MACDOCH AUSTRALIA

SUMMARY PAPER

Agriculture's role in Australia's emissions-reduction gap

The Australian Government has committed to a legislated reduction in Australia's greenhouse gas emissions of 43% by 2030 and the achievement of net zero by 2050.[1]

This commitment is in response to the unprecedented scale of effort required to absorb the carbon dioxide needed to stay within the Paris Agreement temperature limit of 1.5C above pre-industrial temperatures.

Looking to the first reduction target horizon at the end of this decade, the current official baseline projection of emissions to 2030 sees an emissions reduction shortfall of 69 million tonnes in that year.[2]

KEY POINTS:

Australian agriculture can be a significant part of Australia's climate solution.

If just the best 10% of Australia's grazing land was harnessed for soil carbon sequestration at 1 tonne of soil carbon gain per hectare per year, it could abate more than 20% of Australia's total emissions.

The Nature Conservancy believes nature-based offsets or credits could neutralise up to 30% of CO_2 emissions required by 2030 to limit warming to 1.5 degrees.

As yet, much of the technology needed to deal with emissions in hard-to-abate sectors such as aviation and mining does not exist. However, agriculture can make a significant contribution to offsetting these sectors' emissions through on-farm sequestration.

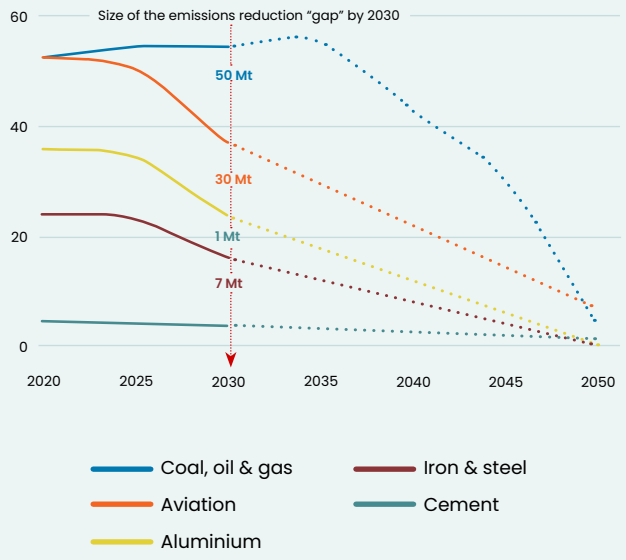
Hard to abate sectors

The anticipated shortfall stems from a combination of the government's ambitious 2030 target and the challenges posed by hard-to-abate sectors such as aviation, transport, mining, and mineral processing. These industries present a greater hurdle to emissions reduction as mitigation solutions are developed.[3]

It is also currently estimated that meeting the 82% renewable electricity target by 2030 will require a doubling of the current rate of deployment of large-scale renewable generation capacity (wind and solar), starting in 2024.[4]

While the technology to address these challenges is yet to be developed, there is an immediate need to address the predicted shortfalls. This is expected to significantly increase the demand for Australian Carbon Credit Units (ACCUs).

Projections of hard to abate sector trajectories to 2030 and 2050 (Mt CO_2e)



Rising demand for ACCUs

High integrity carbon markets will therefore be essential to Australia achieving its net zero target.

At a global scale, the call for offsets as part of the climate response could see a 100-fold increase in demand for voluntary offsets (representing 13 billion tonnes per annum) beyond 2050.[5]

ACCUs in Australia

Estimates of the capacity of ACCU projects to generate ACCUs up to 2050 vary enormously. Data compiled by the Carbon Market Institute indicate a range between 13 and 700 million ACCUs per annum.[6]

The large variation highlights the difficulty of convincingly modelling future ACCU price and demand dynamics.

A Climate Change Authority modelling review for the period between 2023 and 2035 suggests that, under a moderate emissions scenario, an aggregate of 440 million ACCUs could be issued in this period.[7]

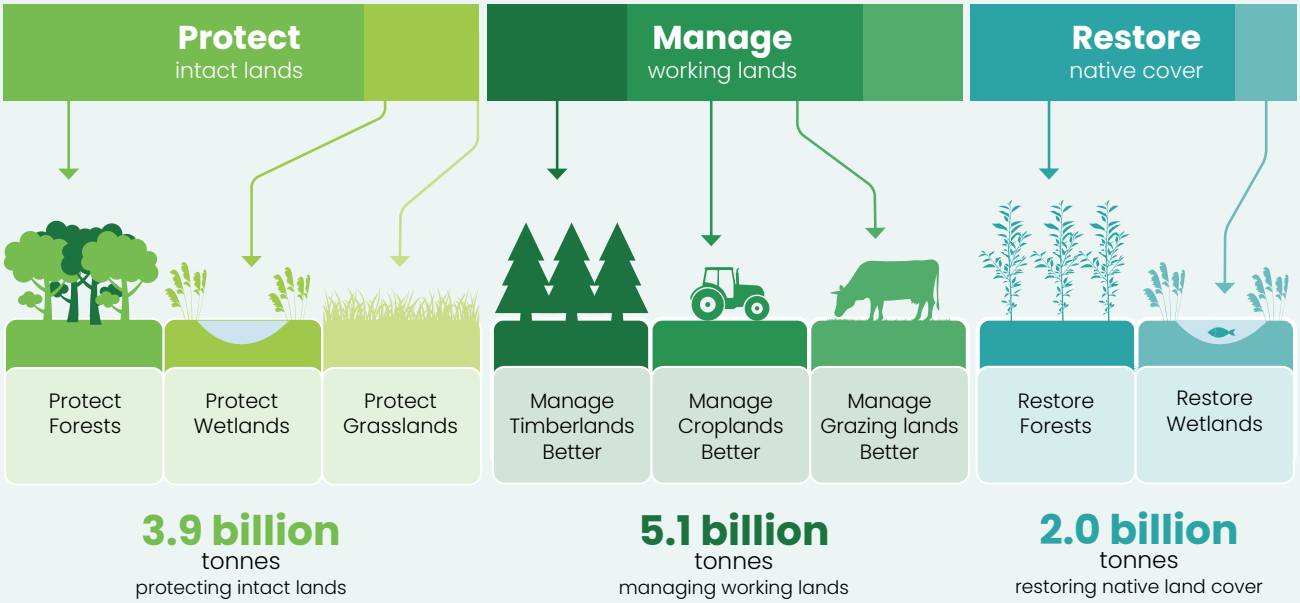
Reasons for uncertain ACCU supply estimates

Some of the uncertainty in ACCU supply derives from the inherent risks in carbon credit systems and markets generally. Sovereign risk involves unpredicted changes in legislative or regulatory rules applying to ACCU generation. The other factor is uncertainty around the way carbon projects are assessed and audited under the various methods administered by the Clean Energy Regulator.

Nature-based CO_2 removals

According to The Nature Conservancy, nature-based CO_2 removals dominate the global climate response to reach net zero. Such offsets or credits could neutralise up to 30% of CO_2 emissions required by 2030 to limit warming to 1.5 degrees.[8]

Role of nature-based mitigation and removals in stabilising climate



The opportunity for agriculture

Approximately 38% of the world's landmass, some five billion hectares, is used for agriculture.[9] Of this, around one third is cropland and two thirds is used for livestock grazing.

In Australia that number is even higher – 55% of the landmass. Some 426 million hectares is farmland[10] and of this around 87% is grazing land.[11]

Through soil and vegetation sequestration, agriculture can make an enormous contribution to meeting the gap and deliver CO_2 removal credits that will make a lasting contribution.

The potential is so great that some experts believe that a mere 0.8% per annum increase in soil organic carbon stocks cross all of Australia's landscapes could effectively mitigate Australia's total greenhouse gas emissions.

At a more realistic scale, if just the best 10% of Australia's *current grazing* land was harnessed for active net soil carbon sequestration through managed grazing, achieving an annual average of 1 tonne of soil carbon gain per hectare per year, this would deliver over 100 million tonnes of net CO_2 abatement per year – more than 20% of Australia's current total national emissions.[12]

Climateworks' 2023 Modelling

Climateworks' 2023 modelling[13] assumes a major role for land-based CO_2 removal between now and 2050, noting:

- Removing carbon from the atmosphere is critical, so practicalities need to be resolved. Land management practices such as tree planting – and emerging soil carbon technologies – can absorb carbon dioxide from the atmosphere.
- Most of the CO_2 removal would come from increased uptake of land-based practices, such as planting trees and ecosystem restoration.
- Land-based removals are the major path forward, with no material role for the other main option – direct air capture – starting to emerge until the 2040s.

Challenges with carbon accounting in agriculture sector

Australia's official on-farm carbon balance data is currently unfairly disaggregated.

Most on-farm emissions are allocated to the agriculture sector accounts, but most on-farm sequestration occurring on agricultural lands in woody vegetation and/or soil is allocated to the separate Land Use, Land Use Change and Forestry category (LULUCF) of the national greenhouse accounts.

This disaggregation of on-farm carbon balance data, with emissions being allocated to the agriculture sector accounts and sequestration allocated to LULUCF, puts agriculture at a distinct disadvantage, particularly as soil carbon and other on-farm sequestration efforts expand.

Thus, agriculture is not credited with its true positive contribution to Australia's overall emissions reduction efforts. Instead, the official data project an increase in agriculture's emissions as a percentage of the nation's total emissions while other sectors are shown as decarbonising. This anomaly needs remedying to give proper effect to agriculture's sizeable CO_2 draw down contribution.

Credible carbon markets as a climate response

In the modern world, few activities can get to net-zero by emission reductions alone. There will always be residual climate effects to deal with innovatively.

A credible offset market remains an essential part of climate response architecture if the world is to meet net zero.

Australia's hard to abate sectors (aviation, natural gas, mining etc.) are a core part of our economy. Hence, an interim solution for achieving net zero for these industries must be found while technologies are perfected to decarbonise the rest of the economy.

This highlights the important role for well-designed nature-based offsets which, as well as having a significant impact on climate goals, can also encourage nature repair.

1. Section 10 of the Climate Change Act 2022 prescribes Australia's greenhouse gas emissions reduction targets as (a) reducing Australia's net greenhouse gas emissions to 43% below 2005 levels by 2030 (implemented as a point target and implemented as an emissions budget covering the period 2021 2030), and (b) reducing Australia's net greenhouse gas emissions to zero by 2050.

2. Department of Climate Change, Energy, the Environment and Water. 2023. *Australia's emissions projections 2022 citing the Power B1 Figure – Australia's 2022 emissions projections in the baseline scenario* (*Ref*). Note: The Government's alternative projections scenario includes "additional measures", especially achieving a national 82% renewable energy target for Australia. Under this scenario, there is a projected shortfall of emissions reductions of 14 million tonnes of CO2-e in 2030, and of 62 million tonnes in 2035. However, for conservativeness, we assume these "additional measures" are not able to be implemented on schedule.

3. The projections in this Figure are modelled from various government data sources and industry emissions reduction plans. The 2005 base for the 43% reduction by 2030 means that some sectors, such as Aluminium and Cement, will have already reached their sectoral reduction target due to contractions in the production of these industries since 2005, not primarily because of major technology changes. Data sources are:
   - Aviation - Combination of domestic and international emissions recoded in ABS data (*Ref*)
   - Cement - Cement industry claims a 25% reduction from 2005, so this is a back-calculation from 2020 (*Ref*)
   - Aluminium - Aluminium is credited with 6.5% of national emissions in 2005 (*Ref*)
   - Coal, oil and gas - Estimation based on production volume and Gas/CO2 coefficient from 2014. This coefficient has deteriorated over time as projects extract heavier GHG-intensive gas combinations (*Ref* and *Ref*)
   - Iron & steel - Estimation based on IEA emissions intensity of production estimations for 2005 (*Ref* and *Ref*).

4. Source: Macdonald-Smith, A. 2023. Australia to fall well short of renewables target: analysis. Australian Financial Review. 15 August (*Ref*).

5. Blaufelder, C. et. al. 2021. A blueprint for scaling voluntary carbon markets to meet the climate challenge. McKinsey white paper. 29 January. (*Ref*). Similarly, a 4 December 2023 McKinsey commentary on COP-28 outcomes states: "… High-integrity carbon markets are an essential tool for reaching net zero. UNFCCC, TSVCM, GFANZ, and McKinsey analysis shows that up to 9 GtCO2e of the 20–24 GtCO2e of emissions reductions required by 2030 to limit warming to 1.5°C could be supported by high-integrity project-based carbon markets. These would include voluntary (with the new framework announced today) and country-to-country carbon markets covered by Article 6, where negotiations are ongoing…" (*Ref*).

6. Sourced from Carbon Market Institute. 2023. Considerations for future ACCU supply & demand market brief. June (*Ref*).

7. SJT and Reputex. 2023. Modelling Results & – Impacts Australian Carbon Credit Unit Market Analysis. Final report for Climate Change Authority, August (*Ref*).

8. The Nature Conservancy (*Ref*), drawing analyses from Griscom, B.W., *et. al.* 2017. Natural climate solutions. PNAS 114(44): 11645–11650 (*Ref*).

9. Food and Agriculture Organization of the United Nations (2020) *Land use in agriculture by the numbers* (*Ref*).

10. Australian Government Department of Agriculture, Fisheries and Forestry Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) (2024), *Snapshot of Australian Agriculture 2024* (*Ref*).

11. National Farmers' Federation (2017), Food, Fibre & Forestry Facts (*Ref*).

12. There are ~400m hectares of grazing land in Australia. 10% of this is 40m hectares x 1t = 40m tonnes of carbon; times 3.67 = 146m tonnes of CO2e. The potential of Australia's soils to sequester significant amounts of atmospheric carbon has also been attested by the Australian Government's Clean Energy Finance Corporation, viz: "… Soil organic carbon has a vital role to play in reducing carbon emissions in Australia's agricultural sector – with the potential for an estimated 541 million tonnes of carbon to be sequestered in Australia's soil, equivalent to 18 years of annual CO2 emissions from the agricultural sector…" (*Ref*).

13. Climateworks Centre (2023) Climateworks Centre decarbonisation scenarios 2023 (*Ref*).