of Jacobs MCM (2016) some of the basic assumptions can be inferred implicitly from the commercial model, specifically Tables 3.1 and 3.2 and Figs 3.1 and 3.2. From these tables, figures and the brief text explaining them, the following points emerge:

1. It is assumed that revenue commences when waste arrives at the port in South Australia (SA). This is chosen to be Year 11 in the baseline timing scenario and Year 8 in the 'aggressive' timeline scenario.

2. Before the first waste arrives, significant up-front costs ($2.4 billion) have to be met by the project owner, assumed to be the State of SA. These costs include construction of infrastructure (e.g. port, interim storage facility). After the wastes begin to arrive, very substantial infrastructure expenditure would be made (e.g. long-term underground repositories, railway, electricity supply) while the interim storage is managed, guarded and monitored. These costs receive surprisingly little attention in the Tentative Findings and Paper 5; instead the focus is on the alleged revenue.

3. The baseline configuration scenario CS4 has an interim storage facility (ISF) on the coast and a pair of co-located inland facilities comprising an intermediate depth repository (IDR) for intermediate level and low level waste and a geological disposal facility (GDF) for high level waste.

4. The capital cost of CS4 is stated to be AUD 41 billion in real 2015 dollars, however this is not disaggregated into its components in the Tentative Findings or Paper 5. The reader is required take much on trust, hardly a sound basis for justifying such high capital expenditure.

5. Returning to Point 1, the commercial model assumes that customers will pay for both interim storage and long-term underground disposal when their waste arrives at the port. Since the IDR and GDF disposal facilities will not be ready until Years 24 and 28 respectively (in both the baseline and 'aggressive' scenarios), why would customers pay for them before they are ready? If they only agreed to pay initially for interim storage until the underground disposal facilities are ready, the financial model of Paper 5 would collapse.

6. Table 4.2 of Paper 5 has operational expenditure ('Other opex') of approximately $1 billion real per decade from the decade ending Year 30 to the decade ending Year 120. However, revenue ceases after the decade ending Year 80 while the operational expenditure continues to the decade ending Year 120. Why doesn't operational expenditure continue to Year 100,000? Surely the closure of the facility will not entail the end of monitoring and guarding?

Risks

A possible scenario is another overseas nuclear disaster comparable with Chernobyl or Fukushima, which leads to the shut down of many or most existing nuclear power reactors in the world. This would severely limit the market to existing nuclear waste. There is only a single, short, superficial paragraph on p.212 of Paper 5 on risk of disruption to (including cessation of) the import of wastes. This claims that

> following the upfront capital investment to achieve initial operating capability and commissioning, all of the types of storage and disposal facility are expanded in a phased fashion.

The implication is that the capital costs of the IDR and GDR would be directly proportional to the quantity of wastes to be stored, without any significant upfront fixed cost. In reality there would be substantial fixed costs, especially for site preparation, railway and transmission line for a GDF. As a result the capital cost *per tonne stored* of constructing a GDF would increase rapidly as the storage size of the facility decreases. This requires detailed analysis rather than a brief dismissal.

Another risk, that is neither considered by the Royal Commission's Tentative Findings nor by Jacobs MCM (2016), is that after the first part of the project, the arrival and interim storage of nuclear wastes, goes ahead, the much more expensive part of the project, the construction of the GDF and IDR will be cancelled. This could occur as the result of technical problems, or the belated discovery that the chosen site is unsuitable, or the discovery that the facility has

been built to inferior standards compared with specifications, or a political decision by a future federal or state government, or refusal of customers to pay upfront for the underground storage in GDF and IDF. The US repository at Yucca Mountain, Nevada, was abandoned in 2011, after expenditure estimated at US $10-15 billion, for a combination of all but the last of these reasons. Then South Australia would be stuck with a vast number of dry casks in interim storage. These casks would only be designed for interim storage. After several decades they would erode to the extent that leakage into the environment of high-level wastes becomes a real threat. Then taxpayers would be faced with the physical risks and huge costs of managing the eroding casks and their deadly contents.

Clearly the financial risks of this proposed project could be substantial, although they cannot be quantified. They should be examined in much more detail instead of being dismissed glibly.

If such a risky project is developed, the SA and Australian governments should ensure that the risk be carried by a private developer, not the State or the nation. After all, if the project is potentially as profitable as the Jacobs report claims, it could be implemented by a large corporation or consortium. The federal government would still set and enforce safety standards and the state could still contract to receive taxes and royalties. Neither the Tentative Findings nor Jacobs MCM considers this possibility seriously. The Tentative Findings simply state (Finding 90) that government must own the facilities (and implicitly the risk) "because of the long-term nature of the activity and the need to secure the long-term trust and confidence of customer countries". Since governments in Australia have only a 3-4 year lifetime between elections, the securing of long-term trust by government is debatable. Indeed, the cancellation of the Yucca Mountain repository in the USA followed a change of president.

Conclusion

The Royal Commission's Tentative Finding, that substantial economic benefits could be obtained at low risk from the storage and disposal of used nuclear fuel in South Australia, is not soundly based. Excessive reliance has been placed on Jacobs MCM (2016), which has made over-optimistic assumptions in the financial analysis, such as the willingness of potential customers to pay for their share of the cost of the geological disposal facility before it has been built. Even buying an apartment off the plan is risky, let alone buying a permanent underground high-level nuclear waste repository, when not a single facility is operating in the whole world. Another questionable assumption is that the substantial fixed costs of the geological disposal facility can be ignored if the size of the planned facility has to be decreased substantially, due to a large decrease in the expected market.

The proposal has major financial risks to taxpayers that have been ignored or played down in the Tentative Findings. These are sufficient grounds to reject the scheme. However, if the Royal Commission is determined to ignore or downplay the risks and recommend the proposed project, it should also recommend that

the substantial financial risks be taken by a private corporation or consortium, not Australian taxpayers.

Abbreviations

CS4	Configuration scenario 4
GDF	Geological disposal facility
IDR	Intermediate depth repository
ISF	Interim storage facility
SA	South Australia

References

Jacobs MCM (2016) Radioactive Waste Storage and Disposal Facilities in South Australia: Quantitative cost analysis and business case. 9 February.

Nuclear Fuel Cycle Royal Commission (2016) Tentative Findings. February 2016.