

Dear Sir,

I would like to respond to the Tentative Findings of the Nuclear Fuel Cycle Royal Commission, specifically the “Management, Storage and Disposal of Waste” section, paragraphs 62-102.

I support South Australia developing a facility for the management, storage and disposal of nuclear waste.

Those opposed to the management, storage and disposal of nuclear waste in South Australia must address at least three key questions:

1. What alternative activity would they have the SA Government undertake (or believe that industry will undertake) that would have the same likelihood of delivering the same level of economic benefit estimated in the Tentative Findings?
2. What alternative high-technology activity do they see as being likely to occur that would deliver the same level of employment for engineers, scientists and technologists in SA – especially given the closing of the car industry, the failure of the Olympic Dam mining proposal to go ahead and the still uncertain future of the naval manufacturing sector?
3. If they are concerned with perceived risks of a nuclear waste storage facility, what data supports their position?

I expand on these three points below:

1. Opponents must propose an alternative activity that would generate the same economic benefits

(Example relevant paragraphs in Tentative Findings report: 79, 80, 86, 88, 91, 92)

It is well known that SA is among the lowest performers economically among the Australian states and territories. This proposal represents a credible opportunity to generate enormous economic benefits to SA and reinvigorate the state financially. If such a rejuvenation were to occur then that influx of money would enable other sectors of the economy to develop on the back of such an economic uplift. Conversely, without this sort of injection of real revenue into SA, the very future of the state is at risk and all other factors (education, new hospital, water, climate change) – important as they may be – are moot.

So how is this different to previous proposed economic saviours that we have seen come and go without delivering on their promises?

A clear case can be made as to why this is different to previous putative significant opportunities for SA such as the Olympic Dam mine, car manufacturing and naval manufacturing.

- The Olympic Dam mine relied upon significant private sector investment by large mining companies to extract resources at considerable commodity price risk. In the event, these commodity price risks were realised in the last 18 months indicating why this proposal had a high associated risk.
- The car manufacturing industry was beaten by an unwillingness on the part of the Federal government to support the industry, a removal of tariffs and the bare facts that overseas manufacturers with cheaper labour costs can significantly undercut Australian labour costs.
- The naval manufacturing sector may well survive given the contents of the 2016 Defence White Paper however there is still no certainty so it still remains at some significant risk.

In contrast to these three examples, the requirement to manage, store and dispose of nuclear waste is clear. There is a current and growing international requirement for this service (Para 81) and therefore there is essentially zero risk to the business case to undertake this. As stated in the Tentative Findings, it would be attractive for other countries that do not have solutions to store their used nuclear fuel to be able to pay someone else to do so (Para 84).

The clear potential for this type of facility to bring international revenue into SA is extremely attractive. Whilst other employment sectors such as hospitality, NDIS and retail are absolutely vital to our everyday life, the harsh reality is that they do not fundamentally generate wealth – they rely on a strong primary economy to be strong themselves. Even tourism which brings in international revenue is beholden to the state of the global economy. This facility would be a true wealth generator bringing in international revenue at essentially zero risk for the service of storing nuclear waste which would then allow other sectors of the economy to prosper as a result.

The economic argument alone should be enough to conclude that we discard this opportunity at our considerable peril.

2. Opponents must identify alternative reliable, high-value, high-technology activities to provide employment for technology professionals

(Example relevant paragraphs in Tentative Findings report: 93c, 101)

Successful economies are so for many reasons including because they are diverse, advanced, high-tech, robust to shock and provide products or services that the world needs. The US may be regarded as an exemplar in high-technology domains having led the world in technology for many decades providing products and services that the world has needed. If SA is to continue as a viable state economy, high-tech activity provided by a significant project such as the design, building and operation of a nuclear waste facility is vital – particularly with the eroding of high-tech industries as discussed. The ability to provide high technology capabilities such as the safe management of nuclear waste is not easy to replicate by poorer countries with lower skilled workforces and thus would be a differentiating advantage to SA. Therefore it is relatively immune to the risks that were faced by the car industry for example. Countries without solutions to their nuclear waste storage needs are willing to pay for this service and therefore it is a high-value endeavour.

In order to build and maintain a world-leading, safe facility to take on the world's nuclear waste an organisation of highly skilled people would be required. SA has the potential to provide these skills from its universities and other industries along with attracting national and international talent to create a team required to design, build and run such a facility. Of course, in addition to the primary science and technology skills required for such a facility, many other non-technology skills would be required thereby providing employment opportunities for a wide range of people overall.

Without a major project such as this and with the well-known loss of technology opportunities in SA, where are SA's next generation of technology professionals to have a career unless moving elsewhere therefore being a loss of talent from the state?

By retaining such home-grown talent the state would benefit enormously in other ways by having a rich intellectual capital base here that would contribute beyond just working in such a facility in terms of mentoring future generations, strengthening local professional organisations and contributing ideas to other areas of life in SA.

This is also a great example of a challenge where innovation would be key to develop new technologies to improve the management, storage and disposal of nuclear waste.

3. Opponents must quantify any risks they identify and demonstrate that they are greater than other risks that we accept every day

(Example relevant paragraphs in Tentative Findings report: 62, 63, 68, 69)

The issue of the perceived risk of such a facility seems to be the greatest challenge since the economic and technology benefits outlined above are surely unarguable.

However I would argue that even on a risk analysis the case is clear that SA should go ahead with such a facility. The risks of such a facility are in fact very low.

It is important to understand that risk is quantifiable and therefore the discussion about risk is an objective one, not a subjective or emotional one.

Another key point about risk in this context is that one must *compare* the risk of this activity with other competing strategies and with other unrelated risks that we take every day. It is not valid to state in isolation, without data that “nuclear related activities are risky”.

The reason that risk is quantifiable and can be compared with a wide range of other risks is that masses of relevant statistical data are available from fields such as medicine, insurance and demography along with sources such as actuarial tables, census, Australian Bureau of Statistics and engineering standards.

Cohen [Reference 1] for example has written extensively on the topic of nuclear power and waste storage including providing detailed risk comparisons.

Cohen presents the risk data in terms of Loss of Life Expectancy (LLE) and this enables direct comparison of risks to be made on a dispassionate basis. By way of simple illustration, he shows that common activities such as smoking, being 10lb (4.4kg) overweight or driving 16km/h over the speed limit on freeways and many other everyday activities are far riskier than nuclear power<sup>1</sup> (ie. cause a far greater LLE).

These are risks that many tens of thousands of South Australians undertake every day without giving a second thought!

A strong argument can be made for setting up a nuclear waste storage facility in purely “radioactive waste risk” terms. Coal itself contains small amounts of uranium which eventually decays radioactively to the gas radon which is known to cause lung cancer. It can be shown that the number of lung cancer deaths due to radon from burning coal alone is thousands of times larger than the number deaths caused by the high-level waste produced in generating the same amount of electricity from nuclear fuel. Therefore if more electricity was generated from nuclear instead of coal-fired power stations, this would actually result in fewer deaths caused by radon-caused lung cancer. By SA setting up a nuclear waste storage facility this would enable more nuclear power stations to operate therefore in fact saving lives overall!

Of course people are absolutely entitled to ask about risk but the answer must calmly, methodically and with data make clear that the risks can be quantified and that risks must be compared, not stated in isolation. When this is done, it is clear that risks related to nuclear activities are very low and significantly lower than many other everyday activities that people undertake without worry.

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<sup>1</sup> US studies have shown that cigarette smoking causes a LLE of 6.6 years (men) and 3.9 years (women), being 4.4kg over optimal weight causes a 1 year LLE and the increase in the US rural interstate highway speed limit from 55mph to 65mph caused a LLE of 2 days. In contrast the estimated LLE from nuclear reactor accidents in the US (where significant power is generated from nuclear) is 1.5 days and this the estimate of the Union of Concerned Scientists, an anti-nuclear power organisation!

Finally, we can directly link this discussion of risk with the initial economic argument by considering the risk of being poor. Being economically weaker is itself a risk that carries a LLE<sup>2</sup>. So developing a nuclear waste storage facility would not only be a low risk activity in itself but would actually improve the life expectancy of South Australians through the resulting economic benefits.

#### Reference:

[1] Bernard L. Cohen, *"The Nuclear Energy Option: An Alternative for the 90s"*, (Plenum Press, New York, 1990).

#### Summary

- I commend the SA Government for taking this significant step towards seriously considering SA involvement in the nuclear fuel cycle
- I support South Australia developing a facility for the management, storage and disposal of nuclear waste.
- The onus is far more on opponents to answer key questions as to why such a facility should not be developed, than on proponents to make the case why it should be developed
- The economic and technological arguments for this type of facility are so compelling and the risks so low that it should only be dismissed on the basis of the most extraordinary counter arguments

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<sup>2</sup> Statistics in developed countries comparable to Australia show a LLE of between 6 and 9 years for unskilled labourers compared with professionals. One study estimated a 1% increase in US unemployment results in 37,000 deaths per year. Clearly the risk of losing the economic benefits of this facility are hugely significant.