

Problems on the path to net zero

Australian Projections provides actuarial advice on issues of national policy, such as aged care, education, energy and climate. This note tries to help Australians and their politicians contribute to climate policies. Please contact Dr Richard Cumpston on 0433 170 276 or richard.cumpston@gmail.com with any questions.

Summary

There is almost no information available on the regional consequences of Australia's climate policies. This may reduce trust in the present government, and increase the numbers of climate-conscious candidates at the next election.

Treasury, and the Climate Change Authority, are separately developing models of the socioeconomic consequences of possible emission pathways. This note suggests ways to make these models useful to persons making decisions about their futures.

Australia has national emission reduction targets, in the Climate Change Act 2022. It also has targets for Safeguard emissions, in the National Greenhouse and Energy Reporting Act 2007. Annual changes to Safeguard rules, based on recent data, are likely to be more effective than infrequent changes. Safeguard rules may need to control emission volumes, not intensities.

Some Safeguard facilities may be under-stating their emissions. If so, these facilities are gaining unfair advantages, and Australia is under-stating its emissions. It is concerning that open cut coal mines are reporting emission intensities less than one-tenth of those reported by underground mines. Better measurement procedures may be needed, and stronger audits.

Safeguard facilities using Australian carbon credit units (ACCUs) to offset more than 30% of their baseline emissions have to give a written explanation of why more abatement was not undertaken. This weak provision may result in heavy use of ACCUs, particularly by fossil fuel producers. No study has yet been made of Australia's realisable sequestration potential.

Any use of ACCUs to offset methane emissions will result in many years of global warming before the offsetting cooling occurs. Methods to abate methane emissions, or to offset them with methane reductions elsewhere, are needed.

Safeguard emissions in 2021 were only about 28% of Australia's national emissions. Little is yet available on the Australian government's plans to eliminate the remaining 72%.

1. Information on the regional consequences of climate change policies

1.1 Political support for regional modelling

In the Senate Environment and Communication Legislation Committee's report on the Climate Change Bill 2022, Coalition senators did not support the bill. One reason for this was that the consultation process failed to properly account for rural and regional

perspectives. National senators also did not support the bill, noting evidence that action on climate change would disproportionately affect certain groups, industries and regions.

In debate on the Safeguard Mechanism (Crediting) Amendment Bill 2023 on 29 March, Liberal Senator Duniam said

“...there are entities, individuals, businesses, households and communities who all have concerns about what this could mean.”

1.2 Potential value of Annual Climate Change Statements

Section 12 of the Climate Change Act 2022 requires the Minister to prepare an annual climate change statement that relates to

- (a) the progress made during the year towards achieving Australia’s greenhouse gas emissions reductions targets; and*
- (b) international developments during the year that are relevant to addressing climate change; and*
- (c) climate change policy; and*
- (d) the effectiveness of the Commonwealth’s climate change policies in contributing to the achievement of Australia’s greenhouse gas emissions reduction targets and reducing emissions in the sectors covered by those policies and in particular whether safeguard emissions and net safeguard emissions are declining consistently with the safeguard outcomes; and*
- (e) the impact of the Commonwealth’s climate change policies to achieve Australia’s greenhouse gas emissions reduction targets on rural and regional Australia, including the social, employment and economic benefits being delivered by those policies in rural and regional Australia; and*
- (f) risks to Australia from climate change impacts, such as those relating to Australia’s environment, biodiversity, health, infrastructure, agriculture, investment, economy or national security.*

Information under (e), on the future impacts of climate change policies on rural and regional Australia, could be of great value to persons and businesses in those regions.

1.3 Limited value of Annual Climate Change Statement 2022

The Annual Climate Change Statement 2022 contained state and territory details of rooftop solar installations, ACCUs, ARENA grants, net zero commitments, emission reduction targets and renewable energy targets. The limited value of the statement for rural and regional Australia may reflect the very limited time available for its completion.

Public consultation by the Climate Change Authority on the 2023 statement, as required under 14(3A) of the Act, started on 18 May, and is due end on 30 June.

1.4 Confidential modelling of onsite abatement instead of offsets

From evidence to a Senate committee hearing on 28 February 2023, Treasury and DCCEEW jointly analysed the likely use by Safeguard facilities of onsite abatement instead of domestic offsets, and the effects on the ACCU market. That analysis was not available to

the Senate, as it fed into cabinet deliberations, and was covered by cabinet-in-confidence (Senate Hansard SECLC p44). In a subsequent letter to the chair of the Committee, seeking public interest immunity, the Minister for Climate Change and Energy said:

“Disclosure of the safeguard mechanism modelling would not be in the public interest because disclosure would reveal the deliberations of Cabinet. It is a long held and accepted principle that deliberations of Cabinet be appropriately protected in order to ensure that decisions can be discussed in an open manner preserving Cabinet unity.”

We hope that Cabinet receives good advice before making decisions. It should be possible to make public the data and analyses underlying those decisions. This would avoid members of parliament having to vote blindly on proposed legislation, and help the public make well-informed decisions in response to changes.

1.5 Confidential modelling of ACCU demand

The Minister also said:

“In addition, disclosure of the safeguard mechanism modelling would not be in the public interest due to market sensitivities relating to the Government’s role as a purchaser of ACCUs.”

This is garbage. 15 auctions to purchase ACCUs have been held from April 2015 to March 2023, with purchase prices ranging from \$10.23 to \$17.35 (CER 2022). In August 2022 the CER said

“Regular and accurate information about the supply of ACCUs can facilitate the establishment of the market, including in relation to price discovery.”

By withholding its projections of ACCU demand, the Commonwealth may be buying ACCU commitments at much less than the initial legislated price cap of \$75, providing useful future revenue.

1.6 Potential loss of support for government

The two most recent Lowy Institute polls showed that 60% of Australians consider that global warming is a serious and pressing problem (2022, p27). The government’s refusal to provide details of the impacts of its climate policies may reflect the continuing development of those policies. The lack of any existing modelling capability may also have been a factor. But continuing failure to provide detailed projections may reduce trust in the present government, and increase numbers of climate-conscious candidates at the next election. Well-informed voters are needed for effective democracy.

2. Proposed modelling by Treasury and Climate Change Authority

2.1 Proposed Treasury modelling of impacts of transition to net zero

At the Senate committee hearing on 28 February 2023, the Deputy Secretary of DCCEEW said (p47)

“...jointly with Treasury, over time, we will be ... rebuilding the capacity within Treasury to do the kind of modelling that will take into account all the policies that will serve to reduce Australia’s emissions to meet the 43 per cent and then on to the net zero target by 2050.”

We have been told by DCEEW that Treasury are now responsible for this modelling. We have asked the Treasurer about the nature of the proposed modelling.

2.2 Proposed Climate Change Authority modelling of emission reduction pathways

In its issues paper of May 2023, the Authority said

“In making its recommendations, the authority will examine the economic impacts of different emission reduction pathways for Australia. This includes ... analysis of socio-economic impacts at a sectoral and regional level...”

The Authority is in the process of planning the modelling exercise and has engaged the CSIRO and EY Port Jackson Partners to assist.”

2.3 Ways to make Treasury and CCA models useful to regional residents

We suggest that

- Models be updated annually, so that overall results can be included in the Annual Climate Change Statement, and personal decisions can be based on up-to-date projections
- Projections for different scenarios be available for a large number of separate areas (for example the 107 ABS level 4 statistical areas, the 151 House of Representative electorates, or the 566 local government areas)
- Users should be able to select the scenarios and areas of interest to them, and receive the results electronically
- No charge should be made for results, or for descriptions of scenarios, assumptions and methodology
- Scenarios should include current government policies, and policy variations that may be needed to help meet national targets
- Descriptions of results, scenarios, assumptions and methodology should be clear enough to allow the results to be independently reproduced and peer reviewed
- Ownership of the model should rest with the Commonwealth, not an external consultancy.

The Australian Energy Market Operator’s Integrated System Plan, published each two years, provides a good example of the detailed, objective projections that are needed for climate change policies.

3. Achieving Australia’s emission reduction targets

3.1 Emission reduction targets under the Climate Change Act 2022

Section 10 requires that net greenhouse gas emissions be 43% below 2005 levels by 2030, and be net zero by 2050. There is also an emissions budget covering the period 2021-2030 - we have asked DCCEEW about this budget.

3.2 Safeguard outcomes under the National Greenhouse and Energy Reporting Act 2007

Subsection 3(2) requires each of the following Safeguard outcomes to be achieved:

- (a) *net covered emissions of greenhouse gases from the operations of a designated large facility do not exceed the baseline applicable to the facility*
- (b) *total net safeguard emission for all the financial years between 1 July 2020 and 30 June 2030 do not exceed a total of 1,233 million tonnes of carbon dioxide equivalence*
- (c) *net safeguard emissions decline to:*
 - (i) *no more than 100 million tonnes of carbon dioxide equivalence for the financial year beginning on 1 July 2029; and*
 - (ii) *zero for any financial year to begin after 30 June 2049;*
- (d) *the 5-year rolling average safeguard emissions for each financial year that begins after 30 June 2024 are lower than the past 5-year rolling average for that financial year;*
- (e) *the responsible emitter for each designated large emitter has a material incentive to invest in reducing covered emission from the operation of the facility;*
- (f) *the competitiveness of trade-exposed industries is appropriately supported as Australian and its regions seize the opportunities of a move to a global net zero economy.*

3.3 ALP target for the proportion of electricity energy from renewable sources

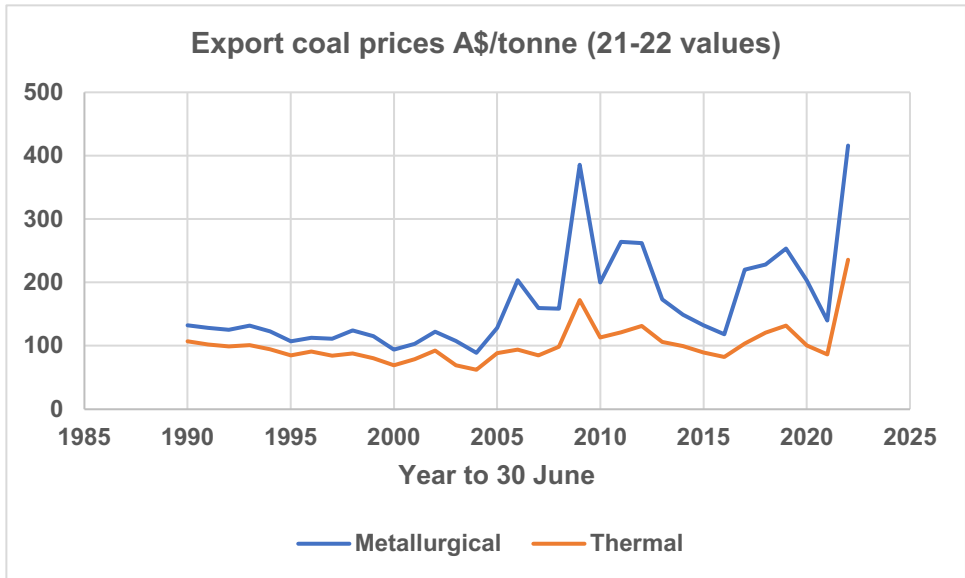
The ALP's "Powering Australia" quoted RepuTex's modelling that the policy would increase the share of renewables in the National Electricity Market to 82% by 2030 (p4). The National Electricity Market currently excludes Western Australia and the Northern Territory. We suspect that "share of renewables" means the proportion of electricity energy supplied from renewable sources, but are seeking confirmation of this from DCCEEW.

3.4 Annual adjustments, based on the most recent data

When trying to meet targets in a system subject to random variations, frequent control variations based on recent data are likely to give smaller variations from targets than large infrequent changes. The Safeguard rules assume a baseline decline rate of 4.9% each year to 2030, with decline rates for 2030-31 to 2034-35 being set by 1 July 2027 (DCCEEW May 2023 p1). These infrequent changes and long notice periods are likely to prove unworkable. Under 14(1A)(b) of the Climate Change Act 2022, the Climate Change Authority is required to report each year whether any changes to the Safeguard rules are required to meet the Safeguard outcomes.

3.5 Using emission amounts rather than emission intensities

From 2023-24 on, all Safeguard facilities will be on production-adjusted baselines (DCCEEW May 2023 p2). Facilities can thus adjust their production to take advantage of high prices, without affecting their Safeguard emission intensity requirements. The following chart shows how unstable export prices for metallurgical and thermal coal have been (DISR 2023). It may be desirable to change the Safeguard rules to use emission amounts rather than emission intensities.



4. Possible understatement of emissions by Safeguard facilities

4.1 Suggestions that facilities are understating emissions

DCCEEW’s August 2022 and January 2023 consultation papers, and its May 2023 paper on the Safeguard reforms, have ignored potential emission understatements by Safeguard facilities. This is despite substantial evidence that some coal and gas producers are understating their emissions, particularly of methane. The International Energy Agency (2022) has estimated that methane emissions from the energy sector are about 70% higher than reported in official data. Assan (2022) suggests potential actions to reduce Australian coal mine methane leaks.

4.2 Emission measurement methods for Safeguard facilities, and audits

The Clean Energy Regulator is responsible for specifying emission measurement methods, and for ensuring that emission reports are audited. It is possible that acceptable measurement methods have not kept pace with technical advances, and that some auditors are relying on outdated rules of thumb, rather than direct measurements. We are seeking details of the measurement and audit methods currently in use.

4.3 Reasons for large differences in emission intensities reported by coal mines

Ker (2023) noted large differences in reported emission intensities for seven Australian coal mines, ranging from 0.007 to 0.626 tonnes of CO₂ equivalents per tonne of coal. We are seeking details of the reasons why emission intensities could be expected to vary across different coal basins and coal uses.

4.4 Reasons for emission intensity differences between underground and open cut coal mines

From fugitive emissions data (DCCEEW 2022) and coal production (DSIR 2023) we estimate the average emission intensity for underground coal mines in 2020-21 as 0.212 tonnes of CO2 equivalent per tonne of coal, and that for open cut mines as 0.0205, a ratio of 10.3.

We are concerned that underground coal mines in aggregate report much higher emission intensities than open cut mines. Are underground coal mines not using available methane abatement techniques (CSIRO 2022)? Are open cut mines not reporting emissions occurring during site clearances?

4.5 Consequences of emission reporting errors

Facilities under-stating their emissions will gain an unfair advantage under the Safeguard system. If there is systematic under-stating, then Australia will be under-stating its total emissions, and probably also its methane emissions. If better measurements confirm past under-statements, then corrected figures will need to be used to measure the achievement of national targets,

5. Limits on use and supply of ACCUs

5.1 Facilities using ACCUs to offset more than 30% of their baseline emissions

Under 72C(4) of the Safeguard rules, facilities using Australian carbon credit units to offset more than 30% of their baseline emissions have to give a written explanation of why more abatement was not undertaken. This weak provision may result in heavy use of ACCUs, particularly by fossil fuel producers.

5.2 Australia's unknown realisable carbon sequestration potential

CSIRO's November 2022 report for the Climate Change Authority recommended that a study be made of Australia's realisable sequestration potential. They estimated that such a study might require investment of the order of \$3-5m over 18-24 months. From enquiries to CSIRO and the Climate Change Authority, we have not been able to find if any such study has been started.

6. ACCUs should not be used to offset methane emissions

6.1 Lifetimes and global warming potentials of different gases

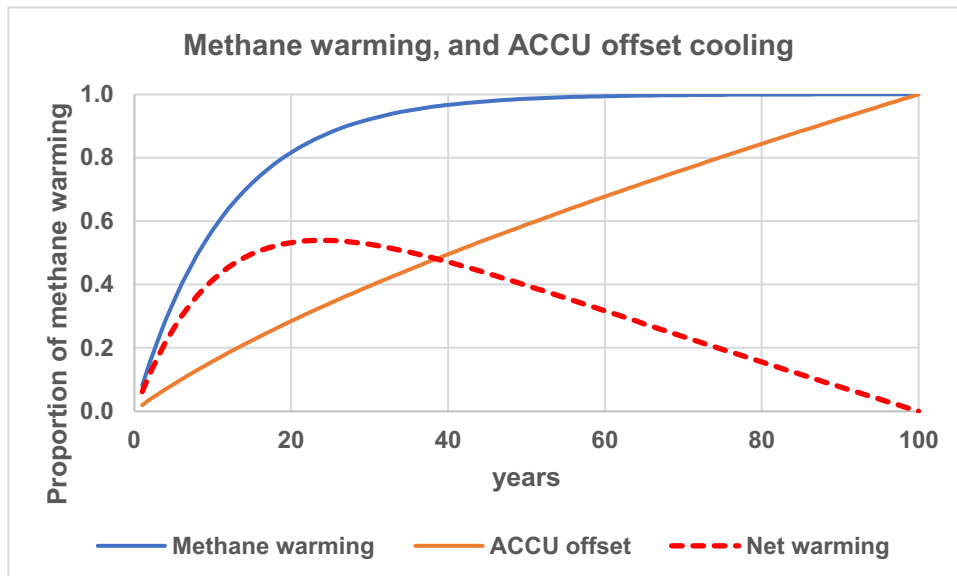
| Gas | Lifetime (years) | GWP over 20 year | GWP over 100 years | GWP20/GWP100 |
|------------------|------------------|------------------|--------------------|--------------|
| Carbon dioxide | Multiple | 1.0 | 1.0 | 1.0 |
| Methane - fossil | 11.8 | 82.5 | 29.8 | 2.8 |
| Nitrous oxide | 109 | 273 | 273 | 1.0 |
| HFC-134a | 14 | 4144 | 1526 | 2.7 |

The above estimates of lifetimes and global warming potentials are from the International Panel on Climate Change (2021, p1017). The lifetime of carbon dioxide in the atmosphere

is shown as “multiple” because some of it disappears quickly, some slowly, and about 22% remains permanently in the atmosphere (IPCC 2007, p213).

20-year global warming potentials (GWPs) are estimates of the amount of atmospheric warming provided by a gas in the first 20 years since its emission, relative to carbon dioxide. A gas with a short lifetime in the atmosphere, such as methane, will have a much higher 20-year GWP than its 100-year GWP. Nitrous oxide, with a 109-year lifetime, has equal 20-year and 100-year GWPs.

6.2 Net warming for about 24 years for methane emission offset by ACCU



We estimated the cumulative amount of methane warming from a single emission from the 11.8 years lifetime estimated by the IPCC (2021, p1017), and the cumulative amount of cooling from an ACCU from a CO2 decay curve (IPCC 2007 p213). We scaled the ACCU cooling to make it equal to the methane warming after 100 years. The net warming, estimated by subtracting the cooling from the warming, peaked at about 24 years, then gradually declined to zero at 100 years.

There are considerable uncertainties in the IPCC’s estimates of lifetimes and decay curves, but it is clear there will be decades of delay before ACCU offsets usefully reduce the warming resulting from a methane emission. We recommend that ACCUs not be used to offset methane emissions.

6.3 Safeguard Mechanism Methane Credits?

In his foreword to the December 2022 report of the Independent Review of Australian Carbon Credit Units, Professor Ian Chubb said:

“Methane and nitrous oxide are both many times more potent than CO2 as a heat-trapping gas, although much lower in atmospheric concentration compared with CO2. Their removal from the atmosphere would likely have a significant impact on slowing temperature rise, in both cases, however, drawdown is not yet feasible. Until suitable technology is available, avoiding emissions of methane and nitrous oxide is the only way to limit their impact.”

One partial solution to the methane problem for Safeguard facilities might be Safeguard Mechanism Methane Credits, created by facilities falling below methane baselines, and used only for offsetting methane emissions.

Abbreviations

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|--------|---|
| ACCU | Australian carbon credit unit |
| AEMO | Australian Energy Market Operator |
| ALP | Australian Labor Party |
| ARENA | Australian Renewable Energy Agency |
| CCA | Climate Change Authority |
| CER | Clean Energy Regulator |
| DCCEEW | Department of Climate Change, Energy, the Environment and Water |
| DISR | Department of Industry, Science and Resources |
| IPCC | International Panel on Climate Change |
| SECLC | Senate Environment and Communications Legislation Committee |

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