

Modelling emission reduction pathways

Australian Projections provides actuarial advice on issues of national policy, such as aged care, education, energy and climate. We are trying to help Australians and their politicians contribute to climate policies. This submission to the Climate Change Authority is in response to their consultation paper of August 2023. Please contact Dr Richard Cumpston on 0433 170 276 or richard.cumpston@gmail.com with any questions.

Summary

Rapid changes in Australia's emission targets and legislation have broadened the types of economic modelling needed to plan emission reduction pathways.

A microsimulation model should be created for each Safeguard facility, reflecting its resources, profitability and abatement costs. This would help project the behaviour of the facility under different legislative and economic assumptions.

Climate change projections should be used to model the growth or decline of regional industries. Higher temperatures are likely to reduce irrigation water flows, and reduce tourism. Australia's realisable carbon sequestration capability may be affected.

Residents in affected regions should be given the results of Safeguard and climate modelling for their region, and the underlying assumptions. This will require relaxation of the privacy rules restricting publication of Safeguard data.

This modelling and publication should help the Authority meet its statutory roles.

1. Rapid changes in Australia's emission targets and legislation

1.1 The ALP's "Powering Australia" plan

On 3 December 2021 the ALP released "Powering Australia". This plan was intended to reduce emissions by 43% by 2030, keeping Australia on track for net zero by 2050.

Facilities already covered by the Safeguard Mechanism were to have emission baselines gradually reduced over time:

"Labor will ask the Department of Industry and the Clean Energy Regulator to determine revised baselines for each facility in close consultation with industry. They will carefully consider the available and emerging technologies for each sector."

Noting unsuccessful attempts by the Coalition Government to abolish the Climate Change Authority, "Powering Australia" said

"Labor will improve integrity around climate change by restoring the role of the Climate Change Authority and incorporating an annual statement into Parliamentary processes."

1.2 Australia's enhanced nationally determined contribution

Following the ALP's election win on 21 May 2022, on 16 June 2022 Albanese and Bowen advised UNFCCC that

"Our new ambitious target to reduce greenhouse gas emission by 43 per cent below 2005 will put Australia on track to achieve net zero emissions by 2050. We are moving to enshrine these targets in legislation.

Our updated target is a 15 percentage point increase on Australia's previous 2030 target."

1.3 Climate Change Bill 2022

On 28 July 2022 the Senate referred the Climate Change Bill 2022 and the Climate Change (Consequential Amendments) Bill 2022 to the Environment and Communication Legislation Committee. In their August 2022 report, the committee recommended that the Senate pass the bills.

In a dissenting report, Coalition Senators said:

"Coalition Senators believe that this Bill will have unacceptable social impact. Specific communities could be disproportionately affected."

A dissenting report by National Senators said:

"The Nationals welcome evidence to the Inquiry that finally recognise that action on climate change will disproportionately impact certain groups, industries and regions."

The Climate Change Act 2022 commenced on 14 September 2022. It included some important amendments, strengthening the roles of the Authority. These roles are discussed in our submission of 7 July 2023 to the Authority, titled "Roles and models for the Climate Change Authority".

1.4 Major changes to the NGER (Safeguard Mechanism) Rule 2015

A DCCEEW consultation paper (August 2022) noted that the Safeguard Mechanism had not been effective in reducing emissions. Following extensive consultation with industry and the public, major changes to the Safeguard Mechanism commenced on 1 July 2023. If the new Safeguard objectives are not being achieved, the Authority is required to advise on any amendments needed to Safeguard rules.

2. A microsimulation model for each Safeguard facility

The new Safeguard Mechanism relies on facilities abating their emissions, or buying offsets for emissions above their baselines. It should be feasible to create a separate simulation model for each Safeguard facility, taking into account their different resources and abatement opportunities. As proposed by Orcutt (1957), simulations should be done at short intervals, say quarterly.

Such simulations could help evaluate proposed changes to Safeguard rules, such as a limit on the proportion of emissions that can be offset. They could also show the likely effects of economic changes, such as commodity price changes.

Initial versions of the simulations could be done in spreadsheets. As better data become available, macros could be added, or a programming language used.

3. Effects of climate change on each small region

The Authority proposes using CSIRO's Land Use Trade-Offs (LUTO) model, a spatially explicit partial equilibrium model of Australian land uses. The model works on a grid cell resolution of 0.01 degrees (about 1.1km) and an annual time step from 2013-2050.

As illustrated in the Australian Government's Intergenerational Report (2023 p97), climate change projections are available for Australian regions under different global climate scenarios. These should be used to model the growth or decline of regional industries. Projected crop yields are shown to increase initially, then decline (p102), but these projections do not take into account the effects of higher evaporation rates. Higher temperatures are likely to reduce irrigation water flows, and reduce tourism. Continuing coal mining may also reduce water for other uses.

Climate changes may affect Australia's realisable carbon sequestration potential, and limit available offsets. CSIRO's 2022 report did not consider realisable sequestration potential, which is anticipated to be considerably lower than economic sequestration (p14 of executive summary). The report suggested an approach to uncovering the realisable sequestration potential, but we understand this approach has not yet been adopted.

4. Informing residents of affected regions

The concerns of Coalition and National Senators about the disproportionate impact of the Climate Change Bill 2022 on specific communities, industries and regions are noted in 1.3. 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."

There are strong needs for annual projections of the effects of climate change, Safeguard and other emission reduction measures on each small region. Given the importance of jobs, these regions need to roughly correspond to labour markets.

For credibility, these projections need to be supported by published documentation of the assumptions and methodology. To allow independent verification, all the data should be publicly available. Safeguard facilities are very large emitters, and should not be protected by normal privacy rules.

5. Recommending changes to Safeguard rules to achieve Safeguard outcomes

The Authority's many statutory roles were discussed in our submission of 7 July 2023, titled "Roles and models for the Climate Change Authority". In particular, section 14(1A) of the Climate Change Act 2022 requires the Authority to advise if Safeguard emissions are

declining consistently with the legislated Safeguard outcomes, and to advise on legislative amendments needed to achieve compliance. The microsimulation models here proposed for each Safeguard facility should help do this, and should help inform regional residents.

Abbreviations

ALP	Australian Labor Party
CCA	Climate Change Authority
CER	Clean Energy Regulator
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCCEEW	Department of Climate Change, Energy, the Environment and Water
NGER	National Greenhouse and Energy Reporting
UNFCCC	United Nations Framework Convention on Climate Change

References

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Australian Government (2023) *Intergenerational Report* <https://treasury.gov.au/publication/2023-intergenerational-report> (accessed 1 September 2023)

CCA (August 2023) *Economic modelling of potential Australian emissions reduction pathways* <https://consult.climatechangeauthority.gov.au/economic-modelling> (accessed 29 August 2023)

CSIRO (November 2022) *Australia's carbon sequestration potential* <https://www.csiro.au/en/research/environmental-impacts/emissions/carbon-sequestration-potential> (accessed 29 August 2023)

DCCEEW (August 2022) *Safeguard Mechanism reforms: Consultation paper* <https://consult.industry.gov.au/safeguard-mechanism-reform-consultation-paper> (accessed 22 August 2022)

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Orcutt GH (1957) *A new type of socio-economic system*. Review of Economic and Statistics, 39(2) 116-123 (available from <https://www.microsimulation.pub/articles/00002>)