Australia's Chaotic Climate Policies

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Introduction

Australia's deadly bushfires in the summer of 2019-2020 dramatically demonstrated to the entire world the horrific dangers of climate change. It confirmed what the steady accumulation of scientific data over the last 25 years has been predicting; and what the climate activist were demonstrating about in more recent times. These bushfires resulted in a dramatic shift towards action by the European Union, China, Japan, South Korea and, most recently, the US since the election of President Joe Biden, and the appointment of its former secretary of state John Kerry as his Climate Envoy.

John Kerry will make the point in coming summits that countries collectively need to do at least three times as much as they are currently pledging. The costs of climate events are rising alarmingly, with Kerry drawing attention to the cost of some $US350 billion ($452 billion) in one year after three storms.[2]

All of this highlights that existing Paris pledges are inadequate to meet the goal of keeping global warming below 2 degrees, i.e., the amount specified by science as an "upper limit", or "guardrail", or "tipping point", beyond which global warming becomes an unstoppable chain reaction. Our children could well face the prospect of their planet becoming uninhabitable in their lifetimes. To stay below that limit the world has a finite carbon budget – a fixed amount of pollution we all can emit over the next two to three decades. However, it is the next decade that will be the determinant. Hence the global focus on increased targets for 2030.

Here in Australia, however, the policy shifts have been more spin than substance.

Australia's Paris commitment in 2016 to reduce emissions by 26 to 28 per cent from a 2005 base was political and is widely considered to be inadequate to meet the Paris Accord goal of limiting global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. Note that a 26 per cent target is consistent with global warming of about 3 degrees, defeating the whole objective of not reaching a tipping point. Recently, *Australia's Bureau of Meteorology* gave evidence to the Australian Senate that current world targets have Australia on track to warm by a catastrophic 4.4 degrees by the end of the century.[3]

Australia's Prime Minister, Mr Scott Morrison is a supporter of fossil fuels. Once, he famously brought a lump of coal to its Federal Parliament to show his support to the mining industry and score political points that ultimately helped him to win a prime ministership against all odds. More recently, in 2019, he warned that electric cars would end the Australian weekend as: *"it's not going*

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[2] John Hewson (2021), "Emissions Verdict is Catastrophic", *The Age,* January 28, p.21

[3] AAS Media Releases, (2020), "Leading scientists to give evidence to Senate inquiry into Australia's unprecedented bushfires", *Australian Academy of Science*, July 29. https://www.science.org.au/news-and-events/news-and-media-releases/leading-scientists-give-evidence-senate-inquiry-australias-bushfires

to tow your trailer, it's not going to tow your boat, it's not going to get you out to your favourite camping spot with your family."[4]

Despite this show of populism, he faced criticism, and even condemnation in some quarters, over his disastrous decision to take a holiday in Hawaii as Australia burned with the most devastating bushfires in our history. These were clearly the result of anthropogenic climate change caused by the burning of fossil fuels.[5] His early return from holiday to deal with the bushfire crisis coincided with the onset of the Covid-19 pandemic; and climate change took a back-seat for a while. However, he could not continue to ignore the dramatic shift towards 'climate action' by the international community that was first horrified, and then galvanised, by Australia's devastating bushfires.

Technology Investment Roadmap

This international pressure resulted in the release of the Australian Government's *'Technology Investment Roadmap'* in September 2020.

This roadmap articulated a strategy to accelerate development and commercialisation of low emissions technologies. These were the key milestones of the roadmap process. Priority was given to government investment on new and emerging technologies with the potential to deliver the strongest economic and emissions reduction outcomes for Australia.[6]

To the dismay of many climate scientists, however, the document whilst championing the use of gas, barely mentioned coal. Also, in keeping with the current Australian government's climate doctrine, it included no reductions targets and no price on carbon. Instead, the document claimed that emissions targets would be achieved by backing new technologies rather than penalising old industries. (These new technologies will be covered in Part Two of this series). Further, to meet its voluntary Paris Accord emissions goals, it was announced that Australia would use the 'Kyoto credits', i.e., what the government claimed to have earned in the past by beating reductions targets set under the Kyoto Protocol.

PM Morrison, when flagging the plan in the Australian Parliament, stated that*, "If this technology investment and use of previous carbon credits cut emissions by the amount the international community was increasingly demanding, it would be almost incidental".*[7]

Such vague promises and use of historical carbon credits was just not good enough for UK Prime Minister Boris Johnson, the host of the upcoming UN climate talks in Glasgow in November 2021 (set for November 2020 but delayed by a year due to the Covid-19 pandemic). PM Johnson kept ramping up his own goals; claiming that the UK would not only hit net-zero by 2050 but also reduce emissions by 68 per cent on 1990 levels by the end of the decade. China, Japan, Britain and South Korea, which account for more than $310 billion in Australian annual trade between them, have all now adopted the net-zero emissions target by 2050 or 2060, ramping up pressure on Australia's fossil fuel industry.

[4] Mike Foley (2021), "Almost alone: Australia isolated on climate despite PM's ambitions, *Sydney Morning Herald,* February 7. https://www.smh.com.au/politics/federal/almost-alone-australia-isolated-on-climate-despite-pm-s-ambitions-20210205-p56zu6.html

[5] Jacqueline Maley, (2020), "Not so splendid Isolation", *Sunday Age* December 13, p.35

[6] Department of Industry, Science, Energy, and Resources (2020), *Technology Investment Roadmap: First Low Emissions Technology Statement 2020*, *Australian Government.* https://www.industry.gov.au/data-and-publications/technology-investment-roadmap-first-low-emissions-technology-statement-2020

[7] Nick O'Malley (2021), "Morrison's climate stance is shifting say observers, but glacially", *Sydney Morning Herald*, February 7, 2021. https://www.smh.com.au/politics/federal/morrison-eyeing-more-ambitious-climate-target-of-net-zero-by-2050-20210201-p56yj3.html

However, with coal and natural gas alone being worth more than 25 per cent of Australia's exports - or $110 billion each year - in October 2020 PM Morrison said he will not be dictated to by other governments' climate change goals and declared that he is not worried about the future of Australia's exports despite the above four of the country's top trading partners adopting net-zero emissions targets.[8]

PM Morrison went on to say: *"I am not concerned about our future exports. Australia will set our policies here. Our policies won't be set in the United Kingdom, they won't be set in Brussels, they won't be set in any part of the world other than here."* The outcome was that PM Morrison was not offered a speaking slot by UK PM Johnson at an interim climate meeting in December 2020.[9] To put this into context, leaders from 70 countries, including Belize, Afghanistan and Rwanda, are speaking, but Australia does not have a seat at the table.

Policy Change 'Spin'

Despite PM Morrison stating that he will not bow to international pressure, the diplomatic snub by UK's PM Johnson resulted in PM Morrison announcing at a meeting of Pacific island leaders that Australia would not use the controversial 'Kyoto credits'. Despite this back-down, diplomatic pressure was mounting on Australia to take even more climate action.

This pressure grew with Joe Biden's victory as the President of the United States in November 2020 and his pledge to implement a "carbon-adjustment fee" (carbon tariff) at the border. Britain and the EU are already looking to settle on plans to impose carbon tariffs in the coming months. Such moves would establish levies on energy-intensive imports from carbon-price-free jurisdictions such as Australia.[10]

This has resulted in a lot of spin about policy change, but no real action.

Perhaps this slow pace of change is in fact a deliberate strategy by PM Morrison. He is probably aware that he cannot be seen to attend the Glasgow talks in November 2021 and be isolated alongside a small handful of climate rebels in the face of Australia's allies and trading partners. Further, he knows that, in the general community in Australia the winds have shifted and that there is a political advantage in acting on climate change. But he is perhaps weary of alienating those in his political party who oppose any sort of climate action.

In January 2021, PM Morrison took another small step, by announcing that *"the shift towards a net-zero economy was inevitable"*. Then in February 2021, instead of announcing a firm target of reducing greenhouse gas emissions to net-zero by 2050, PM Morrison said *"Our goal is to reach net-zero emissions as soon as possible, and preferably by 2050."* He also said that he would not commit to an emissions' deadline until "*I can tell you how we get there*". Economists say despite Morrison's increasing ambition to hit a 2050 deadline for net-zero, the government's focus on low emissions' technology will not be enough on its own to achieve it.[11]

[8] Eryk Bagshaw, Nick O'Malley and Mike Foley (2020), "Australia defies international pressure to set emissions targets", *Sydney Morning Herald,* October 28. https://www.smh.com.au/politics/federal/australia-defies-international-pressure-to-set-emissions-targets-20201028-p569ed.html

[9] Op. cit., O'Malley (2021)

[1010] Anthony Galloway and David Crowe (2021), "Australia 'dead against' climate tariffs", *The Age*, February 12, p.6.

[11] Op. cit., Foley (2021)

A firm net-zero target would have brought Australia's ambitions into line with Europe, the United States and much of Asia.[12]

This slow shift in climate policy has, however, been viewed positively in Australian climate science circles. Professor Lesley Hughes, a counsellor with the *Climate Council* says it is clear the PM's progression is real. *"I think he is boiling the frog, getting opponents, mainly in the National party, used to the idea of action. He knows in the general community there is a political advantage in acting."*[13]

The issue is one of *'Functional Reality'* vs. *'Climate Reality'*. Those who are in the 'functional reality' camp do not support any climate action policies – even when recommended by scientists, engineers, and economists – if they are perceived to be not politically implementable. Those in the 'climate reality' camp, on the other hand, recognise the actual reality of climate change that the Paris Accord and other treaties are urgently trying to address. Around the world, functional reality is being rapidly overwhelmed by climate reality; as demonstrated by the Australian bushfires; the melting of the glaciers, the intensity of the hurricanes, the flooding of the coastal cities, etc.

Unfortunately, functional reality has retarded climate action in Australia – longer than it has in comparable nations – in large part because the country creates its wealth not only by using fossil fuel but also by its export. This has resulted in Australia's chaotic climate policy.

Take for example the case of climate policy with regards to Agriculture in Australia. The current Australian government is a Coalition of parties, dominated by a more city-based Liberal Party (more politically akin to the Republicans in the USA or the Conservatives in the UK) and the more rural-based National Party.

In response to PM Morrison's net-zero by 2020 goal, the National Party said that it would oppose any emissions deadline that does not exempt agriculture, mining, and manufacturing. The National party leader Michael McCormack said: *"We are not worried, or I'm certainly not worried, about what might happen in 30 years' time. If the Nationals supported net zero emissions, we would cease to be a party that could credibly represent farmers."*[14]

The climate reality is that in 30-years, if there is no climate action in the next 10 years, there will be no arable land to farm on.

Also, the National party seems to be hopelessly ignorant of their own constituents; as the *National Farmers Federation, NSW Farmers, the Grains Council, Meat and Livestock Australia,* the pork industry, and others across the agriculture sector, have already committed to net zero emissions by 2050. They believe that this can be achieved via 'Carbon Farming' (more on this later).

Australia's business community is also voting with its wallet for more ambitious climate action. An investment splurge on Australia's carbon credits markets revealed this week investors have started betting that PM Morrison will wind up with firm climate targets one way or another. Australian export behemoths including *Rio Tinto* and *BHP*, as well as *the Business Council of Australia*, employer groups, major agriculture lobbies and multinational food companies are pursuing carbon neutrality

[12] Eryk Bagshaw, Nick O'Malley and Mike Foley (2020), "Australia defies international pressure to set emissions targets", *Sydney Morning Herald,* October 28. https://www.smh.com.au/politics/federal/australia-defies-international-pressure-to-set-emissions-targets-20201028-p569ed.html

[13] Nick O'Malley (2021), "Morrison's climate stance is shifting say observers, but glacially", *Sydney Morning Herald*, February 7, 2021. https://www.smh.com.au/politics/federal/morrison-eyeing-more-ambitious-climate-target-of-net-zero-by-2050-20210201-p56yj3.html

[14] John Hewson (2021), **"**The Nats lose Touch with Their 'Wonderful People'", *The Age,* p. 30.

deadlines - in part to avoid being stung with trade tariffs or charges by countries that have set net-zero targets.[15]

However, these shifts in corporate attitudes have not been reflected in the Australian federal government circles. Australia remains the only developed nation not to have committed to a mid-century net-zero emissions target, and some cabinet members are determined to push back against capital flight from fossil fuels. In fact, amazingly, in federal parliament an inquiry was launched in December 2020 to question banks and insurers over their plans to reduce support for new mines and coal-fired power plants due to global warming.[16]

In fact, whilst visiting a coal mine in Queensland, Australia in January 2021, PM Morrison fended off calls to phase out fossil fuels and toughen action on climate change by stating that he expects coal mining to continue to generate wealth for Australians for decades to come. *"These mines have got, you know, 10, 20, 30 years to run",* he said.[17]

Then, in February 2021, the National party's former leader, Barnaby Joyce (a CPA, and not a CMA) lodged a formal amendment in Parliament to rule that the $1 billion *Grid Reliability Fund*, to be administered by the *Clean Energy Finance Corporation (CEFC)* be "technologically neutral", rather than limiting options. The amendment does not compel the CEFC to fund coal power but removes a restriction which will prevent it from backing the energy source. Mr Joyce said that, *"Our largest sale as a nation is fossil fuels, like it or not, and I can't see anything to change that*." Mr Joyce is hoping that his amendment would permit high-efficiency low-emissions coal (clean-coal) plant projects to apply to the fund, which he claimed would boost greenhouse gas reductions. The outcome was that the government withdrew the bill from debate and at the time of writing this article was considering whether to bring it to Parliament in weeks or months to come.[18] In part two of this article, we will discuss the scientific validity of this so-called "clean coal".

Australia's reliance on the exports of fossil-fuels will be severely tested on the international arena, due the possibility of 'carbon tariffs' being imposed. President Biden will host a climate leaders' summit on *Earth Day*, April 22, 2021, and PM Morrison is hoping to be invited. If invited, it is reported that PM Morrison will argue against carbon tariffs, saying that they are not aimed at combating climate change, but rather at economic objectives including protecting local industries such as British and European meat, cheese, and wine.[19]

However, a briefing prepared for the European Parliament found carbon tariffs would not amount to protectionism provided they did not discriminate against one particular country and were set at the correct rate.[20]

Just Transition

The reason why PM Morrison is talking-up fossil fuels is because the possible loss of jobs from coal to renewables. In Australia, most talk of an energy transition centres on thermal coal, which is burned to make electricity. Renewables are now largely cheaper than these old power sources; and

[15] Op. cit., Foley (2021)

[16] Nick O'Malley and Mike Foley (2020), "Climate of change puts business and Coalition at odds", *The Age*, December 19, p.35.

[17] David Crowe (2021), "Morrison backs future of coal mining", *The Age*, January 21, p.14.

[18] David Crowe and Mike Foley (2021), "Liberals fuming as Nats coal revolt gathers steam", *The Age*, February 18, p.18.

[19] Op. cit., Galloway and Crowe (2021).

[20] Hans van Leeuwen (2021), "EU's carbon clock starts ticking for Australian companies, *Australian Financial Review*, October 5. https://www.afr.com/world/europe/eu-s-carbon-clock-starts-ticking-for-australian-companies-20201002-p561m3

that means more mines and legacy power stations will close in coming years. The question is: how fast and what happens to the workers when they do?

Almost everywhere industries have collapsed, and workers have been left in the lurch from manufacturing and coal today, similar to the cotton mills of the previous century. But when Germany shuttered its black coal industry in 2018, it did so without sacking a single worker, under a model known as "just transition".

The term "just transition" was coined by North American unions in the 1990s as concerns about abrupt closures grew. The basic premise is that, as a shift from fossil fuels to renewable power is necessary for the common good, just as those industries have provided for the common good before the threat of global warming was understood, those workers and communities most affected should not be penalised.

Two decades on, the coal and steelmaking in Germany's Ruhr valley that had once helped Europe recover from two terrible world wars was facing a similarly bleak future. But instead, the German government stepped in with a staged 10-year closure, now considered the gold standard of "just transition". Working alongside communities, unions and the major employers under a slogan loosely translated as "no one left underground", the German government re-nationalised the industry and then set a timetable for closures. It repurposed existing government subsidies into pensions for older workers and retraining packages for those looking to transition. Five thousand people were kept working on land remediation, funded by a $355-million annual "eternity fund", as the region was transformed through new infrastructure and research institutes. No miner lost their job. Today, Germany is running a similar phase-out of thermal coal by 2038.

Opponents to government intervention often speak of letting the market decide but others insist the shift to clean energy is now inevitable. And when there is no dialogue or formal support, the fortunes of workers on the losing side can be left entirely to big corporations squeezing the last drop of profits from a region.[21]

Green Jobs – A Management Accounting Challenge

With all this activity in the renewable energy sector, should we be seeing a green jobs boom already, if not in Australia, then at least in Western democracies that have sounder climate policies?

Germany, which takes its transition to renewable power so seriously it has a word for it, *Energiewende*, offers a cautionary tale. It is on track for 65 per cent of its electricity to be from renewable sources by 2030. A report released in February revealed the number of jobs in the German renewable sector — production and installation — had almost halved from 300,000 in 2011 to around 150,000 in 2018, offset partly by a gain of 30,000 in maintenance, up to 80,000.[22]

The reason is that most of the green jobs have been created in Asia. Last year, sixty-three per cent of all green jobs were recorded in Asia, confirming the region's status as a market leader. Biofuels jobs followed closely behind solar PV, reaching 2.5 million. Many of these jobs are in the agricultural supply chain, particularly in countries like Brazil, Colombia, Malaysia, the Philippines, and Thailand,

[21] Sherryn Groch and Nick O'Malley (2021), What's a 'just transition' and can you switch to green energy without sacking coal workers?, *The Age,* January 11. https://www.theage.com.au/national/what-s-a-just-transition-and-can-you-switch-to-green-energy-without-sacking-coal-workers-20201218-p56oub.html?ref=rss

[22] Adam Creighton (2021), "Green jobs revolution running out of power", *The Weekend Australian*, February 13-14, 2021, P.16.

with labour-intensive operations. Other large employers in the renewables sector are the hydropower and wind industries, with close to 2 million and 1.2 million jobs, respectively.[23]

The growing competitiveness of Asian companies (in China, Korea, and India) in creating green manufacturing jobs should be of concern to Western economies. For example, of the top 10 solar panel manufacturers in the world, eight are Chinese. German workers have priced themselves out of the market, as have Australian workers.

Australia is in a worse position than Germany. It has lost its manufacturing expertise in key industries that could have enabled it to compete with the Asians.[24] For example, Australia's car industry that was the backbone of manufacturing in Australia from 1925, is now lost (along with its related know-how). Tesla, the electric car manufacturer is building giga-factories in Austin, Texas, Shanghai, and Berlin. If Australia had a car manufacturing base, a factory could have been built in the country. After all, Australia's Pilbara Minerals mines the key resource of lithium needed for the batteries. Also, its wages would be competitive against at least Austin and Berlin, so that would not be an excuse.

But the actual calculation of exactly how many green jobs are created is a management accounting challenge. Should it be ratio of those who work in the creation and capture of renewable energy compared to those who work in the mining of fossil fuels; or should it be a percentage of the total labour force? What about faming – traditional vs. carbon farming? What about manufacturing – do we include those manufacturing lithium batteries, hydrogen fuel cells and solar panels? What about the mining of lithium for the batteries – should it go to the green jobs count?

As management accountants know, numbers can be manipulated to tell the story. In a recent article, it was interesting to see that big mining businesses and their ach enemies the labour unions singing from the same song sheet. It showed that, in the decade to 2019, the number of workers in the renewable energy sector in Australia added only 27,000 green jobs out of a total labour force in excess of 13 million. The report claimed that for every full-time equivalent job in renewable energy there were 56 jobs in agriculture, mining, and manufacturing. The report went on to say that "carbon workers" in coalmining, gas and oil extraction, fossil-fuel generation and integrated steelmaking amounted to around 100,000.[25]

Renewable energy is fundamentally less jobs-intensive than supplying energy from traditional power sources. It takes hundreds, sometimes thousands, of skilled workers to operate coal, gas, and nuclear plants. By contrast, solar panels and wind turbines are largely set-and-forget once they are up and running.

Of course, it is bad economics to choose a particular energy source because it sustains a large number of jobs. Economic history is a series of new labour-saving devices that free up workers to do other, higher-value jobs.

Clearly, there is an urgent need in the longer term for Australia to expand from an economy that extracts and farms to one that adds value and manufactures complex things in a sustainable way. In the long-run, Australia needs to support advanced manufacturing, not just primary production. This means that Australian companies must manufacture complex products such as drones and robotics,

[23] IRENA (2020), "Renewable Energy Jobs Continue Growth to 11.5 Million Worldwide" *International Renewable Energy Agency*, 29 September.

[24] Janek Ratnatunga (2020), "Funding Manufacturing Post COVID-19: A National Security Issue", *On Target,* May 26. https://cmaaustralia.edu.au/ontarget/funding-manufacturing-post-covid-19-a-national-security-issue/

[25] Op cit. Creighton (2021).

renewable energy, processed food for export and the like, so they can scale up to become global powerhouses that can compete on quality, not on price.

The Road to Net-Zero by 2050

In part one of this series, the reasons why Australia's carbon policy shifts have been more spin than substance; and why it is a laggard in international climate action were discussed.

In late-January 2021, the UN Secretary-General Antonio Guterres called on wealthy nations to abandon coal and set net-zero emissions targets to reach key milestones by the time the COP25 climate talks begin in Glasgow in November 2021. He said nations that were responsible for 65 per cent of global emissions had announced plans to reach net-zero by 2050 and by November he hoped that figure would be 90 per cent. He went on to say that no new coal-fired power plants should be built, and wealthy nations should abandon coal by 2030, and all nations aim to end its use by 2040. Also, that a carbon price should be embraced and an end date for financing all fossil fuels, starting with coal, should be introduced.[26]

Australia was, most likely, foremost on his mind.

This part two will cover the new and emerging technologies with the potential to deliver the strongest economic and emissions reduction outcomes for Australia, as per the government's *'Technology Investment Roadmap'* released in September 2020. This roadmap articulated a strategy to accelerate development and commercialisation of low emissions technologies. But first, a transition period is called for.

Transition from Coal to Gas

Gas has been used in Australia for decades in power generation, heating, and manufacturing. In Australia, large stores of it are found onshore and offshore, bound up in sedimentary basins capped by impermeable rock as well as in shale and coal seams. For domestic use, it is typically extracted by drilling then treated, piped to distribution hubs near cities and industrial centres, and plumbed into homes.

The Australian government backs the expansion of the gas industry for two main reasons.

The first is economic: more gas, the government says, means more affordable and reliable energy to domestic manufacturers that rely on it – thereby boosting employment. The second is to smooth the electrical grid's transition from coal.

Many large Australian companies in the energy industry support the government in promoting gas as the "transitional" energy source, i.e. one that (supposedly) emits far fewer greenhouse gasses than coal but is still capable of dispatching the around-the-clock energy needed to support the growing use of weather-reliant wind and solar generators. The government says it is focused on ensuring that electricity remains reliable and affordable as the market transitions from coal and, for this reason, it is promoting gas as the key plank of its plan.

The problem, however, is natural gas also faces some big challenges.

The first is that gas is still a heavy source of emissions. While it is a cleaner-burning fossil fuel than coal, it is a fossil fuel, nonetheless. Australia needs to reduce its reliance on all fossil fuels over time in order to achieve its climate targets. There are also growing questions among scientists about the

[26] Nick O'Malley, (2021), "Global Climate Action Surges from Fossil Fuels", *The Saturday Age*, January 30, p.15.

extent of unmeasured methane emission leaks, known as "fugitive emissions", which escape during drilling and processing. If the methane escapes unburnt into the atmosphere, in its first two decades it is a devastating 84 times more potent as a greenhouse gas than carbon dioxide.

The second problem is that gas has become very expensive. Gas prices began sharply rising on the east coast of Australia in 2017, when commercial and industrial buyers started receiving new contracts offered at above $10 a gigajoule, much higher than the historic levels of between $4-$6 a gigajoule. This price rise coincided with Australia deciding to sell natural gas in its super-chilled form, known as *Liquefied Natural Gas (LNG),* overseas. The construction of six new LNG export facilities at Gladstone in Queensland increased overseas demand for Australian gas – our top LNG export destinations are Japan, South Korea, and China – and required producers to tap more expensive gas fields to meet their obligations. This linked the east-coast gas market to international LNG prices, pushing up domestic prices.

Australia has become the world's number one exporter of LNG. In 2019, cargoes of LNG accounted for about $50 billion in export earnings, sealing its position as the country's second-biggest commodity export after iron ore ($100 billion a year).

The Achilles' heel of gas is that it is still a global-heating fossil fuel. An estimated 19 per cent of Australia's greenhouse gas emissions are caused by gas and its long-term use must be reduced over time for the world to meet the goals of the Paris agreement to limit global warming.[27]

Carbon Farming

Australia can and should lead the world in regenerative agriculture (carbon farming). The essence of carbon farming is to return carbon to the soil - to sequester it from the atmosphere - by simple improvements in farming practices and effective application of technology. It involves holistically controlled grazing, zero tillage, biological rather than chemical fertilisation, biological primers, and pasture cropping. Many farmers would do this anyway, as these methods improve farm productivity and profitability.

Australian Government's *'Technology Investment Roadmap'* has listed soil-carbon measurement as one of five priority technologies with the aim of reducing costs by about 90 per cent to under $3 per hectare.[28] Since European settlement Australian agricultural soils have lost about two-thirds of their carbon content. But as the soil-carbon expert John White has reported, a 0.5 per cent increase in soil carbon on only 2 per cent of our agricultural lands would more than offset all of Australia's emissions from all sectors.[29]

Farmers can generate credits for their improvements to the carbon content of their soils. *Australian Carbon Credit Units (ACCUs)* were developed as a key element of the *Carbon Farming Initiative*. The government also uses the A$2 billion *Climate Solutions Fund* to incentivise farmers by buying these credits via low-abatement reverse auctions. These credits are now traded – recently at $17 a tonne. In time, farmers should be free to trade these overseas, if the domestic market proves inadequate. They are being increasingly sought by large emitters seeking to voluntarily offset their emissions.

However, whilst the Coalition parties of the Australian government fight among themselves due to perceived 'functional or political reality', the Europeans and the British, amongst others, are talking

[27] Nick O'Malley and Nick Toscano, (2021), "What is the role of gas in a green economy?", *The Age*, January 18, p.12-13

[28] Australia is close to satellite measurement and verification technology.

[29] John Hewson (2021), "Emissions Verdict is Catastrophic", *The Age,* January 28, p.21

about introducing carbon tariffs on Australia's agricultural exports for as long as it remains a conspicuous laggard in response to climate.

Renewable Capacity (Wind, Solar, etc.)

There is good news here.

The *Australian Energy Market Operator* has forecast strong investment in renewables to continue with an additional 24GW of rooftop solar by 2030, tripling the nation's small-scale solar generating capacity over the decade. Official government data has found that, despite the coronavirus-induced economic downturn, more than two million extra Australian homes were powered by new renewable energy generation last year as wind and solar projects hit record levels.[30]

The *Clean Energy Regulator* in Australia estimates that a record 7 gigawatts of new renewable capacity was installed throughout Australia in 2020 off the back of record rooftop solar investment, which was 11 per cent above the previous record of 6.3 gigawatts installed in the previous year. Data compiled by the regulator also found the share of renewables in the *National Electricity Market* exceeded 30 per cent for the first time in 2020; with a record 53 terawatt hours generated from renewable projects in the year. The analysis found that the renewables boom has helped Australia deploy new renewable energy 10 times faster per capita than the global average and four times faster per capita than Europe, China, Japan or the United States.[31]

The government's policy is to underwrite new firm generation capacity and establish a $1 billion grid reliability fund; as the renewables boom was increasing the reliance on firm generation, such as gas-fired or pumped-hydro. Australia has invested $7.7 billion or $299 per person in renewable energy, placing the nation ahead of Canada, Germany, Japan, Korea, New Zealand, and the United States on a per capita basis.

Carbon Capture and Storage (CCS)

This is an unproven technology that is being pushed by the fossil-fuel industry as its 'saviour'. A case in point is the February 2021 amendment put forward by Australia's National party that wants access to government funds that would permit high-efficiency low-emissions coal (clean-coal) plants to be commissioned (see part one of this article).[32]

Carbon capture and storage describes capturing the carbon dioxide emitted by an industrial process – say, burning gas or coal for electricity or in cement and steel production – and permanently keeping it out of the atmosphere. For large projects, this generally means pumping it underground, typically into the geological formations from which oil and gas have been extracted in the first place.

CCS's champions – which include not only the Australian government and resources sector but the *International Energy Agency (IEA)* and even the UN's lead agency for assessing climate science, the *Intergovernmental Panel on Climate Change (IPCC)* – say the technology will be critical to meeting net zero emissions targets to slow the trajectory of global warming.[33]

[30] Rob Harris (2021), "Australia leading world with record renewable take-up, new data finds", Sydney Morning Herald, February 1. https://www.smh.com.au/politics/federal/australia-leading-world-with-record-renewable-take-up-new-data-finds-20210201-p56yfu.html

[31] Ibid.

[32] David Crowe and Mike Foley (2021), "Liberals fuming as Nats coal revolt gathers steam", *The Age*, February 18, p.18.
[33] Nick O'Malley (2021), "What is carbon capture and storage (and does it work)?", *The Age*, January 24, p. 24-25.

But its detractors – which include leading engineers and scientists along with climate activists – say that CCS is an unproven and expensive Band-Aid designed to extend the life of unnecessary, dirty industries. They say it is a diversion that has wasted billions of dollars that might have been better spent on reducing emissions.

In Australia, however, CCS technology was being referred to as "clean coal technology" in government and industry circles, much to the frustration of climate scientists. "Clean coal is like dry water. It's an oxymoron," says Dr Martin Rice, head of research for the *Climate Council*.

Recently, there has also been a surge of interest in what is known as *Bioenergy with Carbon Capture and Storage* (BECSS). This is the process of capturing emissions released when a biomass is used for energy. A Biomass is a measure of biological matter, customarily expressed in weight. The biomass of a forest includes all organisms, trees, fungi, insects, and so forth. When a biomass is growing in is sequestering carbon dioxide (CO_2). However, when it is used to produce energy (e.g., for electricity and heat) then it is releasing CO_2 to the atmosphere; thus, the result is a *zero-sum* (i.e. the CO_2 that was captured by the bio-mass when it was growing is released when the biomass is converted to energy).

However, the theory goes that if this energy can be somehow captured and stored it will result in *'negative emissions'*, i.e., CO_2 is prevented from being released to the atmosphere. BECCS is the process of extracting bioenergy from biomass and then capturing and storing the carbon that released in this process - thereby removing it from the atmosphere. In a BECCS process, some of the carbon in the biomass can be converted to CO_2 or biochar which can then be stored by geologic sequestration or land application.

Some advocates see this as the future of CSS. In 2014, the IPCC presented 116 models of how the world might reach the Paris Agreement's target of keeping climate change to 2 degrees or lower, and in 101 of them carbon removal from the atmosphere, mainly via BECSS, was considered. This provoked criticism from a range of scientists who argued that the world, via the IPCC, was at risk of putting its hopes of avoiding the global calamity of climate change in a technology that was at best unproven and at worst fanciful.[34]

Electric Vehicles

Electric Vehicles are undisputedly more climate friendly than conventional petrol or diesel cars.[35]

Just a month after he took office, President Joe Biden ordered a complete policy U-turn for the USA in terms of climate action. As a centrepiece of the US's commitment to hit net-zero emissions by 2050, he pledged to convert the US federal government's fleet of 650,000 vehicles to electric cars. This bold policy was a catalyst for General Motors which immediately announced that it would stop making petrol commuter vehicles by 2035 and is now rolling out big-budget advertisements claiming that its commitment to reach net-zero emissions by 2040 can jumpstart the country's beleaguered auto industry.[36]

President Biden's electric vehicle transition, estimated to cost around $20 billion, is backed with market-driving policies including tightened fuel efficiency rules for cars, extending the $10,000

[34] Ibid.

[35] Janek Ratnatunga (2020), "Electric Blues: Cost-Benefit of Taxing Electric Car Usage", *On Target,* December 17, https://cmaaustralia.edu.au/ontarget/electric-blues-cost-benefit-of-taxing-electric-car-usage/

[36] Reuters (2021), "General Motors announces plan for all-electric lineup by 2035", *The Guardian*, January 29, https://www.theguardian.com/environment/2021/jan/28/gm-electric-vehicles-cars-gas-diesel

rebate for electric vehicle buyers, and funding the roll-out of 500,000 charging stations across the country. The President has also launched a $2 trillion green stimulus fund, which will include funding for electric vehicle manufacturing, which he claims will generate one million new jobs across the automotive supply chain.

The contrast with Australia in electric vehicle policy could not be starker. The Australian government released in early February 2021 its long-awaited electric vehicle strategy, which unlike other developed nations included no targets for market share, and no incentives to drive uptake. The Australian government has ruled out offering taxpayer subsidies for the private uptake of plug-in hybrids and battery electric cars, arguing in its long-awaited strategy that subsidies would not represent value for money in efforts to drive down carbon emissions. Instead, Australian businesses were encouraged to invest in plug-in hybrid and electric car fleets in an attempt to increase private uptake by flooding the second-hand market with new vehicle technologies at lower prices.[37]

Hydrogen Export Supply Chain

An international race is on to be the first nation to develop a hydrogen export supply chain. The fuel source is viewed as a potential boom commodity if it is adopted as a zero-emissions replacement for petroleum products. Australia, with its abundant land and sunshine, can become a hydrogen superpower, and the Morrison government has committed $500 million to support the hydrogen industry.

But Australia's investment to date pales in comparison to other nations. Saudi Arabia, the world's biggest oil exporter, is investing $6.5 billion in the hydrogen industry to drive down production costs and make exports economically viable. Other heavy fuel users in Japan, France, Spain, and Germany are planning to invest more than $10 billion each in production and to switch from fossil fuel energy generation to hydrogen.[38]

At present hydrogen can be generated at scale using either renewable energy to split water, known as *green hydrogen*, or using gas, which emits carbon that may in future be captured and stored, known as *blue hydrogen*. The problem is that future exporters of hydrogen would then have the problem of transporting and shipping this hydrogen which needs to be stored under pressure or converted into ammonia.

Interestingly, the world's first commercially available line of hydrogen-powered domestic products, including a barbecue, a bicycle and most crucially a unit that creates and stores hydrogen power, has been developed by an Australian company, LAVO, working with the University of NSW. The company claims that the LAVO battery, which is about the size of a large fridge, can be hooked up to an existing array of solar panels. Inside it, electrolysers use that power to convert water into hydrogen and oxygen. The oxygen is vented and the hydrogen is stored in patented *hydride* canisters (a fibrous metal alloy not dissimilar to iron-filings in appearance) in inside the unit for use as needed.

LAVO's chief executive, Alan Yu, claims that the unit can store three times as much power as the largest popular commercially available wall-mounted batteries, allowing it to power the average household for two to three days on a single charge. Also, the developers claim that the transportation problem could be solved by the hydride used in the LAVO system, which is safer and easier to transport than hydrogen stored under pressure or converted into ammonia.[39]

[37] Rob Harris (2021), "Morrison government rules out subsidies in electric vehicle strategy", *Sydney Morning Herald*, February 5. https://www.smh.com.au/politics/federal/morrison-government-rules-out-subsidies-in-electric-vehicle-strategy-20210204-p56zju.html

[38] Mike Foley (2021), "Almost alone: Australia isolated on climate despite PM's ambitions, *Sydney Morning Herald,* February 7. https://www.smh.com.au/politics/federal/almost-alone-australia-isolated-on-climate-despite-pm-s-ambitions-20210205-p56zu6.html

[39] Nick O'Malley (2021), "Hydrogen battery powers household on single charge", *The Age,* January 21, p. 14

Listen to the Scientists and the Economists

The Covid-19 pandemic taught policy makers in Australia some important lessons in meeting its climate challenge. Australian federal and state leaders put aside ideology and listened to the scientists and the economists. Australia's conservative leaning government instituted policies that did not come to it naturally – rules that impeded personal freedom and the dumping of billions of dollars of taxpayer money into the economy to prop it up, as business activity withered on the vine.[40]

The number one lesson is to listen to the science. For the pandemic that meant trusting in the expert modelling to set targets for when restrictions could ease. Decisions were based on evidence and data, not focus groups or guestimates of what was politically palatable. And it worked – Australia was one of the few countries in the world that successfully contained a sizeable outbreak. Australian leaders can be proud of that achievement, and with the same strategy it can win that war against global warning by heeding the scientific advice to guide policy. Recently a new report from some of Australia's most senior climate scientists and policymakers showed that to be on track to meet the 1.5-degree objective of the Paris Agreement, Australia should cut emissions by 74 per cent by 2030.

The second lesson learnt from Australia's COVID-19 response is the compounding costs of delay. "Go hard, go early" has become the mantra for both stopping the spread and stimulating the economy. The 'circuit breaker' lockdown in different states was this theory put into practice. Unfortunately, climate change is a very different crisis and the world has already squandered decades so we can hardly say acting now is 'early'. However, it is still not too late if we go hard today.

Wilfully ignoring the issue or tinkering about with half-measures only leaves a much bigger problem to deal with later. The danger with climate change is we are fast approaching tipping points where global warming becomes an unstoppable chain reaction. As such, what is required is the political conviction to act decisively during the next decade, and that means forward-loading the emissions cuts with strong targets for 2025 and 2030.

Herein lies a solution to the climate impasse in the Australian Federal Parliament. As discussed in part one of this series, while a credible national mechanism to cut pollution is the logical choice, a small but influential rump of the Australian federal government's right wing has thwarted progress for too long, and even the PM Morrison's much-hyped climate pivot looks more like a delaying tactic.[41]

Summary

The reality is that if Australia is to have any chance of reaching the tighter objective of the Paris Agreement, and upon which its Pacific island neighbours rely for their survival, namely, to limit global warming to 1.5 degrees, then it must get to net zero emissions by 2035, with a 74 per cent cut by 2030.[42]

[40] Jacqueline Maley, (2020), "Not so splendid Isolation", *Sunday Age* December 13, p.35

[41] Jono La Nauze (2021), "Pandemic Lessons can drive Climate Action", *The Sunday Age*, Opinion, 14th February, p.25.

[42] Adam Morton (2021), "Australia needs to cut emissions by at least 50% by 2030 to meet Paris goals, experts say", *The Guardian,* January 28, https://www.theguardian.com/australia-news/2021/jan/28/australia-needs-to-cut-emissions-by-at-least-50-by-2030-to-meet-paris-goals-experts-say

The problem is, each month the world fails to take significant action, carbon accumulates in the atmosphere. The goal of reaching net-zero by 2050 gave us a good chance of meeting the Paris Agreement target of holding warming to as far under two degrees as possible when it was first set in 2015. But since the world has not reduced emissions enough since then, the goal posts have shifted closer.

The global response to the coronavirus pandemic has shown us that we can all work together to radically and quickly change our lifestyles for the greater good. We need to consider how we can prepare for a world that will be faced with regular extreme weather, unpredictable water and power supplies, food shortages and the resulting unrest that will come with these.

We need to face our worst fears and then work through them starting, well, yesterday.
Create community, build skill bases, buy water tanks and solar panels with batteries, grow a garden, future-proof your house if you have one, demand more action from governments and encourage others with compassion and determination.[43]

Basically, we need to be good be stewards of our collective future … and the only way we can do this is together.

[43] Nicola Philp (2021), "Climate is Ripe for us to change", *The Age*, January 28, p.21.