Business Council of Australia

SUBMISSION

Technology Investment Roadmap Discussion Paper

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Introduction

For over a decade the Business Council has supported strong action on climate change:

- We support the science of climate change.
- We support the Paris Agreement and transitioning to net-zero emissions by 2050.
- If Australia can meet its emissions reduction targets without Kyoto carryover credits then we should.
- We support the need for a market-based carbon price to drive the transition and incentivise investment in low, zero and negative-emission technology.
- Technology needs to drive the transition which will not only get us to a net-zero emissions future but will also create new jobs, opportunities and industries and maintain Australia's competitiveness.

Today, we continue to advocate for policies that reduce Australia's carbon emissions and deliver the more carbon efficient economy Australians and our members want.

Key points and recommendations

- The Business Council and its members acknowledge and support the Government's Technology Investment Roadmap (TIR) as a critical element in Australia's Long Term Emissions Reduction Strategy (LTERS) and a positive step forward in transitioning the Australian economy to net-zero emissions by 2050.
- The LTERS and the TIR need to articulate 'net-zero emissions by 2050' as the policy destination. This would give the private sector a sense of direction and a sense of the abatement gap and investment task that lie ahead.
- Notwithstanding the strategic nature of the TIR, prioritisation of technologies needs to be technology neutral with respect to pursuing the best large-scale abatement opportunities for Australia.
- An assessment of the full system-wide costs and benefits of priority technologies, which includes taking a value chain approach, minimises the risk of unintentionally 'picking winners' and 'crowding out' better alternatives.
- The Underwriting New Generation Investments program is an example of the 'crowding out' problem caused by some forms of government intervention, and as such should be abolished immediately.
- In order to leverage as much private sector investment as possible the TIR needs to carefully target government support at 'market failures' across the innovation chain and avoid intervening in areas of the market where technology is already commercially available and deployable.
- As part of prioritising government support for technology development, the TIR needs to identify the sectors in the economy that i) have large-scale abatement opportunities and commercially viable solutions in the near term; ii) have large-scale abatement

opportunities and emerging viable solutions in the medium term; and iii) have limited opportunities or solutions currently on the horizon.

- Broader regulatory, planning and environmental approvals processes need to be efficient and streamlined to avoid being an impediment to priority technologies progressing under the TIR.
- Adopting a problems-based approach to prioritising technology options could reduce concerns around 'locking in' priorities prematurely.
- Agencies like ARENA and CEFC operating to deliver on TIR priorities need to be appropriately structured and resourced for the task, which includes reprioritising investment mandates, stable long term funding, appropriate risk appetite and rate of return settings, and a strong focus on evidence-based evaluation of technologies and arms-length decision making processes.
- For private sector capital and commitment to be fully forthcoming, Australia's LTERS needs to address policy uncertainty around how priority technologies, that fail to achieve cost parity, will be pulled through to market in the future.
- Existing and routine research and development efforts by industry into low, zero and negative-emission technologies need to continue to be supported by government.
- Australia's LTERS ought to address how multiple policies and government funding initiatives, national and jurisdictional, will be coordinated.
- Australian industry's expertise in leading the deployment and servicing of large-scale, complex projects domestically and internationally, should be leveraged by the TIR.
- Where Australia lacks a comparative advantage or strength, the potential to partner with and invest in other countries with complementary strengths, ought to be evaluated as part of the TIR.
- Integration technologies will be crucial to 'unlocking' the full abatement potential of other technologies, and as such the TIR process needs to ensure they are prioritised.

General comments

The Business Council is firmly of the view that a well-designed innovation policy is a critical element in an effective and dynamically efficient response to climate change and the need to achieve carbon neutrality of the global economy by 2050.[1] Achieving decarbonisation at all (let alone at least cost) rests on the large-scale deployment of a range of existing and emerging low, zero and negative-emission technologies across global supply chains between now and 2050.[2]

[1] IPCC, 2018: Summary for Policymakers
https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_HR.pdf

[2] "Without advances delivered by science, research and innovation, achieving global net-zero emissions in the second half of the century would be a difficult and costly task. Source: Climate Change Authority (2020), *Prospering in a low-emissions world: An updated climate policy toolkit for Australia* (p.142).

A well-designed policy will target market failures in the innovation chain, increase investor certainty and accelerate and drive down the costs of deployment of low, zero and negative-emission technologies. A well-designed policy also has the potential to be a catalyst for the research, development and deployment of low, zero and negative-emission technologies.

A successful approach has the potential to reduce low, zero and negative-emission technology costs to the point of parity with emissions intensive alternatives (or at least close the gap) and minimise the long run abatement cost curve facing Australia. The potential flow-on benefits include new job opportunities; opportunities for new industries; greater economic resilience in regional Australia; a stronger competitive position internationally; opportunities to build new export industries; and ultimately, sustained growth in productivity and the real incomes of Australians.

We note that the TIR is a strategic, system-wide framework for assisting the development of priority technologies that seeks to complement the Government's voluntary approach to emissions reductions based on the Climate Solutions Fund, the Safeguard Mechanism and the Climate Active Program.

With the above in mind, we provide the following comments on the TIR framework as outlined in the discussion paper. Our comments relate to three broad aspects of the framework:

1. Framing objectives and addressing risks.
2. Policy pathways and agency support.
3. Opportunities for Australia to lead on technology development.

Framing objectives and addressing risks

Overarching goals supporting the vision

The Business Council strongly supports that employment and growth opportunities in regional Australia are called out in the discussion paper as one of the overarching goals of the vision. Regional communities have an important role to play in delivering on the TIR vision and stand to benefit from the greater economic resilience that comes from new investment in land based negative emissions technologies and related economic activities.

Australia's international competitiveness and relative attractiveness as an investment destination, although implicit in the vision, are not clearly identified as an overarching goal of the vision. In our view, the vision would be enhanced by an explicit overarching goal connecting Australia's international competitiveness and relative attractiveness as an investment destination, to outcomes of the TIR.

By way of example, primary steelmaking in Australia uses blast furnaces (BF) and basic oxygen furnaces (BOF) to produce steel from virgin raw materials. Currently available technology includes direct reduced iron (DRI) and electric arc furnace (EAF). DRI/EAF plants offer significantly reduced GHG emissions intensity over the conventional BF/BOF approaches. DRI plants may have the potential for either CCS (concentrated CO2) or future conversion to hydrogen, which can provide a transition pathway to low emissions ironmaking. However, transitioning to this technology would require overcoming several significant barriers related to cost to ensure that Australia remained internationally competitive in steel making.

Broader implications for shareholders and taxpayers

Even though the TIR is focussed on driving technology outcomes with large-scale abatement potential, the pursuit of good public policy outcomes should also be a core focus. Significant policy initiatives like the TIR have implications for shareholders and taxpayers, particularly over the longer term. In our view the TIR framework and the way it is implemented needs to ensure the following:

- Shareholders of businesses operating in Australia face less policy risk and uncertainty than they would in the absence of the TIR — which goes to the governance, stability and durability of the policy framework over the medium to long term.
- Taxpayers receive value for money from the allocation of public funds to TIR initiatives, versus other public spending initiatives that could have received the funding — which comes down to how effectively government support is targeted at market failures across the innovation chain, and avoids 'crowding out' private sector investment.

A rigorous system-wide approach is required to minimise risks

One of the unavoidable risks of any strategic approach to assisting the development of technologies relates to the pitfalls of 'picking winners' and 'crowding out' better alternatives. Indeed, an effective TIR is very likely to be decisive in driving Australia down one technology path over another in some cases. For example, pursuing end-use electrification based on renewable sources, versus pursuing end-use liquid fuel and gas based on renewable sources. These choices will have significant long-term implications for incumbent business models, shareholders and customers in different industries and some communities (especially in terms of employment impacts).

To minimise this risk, the full system-wide costs and benefits of technologies need to be assessed as part of the technology prioritisation process — including community impacts, infrastructure costs, necessary enabling technologies, and any unpriced costs and benefits associated with the technologies and their inputs.

Defining problems before locking into solutions

The TIR is essentially an eight stage process designed to filter more than 140 possible technology options down to a 'short list' with the greatest emissions reduction prospects for Australia. A potential concern with this process is that it may eliminate options and lock in priorities prematurely.

While filtering is 'part and parcel' of any strategic approach to assisting the development of technologies, adopting a problems-based approach could reduce this concern. It would involve an additional step at the 'short listing' stage of the TIR process. The TIR process would define a series of key problems (barriers) to achieving emissions reductions, and then the range of technology options for addressing each problem. The following are examples of key barriers to emission reductions and possible options for addressing them:

- A lack of integration between electricity grid and distributed assets technologies — options for addressing this barrier could include digital optimisation tools for networks, digital vehicle-to-grid-technology, and integration of distributed batteries and solar to create virtual power plants.

- Further reductions in the cost of firming in the NEM as rates of renewables penetration increase — options for addressing this barrier could include utility-scale storage for different durations, aggregated distributed generation, demand-side response technologies applicable for households and industry, renewable gas generation, and provision of system security services from battery storage technologies.
- Reliance on emission-intensive diesel for heavy vehicle use in mining operations — options for addressing this barrier could include bioenergy fuel blending, hydrogen fuel cell vehicles, and electrification and related remote grid augmentation.
- Long-lived, emissions intensive, capital assets in hard-to-abate sectors — options for addressing this barrier could include lowering the emissions intensity of the NEM, plant-specific energy efficiency technologies, using different feedstock technologies, and a range of negative emissions technologies.
- Emissions from high-temperature process heating — options for addressing this barrier could include biomethane utilising existing infrastructure and appliances, electrification of process heat, hydrogen and carbon capture and storage.

The annual Low Emissions Technology Statement would also need to be structured around these core barriers and track the relative progress of multiple technology options with respect to each barrier. This would enable a larger number of technology options to be considered as priorities initially, at least until the relative merits of different options resulted in filtering down over time.

Thinking about technologies in the context of broader supply chains

All technologies will ultimately operate as components in a domestic economic supply chain which is often part of a larger global supply chain. In our view the TIR would be enhanced if technologies were evaluated, more explicitly, in the context of their broader supply chains. This approach has two distinct advantages over stand-alone evaluation:

- It assists in evaluating system-wide costs and benefits associated with the large-scale deployment of a technology in Australia — for example, if the size of jet aircraft were to increase as a result of using a different fuel types, airport infrastructure may also need to change to accommodate this.
- It assists in identifying where Australia should collaborate and partner with other nations on aspects of technology development where Australia does not necessarily have a comparative advantage or strength in all aspects of the global supply chain — for example, the existing Hydrogen Energy Supply Chain project partnership between Japan and Australian which is progressing towards establishing the world's first international liquid hydrogen supply chain.

Policy pathways and agency support

Agency support needs to be fit for purpose

The discussion paper refers to Australia's public institutions that support clean energy innovation from early-stage research and development to commercial deployment, and the pivotal role that ARENA and the CEFC have performed to date in this regard. These two agencies were designed to complement each other by providing, pre-commercial grant and

venture capital funding for loss-leading investments, and affordable debt and equity for deployment of investments which are too risky for private capital markets to underwrite (at affordable prices).

The capital investment required to underwrite the development and large-scale deployment of technologies under the TIR will be substantial if Australia is to decarbonise its economy by 2050. Going forward it is important that these agencies are appropriately structured and resourced for the task:

- Agency investment mandates will need to be reprioritised to accommodate a broader range of technologies in multiple sectors of the economy and to keep pace with emerging innovation trends over time.
- Agency funding streams will need to be adequate and stable to accommodate the longer time horizons envisaged by the TIR and to encourage private sector commitment and capital to be forthcoming.
- The risk appetite and rate of return settings of the CEFC will need match the nature and financing needs of technology initiatives prioritised under the TIR.
- Agencies need to maintain their strong focus on evidence-based evaluation of technologies, and arms-length decision-making processes that appropriately balance broad missions with flexibility.

For some technologies support from other agencies will also be required.

Broader policy support will be required for some technologies

Fundamental to private sector participation under the TIR is the expectation of an adequate return on investment, adjusted for investment risk. As a result, private sector investment capital is less likely to flow to the development and deployment of technologies that ultimately can't be supported by the market, irrespective of TIR support.

The discussion paper refers to driving down the cost of deploying low, zero and negative-emission technologies to the point where they are market-competitive with existing higher emissions alternatives. However, for some technologies this may not be possible unless the carbon externality of higher emission alternatives is effectively priced into the market via some mechanism.

In our view the TIR will be more effective and efficient at leveraging private capital if Australia's LTERS addresses how priority technologies, that fail to achieve cost parity, will be pulled through to market. Policy uncertainty over this issue increases the public funding required from agencies like ARENA and CEFC to leverage a given amount of private capital. It may also mean that some priority technologies never graduate to large-scale deployment, even if they are targeted under the TIR, because insufficient private sector commitment and capital is forthcoming.

Existing technology support needs to be maintained

While the TIR is expected to focus on priority technologies with large-scale abatement potential, existing and routine research and development efforts by industry into low, zero and negative-emission technologies need to continue to be supported by government. For example, research and development underpinning upstream oil and gas industry deployment

of sub-sea production and processing technology is supported by the Government's existing research and development tax incentive. This technology dramatically reduces high levels of emissions-intensive energy consumption typically required to operate offshore platforms.

Coordination with other policy processes is important

The discussion paper makes it clear that the TIR has been designed to complement other national initiatives including the National Hydrogen Strategy, the National Electric Vehicles Strategy, the ARENA Bioenergy Roadmap, the Critical Minerals Strategy, National Waste Policy Action Plan and AEMO Integrated System Plan.

In our view, government funding under the TIR will be most effectively and efficiently targeted if it is coordinated, at least at a high level, with jurisdiction-led programs to develop and deploy low, zero and negative-emission technologies. For example, Tasmania's Battery of the Nation project.

In our view, addressing how multiple policies and government funding initiatives will be coordinated to best leverage private investment is a key part of the role of Australia's LTERS.

Opportunities for Australia to lead on technology development

Leveraging Australia's strengths in global supply chains

Australia has several comparative advantages and research and development strengths to leverage in the execution of the TIR which are well articulated in the discussion paper. In particular, Australian companies are very good at leading the deployment and servicing of large-scale, complex projects domestically and internationally, even where the underlying technologies have been developed and manufactured in other countries. This expertise should continue to be leveraged by the TIR process.

Where Australia lacks a comparative advantage or strength, the potential to partner with and invest in other countries with complementary strengths, ought to be evaluated as part of the TIR process. For example, for a given technology Australia could contribute large-scale deployment expertise while investing in another country for the manufacturing of the technology.

Replacing coal with gas will continue to be an important part of the transition to a decarbonised world economy and as the world's largest exporter of LNG, Australia will continue to play a key role in facilitating this transition. The existing gas infrastructure and expertise in Australia is likely to be a strength in terms of being able to export zero and low emission gas products to the world in the future, to the extent that they are prioritised and developed under the TIR.

Supporting regional and remote communities

The discussion paper identifies Australia's large distances as a unique challenge in relation to the transportation of electricity. Improvements in microgrids and related technologies have a critical role to play in improving the energy affordability, energy reliability and emissions reduction potential of remote regions and communities. Programs like the Regional and Remote Communities Reliability Fund are essential to expanding the deployment of microgrids to replace, upgrade or supplement existing supply arrangements in off-grid and

fringe-of-grid communities in regional and remote areas. This will help to ensure that all Australians share in the benefits of the TIR.

Enabling technologies are critical

The TIR process has been designed to prioritise a 'short list' of technologies with the greatest emissions reduction prospects for Australia. It is important to recognise that integration technologies, particularly those of a 'soft' or digital nature, will be crucial to 'unlocking' the full abatement potential of other 'hard' technologies. For example, digital technologies that enable the electricity grid to 'talk to' a future electric vehicle system, or network optimisation and demand side response optimisation tools that ultimately lower the cost of firming for higher levels of renewables penetration, or energy efficiency enabling technologies such as 5G-connected smart homes/appliances.

In our view, the TIR framework as currently proposed, may need to accommodate support for enabling technologies, as a special case and in addition to the official 'short list' of technologies, to ensure that crucial integration options are developed and deployed to support the full potential of other priority technologies to reduce emissions.

An indicative shortlist of technologies

In no particular order, the following technologies were highlighted by our members as being worthy of consideration as priorities under the TIR:

1. Electrolysers to produce hydrogen (for export and domestic industrial use).
2. Blending hydrogen and biomethane with gas.
3. Carbon capture use and storage (for use by a range of carbon emitting activities).
4. Digital integration technologies (electricity network, electric vehicle system, manufacturing applications, 5th generation cellular technology).
5. Replacing coal with bioenergy in the form of biochar/biocoke.
6. Soil carbon measurement technology.
7. Heavy mining vehicle diesel replacement.
8. Long-haul road freight vehicle diesel replacement.
9. Utility-scale battery storage for different durations (grid-scale and remote grids).
10. Hydrogen fuel cell vehicles.
11. Battery electric vehicles.
12. Technologies for efficient recovery of low-grade waste heat from industrial processes.
13. Magnesium oxychloride cement (or other substitutes for carbon intensive inputs in products or industrial processes).
14. Alternative livestock feed and livestock feed supplements.
15. Coastal 'blue' carbon.
16. Solar thermal.

Meaningful economic metrics are needed

All technologies identified as priorities under the TIR require meaningful economic metrics to facilitate performance measurement over time. Both marginal and average cost measurement techniques are likely to be relevant in this regard. The discussion paper proposes a single price per unit approach, using hydrogen as the example (<$2 per kilogram).

Price per unit metrics could be made more comprehensive if they included interim targets points (in time and quantum) between now and 2050.

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