

# RESPONSE TO TENTATIVE FINDINGS OF THE ROYAL COMMISSION INTO THE NUCLEAR FUEL CYCLE

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## EXECUTIVE SUMMARY

The Royal Commission's "Tentative Findings" state what we already knew – that there would be no net benefit to South Australia from increased uranium mining, uranium processing or nuclear power.

On the other hand, the "Tentative Findings" in relation to storage and disposal in South Australia of overseas high level nuclear waste are at best misleading and at worst plain wrong.

The "Tentative Findings" Report proposes establishing a high level international nuclear waste dump as the future for South Australia. This proposal is a path that, once taken, is irrevocable, that has inherent implications for ongoing liabilities and risks profound adverse impacts on our society.

This is a globally unprecedented proposal which envisages South Australia accepting 138,000 tonnes of high level spent nuclear fuel waste which will require isolation from the environment for many hundreds of thousands of years. This is equivalent to one third of the current global total inventory of 390,000 tonnes.

The magnitude of what is proposed is enormous. This is a "First of a Kind" nuclear waste disposal facility far beyond any that has been attempted previously. This is despite considerable global nuclear expertise developed over the last 60 years of the Nuclear Industry.

On releasing the "Tentative Findings" Report to the media on 15<sup>th</sup> February 2016, Commissioner Kevin Scarce stated, "The community needs to understand the risks and the benefits." The Royal Commission's Report highlights many purported benefits but is scant on detail when it comes to the profound risks.

The "Tentative Findings" failures include:

1. Unrealistic expectations of the magnitude of the project;
2. Failure to appreciate or learn from six decades of international failure to achieve the outcome proposed by the Royal Commission;
3. Missing costs, unfunded liabilities, missing contingencies and failure to adequately account for inevitable cost blow-outs
4. Heroic assumptions of willingness to pay;
5. Lack of recognition of the potential for irrecoverable sunk costs and unlimited liabilities into the future;
6. Failure to address reputational damage and impact on other sectors of the economy;
7. Naïve expectations that South Australia would be the sole beneficiary of the profits from a nuclear waste dump located in our State

The Commission's final report should recommend that the folly of South Australia's increased involvement in the nuclear industry be abandoned.

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## IT'S NEVER BEEN DONE BEFORE

At the Media Conference on 15th February 2016 for the release of the “Tentative Findings” Report, Commissioner Kevin Scarce stated, *“We’ve had waste now for 50, 60 years. There has not been an international solution yet.”* This is true. After 60 years of the Nuclear Industry, no country has delivered a solution for the actual disposal of high level nuclear waste. As such, there is no international precedent to follow in regards to a high level nuclear waste dump in South Australia.

The “Tentative Findings” Report claims that a start-up in SA can follow the experience of the 30-year nuclear waste disposal programmes in Finland and Sweden. However, this is effectively invalidated by proposing that SA take on 20 times the 6,500 tonnage of spent nuclear fuel waste licensed for disposal in Finland, which is still at least eight years off first disposal, and over 10 times Sweden’s plan, which isn’t due to open until the late 2020’s (Jacobs p.43). Scaling up a project by a magnitude of 10 or 20 times is such a fundamental departure from the “base case” as to be entirely unreliable in its predictions of costs and benefits.

The project proposed in the “Tentative Findings” Report is twice the scale of the abandoned Yucca Mountain spent nuclear fuel waste geological disposal project in the USA, which was licensed to take 70,000 tonnes of waste. The project was cancelled by President Obama in 2009 after 20 years and at a cost of over US\$10 billion (A\$14 billion).

Despite the stable political and geological environment and the backing of a world superpower, Yucca Mountain failed. How much can South Australians afford to lose?

So far, the only deep geological repository that actually contains nuclear waste is the “Waste Isolation Pilot Plant” in New Mexico, USA. This facility was designed to contain radioactive waste for 10,000 years, however it suffered a major radiological incident in its first decade due to a chemical explosion. The incident was brought about by human error and traced to a typographical mistake in an instruction manual. The incident resulted in 21 individuals receiving low level internal contamination and there was a measureable leak of waste from the site into the environment. The facility cost \$19 Billion to establish and will cost another half a billion to clean up during the four or so years that it will be closed. <http://www.reuters.com/article/us-usa-nuclear-new-mexico-idUSKBNOMNOC920150327>

Another international example ignored by the Royal Commission is the Bure facility in France, which is still under construction but earlier this year there was a collapse in the tunnel killing one worker and injuring and trapping another. <http://www.reuters.com/article/us-france-nuclear-idUSKCN0V41NV>

The lessons for South Australia are clear. If countries with decades of nuclear experience have been unable to develop a facility of the nature and scale of that proposed by the Royal Commission, then clearly it is far more difficult and complex than we can imagine.

Over the last 30 years, Australia has failed to come up with an acceptable solution for managing our own nuclear waste. The proposal to store international radioactive waste relies on Australia doing what other countries have failed to do since the inception of the industrial Nuclear Industry.

## THE PROPOSAL IS “OFF THE SCALE”

The Royal Commission into the Nuclear Fuel Cycle’s “Tentative Findings” Report is largely based and dependent on Jacobs MCM’s desk top consultancy report: “Radioactive waste storage and disposal facilities in SA”. Jacobs state the scale of this baseline proposal to receive, manage and dispose of high level nuclear waste in SA, “would be by far the largest operation in existence” (p. 211).

This is a globally unprecedented proposal which envisages South Australia taking on 138,000 tonnes of high level spent nuclear fuel waste which the report states, “*require isolation from the environment for many hundreds of thousands of years*”. This is equivalent to one third of the current global total inventory of 390,000 tonnes.

Baseline capital costs are reported at A\$41 billion and the overall operating cost is calculated to be around A\$900 million per annum for the first 40 years of operation (Jacobs *Executive Summary* p.2).

The proposal is for South Australia to receive a shipment of high level nuclear waste every 24-30 days for decades. It is proposed that 100,000 tonnes of spent nuclear fuel waste is transported to SA in the first 33 year period of the proposed nuclear port operations, which is 25 per cent higher than the global total of 80,000 tonnes of spent nuclear fuel waste shipped around the world since 1971 (see <http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/transport-of-nuclear-materials/transport-of-radioactive-materials.aspx>).

The “Tentative Findings” Report refers to a baseline analysis which adopts timelines whereby the first potential disposal of international nuclear waste in SA takes place nearly three decades after a decision to go ahead (Project Year 28). This is at least 17 years after any decision to take on actual ownership and perpetual liability for the spent nuclear fuel waste, a decision which is irrevocable. The first arrival of spent nuclear fuel waste into South Australia (at year 11) would bind all future generations of SA children, thereby taking away their right to decide their own future.

The Jacobs report (p.31-32) identifies a minimum required period of 15 years once a decision to go ahead with this nuclear waste project is made, to a potential point of “*final selection of a preferred site*”. Jacobs state, “*For modelling purposes we have assumed 23 years before ILW starts to be emplaced (five years for establishing the framework plus eighteen years for project execution) and 27 years for HLW / spent nuclear fuel – which included two years of testing after physical completion of the facility.*” The process and associated timeframes for site selection and establishment of Deep Geological Disposal Facilities require exceptionally long lead times and so impose serious inherent risks on society.

## IT'S FIVE DUMP SITES, NOT ONE!

Under the “Tentative Findings” proposal, South Australia faces five nuclear dumps with the first three dumps proposed to open in project Year 11. These include:

1. a new deep sea dedicated nuclear port to receive high and intermediate level nuclear waste over 70 years of operations. This port will also store up to 280 tonnes of spent nuclear fuel waste (equivalent to 14 years worth of spent nuclear fuel waste production at a typical nuclear Power Reactor);
2. a 100 year Interim Storage Facility assumed in baseline case costings to be sited at a coastal location less than 10 km from the port;
3. a Low Level Waste Repository capable of storing eight times the waste of the proposed National Radioactive Waste Repository (which is currently under consideration by the Australian Government and which has repeatedly failed attempts at siting and gaining community consent);
4. an intermediate depth underground repository for intermediate level waste; and
5. a Deep Geological Disposal Facility for high level nuclear waste.

The “Tentative Findings” Report states:

*“Four generalised types of waste storage and disposal facilities are considered in the study. ... with the preferred combination being: an independent low level waste facility, an independent interim storage facility and a combined geological disposal facility and intermediate depth underground repository at a single site.”* (Executive Summary, Key Findings / Conclusions p.1-2)

## THE NUCLEAR PORT

Jacobs' baseline case requires a nuclear port to receive an estimated average 3,000 tonnes of high level nuclear waste per year throughout the first three decades of operations. Jacobs state that this requires "12-15 nuclear waste shipments per annum, meaning one ship each 24-30 days on average" (p.170). Jacobs state that the nuclear port is required to store high level nuclear waste on-site, with a minimum immediate port storage capacity for 280 tonnes of waste in 28 casks (p.170).

This means that the proposed new deep sea dedicated nuclear port is itself to become a nuclear waste dump holding high level wastes equivalent to some 14 years operations of a typical nuclear Power Reactor (at 20 tonnes of spent nuclear fuel waste generated at a power reactor per annum).

Jacobs flippantly claim 'an abundance' of suitable locations across SA without presenting evidence or identifying any potential location or region suitable for a new deep sea port in SA. This claim underlies the "Tentative Findings" assertions in *Finding 78-79* that SA "offers a safe long term capability" and SA locations are "likely to be technical feasible" (p.16-17).

*"Paper 1 ... The paper finds that there appears to be an abundance of locations with suitable physical and demographic features across SA to host the various types of facilities, including a sea port to receive the material from overseas."* (Jacobs, Introduction p.11).

In contrast, Jacobs also cite: "the uncertainty regarding the number of regions, locations and sites which will be the subject of initial and more detailed investigation over several years." (pp. 134-135).

Point 78 of the "Tentative Findings" Report claims that South Australia has a unique combination of attributes for the storage and disposal of high level nuclear waste and names the "Gawler Craton" as part of the underlying SA geological structure with an appropriate depth for disposal. The Gawler Craton is a large area, west and north-west of Port Augusta and across much of the Woomera Prohibited Area (WPA).

## THE LOW / INTERMEDIATE LEVEL WASTE REPOSITORY

The proposed *Low Level Waste Repository* costs A\$820 million and has a nominal waste burial capacity of 80,000 m<sup>3</sup> of radioactive waste derived from operations of the other nuclear facilities (Jacobs p.144). This is eight times the scale of the proposed Federal National Radioactive Waste Repository.

## GETTING THE WASTE HERE AND TRANSPORTING IT AROUND

The scale of the proposed shipments of high level nuclear waste to an SA port is globally unprecedented. It is proposed that South Australia receive around 100,000 tonnes of high level nuclear waste over a 33 year period during the peak of the nuclear port operations, being from project Year 11 to Year 45, and a total of 138,000 tonnes over the 70 years of the project until Year 82.

The shipments of high level nuclear waste will occur every 24-30 days for decades.

The total amount of the proposed shipments of waste is 25 per cent higher than the global total of 80,000 tonnes shipped around the world since 1971 (Jacobs p.152, and in "Transport of Radioactive Materials", World Nuclear Association report, Sept 2015, [www.world-nuclear.org/](http://www.world-nuclear.org/)).

In comparison with other projects:

- Between Year 11 to Year 45 of this project, SA will receive three times the 30,000 tonnes of high level nuclear waste shipped to the UK's Sellafield reprocessing facility, and two and a half times the 40,000 tonnes shipped to the French La Hague reprocessing facility in the 45 year period since 1971 (WNA report).
- SA will receive 10,000 high level nuclear waste casks in the 33 year period of peak nuclear port operations (Jacobs p.5), compared to 4,000 casks in over 160 shipments from Japan to Europe from 1969 to late 1990's, totalling 7,040 tonnes spent nuclear fuel waste (WNA report).
- Sweden had shipped 6,000 tonnes of used nuclear fuel to their CLAB central interim storage facility by mid-2015, with over 4,500 tonnes shipped around the Swedish coast (WNA report). South Australia would receive 6,000 tonnes in only two years at the proposed rate of 3,000 tonnes a year and the 4,500 shipped around the Swedish coast to date equates to only 18 months of proposed nuclear waste shipping imports to a nuclear port in SA.
- In Sweden, more than 80 large transport casks are shipped annually to the CLAB facility compared to 300 casks to be shipped annually to a proposed nuclear port in SA.

## VIABILITY OF PROJECT

### ECONOMIC MODELLING

The viability of the project is predominantly focused on the potential for economic gain for South Australia and based on the quantitative cost analysis and business case prepared by Jacobs MCM in their desk top consultancy report, *"Radioactive waste storage and disposal facilities in SA"*.

<http://nuclearrc.sa.gov.au/app/uploads/2016/03/Jacobs-MCM.pdf>.

Jacobs publishes a disclaimer on their work which states: "In no part of this report does Jacobs, either explicitly or implicitly, make any recommendation or endorsement of the viability or otherwise of the Project." (p. 10).

Despite this, the "Tentative Findings" Report proposes a nuclear waste case using cost estimates that Jacobs say *"are conceptual in nature"* and that *"... should only be regarded as no better than -50% to +100%"* (p.128). This margin for error cannot be ignored.

At page 77 of their report, under "Conclusions for dry storage Interim Storage Facility" Jacobs state:

*"At the present stage of analysing the International repository option, all of the assumption related to cost and revenues are dominated by the rather subjective judgement of how much of the world's spent fuel would land in Australia."*

Forming a recommendation that South Australia should head down an irreversible path on the basis of subjective judgements of costs and revenues is extremely foolish and irresponsible.

### HORIZONTAL FISCAL EQUALISATION

The Royal Commission's headline findings are that South Australia could earn A\$5 billion per year for 30 years and A\$2 billion per year for the next 40 years in return for taking permanent responsibility for international high level nuclear waste. Even though these figures are little more than a fanciful conjecture, they are at the heart of current State Government market research. Current Government telephone polling [Colmar Brunton on behalf of the Department of Premier & Cabinet] informs participants that:

*“the storage and disposal of used nuclear fuel in SA has the potential to generate total revenue of more than \$257 billion with total costs of \$145 billion over 120 years expressed in annual terms generates state revenue of over \$5 billion per year over the first 30 years of operation and \$2 billion per year over the following 40 plus years at which point waste receipts nominally conclude, and generate approximately 1500 full time jobs peaking at between 4000-5000 during the 25 year construction process and 600 full time jobs once operational”.*

Having delivered these “facts”, the researchers ask participants:

*“Do you support, strongly support, support, oppose or strongly oppose the idea of exploring the expansion of the nuclear industry in SA?”*

Of course, this approach is misleading in several respects. Leaving aside the highly speculative nature of these projections, the assumption that South Australia would get to “keep” all the proceeds from an international nuclear waste dump defies both logic and history.

Since before the Second World War, the Federation of Australia has adopted various forms of Horizontal Fiscal Equalisation (HFE). According to the Commonwealth Grants Commission, “equalisation aims to put all States on a level fiscal playing field”.

In the past, those States with less capacity to raise revenue or a greater need to provide services were cross-subsidised by wealthier States through differential Commonwealth payments, largely derived from income and company taxes. These days, HFE is achieved by a differential distribution of GST revenue.

The effect of these policies is that States with a greater capacity to raise funds through, for example, mining royalties, are given less GST revenue, whilst non-mining States receive more GST revenue per capita. The Government of Western Australia has been complaining about this for years. The WA State Government only receives about 38 cents for each dollar of GST revenue raised in that State. South Australia on the other receives \$1.29 for each dollar of GST raised here.

According to the Commonwealth Grants Commission:

*“Western Australia’s above average revenue raising capacity drives its fiscal strength ... The relatively low fiscal capacities of South Australia, Tasmania and the ACT stem mostly from below average capacities to raise revenue while Queensland and the Northern Territory face very high costs of providing services.”*

[http://www.aph.gov.au/about\\_parliament/parliamentary\\_departments/parliamentary\\_library/flagpost/2014/july/gst-relativities-where-is-revenue-raised](http://www.aph.gov.au/about_parliament/parliamentary_departments/parliamentary_library/flagpost/2014/july/gst-relativities-where-is-revenue-raised)

The relevance of this to the Royal Commission’s “Tentative Findings” is that there is a lack of analysis of the net benefit to South Australia once the returns from the nuclear waste dump project have been “shared” across the nation.

To put it simply, it is ludicrous to think that a project of this scale would be immune from Horizontal Fiscal Equalisation. South Australia’s share of the returns, (if there are any), would be a fraction of the total. Every State and Territory would want its share of the profits, just as we demand that Western Australia shares its considerable mining royalties. We might get to keep nuclear income, but it would be taken away from SA in other ways. So to suggest that SA would keep A\$5 billion per year is just wrong.

On the other hand, the risks would be disproportionately borne by our State, especially in relation to reputational damage if anything were to go wrong. The costs in such a circumstance were identified by the Royal Commission as “profound” but are otherwise ignored in the purported cost-benefit analysis.

Jacobs' assumptions [p.211] regarding the ability of South Australia to quarantine profits in a State Wealth Fund with the State Government having unfettered discretion to determine strategic objectives for the fund do not stand up to scrutiny.

Similarly, the ability of a State Government to maintain the integrity of a "Reserve Account" for decommissioning and rehabilitation purposes is doubtful. According to Jacobs, "Funds must also be set aside for many hundreds of years of ongoing monitoring..." [p.210]. Try telling that to a treasurer under political pressure to fund health and education budgets.

## ASSUMPTIONS REGARDING WILLINGNESS TO PAY

In the section of the "Tentative Findings" Report headed "In what circumstances is the activity viable?" it states: "*Globally there are significant quantities of used fuel from nuclear reactors in temporary storage awaiting permanent disposal, including in the Asia-Pacific region, for example, in Taiwan, Japan and Korea.*" (p.17). Spent nuclear fuel waste inventories up to 2014 are an order of magnitude higher across Japan and South Korea than in Taiwan (Jacobs pp.108-109).

In their baseline case, Jacobs propose a selection of potential client countries but is actually heavily reliant on realising an agreement with either or both Japan and South Korea for the storage and disposal of much of their current spent nuclear fuel waste inventories (pp.106-114).

As the "Tentative Findings" admit, there is no current marketplace for the international transfer of liability for high level waste. Therefore, there is no known price that can be confidently used in a business case analysis. In addition, there is no overseas commitment to the price used in the Jacobs' analysis. This makes the projected income pure speculation.

The "Tentative Findings" claim of project viability depends in part on the client countries being willing to pay up to 50 per cent more (around A\$2.1 million a tonne, being the cited A\$1.75 million a tonne plus required transport, shipping and spent nuclear fuel waste storage cask costs that aren't factored into the analysis – see next section for further details) than the reported direct disposal costs of A\$1.38 million per tonne in countries with existing disposal programmes.

There is also an assumption that these countries have the money available upfront (that is a requirement to make this scenario a potentially economically viable project for SA) for what is a long-term liability and cost for their governments and people. This assumes that any costs their governments have accounted for as being in the future (in terms of the cost of long term storage for their high level nuclear waste), they would be willing and able to bring forward to today.

Another issue that appears not to have been considered is the fluctuation in the value of the Australian dollar compared with other currencies over the timeframe required for this project. Over the last 40 years, the A\$ has been as high as US\$1.50 and as low as US\$0.50. Fluctuations over even part of this range over the next few decades would make any assessment of other nations' willingness to pay little more than guesswork.

## MISSING COSTS AND UNFUNDED LIABILITIES

A major short-coming of the Jacobs report and therefore of the Tentative Findings is the large number of missing costs and unfunded liabilities. These skew the whole of the economic analysis.

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## THE COASTAL DUMP

While most of the debate has been around siting the 100 year high level Interim Storage Facility at an inland site, the costings have been based on this facility being sited at a coastal site, within 5km of the dedicated nuclear port. This scenario effectively understates the projected cost outlays (both capital & operating) compared to inland sites.

Jacobs report that:

*“An Interim Storage Facility either at or near a receiving port has the advantages that the initial transport move will be short, and facilities can be established as part of the port / Interim Storage Facility development. ... and hence less costly to operate. ... Establishment of an Interim Storage Facility at an intermediate location is likely to be more expensive due to the need for two land transport legs... However, if suitable land is not available adjacent to the port, there may be no alternative to Interim Storage Facility at an intermediate location.” (p.170-171).*

Additional transport costs from the nuclear port to the Interim Storage Facility need to be considered.

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## CO-LOCATION OF DIFFERENT DUMPS

The “Tentative Findings” Report also accepts another key Jacobs assumption regarding a combined Deep Geological Disposal site. It bases its costing on the assumption that a high level nuclear waste Geological Disposal Facility (required to be around 400-500 metres deep), can be co-located at the same site with the Intermediate Disposal Repository which is required to be at a minimum depth of 200m. This assumption alone carries a potential A\$9.6 billion capital cost blow out if a combined disposal siting is not realised in practice and as a result a stand-alone Intermediate Disposal Repository is required.

If this were to eventuate, the total capital costs would increase by 25 per cent. This would appear to then make the project uneconomic as Jacobs reports that the potential revenues from intermediate level nuclear wastes is around A\$15 billion with the capital costs of a potential stand-alone Intermediate Disposal Repository being \$14.3 billion, plus increased long term operating costs.

The baseline case siting reports the total nuclear dump capital costs at A\$41 billion based on a combined co-located Geological Disposal Facility and Intermediate Disposal Repository at a single site (Configuration Scenario CS4 at p.198). However, if stand-alone inland siting locations are required for both of these, then the required capital costs are A\$9.6 billion higher at A\$50.6 billion (Jacobs p.198). Factoring in this additional capital cost of A\$9.6 billion, it is clear that a potential stand-alone Intermediate Disposal Repository is uneconomic (Jacobs p.124).

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## COST OF TRANSPORTATION, SHIPPING AND STORAGE CASKS NOT INCLUDED

The costings have not taken into consideration the expense of the transportation and shipping of the waste (approx. \$28.5 billion), nor has it costed in the expense of the casks that the waste is to be stored in upon arrival in SA (\$10 billion in capital cost for 7,200 spent nuclear fuel waste storage casks for the Interim Storage Facility). These missing costs total approximately A\$38.5 billion.

If it is expected that the client countries are required to pay these missing costs, then it follows that this should be factored in and deducted from their willingness to pay. As a result, it appears that the modelling has overestimated revenue and underestimated costs and therefore the projected financial returns to SA are highly suspect.

Further, the proposed “Financial Investment Decision” for SA to decide to take on a threshold 15,000 tonnes of high level nuclear waste claims a reported “initial outlay of A\$2.4 billion real in net terms” (p.205). These core cost exclusions bring into question how much SA will have to pay up front, with no revenues expected ahead

of waste delivery to SA. If the missing costs of storage casks of A\$2.2 billion and transport and shipping costs of A\$3.2 billion for this 15,000 tonnes of waste is factored in, the real outlay could be more like A\$7.8 billion.

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## COST OF DECOMMISSIONING, CLOSURE AND ONGOING MONITORING

Once the first shipment of high level nuclear waste arrives, a potential unfunded liability is imposed on South Australia in relation to future decommissioning, closure and ongoing monitoring of facilities costs. The “Tentative Findings” Report states these as a A\$32 billion fund over the 120 year project. However, the “Tentative Findings” Report also proposes a delay in financing these liabilities until project Year 45 with reliance on far distant assumed future revenues over project Years 45 to 83 – revenues which may never eventuate. SA’s future taxpayers may be left to pay this enormous bill in addition to being left with a radioactive legacy as their future.

Jacobs MCM state: *“Funds must be set aside for many hundreds of years of ongoing monitoring of these underground sites.”* However, baseline case projections reported by Jacobs show this A\$32 billion Fund declines to an indicated balance of only circa A\$1 million in project Year 120 - leaving the identified ongoing monitoring that is required, unfunded.

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## ARE DISPOSAL COSTS IN SA REALLY CHEAPER THAN ELSEWHERE?

The “Tentative Findings” Report claims a dubious proposition that first-of-a-kind high level nuclear waste disposal costs will be lower in SA than the reported direct costs in countries with already existing disposal programmes. They estimate the costs for SA at around A\$1.05 million a tonne (138,000 tonnes at a cost of A\$145 billion), whereas direct disposal costs reported in countries with ongoing Nuclear Waste Disposal programmes are reported at around A\$1.38 million a tonne.

This claim that the costs for disposal in SA will be significantly less than disposal costs reported by other countries is extraordinary. It is highly unlikely to be the case, if history’s lessons are anything to go by. Even experienced nuclear countries face increased disposal costs, with France having doubled their spent nuclear fuel waste disposal cost estimates from median A\$22 billion in 2005 to A\$45 billion in 2016.

If there is a financial advantage to be gained by accepting and disposing of international high level nuclear waste, then we need to wonder why neither Sweden nor Finland are taking advantage of this opportunity. Given these countries are already constructing deep geological nuclear waste repositories for their own waste, it would make sense economically for them to accept international high level nuclear waste for storage and disposal if indeed this is an economically attractive proposition as we are being told it is.

Perhaps the biggest elephant in the room for the Royal Commission is the question: “If this is such a fantastic deal for SA, why has no other country thought about it or taken it up?”

In fact, Finland legislated in 1994 to require their nuclear wastes to be managed wholly within the country and won’t accept international wastes. Sweden and France also have purely national approaches to their nuclear wastes, see:

<http://www.world-nuclear.org/information-library/country-profiles.aspx>

<http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-wastes/international-nuclear-waste-disposal-concepts.aspx>

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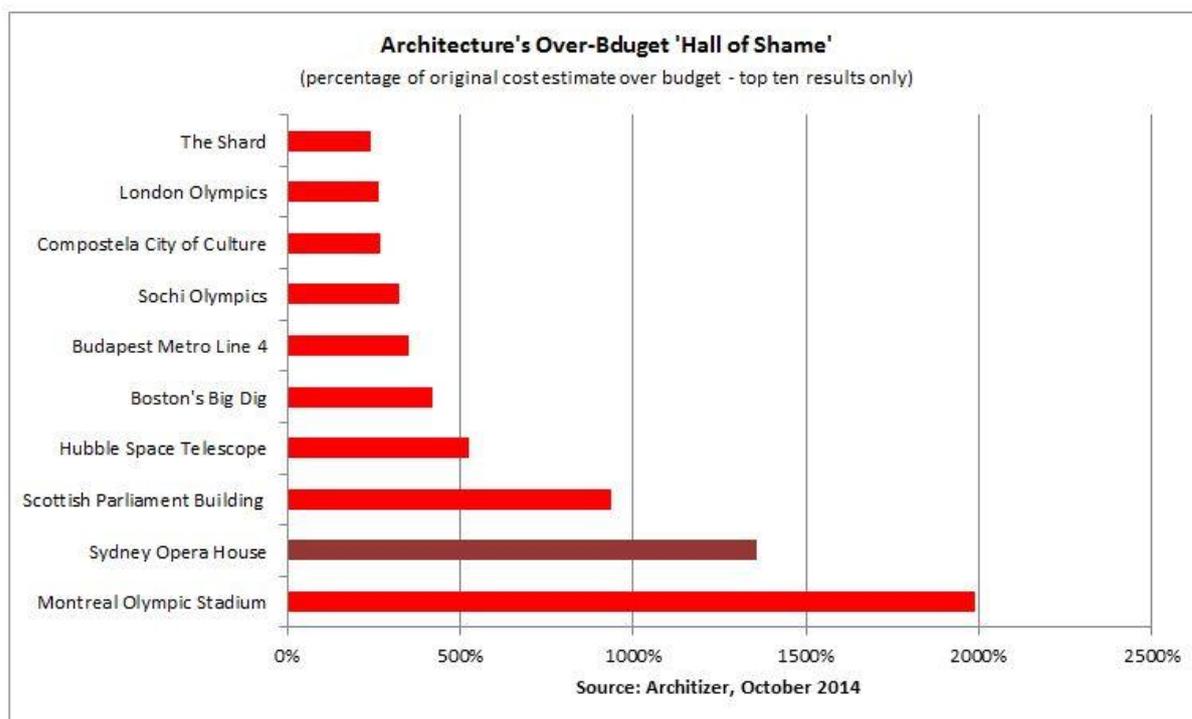
## COST BLOW-OUTS

The Sydney Opera House was finally completed 10 years late and 1400% over budget. These days, few Australians remember this and the building is well loved and iconic in nature. Would a high level radioactive

waste dump be similarly popular if it came in late and grossly over budget? I doubt it, especially since the ONLY thing it has going for it is its expected financial return.

Major projects, especially novel or first of a kind projects are notorious for being delivered late and over budget. The nuclear waste dump proposed by the Royal Commission is a likely candidate for this fate.

Excluding defence projects (eg. submarines or fighter aircraft), here is a table of some high profile cost blowout cases.



Source: <http://architizer.com/blog/architectures-over-budget-hall-of-shame/>

## UNFUNDED CONTINGENCIES

Nuclear contingencies, including *“the need to abandon a site and move to an alternative site”* (Jacobs p.32) and any required response capacity to major nuclear accidents remain unfunded throughout the life of the project and beyond. Given the experience of other failed attempts at establishing nuclear waste disposal facilities (eg. Yucca Mountain), it is a live possibility and needs to be funded.

Also, the *“Tentative Findings”* Report fails to provide for, or to quantify, any required ongoing contingency capacity and requisite funding to conduct potential interventions over hundreds of years. The assumption that once completed, the facility will be able to be safely abandoned is irresponsible.

## RISKS TO SOUTH AUSTRALIA

The Jacobs report provides only cursory attention to potential nuclear waste accidents and impacts:

*“Impact of an Incident ... The risk of a nuclear incident post emplacement is therefore extremely small, given both the condition of the waste and the multiple barriers preventing a release of any consequence.”*

*“Similarly there is a risk of an incident at the temporary store. ... Any incident is likely to be localised (ie will not spread beyond the facility) and the cost of any clean-up be covered within the project NPV. There is though, a risk to ongoing operations due to public perception issues and this will require proactive management to mitigate against.” (Risks and mitigation p.212-213)*

In proposing a globally unprecedented scale of high level nuclear waste storage and disposal in South Australia, Jacobs look to mitigate public perceptions rather than the potential for profound adverse impacts which our society faces in the event of a major nuclear accident.

## HEALTH

The current South Australian *Nuclear Waste Storage Facility (Prohibition) Act 2000* was used to prevent the Pangea nuclear waste dump proposal 15 years ago. The Act continues to prohibit the type of international nuclear waste dump proposal presented in this Nuclear Royal Commission’s “Tentative Findings” Report.

It is worth noting that the “objects” of this important Act are *“to protect the health, safety and welfare of the people of South Australia, and to protect the environment in which they live, by prohibiting the establishment of certain nuclear waste storage facilities in this State.”*

This was the assessment of the Parliament back in 2000. Since then, nothing has changed in relation to the safety of nuclear waste. Nothing has changed in relation to the long-term nature of the health and environmental risks. The only thing that has changed is a massive increase in the scale of operations proposed. In my submission, the health, safety and welfare of the people of South Australia and the environment in which we live is paramount.

## ENVIRONMENT

The *“Tentative Findings”* Report recommends that South Australia take on ownership and perpetual liability for 138,000 tonnes of spent nuclear fuel wastes (Finding 88), which will “require isolation from the environment for many hundreds of thousands of years” (Finding 73). This is equivalent to 1/3 of the current Global total high level nuclear waste Inventory of 390,000 tonnes (Finding 81).

There is no analysis of the potential impacts on the environment into the future. In fact, it is not possible to even comprehend what the environment could be like 100,000 years into the future. For example, climate change models predict significant changes in weather patterns including precipitation and temperature. Models of potential sea level rise indicate significant inundation of coastal areas, but if worst case scenarios eventuate, such as significant melting of the polar ice caps, most of South Australia would be underwater. That might take thousands of years, but there is nothing to indicate the possible impacts of the environment if a currently arid environment became wetter or if groundwater levels rose or if a site became completely inundated. It is not possible to judge the future geological stability of a specific locations in the wake of major changes to climate and surface landforms.

In short, any attempts to predict environmental impacts over geological timeframes are completely in the realm of guess work and have no credibility.

## REPUTATIONAL DAMAGE

The Nuclear Royal Commission acknowledge a self-evident truth in nuclear waste issues:

*“In the event of a major nuclear accident, adverse impacts on the tourism, agriculture and property sectors could potentially be profound.” (Finding 155, Impacts on other Sectors p.28)*

This is at the heart of the risk that would be assumed by all South Australians if this project were to go ahead.

In relation to “major nuclear accidents”, the Royal Commission should consider the publication “Let the Facts Speak”, which chronicles decades of nuclear accidents, disasters and near misses. <http://scott-ludlam.greensmps.org.au/let-the-facts-speak>

## FUTURE GENERATIONS

Even though the first potential opportunity for deep geological disposal of any international high level nuclear waste is estimated to be close to three decades after a decision to go ahead is made, and at least 17 years after taking over ownership and perpetual liability for the waste, there is no turning back once the first shipment arrives in SA, even if the money dries up.

Once the first shipment arrives, all future generations of SA children will be bound to this decision, effectively taking away their right to decide their own future.

A key component of “ecological sustainability” is the concept of inter-generational equity. This project fails that test and as a result, the project is unsustainable.

## CONCLUSION

The Royal Commission’s “Tentative Findings” state what we already knew – that there would be no net benefit to South Australia from increased uranium mining, uranium processing or nuclear power.

On the other hand, the “Tentative Findings” in relation to storage and disposal in South Australia of overseas high level nuclear waste are at best misleading and at worst plain wrong.

The “Tentative Findings” fail to properly assess risks and costs, including:

1. Unrealistic expectations of the magnitude of the project;
2. Failure to appreciate 6 decades of international failure to achieve the outcome proposed by the Royal Commission;
3. Missing costs, unfunded liabilities, missing contingencies and failure to adequately account for inevitable cost blow-outs
4. Heroic assumptions of willingness to pay;
5. Lack of recognition of the potential for irrecoverable sunk costs and unlimited liabilities into the future;
6. Failure to address reputational damage and impact on other sectors of the economy; and
7. Naïve expectations that South Australia would be the sole beneficiary of the profits from a nuclear waste dump in our State.

The Commission’s final report should recommend that the folly of South Australia’s increased involvement in the nuclear industry be abandoned.

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