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Attention: Department of Industry, Innovation, Energy and Resources

Submission on Australian Technology Investment Roadmap

We welcome the work done in developing the Australian Technology Investment Roadmap, although we highlight this is insufficient for meeting Australia's commitments for a new Nationally Determined Contribution to be submitted in 2020 to the UNFCCC ramping up our action.

It is not enough to talk about the Technology Investment Roadmap, we need to take a step back and look at what we need to do given the climate emergency we are facing.

We put forward some general notes in reading the Technology Investment Roadmap, then some notes on prioritising certain technologies.

John Englart, Convenor,
Climate Action Moreland

Australia's advantages.

Australia has excellent solar insolation, good onshore and offshore wind resources, many opportunities for pumped hydro, surrounded by ocean to generate power from waves, tides, currents, potential for geothermal energy.

Energy can be exported directly to Indonesia, Singapore, Malaysia through High Voltage DC (HVDC) submarine cables, and also exported by ship to the world by converting renewable generated hydrogen to ammonia.

Australia is well suited for developing renewables and being a global energy powerhouse attracting energy intensive manufacturing for production of value added products and providing a range of high skilled, highly paid, secure jobs.

Australia has great potential for Nature Based Solution Carbon Dioxide Removal technologies, through landuse management, forest management, reforestation, soil carbon and blue carbon.¹

General Notes

1. Present 2030 Australian Target of 26-28 percent emissions reduction on 2005 levels is grossly insufficient, not Australia's fair share. The Climate Council described this target in 2018 as “woefully inadequate to protect Australians from intensifying climate change” and “more appropriate target for Australia in line with the science would be a 45-65% emissions reduction target by 2030, as recommended by the Climate Change Authority and zero net emissions well before 2050.”²

Current assessment by Climate Action Tracker highlights “Under current policies, Australian emissions are headed for an increase of 8% above 2005 levels by 2030 (excluding LULUCF), and if rated would be “highly insufficient”³

2. Tackling emissions should be done using multiple tools including: technology investment, taxes, subsidies, regulatory action, carbon market trading, and social behaviour change. Climate Policy is about interweaving this mix for maximum effect at minimum social and environmental cost. The Technology Investment Roadmap is just one tool that should be used.

3. Boost and extend funding of CEFC and ARENA. These organisations drive public and private investment in innovation in Australia. ARENA funds are nearly exhausted.⁴ The CEFC mandate should not be changed to allow investment in fossil fuel technologies.⁵

4. Technology Investment Roadmap policy is about continuing present business models/ extractive policies and using technology to adapt, such as in technologies to ameliorate coal or CSG fugitive emissions. We need to consider the decision processes that start and maintain high emissions processes and activities, such as new mine or gas approval, or maintaining existing airline unsustainable growth models.

Prioritising technologies:

Fast Track Firmed Renewables technologies

Give Energy (electricity) technologies a high priority as the technologies for decarbonisation are mature. Including: large scale solar PV, off-shore and onshore windfarms, concentrated solar thermal, large scale batteries, pumped hydro schemes⁶, micro-grids, rebuilding the grid for changing generation technologies, energy efficiency programs (Negawatts). Mining exploration and drilling resources reallocated for development of geothermal energy sources.

Demand management in Energy Intensive Industry

The aluminium manufacturing Industry is extremely energy intensive, and also provides opportunities for more effective grid management through efficient demand management and energy trading with investment and upgrading.⁷ Clark Butler highlights, "Australia is one of the world's most emissions-intensive aluminium producers. Accelerated deployment of renewable electricity is a path out of this quagmire."

Hydrogen economy

Aim to well exceed 100 percent renewables, putting excess energy into generating green (renewables) hydrogen for storage, used as a fuel, exported as ammonia.⁸

Hydrogen can also replace metallurgical coal for manufacture of green iron and steel. Upgrade to Australia's heavy industry would also provide high skilled and high pay manufacturing jobs to replace mining jobs that are increasingly being automated.⁹

Transport

Fast-track electrification of private vehicle fleet, delivery vehicles, long haul road freight.

Niche role for Hydrogen fuel cell vehicles especially in road freight, some fleet applications. Co-benefit in reducing fuel security risk.

The paper mentions transport "mode shift technologies" with no explanation or definition of this term or examples.

For cities we need to enhance public transport network and active transport

infrastructure for modal shift, including micro-mobility options: e-bikes, e-scooters and e-skateboards.

Co-benefit of reducing pollution, enhancing population health.

Rebalance infrastructure funding to increase weighting towards public and active transport, reducing funding of major road projects

Inland rail freight line (in planning and construction)

East Coast High Speed rail network

Build East Coast High Speed Rail Network providing low emissions competition to aviation high capacity routes.

Beyond Zero Emissions report into High Speed Rail concluded:¹⁰

- 45% of Australian regional travel is contained within the proposed High Speed Rail network corridor
- Journey times of less than three hours from the centre of Sydney CBD, to the CBD of Melbourne or Brisbane
- 60% of Australian population is within 50km of a High Speed Rail station on proposed network
- Three million fewer domestic passengers at Sydney Airport in 2030 than current levels, removing the need for a second airport in Sydney
- 40 year capital repayment from operating profits
- 100% renewable energy powered HSR allows zero emissions journeys
- Internationally, comparable HSR projects have been delivered in less than 10 years
- \$7 billion estimated fare revenue when fully operational in 2030.

Upgrade regional train services to fast or high speed.

Aviation:

Aviation only briefly mentioned in the report.

Battery power aviation for short haul regional services for 20 people up to 400km distance may be 5-10 years away according to Nordic research.¹¹

Current airline technology can be configured for fuel efficiency and limiting CO2 emissions, but this comes at the expense of more NOx emissions, which can have a large climate impact at cruising altitudes.¹²

Biofuels

Biofuels for aviation are likely to remain, at best, a limited partial solution for the volume of land required for current aviation levels.¹³ Some scientific research argues biofuels are very far from being carbon neutral.¹⁴

Production and certification of biofuels face substantial financial and technical barriers

to overcome.¹⁵

John DeCicco et al (2016) conclude in their analysis of biofuels production in the USA: “this analysis found that the gains in CO₂ uptake by feedstock were enough to offset biofuel-related biogenic CO₂ emissions by only 37 % over 2005– 2013, showing that biofuel use fell well short of being carbon neutral even before considering process emissions. When this estimate of the real-world offset is considered together with values from the literature for displacement effects, the conclusion is that rising U.S. biofuel use has been associated with a net increase rather than a net decrease in CO₂ emissions. This finding contrasts with those of LCA studies which indicate that even crop-based biofuels such as corn ethanol and soy biodiesel offer modest net GHG reductions. The global GHG impact of biofuel use remains highly uncertain. Nevertheless, the necessary condition for a biofuel to offer a CO₂ mitigation benefit, namely, that the production of its feedstock must increase NEP, can be evaluated empirically. Doing so provides a bounding result that suggests a need for greater caution regarding the role of biofuels in climate mitigation.”¹⁶

Aviation Demand Management

What is often neglected in limiting short to medium term aviation emissions and emissions growth is demand management. Professor Alice Larkin argues “the more simply structured aviation sector is pinning too much hope on emissions trading to deliver CO₂ cuts in line with 2C. Instead, the solution remains controversial and unpopular – avoiding 2C requires demand management.”¹⁷

Demand management implementation would be easy to do given the current situation with Covid19 pandemic disrupting air travel for next 2 - 5 years.¹⁸ Also an ideal time to place a Moratorium on all present airport expansion programs.¹⁹

The pandemic may result in major change in behaviour for business, given the systemic shift to online video conferencing and communication and weakened corporate budgets post-COVID19.²⁰

Shipping:

Mentioned just twice. Australia is surrounded by sea, so shipping should be a priority area for tackling emissions reduction through technology investment. Researcher Simon Bullock says “The [Shipping] sector does, however, have significant potential to reduce this committed emissions figure without premature scrappage through a combination of slow speeds, operational and technical efficiency measures, and the timely retrofitting of ships to use zero-carbon fuels.”²¹

Climate Action Moreland made these recommendations on shipping to the Climate Change Authority:²²

- Australia should set targets for transitioning it’s domestic coastal shipping

fleet to battery power, or use of hydrogen or ammonia as fuels for longer domestic shipping journeys.

- replacing/updating Spirit of Tasmania with electric/battery power or hydrogen fuel cell electric vessel
- Set targets to replace/update urban waterway and harbour passenger ferries to 100 per cent battery/electric power to replace fossil fuel ferries
- Australian Marine Safety Authority set interim greenhouse gas emissions reduction targets for all shipping, aiming for 2050 zero net emissions.
- AMSA should rigorously monitor, report and verify CO₂, NO_x, SO₂ and other pollutants from large ships, including container and cruise ships, using Australian ports.
- Australia should advocate in International Maritime Organisation forums for a target of zero international shipping emissions by 2050

Buildings

Building standards upgrade needed.

Insulation standards upgrade for new constructs, retrofits.

Elimination of residential gas with a transition to all electric homes.

Integrated PV solutions for windows and roofing tiles.

Co-benefits in reducing heating/cooling costs, increasing health and safety.²³

Cement

Use of Portland cement produces 8 percent of present global emissions.

Rapid transition to using zero emissions or low emissions geopolymers cements.

Mandate use in government infrastructure projects to drive production at scale.²⁴

Agriculture

Soil carbon farming initiatives ramped up further.

Eco-agriculture, eco-forestry, permaculture, indigenous fire farming increased.

If done effectively opportunity for negative emissions.

Use seaweed as carbon drawdown technology, food additive to ruminants to reduce methane production.²⁵

Blue Carbon

Not mentioned in report.

Conservation and expansion of coastal wetlands, saltmarsh, mangroves and seagrass meadows an important potential negative emissions (carbon drawdown) nature based solution, with large environmental and fisheries co-benefits.²⁶

Fugitive Emissions

While technologies to capture methane emissions are useful for existing coal, oil and gas projects, of greater use would be to not approve any new or expanded fossil fuel projects. There is no room for new fossil fuel projects compatible with meeting the Paris Agreement temperature target.²⁷

Recycling and Waste

- Reduce use of single use plastics, engage in advanced sorting, recycling programs (providing skilled jobs).
- Food and organic waste diverted to compost, redirected to farming feedstock.
- Set a target for zero waste to landfill
- Waste to energy combustion should be absolute last priority of a recycling process. Perhaps Copen Hill, in Copenhagen, provides an example of a modern high efficiency Waste to Energy plant.

Technologies to avoid

Little future for nuclear in Australia, just on a straight cost basis.²⁸

Widespread community wariness of nuclear technologies: many people ranked it very low in preferred energy sources.²⁹

Development of Fossil Gas infrastructure poses high stranded asset risks should be avoided.³⁰ Gas fugitive emissions are underestimated³¹, gas is not a transition fuel.³² Investment in technologies that increase efficiency of existing thermal fleet is throwing further money into stranded assets that could be better spent in firmed renewable technologies.

Some usefulness in research and development of niche carbon capture and use technologies in certain manufacturing processes.

Carbon capture and storage has proved highly expensive, highly energy intensive with limited successful projects globally using this technology.³³ from 2003 to 2017 Australia invested \$1.3 billion with little commercial success. Further investment should be avoided.³⁴

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