



21 June 2020

Dr Alan Finkel
Chair Ministerial Reference Panel
Technology Investment Roadmap
Department of Industry, Science, Energy and Resources
GPO 2013
Canberra ACT 2601

Dear Dr Finkel,

The Minerals Council of Australia (MCA) and all of its members are taking serious action on climate change and are committed to the Paris Agreement and its goal of net zero emissions.

Accordingly, we welcome the opportunity to comment on the *Technology Investment Roadmap Discussion Paper – A framework to accelerate low emissions technologies*.

The MCA strongly supports the Discussion Paper process in identifying those technologies which work in an Australian context – those that are critical in helping Australia reduce its greenhouse emissions to net zero and meeting its international obligations. The intention to deliver Low Emission Technology Statements is also welcomed.

Sustained climate action is a global undertaking of major technological, economic and social challenge in which Australia and the minerals sector must play their part.

Our sector improves the lives of millions of people in Australia and overseas through the responsible mining of minerals that are essential for everyday life.

To achieve an ambition of net zero emissions in Australia, and reflecting the importance of rapid action, requires a stable national policy framework that includes:

1. Substantially increased research, development and investment in technologies and processes to reduce mine site emissions
2. Widespread deployment of low and zero emission technologies including consideration of all technologies
3. Credible, verified low cost abatement options, including domestic and international offsets
4. Accelerated development of the minerals required for a low emissions future including aluminium, copper, nickel, zinc, iron, uranium, base metals, lithium, minerals sands, and rare earths
5. Global and domestic partnerships with governments, regulators, customers, technology developers, universities, NGOs and other relevant groups to drive new technologies that cost-effectively reduce emissions
6. Policies that foster continued economic growth and investor confidence in Australia.

The scale of the technology-led transformation required cannot occur without the minerals and raw materials provided by the Australian mining sector.

Our sector is already making major investments to significantly reduce emissions such as renewable energy investments at mine sites and collaborations with partners on low emissions technologies and processes.

Australia's ability to successfully adapt to climate change will rely on a strong economy including a strong and internationally competitive Australian mining industry. Our sector will continue to deliver the raw materials and contribute to the new technologies which will underpin necessary resilient infrastructure and act on new opportunities that will drive lower emissions for the minerals industry.

The MCA supports a technology-neutral policy framework, where all low emission technologies are able to compete on a level playing field. In addition to the many technologies explored in the Discussion Paper, the MCA encourages the Ministerial Reference Panel (the 'Panel') to consider the following technology development opportunities in the 2020 and 2030 period.

Low emissions electricity options

The MCA supports the considerable progress made with renewable energy deployment and storage technology development in Australia. Several MCA members are investing in renewable projects at mine sites and renewable technologies will play an increasing role in Australia's decarbonised future.

Increased penetration of renewable energy technologies such as solar and wind into both remote and larger grids (such as the National Electricity Market) requires a key focus for the Roadmap to be on pathways to lower the cost of firming renewables, including the development of commercially viable energy storage systems for use in remote locations.

In parallel to this work, there should also be a focus on other firm zero emission technologies including the potential of small modular reactors (SMRs). MCA acknowledges the Panel has a watch-in-brief on SMRs. Given that they will be commercially available in less than a decade, the MCA recommends the Panel make them a priority medium-term technology rather than a technology for consideration post 2030.

SMRs have multiple potential applications across Australia.¹ Key international SMR vendors are already undergoing regulatory approval, targeting commercial deployment in 2026-28.²

While nuclear energy is currently banned in Australia, there is an increasing awareness that Australia needs to consider all technologies if it is serious about decarbonising the economy.³

A supportive policy would be to commission the Australian Nuclear Science and Technology Organisation (ANSTO), or another expert reviewer, to undertake a technological assessment on nuclear energy reactors as recommended by the recent parliamentary inquiry.⁴

Competitively priced low emission electricity will be fundamental to decarbonising mining and the associated downstream processing.

Advanced battery technology

Heavy mobile equipment (HME) powered by diesel is currently a core technology for Australian mining, as is diesel powered electricity generation in remote grids. Low emissions electricity provides one potential pathway to replace diesel. The viability of this pathway for HMEs will depend strongly on the development of more advanced battery technology – an important area of technology focus. Other

¹ MCA, [Untapped Potential & The Case for Nuclear](#), October 2019. p. 10

² For example, see GE-Hitachi's Submission to the House of Representatives Inquiry into the prerequisites for nuclear energy in Australia (p.4) and [NuScale's submission](#) says it expects its first plant to be operating by 2026 (p. 1.)

³ MCA, [Support for lifting the ban on nuclear energy](#), 2 December 2019

⁴ House of Representatives Standing Committee on the Environment & Energy, *Not without your approval – a way forward for nuclear technology in Australia*, December 2019, p. xii

pathways include the potential use of hydrogen and the MCA supports the focus in the Discussion Paper on lowering the cost of hydrogen production in Australia.

Carbon Capture Use and Storage (CCUS)

CCUS presents a range of opportunities to support the transition to a net zero global economy.

While the Discussion Paper appropriately considers the opportunity of CCUS with gas, the MCA recommends the Panel examine the opportunity in all possible contexts, including Australian coal.

One policy framework which may accelerate CCUS development and deployment would be to allow CCUS to generate Australian Carbon Credit Units (ACCUs) under the Emissions Reduction Fund.

Retrofitting existing facilities

Some sectors of the economy do not have immediate decarbonisation options. Sectors such as steel making and cement making for example will require significant development work to support low emissions outcomes. While there are potential alternative processes including new flowsheets based around hydrogen, the ability to retrofit CCUS to existing flowsheets provides an important potential pathway to decarbonise these hard-to-abate sectors.

Further, CCUS has the potential to substantially reduce the emissions of some existing coal thermal plants that still have substantial asset lives. This would enable significant emissions reduction whilst making use of existing infrastructure, and ensuring the continued provision of reliable and affordable power generation to support Australian regional industries and jobs.

The CTSCo demonstration project based at Queensland's Millmerran Power Station is on track to capture, transport and sequester significant quantities of CO₂ per year and form the foundation of a Carbon Hub in Queensland. When combined with emerging technologies like the United States driven Allam Cycle (converting gas or coal into mechanical power, while capturing the generated CO₂ and water), it offers the prospect of near zero emission power generation.

CCUS would add technology diversity to clean hydrogen production

Hydrogen produced from coal with CCUS should be a key pathway considered for the developing clean hydrogen industry.

The Hydrogen Energy Supply Project in Victoria offers a world leading example of what is possible with the gasification of coal combined with CCUS. This offers potentially one of the cheapest forms of hydrogen production of between \$2.02-\$2.74/kg H₂.⁵

Ventilation Air Methane (VAM) technologies

Methane in ventilation air from underground coal mines represents approximately 35 per cent of all coal mine fugitive emissions.

Australia's black coal industry through the Australian Coal Association Research Program (ACARP) and COAL21 is investigating a number of technologies to safely mitigate ventilation air methane emissions. The most promising is high temperature Regenerative Thermal Oxidation which provides an effective system for mitigating low concentration methane emissions in gas streams such as VAM. This technology has broader applications for reducing methane emissions including from landfills. However, further work needs to be undertaken to ensure it can be safely applied in commercial operations. The MCA encourages the Panel to consider this technology development as a key area of focus.

Offsets for hard to abate sectors

Abating emissions from some sectors is difficult, especially where technological solutions are either unavailable or not commercial as is the case for some areas of the resources sector.

⁵ CSIRO, [National Hydrogen Roadmap – Pathways to an economically sustainable hydrogen industry in Australia](#), 2018, pp 82-83.

Having access to verified and credible offsets will play a key part in helping Australia meet its emission reduction obligations and system reliability.

Australia's energy-intensive businesses need a deep and liquid domestic and international offset market. The King Review into the ERF provides an important guide for developing the offset market and should be included in the technology investment roadmap.

The MCA encourages the Panel to consider offsets as an important supportive mitigation mechanism.

Discussion Paper Queries

Query	MCA comment	
The challenges, global trends and competitive advantages that should be considered in setting Australia's technology priorities	Australia has almost every resource required for every technology. The focus should be on technologies which best fit the use of those resources – including all low emission technologies, such as wind and solar, coal with CCUS, nuclear and storage.	
The shortlist of technologies that Australia could prioritise for achieving scale in deployment through its technology investments (see Figure 7).	<i>Technologies</i>	<i>Reasoning</i>
	Low emissions electricity	<p>Opportunities within Australia's large and geographically dispersed grid.</p> <p>Replacement of diesel with firm renewables and/or SMRs for numerous remote communities and demand centres.</p> <p>Australia's nuclear expertise would support SMR deployment – mining, medicine, non-proliferation and regulatory expertise.</p>
	Advanced battery technology	HME electrification or conversion to hydrogen would allow material decarbonisation in mining and transport.
	CCUS	<p>CCUS would enable some of Australia's current coal plants and communities to continue supplying electricity with dramatically lower emissions, and decarbonisation of hard-to-abate sectors.</p> <p>Upgrades could underpin system security with emissions reduction at relatively low cost.</p> <p>CCUS Hubs provide further cost advantages through scale and shared infrastructure.</p>
	Ventilation air methane technologies	There is a need to safely decarbonise Australian landfills and underground coal mining.
	Carbon offsets	Vital for ensuring lowest cost abatement is leveraged and import competing and export oriented industries remain internationally competitive.

	Commercially viable energy storage solutions, particularly those focused around critical minerals	Support value-adding potential activities. Support system reliability and continuing rollout and integration of solar and wind energy sources.
Goals for leveraging private investment.	Private sector investment will be best leveraged for those technologies which are closest to commercial viability. Avoiding ongoing production subsidies will be critical for attracting sustainable long-term private sector investment, especially for technologies being considered for the short list. If government assistance is being considered by the Panel, it should focus on addressing identified barriers to commercial deployment including regulatory and policy issues.	
What broader issues, including infrastructure, skills, regulation or, planning, need to be worked through to enable priority technologies to be adopted at scale in Australia.	Developing low-emissions technologies targeted at Australia's world leading mining sector leverages Australian manufacturers that provide equipment and maintenance support to the sector. Australia has a strong nuclear industry base on which to build necessary increased regulatory capacity. Given the capital intense nature of many low-emission technologies, a national focus on lowering the cost of capital projects in Australia is vital.	
Where Australia is well-placed to take advantage of future demand for low emissions technologies, and support global emissions reductions by helping to deepen trade, markets and global supply chains.	Australia is well placed to take advantage of any future demand for low emissions technologies. Australia is almost uniquely placed in having world-class supplies of the minerals which will be used low emission technologies. Australia's highly-skilled workforce could be deployed to supercharge the broad implementation of low emissions technologies, putting Australians at the forefront of international emissions abatement efforts. Australia should endeavour to harmonise international and domestic SMR regulatory standards to encourage scaled-up global deployment.	

The MCA thanks the Panel for the opportunity to provide feedback.

We are also pleased to direct the Panel to our newly released **Climate Action Plan** which can be found at <https://minerals.org.au/news/climate-action-plan>.

If you have any questions please contact Daniel Zavattiero – General Manager Climate Change and Energy – Daniel.zavattiero@minerals.org.au.

Yours sincerely



TANIA CONSTABLE PSM
CHIEF EXECUTIVE OFFICER