

Bending the trend

The role of prices, policies and pamphlets in driving emission reductions

Discussion paper

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Introduction

The Morrison Government has released a ‘whole of economy plan’ to achieve net zero emissions by 2050.¹ While they are yet to reveal the underlying economic modelling on which the plan was based, it is still possible to consider the plausibility of the results of the modelling even when the assumptions behind the modelling remain concealed.

This paper focuses on the plausibility of the Morrison Government’s belief that the course of the Australian economy can be significantly altered without changes in policy, without the introduction of taxes and without the introduction of new regulation or indeed legislated targets. In short, the Morrison Government’s ‘whole of economy plan’ is based on the idea that it is possible to bend the trends in the economy without pulling on any of the traditional policy levers. Evidence is presented to suggest the plan is fanciful.

To summarise the plan, in the words of Angus Taylor:

The Morrison Government’s Long-Term Emissions Reduction Plan sets out the responsible, practical steps we will take over the next 30 years to reduce Australia’s emissions to net zero by 2050, while growing our economy and jobs.

Our Plan is built on five key principles, the most important of which is technology not taxes.

Our Plan won’t impose new costs on households, businesses or regions. It won’t raise the price of energy, or reduce the competitiveness of our industries, which would destroy jobs. Not one job will be lost as a result of the Government’s actions or policies under the Plan

We will respect Australian households and businesses’ right to choose rather than enforce mandates on what people can do or buy...

Our Plan will continue the policies and initiatives that we have already put in place and that have proven to be successful, reducing emissions and energy costs at the same time as manufacturing employment has risen.²

John Howard called his approach to climate action ‘no regrets’. He too refused to set targets or introduce carbon pricing (until the very end of his 12 years in office) while giving

¹ Australian Government (2021) *Australia’s long-term emissions reduction plan*, <https://www.industry.gov.au/data-and-publications/australias-long-term-emissions-reduction-plan>

² Australian Government (2021) *Australia’s long-term emissions reduction plan*, p 3

significant amounts of public money to the fossil fuel industry to fund research into technologies that promised much and delivered little.

While the ‘whole of economy plan’ is 129 pages in length, in addition to all of the underlying assumptions for the underlying modelling, much is missing, including any description of how the Morrison Government expects to significantly change the shape of the economy without changing taxes, regulations or targets. For decades Australian economic debates have proceeded on the implicit assumption that it was necessary to change policies to change outcomes, but the ‘whole of economy plan’ rejects this assumption without so much as a discussion.

For decades Australian and global debates about climate change have been based on the assumption that there would be some economic costs associated with transitioning economies to a low carbon future. While there have been significant disputes about the relative size of the benefits of transitioning economies away from fossil fuels and the costs of doing so, the existence of some transition costs has never been in dispute. Until now. According to Angus Taylor, the radical reshaping of the Australian economy, a reshaping that has been long resisted, and a reshaping that recently required significant ‘compensation’ for the National Party, will have no adverse impacts whatsoever. In the words of Minister Taylor:

[Not one job will be lost as a result of the Government’s actions or policies under the Plan.³](#)

It is not at all clear why the Morrison Government, the National Party, or indeed the fossil fuel industry, have been so resistant to committing to net zero emissions for so long when there are, apparently, absolutely no costs associated with doing so. Indeed, it seems that had such goals been set eight years ago, or indeed three years ago, the benefits to Australia would have been significant. Unfortunately, the ‘whole of economy plan’ provides no discussion of either what the potential benefits of earlier action may have been or, alternatively, why 2021 is the perfect time to commence such a bold, but costless, change of course.

Similarly, despite the lengthy discussion of the benefits of technological change the ‘whole of economy plan’ provides no detailed analysis of the likely costs of climate change and, in turn, no discussion of the potential benefits of achieving net zero even earlier than 2050. Put simply, if the Morrison Government believes it is economically costless to achieve net zero by 2050, how can we be sure that it is not desirable to achieve it even sooner? Or to have negative emissions by 2050 to help assist other countries that lack a ‘whole of economy plan’ by exporting large amounts of offsets and, in turn, generating large amounts of export revenue at zero economic cost.

³ Australian Government (2021) *Australia’s long-term emissions reduction plan*, p 3

Intriguingly, while the ‘whole of economy plan’ states that ‘The analysis shows that policy choices are important and directly impact the future wellbeing and prosperity of Australians’⁴ it seems clear that, as luck would have it, no new policies are needed to shepherd the Australian economy to a destination that, less than a year ago, was seen as economically ruinous.

⁴ Australian Government (2021) *Australia’s long-term emissions reduction plan*, p 35

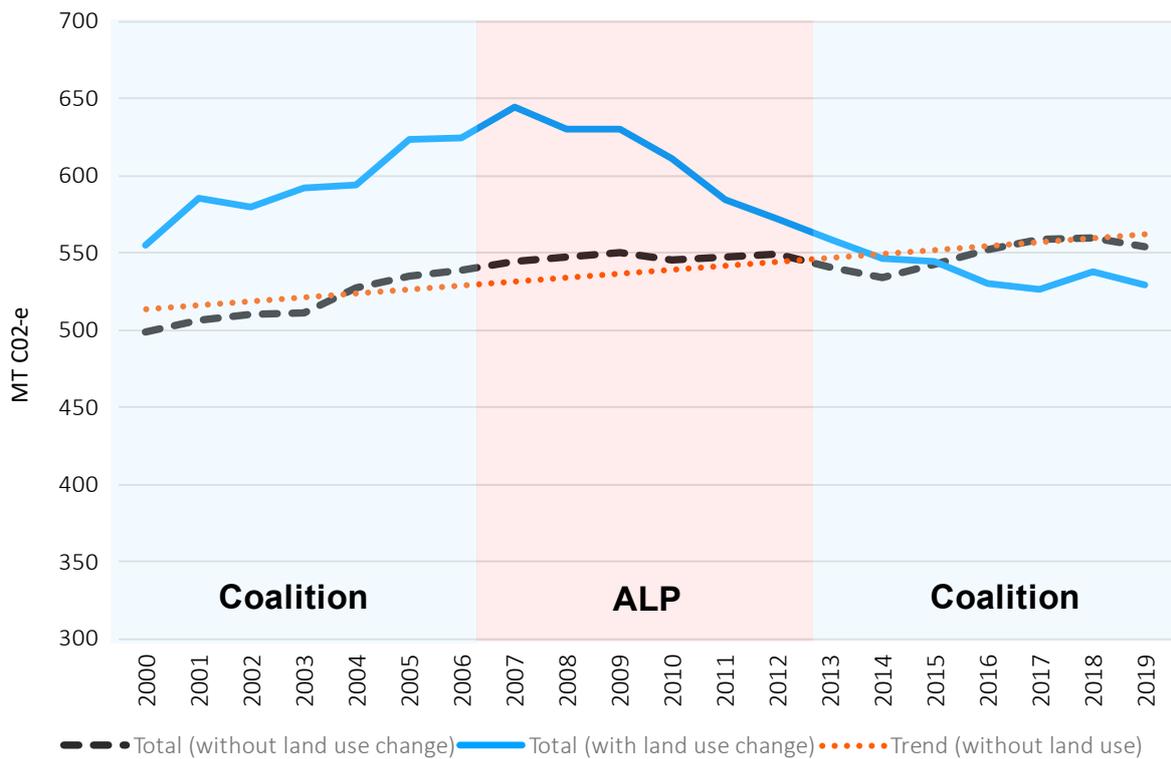
Trends to date

It is true that, as the Prime Minister says, Australia has reduced its emissions below their peak by around 20 percent, but it is also true that all of this reduction is accounted for by the fact that emissions from the 'land sector' have declined rapidly since 2005. Keeping in mind that the Coalition came to office in 2013, and that emission reductions from 'Avoided Deforestation' deliver one-off benefits, it is important to look at the trends in emissions in the 'non-land' sectors of the Australian greenhouse gas accounts to understand both how Australia got to where it is and where we are likely to go next.

As Figure 1 below shows, while Australia's total emissions have been trending downwards since 2007, Australia's emissions from the 'non-land' sector have been rising relatively steadily. The non-land sectors include emissions from, for example, electricity, industrial processes, transport and agriculture.

While reductions in land clearing that occurred long before the Coalition were elected in 2013, and long before the Paris climate commitments were made, account for the vast majority of Australia's measured emission reductions. Of more significance to Australia's future mission trajectories are movements in the level of emissions from the non-land sector. As also shown in Figure 1, non-land sector emissions stopped growing during the two terms of Labor government between 2007 and 2013. The reasons for this are discussed further below, but it is significant to note that there was no 'loss' of technology that drove Australia's emissions up from 2013, but there were changes in policy.

Figure 1: Total emissions, with and without land-use change, 2000-2019, MT CO2e



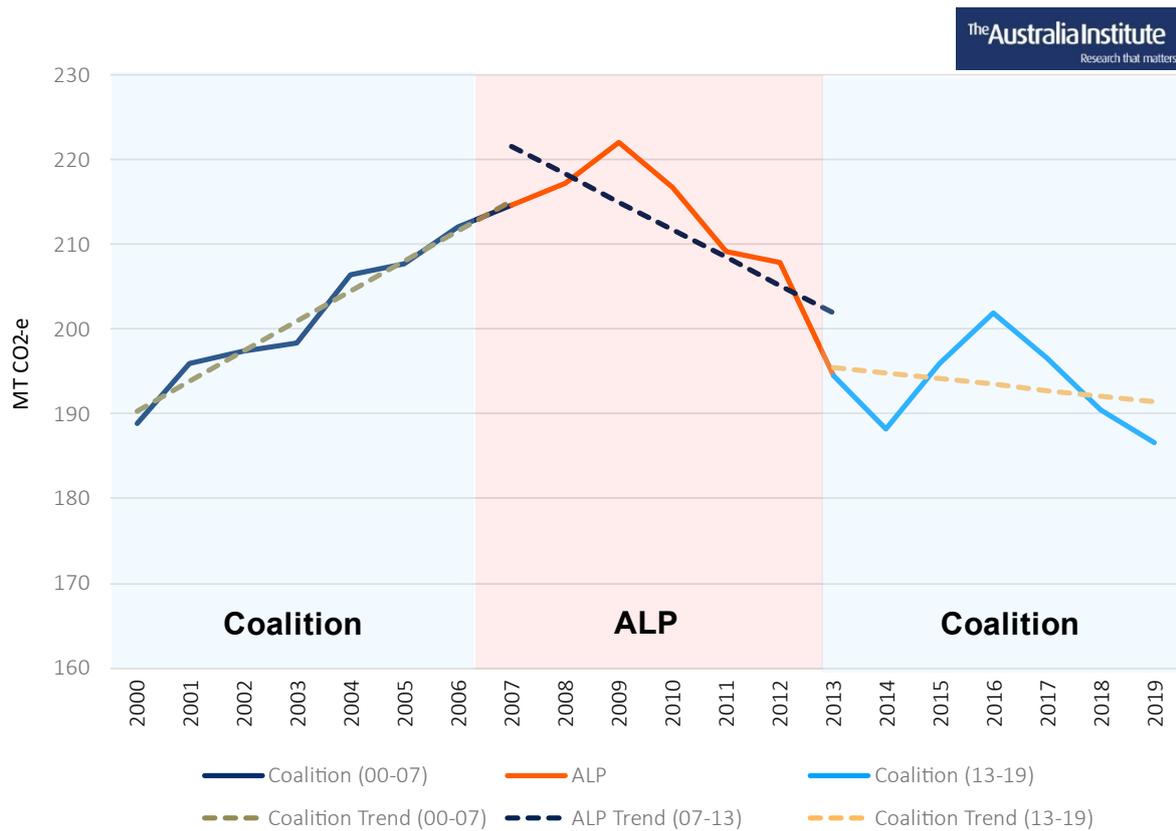
Source: Department of Industry, Science, Energy and Resources (2021)
National inventory by economic sector



Figure 2 below shows the apparent responsiveness of emissions from the electricity sector to changes in government. While there is no evidence that ‘new technologies’ emerged after the election of the Labor Government in 2007, there is strong evidence that a combination of policies including the 20 percent Renewable Energy Target, the carbon price and the creation of the Clean Energy Finance Corporation (CEFC) and Australian Renewable Energy Agency (ARENA) all played a role in driving Australia’s investment in renewable energy up and its emissions from the electricity sector down.

Figure 2 also shows that with the election of the Abbott Government in 2013 emissions from the electricity sector grew strongly after the carbon price was repealed and the RET curtailed. While it is possible that technological decline took place during this period, the ‘whole of economy plan’ provides no evidence to support such a conclusion. It is heartening to see electricity emissions continue to decline, as the global cost of renewable energy falls and aging coal fired power stations are not replaced, but it is important to note that electricity emissions would be significantly lower today were it not for the (non-technological) boost to coal and gas fired electricity provided by the policy changes of the Coalition Government.

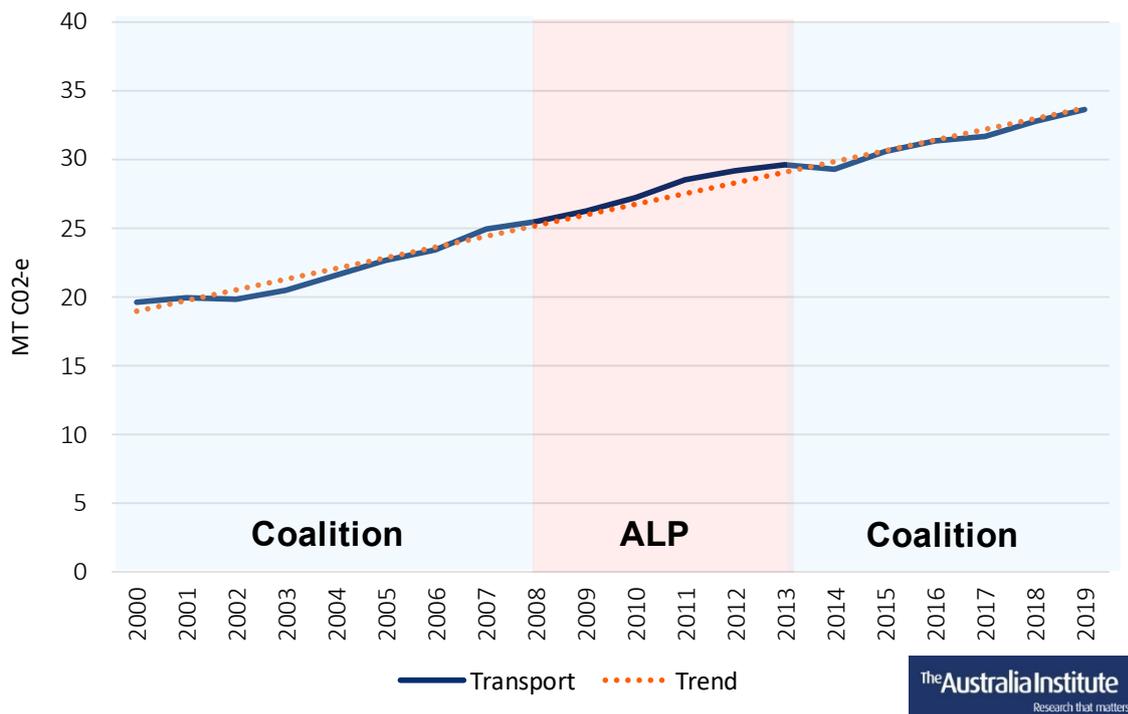
Figure 2: Electricity emissions, 2000-2019, MT CO2-e



Source: Department of Industry, Science, Energy and Resources (2021) *National inventory by economic sector*

Figure 3 below shows how steadily transport emissions have been rising in Australia over the past 20 years. In the absence of national policies to increase fuel efficiency and switch to electric vehicles, and with significant subsidies being provided for the purchase of large twin-cab utes, Australia’s transport emissions have trended upwards under successive governments. While the top selling car in the UK is the Tesla 3, in Australia it is Toyota Hilux. While it is possible that this trend will change rapidly in the coming years, it is important to note that after eight years of Coalition Government no such shift has been apparent, and no new policies were described in the ‘whole of economy plan’ that might be expected to drive such change.

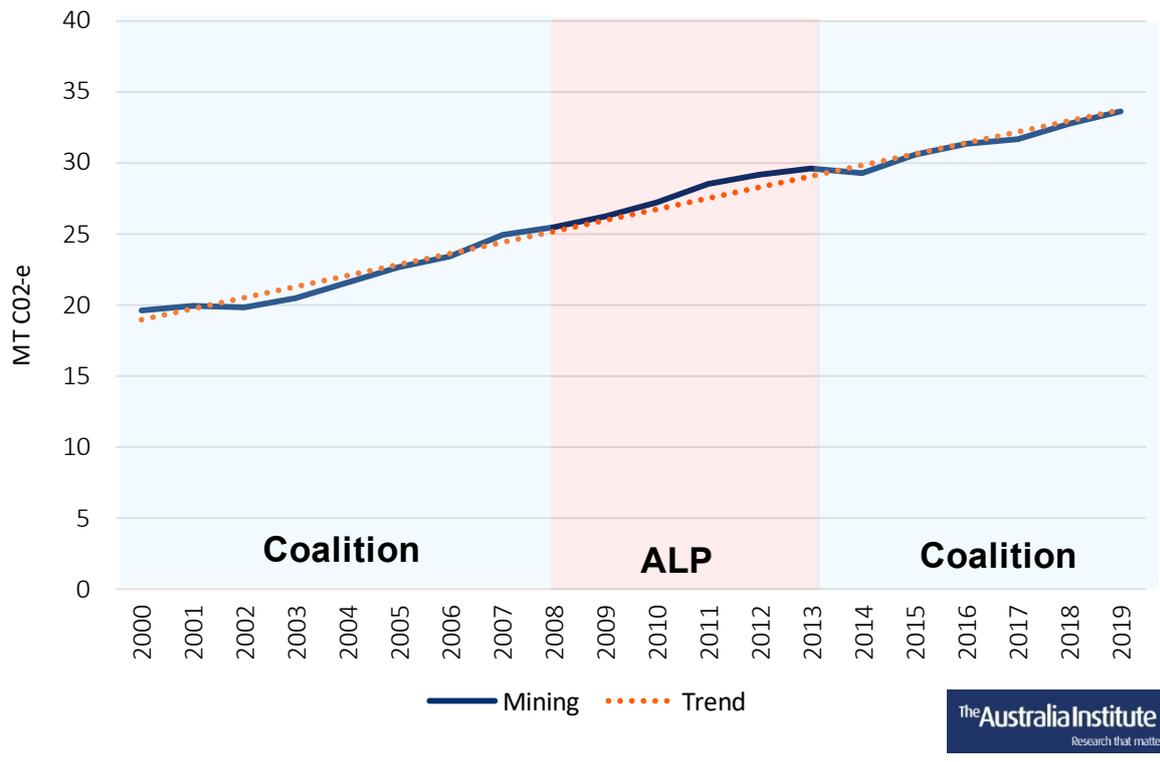
Figure 3: Transport emissions, 2000-2019, MT CO2-e



Source: Department of Industry, Science, Energy and Resources (2021) *National inventory by economic sector*

Figure 4 below paints a similar picture for mining as Figure 3 above does for transport. After eight years in office the Coalition has had no impact on the trend growth in emissions from mining. While it is possible that the ‘priority technologies’ the Coalition hopes will be invented in the coming decades will have a significant impact on emissions from mining, the ‘whole of economy plan’ provides no specific new policies to drive mining emissions downwards.

Figure 4: Mining emissions, 2000-2019, MT CO2-e



Source: Department of Industry, Science, Energy and Resources (2021) *National inventory by economic sector*



Failure is an option

The 'whole of economy plan' is based on the assumption that it is not just possible to forecast which technologies will be developed in the decades ahead, and the cost of deploying those technologies, but that such deployment is inevitable. In reality, as those who have pursued carbon capture and storage in Australia for the last 30 years have clearly shown, it is not just possible that new technologies might be more expensive than expected, it is possible that they will fail completely to eventuate.

Just as it is possible for a start-up to predict that its new product will be developed on time, on budget and with all of the attributes the original plan specified, it is also possible that none of those things will occur. Indeed, the reason that some start-ups experience very rapid increases in their share price is for the simple reason that most start-ups fail to develop and deliver the products they were designing on time and on budget. The few that succeed see their share price soar for the simple reason that investors price in a high risk of failure.

The Morrison Government's 'plan' is just the latest iteration of this 'techno optimism', albeit at the more optimistic end of the spectrum. While it is inevitable that the cost of some existing technologies will fall rapidly, and that some new technologies will be developed, there is nothing inevitable about the timing or the cost of such improvements.

Consider the following:

1. On 11 March 1960, the Canberra Times ran a story with the headline 'Nuclear stations for Australia in 10 years says Spooner'. Senator Bill Spooner was at the time the Federal Minister for National Development. He conceded that nuclear energy was more expensive than other forms of energy at the time but was confident that by 1970 it would be economic for large parts of Australia.
2. In 2007 Geodynamics claimed that it had identified a geothermal resource in South Australia's Cooper Basin which had an energy output equivalent to 15 Snowy Mountain hydroelectricity power schemes. At the time it was reported that there were 16 companies in Australia pursuing geothermal energy with 'work commitments worth about \$500 million.'⁵ Despite receiving public funding, Geodynamics was shut down in 2016 with the then CEO saying "The technology worked but unfortunately the cost of implementing the technology and also the cost

⁵ The Australian (2007) *Geodynamics says it has 'hottest rocks on earth' (archived)*, <https://web.archive.org/web/20070525034616/http://www.theaustralian.news.com.au/story/0,20867,21525816-30417,00.html>

of delivering the electricity that was produced to a market was just greater than the revenue stream that we could create".⁶

3. Since 2003, successive Australian governments have backed their promises that CCS will preserve the coal industry with promises of public money. Over \$3.5 billion has been committed towards a wide range of CCS-related projects, initiatives and programs. Much of this money appears never to have been spent due to the failure of the technology to meet significant milestones. In 2009, the head of the Australian Coal Association promised that that we will 'have commercial scale demonstration plants with carbon capture and storage in operation in Australia by 2015'. In 2017 the chief national coal lobbyist said it is 'pretty early days' with regards to CCS, which is 'an evolving technology'.⁷ Just this year Chevron admitted failures at the CCS facility at its Gorgon LNG plant, despite receiving more than \$60 million in public funding.⁸

There is no talk in the 'whole of economy plan' of the risks of for all the 'planned' technologies to be developed and implemented at low cost. While we are told that 'there is no silver bullet to achieving Australia's net zero by 2050 goal, the 'plan' goes on to say that 'A portfolio of technologies will be needed, including cross cutting 'platform' technologies (like hydrogen)'.⁹ Again, there is no discussion of what might happen in multiple industries if 'cross cutting platform technologies' fail to be developed as quickly or at the low prices assumed in the plan.

The 'priority' technologies to be pursued in the 'whole of economy plan', and their assumed price (but not their date of arrival) are made explicit. They are:

- clean hydrogen (under \$2 per kg)
- ultralow-cost solar (at \$15 per MW h)
- energy storage (under \$100 per MW h)
- low emissions steel and aluminium (under \$700 and \$2,200 per tonne respectively)
- carbon capture and storage (under \$20 per tonne)
- soil carbon (under \$3 per hectare).¹⁰

The round number associated with the price of each of these imagined technologies is perhaps the clearest evidence of where these estimates were drawn from.

⁶ Fedorowytsch (2016) *Geothermal power project closes in SA as technology deemed not financially viable*, <https://www.abc.net.au/news/2016-08-30/geothermal-power-plant-closes-deemed-not-financially-viable/7798962>

⁷ Browne and Swann (2017) *Money for nothing*, <https://australiainstitute.org.au/report/money-for-nothing/>

⁸ Mazengarb (2021) *Chevron concedes CCS failures at Gorgon, seeks deal with WA regulators*, <https://reneweconomy.com.au/chevron-concedes-ccs-failures-at-gorgon-seeks-deal-with-wa-regulators/>

⁹ Australian Government (2021) *Australia's long-term emissions reduction plan*, p 44

¹⁰ Australian Government (2021) *Australia's long-term emissions reduction plan*, p 48

If the technologies do not reduce emissions, the subsidies will

The fine print on page 48 of the ‘whole of economy plan’ makes clear (leaving aside the fact that such technologies are yet to be commercialised and may not ever be viable) that significant government subsidies will be required. While the term subsidies is not used, the repeated references to ‘offtake agreements’ refers to the situation where government promises to buy fixed quantities of a commodity at fixed prices, even if the government then has to sell those commodities to final consumers at lower prices.

Offtake agreements for gas in WA and the NT have cost state governments billions of dollars in the past. In short, while any price is obtainable if a government is willing to provide enough subsidies, even offtake agreements don’t guarantee that the targeted technologies will be viable, scalable or safe. There is no discussion in the plan of the budgetary or economic costs of these subsidies, nor of the impact of collecting the taxes required to offset them in the balanced budget framework preferred by the Morrison Government.

It is important to note that the provision of large amounts of public money, in the form of subsidies, research support or offtake agreements, is still no guarantee of success. Despite decades of assistance, the fossil fuel industry has spectacularly failed to make carbon capture and storage for coal fired power stations viable and the nuclear industry has failed to develop the cheap nuclear reactors or cheap nuclear waste storage they have been promising for decades. Indeed, even the cost of developing the inland rail line from Melbourne to Brisbane, far from a new technology, has blown out by more than 100 percent since it was announced.

But despite the history of the Ord River irrigation scheme, the Adelaide to Darwin railway line, and the construction of the Collins class submarines, there is no hint of caution in the ‘whole of economy plan’ which assures us that:

By investing in research, development and demonstration, the Plan will drive down the cost of these key technologies and achieve their economic stretch goals, unlocking their use across the economy. The Technology Investment Roadmap is the cornerstone of this approach.¹¹

While such research might yield such benefits, the choice of the word will suggest that hope has triumphed over experience.

¹¹ Australian Government (2021) *Australia’s long-term emissions reduction plan*, p 48

There are such things as free lunches

After the price of new forms of energy has been driven down (by rapid technological change or by subsidies) firms are assumed to quickly invest in the large amounts of new capital equipment required to take advantage of those new, cheap, forms of energy. As the ‘whole of economy plan’ says:

Reducing technology costs means the world can reduce emissions rapidly, with smaller impacts on economic growth and without the need for sustained costly policies. Eliminating the price difference between incumbent technologies and low or zero carbon solutions – will enable net zero emissions growth to become mainstream.

We need a renewed global mission on technology. Almost half of the emissions reductions needed by 2050 depend on technologies currently in the demonstration or prototype phase and not yet available to the market.¹²

In the absence of any carbon price, regulation or mandatory targets to drive change, the ‘whole of economy plan’ relies entirely on technology driving the price of new forms of energy so low that firms and individuals will switch voluntarily. While such a transition is possible, a number of significant issues arise:

1. The ‘whole of economy plan’ does not provide estimates of how long it will take technologies that are still experimental to be commercialised at the low prices assumed by the modelling
2. The ‘whole of economy plan’ does not discuss the consequences of failures of some technologies failing to reach commercial scale by 2050 and/or reaching commercial scale very close to 2050
3. The uptake of new technologies, such as energy efficient buildings, has been very slow in Australia despite the evidence of their benefits. The Morrison Government has been unable to drive significant increases in household, commercial or vehicle energy efficiency in the past eight years but, despite the absence of any new policies, it is now assuming that future uptake of new technology will be as rapid as the invention of the new technologies themselves.

In short, it is one thing to assume that the costs of new forms of energy will fall rapidly and that uptake of those technologies will be just as rapid. As the sales of electric cars in

¹² Australian Government (2021) *Australia’s long-term emissions reduction plan*, p 29

Australia has shown, culture, policy and the roll out of enabling infrastructure can impose significant barriers which, in the 'whole of economy' modelling are assumed away.

Can small government grants reshape the Australian economy?

The fundamental assumption on which the Morrison Government's 'whole of economy plan' is based is that small grant programs combined with carefully selected 'priority technologies' will have a significant, predictable and timely impact on the viability and cost of new technologies.

The 'whole of economy plan' states that:

The Technology Investment Roadmap will guide more than \$20 billion of government investment in low emissions technology to 2030

But what it fails to mention is that more than half of that spending was announced more than nine years ago by the Gillard Government in the form of the CEFC and ARENA, both institutions the Coalition Government has tried to abolish.

While \$20 billion may seem like a significant investment, when divided evenly over the 18 years between 2012 and 2030 it is a little over \$1 billion per year in an economy of around \$2,000 billion per year. By way of further perspective, the big four banks spend around that amount each year on advertising, the CSIRO currently spends around \$1.3 billion per year and the Australian university sector received around \$11 billion in public funding in 2021. The defence budget is around \$45 billion per year.

Given the relatively small cost of support for the 'whole of economy plan' it is unclear why it was not embraced much sooner or, indeed, expanded. The rate of return on investment in 'priority technologies' would seem to dwarf the expected return on the Coalition's significant expenditures on car parks and sporting clubs.

In addition to the, relatively small, amount of public money that is focussed on the 'priority technologies' identified in the 'whole of economy plan', a key variable is likely to be private sector expenditure on research and development (R and D). Unfortunately, as shown in Table 1 below, since the Coalition came to power in 2013 private sector expenditure on R and D has been declining steadily.

Table 1: R and D spending in Australia

| Year | R and D as % of GDP |
|---------|---------------------|
| 2008-09 | 1.37 |
| 2013-14 | 1.18 |
| 2015-16 | 1.00 |
| 2017-18 | 0.94 |
| 2019-20 | 0.92 |

Source: ABS (2021) *Research and Experimental Development, Businesses, Australia*, 3 September, <https://www.abs.gov.au/statistics/industry/technology-and-innovation/research-and-experimental-development-businesses-australia/latest-release>; ABS (2021) *Australian National Accounts: National Income, Expenditure and Product*, <https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-national-income-expenditure-and-product/latest-release>

Note: GDP stands for Gross Domestic Product.

Of even more concern, given the size and urgency of the transition task in the energy sector, is that research and development expenditure in the electricity industry was just \$133 million in 2019-20 with 382 full time equivalent staff employed to undertake that research.¹³ Coincidentally, combined the Australian Defence Department and Department of Home Affairs employs 382 staff in communications and marketing roles.¹⁴

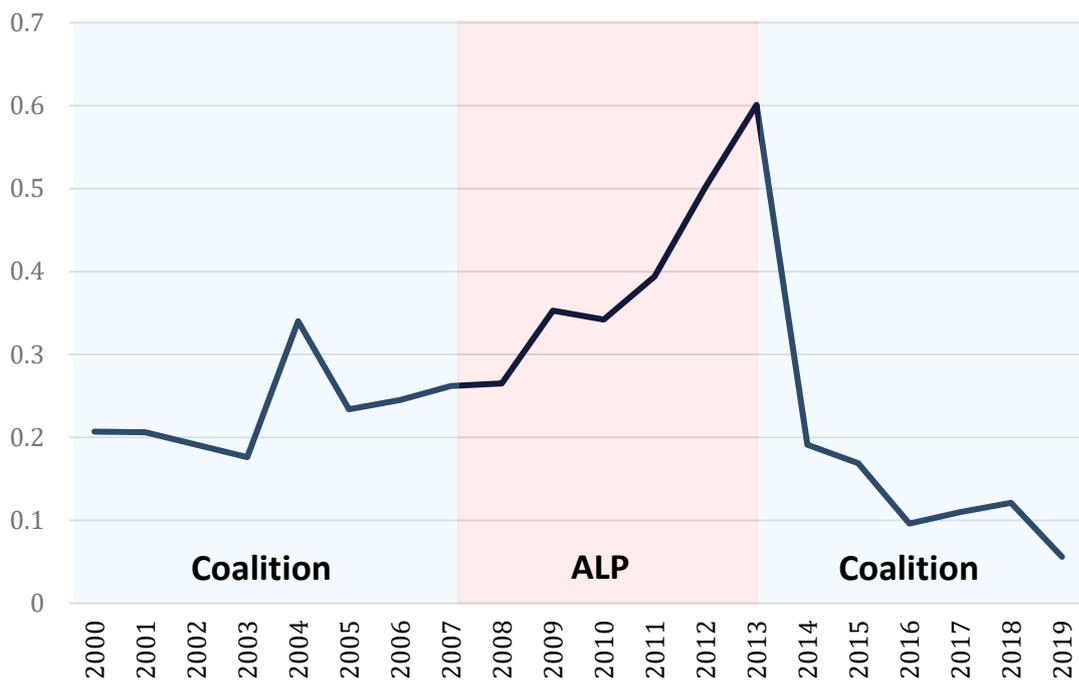
The electricity industry spent far more on marketing than it did on research and development. Despite the electricity industry's size and the challenges it faces, the 0.49 percent of output it spends on R and D is less than that spent by furniture manufacturers and wholesale trade. Indeed, the electricity industry spends less than one third of the industry average on research and development as a proportion of output.

Figure 5 below shows that Australian expenditure on R and D declined rapidly, and to record low levels, after the Coalition was elected in 2013.

¹³ ABS (2021) *Research and Experimental Development, Businesses, Australia*, 3 September, <https://www.abs.gov.au/statistics/industry/technology-and-innovation/research-and-experimental-development-businesses-australia/latest-release>

¹⁴ ANAO (2020) *Defence's Management of its Public Communications and Media Activities*, <https://www.anao.gov.au/work/performance-audit/defences-management-its-public-communications-and-media-activities>

Figure 5: Energy technology RD&D budget: per 1,000 GDP units



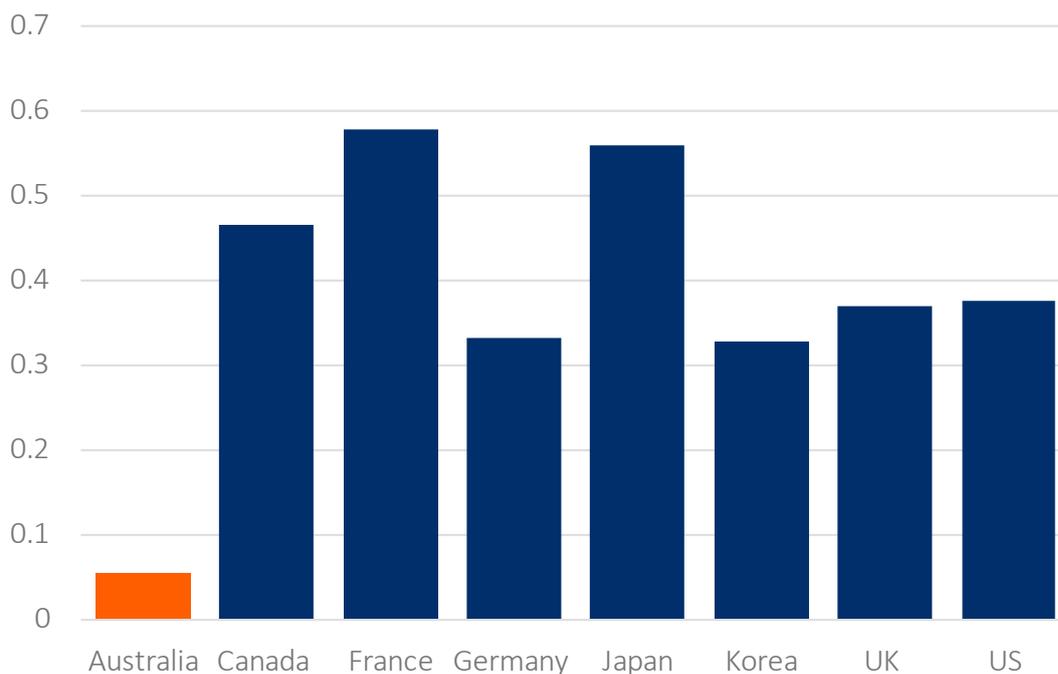
Source: IEA



Note: RD&D stands for Research, Design and Development.

Figure 6 below shows that, compared to other developed countries, Australian expenditure on research and development in the energy sector is trivial.

Figure 6: Energy technology RD&D budget: per 1,000 GDP units



Source: IEA

Conclusion

Australia's emissions from burning fossil fuels have been rising, not falling, over the past three decades. While it is true that reductions in land clearing and the end of the millennium drought have led to large amounts of carbon being sequestered in trees and, to a lesser extent, soil, it is also true that Australia has not been decarbonising its actual economy.

The Morrison Government's 'whole of economy plan' is based on the assumption that technological changes will rapidly occur that will allow Australia to achieve 'net zero emissions' by 2050 with no loss of jobs and no significant new policy. This assumption is optimistic in the extreme.

Under the policies of the Coalition government for the last eight years Australia's expenditure on R and D in general, as well as R and D in the energy sector, has declined significantly. Our expenditure on energy R and D is very low by world standards. And most of the \$20 billion that 'the technology investment roadmap will guide' was introduced by Labor and has already been committed.

It is easy to announce a new technology but, as history has shown, it is much harder to develop it, commercialise it and predict its price. Despite the lack of any new spending, new policies, or even legislative targets, the Morrison Government is predicting that the task of decarbonising the Australian economy that has proved so difficult for decades will be costless and quick. While such optimism may be reassuring to some, it is likely no accident that all of the modelling on which this optimism is based is yet to be released.