

Most Australian care about our environment, pollution and limited fossil fuel resources. We can develop a roadmap based on these considerations, without getting into the more controversial topics of climate change and global warming. In this newsletter we look at an adaptive roadmap to address our concerns, in Australia and overseas, with an open approach to energy options.

Introduction

As global emissions rise, Australia is compromised both as a high CO₂ emissions country on a per capita basis, and a country that is dependent on income and jobs from mining and exporting fossil fuels (coal and gas).

The first issue is being tackled by the Government and involves the development of a renewable energy grid (wind and solar), as quickly as possible. The strategy is to lock in a 100% renewables pathway to net zero by 2050 [1], without an adaptable model that can be adjusted to minimize environmental damage or the ability to incorporate all available technologies such as other emerging renewables technologies, nuclear, clean carbon and carbon capture.

The second issue, that is yet to be tackled involves our dependence on fossil fuel exports for income and jobs. It's almost as if we are in denial, like the "US Gun Lobby" is in denial that they have any responsibility for mass shootings in the USA [2]. Don't we have an obligation to help the world to move away from fossil fuels to zero carbon or low carbon emitting alternatives?

In developing an energy strategy, we need to tackle both these issues, carefully balancing demands, costs, environmental and social issues.

Adaptable Energy Roadmap

The following roadmap provides four pathways that Australia could follow to achieve net-zero emissions obligations by 2050. By having these options, Australia can adapt to a range of energy options that provide the best value and least environmental impact to meet our emissions obligations.

In Table 1 we consider (R-Renewables) as being the only option up to 2035, and then a range of options on four different pathways from 2035 onwards with varying proportions of (N-Nuclear) energy being introduced.

Note: energy projections don't end in 2050, and the energy mix will continue to evolve in the future.



Table 1 – Adaptable Energy Roadmap for Australia

Pathway	1	2	3	4
Construction Period	Renewables Only	Renewables + Nuclear 2035	Renewables + Nuclear 2040	Renewables + Nuclear 2045
2025 – 2030	R20%	R20%	R20%	R20%
2030 – 2035	R40%	R40%	R40%	R40%
2035 – 2040	R60%	R50% N10%	R60%	R60%
2040 – 2045	R80%	R55% N25%	R70% N10%	R80%
2045 – 2050	R100%	R60% N40%	R75% N25%	R90% N10%

Note: The table indicates the proportion of renewables and nuclear energy required to replace existing coal and gas generation.

Important Features of the Roadmap:

Renewable works proceed in a logical sequence, from the least cost, highest output, least environmentally impactful projects first, to connect to the grid. Then move progressively to less viable projects into the future, the least viable projects may be cancelled, if nuclear can come on in a timely manner.

Make the energy grid expansion highly adaptable and scalable, without over-committing to transmission in areas where it may never be needed. Properly account for environmental and social factors and properly compensate nearby property owners for the devaluation of effected land.

Prioritize the closure of coal power stations, based on reducing emissions as quickly as possible, for instance close brown coal power stations ahead of black coal power stations, where emissions can be lowered more quickly [3].

Remove all roadblocks to have all zero / low emissions energy technologies in the mix, as early as possible, ideally by 2030, and provide sufficient time to investigate the most appropriate nuclear options. This includes the removal of federal and state moratoriums on nuclear energy [4].

Factor in a lag due to the time to construct projects in the model, so we continue along our carbon reduction pathway, without it being compromised by project delays.

The Fossil Fuel Export Problem

Australia currently exports far more coal than it consumes, and we import products made with fossil fuel. This makes us heavily dependent on the global carbon economy. We need to contribute to a global effort to decouple growth from rising CO2 emissions [5].

There are two ways this can be achieved. The first involves the world developing energy alternatives that are cheaper than importing and burning fossil fuel.

Bi-partisan support for adaptive energy roadmap for Australia



The second involves offering energy to gain geopolitical influence. We can see this with Russia building nuclear reactors in Bangladesh and China having built reactors in Pakistan [6]. Australia does this to a far lesser extent by providing wind and solar investments to Pacific nations [7].

Table 2 – Ways that Australia can contribute to Global Emissions Reductions

Item	Strategies
	Support international efforts to reduce CO2 emissions through various carbon tax mechanisms. With revenue used to promote zero-carbon or low carbon energy initiatives [8].
Export Low or Zero Carbon Energy	This may be from renewable electricity via subsea cables, or from hydrogen made from Australian renewable energy [9] or from nuclear energy [10].
Aid Programs	Continue to provide aid in the form of renewable energy to our Pacific neighbors and elsewhere, recognising that this may not be the best use of aid money, when there are health and educational imperatives to consider [7].
Innovation	This could be in any form such as: fossil fuel burning additives that reduce pollution, carbon capture, nuclear fission and fusion, improved renewables outputs, and in ways that have never been considered before.
Education	Australia already has a comparative advantage in tertiary education and research. This could be more focused on being a world leader in clean energy education that includes all renewables, nuclear options, carbon capture, geothermal energy, etc... by expanding education opportunities for both Australian and overseas students. UNSW already provides a Nuclear Engineering program [11], with students from China and Bangladesh being educated here, as an example of a current contribution to decarbonizing technology. This needs to be expanded.
Nuclear waste Repository	Australia is the most sparsely populated and seismically stable country in the world. A disused mine or other “non-sacred site” could be used for a worldwide repository, that not only stores Australia’s waste but also the waste that we exported the uranium to, and possibly spent fuel from 440 reactor sites around the world. This could generate revenue and help to lower the cost of spent fuel management - globally.
Nuclear fuel manufacturing	Australia currently exports uranium “yellow cake” but is not allowed to process, enrich or manufacture fuel. If these bans can be lifted, Australia can contribute to these activities, to drive nuclear fuel prices down, and make nuclear energy more competitive.
Plan to reduce coal and gas exports	The global demand for coal and gas will continue for most of this century, but Australia can take a proactive role in transitioning to clean energy by working with other countries to promote renewable and nuclear energy. We can expand uranium, lithium and rare earth metals mining, to help make zero emissions options more affordable [13].

In Table 2 are a list of some ways that Australia can contribute to a global reduction in the use of fossil fuels, and in promoting zero or low emissions alternatives. The overall objective is to develop more viable alternatives to fossil fuels (irrespective of whether it’s renewables, nuclear or something else), for Australia and global energy markets.

Conclusion

This paper presents adaptable energy strategies for Australia and considers our global trade impacts, in ways that should be able to achieve bi-partisan support. Regrettably obstructionists can delay or derail processes that are in Australia and the world's best interests. If both sides of government can agree to a roadmap, and a mining and export strategy, then it will help to quieten dissent.

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References

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