



2024 Annual
Progress Report

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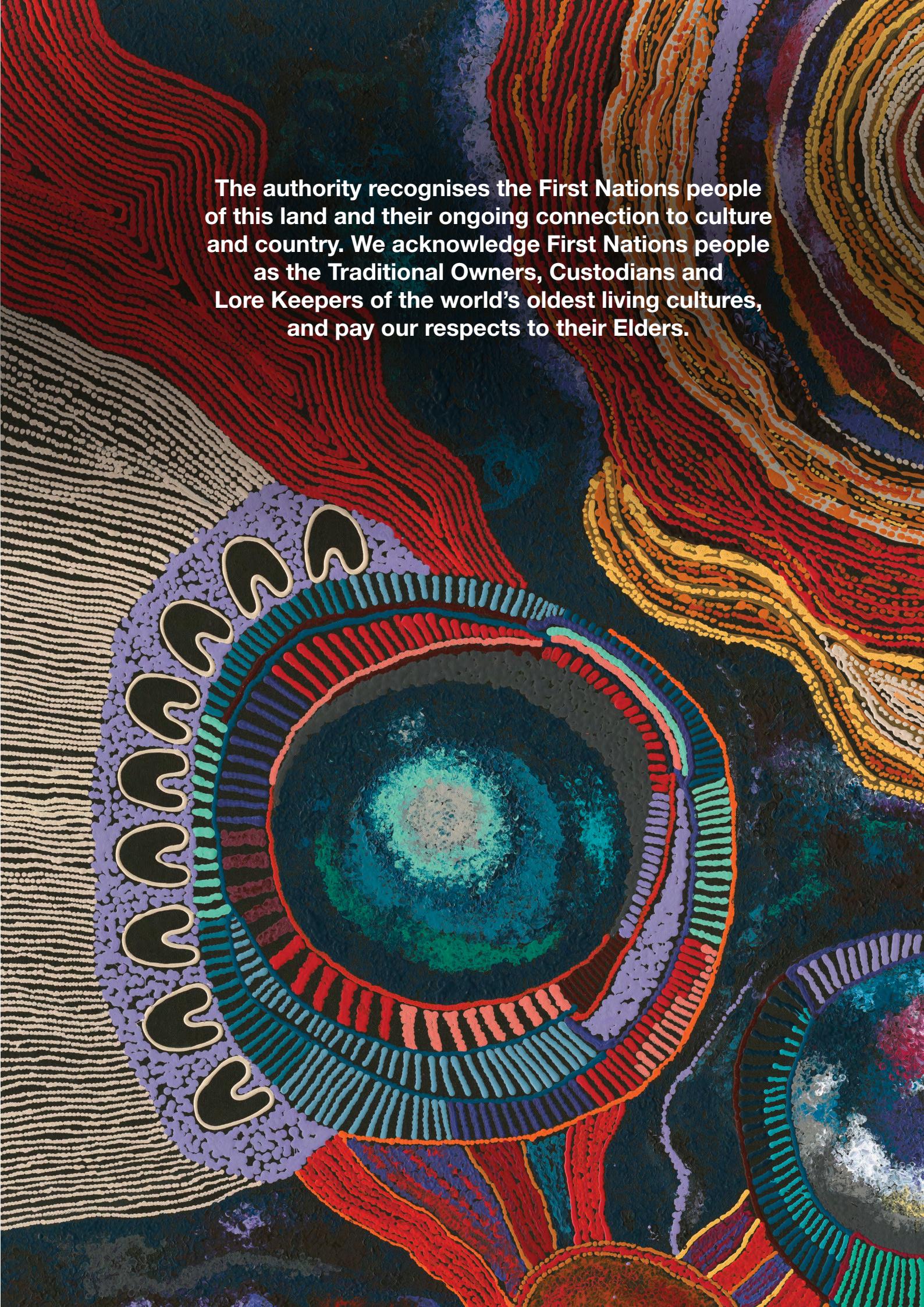
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The authority recognises the First Nations people of this land and their ongoing connection to culture and country. We acknowledge First Nations people as the Traditional Owners, Custodians and Lore Keepers of the world's oldest living cultures, and pay our respects to their Elders.

15 November 2024

The Hon Chris Bowen MP
Minister for Climate Change and Energy
Parliament House
CANBERRA ACT 2600

Dear Minister Bowen,

In response to your request of 19 August 2024, and in accordance with section 14 of the *Climate Change Act 2022*, we are pleased to submit to you the Climate Change Authority's advice, entitled *2024 Annual Progress Report*, to inform the third Annual Climate Change Statement to Parliament.

In accordance with section 14(6) of the *Climate Change Act 2022*, the authority will proceed to publish a copy of the report on its website no later than the day you table your annual statement. The authority is also required by the Act to cause its advice to be tabled within 15 sitting days after giving you the advice, and in any event no later than the day that you table your statement.

The authority will work with your office to ensure these requirements are met.

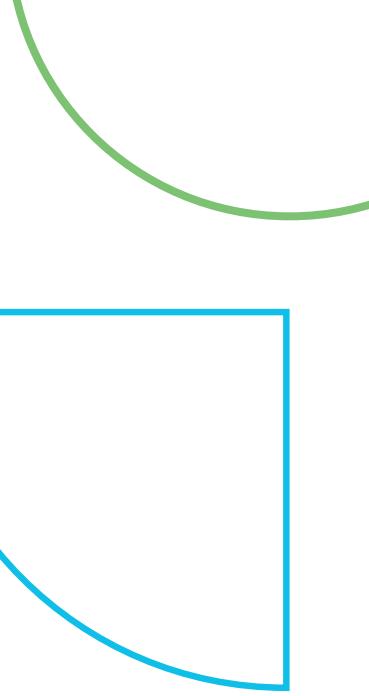
Yours sincerely,



Matt Kean
Chair



Brad Archer
Chief Executive Officer



Acknowledgements

The Climate Change Authority would like to thank the many individuals and organisations who contributed their time and expertise to the development of this report.

The authority received 221 formal submissions to its 2024 issues paper *Targets, Pathways and Progress* as well as many more informal contributions. These contributions have improved the quality of this report and provided evidence to help inform the authority's analysis and recommendations.

Public submissions received by the authority in response to its 2024 issues paper are published and can be viewed via the consultation page on the authority's website.

The Department of Climate Change, Energy, the Environment and Water, the Clean Energy Regulator and other government agencies also provided technical expertise to the authority in the preparation of this report.

The views expressed in the report are the authority's own. They should not be taken as the views or positions of any of the entities mentioned above.

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Acronyms and abbreviations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences	M&E	Monitoring and Evaluation
ABS	Australian Bureau of Statistics	MAC	Marginal Abatement Cost
ACCU	Australian Carbon Credit Unit	Mt CO ₂ -e	Million tonnes carbon dioxide equivalent
ACS	Australian Climate Service	MYMP	Multi-Year Monitoring Period
AEMC	Australian Energy Market Commission	NathERS	Nationwide House Energy Rating Scheme
AEMO	Australian Energy Market Operator	NDC	Nationally Determined Contribution
APR	Annual Progress Report	NEM	National Electricity Market
ARENA	Australian Renewable Energy Agency	NEPS	National Energy Performance Strategy
ASX	Australian Securities Exchange	NGER Review	2023 Review of the National Greenhouse and Energy Reporting Legislation
BEV	Battery Electric Vehicle	NGGI	National Greenhouse Gas Inventory
C&I	Commercial and Industrial	NIAA	National Indigenous Australians Agency
CBAM	Carbon Border Adjustment Mechanism	NSW	New South Wales
CCA	Climate Change Authority (the authority)	NVES	New Vehicle Efficiency Standard
CCM	Cost containment measure	NZ	New Zealand
CEC	Clean Energy Council	NZEA	Net Zero Economy Authority
CEFC	Clean Energy Finance Corporation	ODP	Optimal Development Path
CER	Clean Energy Regulator	PBC	Prescribed Body Corporate
CIS	Capacity Investment Scheme	PHEV	Plug-in Hybrid Electric Vehicle
COP28	Conference of the Parties: UN Climate Change Conference 2023	PNDC	Power Networks Demonstration Centre (in the UK)
CSIRO	Commonwealth Scientific and Industrial Research Organisation	PRF	Powering the Regions Fund
CWO	Central West Orana	PV	Photovoltaic
DCCEEW	Department of Climate Change, Energy, the Environment and Water	RET	Renewable Energy Target
DHA	Defence Housing Australia	RETA	Renewable Energy Transformation Agreement
DNSP	Distribution Network Service Provider	REZ	Renewable Energy Zone
ECMC	Energy and Climate Change Ministerial Council	SMC	Safeguard Mechanism Credit
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>	SRES	Small-scale Renewable Energy Scheme
EU	European Union	SSD	State Significant Development
FCAS	Frequency Control Ancillary Services	TEBA	Trade-Exposed Baseline-Adjusted
FMIA	Future Made in Australia	TNSP	Transmission Network Service Provider
FNCES	First Nations Clean Energy Strategy	TWh	Terawatt Hours
FY	Financial Year	UK	United Kingdom
GEMS	Greenhouse and Energy Minimum Standards	UNEP	United Nations Environment programme
GW	Gigawatt	UNFCCC	United Nations Framework Convention on Climate Change
IRA	<i>Inflation Reduction Act 2022</i>	UNSW	University of New South Wales
ISP	Integrated System Plan for the NEM	V2G	Vehicle-to-Grid
ISSB	International Sustainability Standards Board	VNI	Victoria – New South Wales Interconnector
LULUCF	Land Use, Land Use Change and Forestry	WA	Western Australia
		WEM	Western Australian Wholesale Electricity Market

Legislation

All legislation cited in this report is Commonwealth legislation unless otherwise indicated. Commonwealth legislation can be found on the Federal Register of Legislation: www.legislation.gov.au. The following Commonwealth Acts are cited in this report:

Climate Change Act 2022

Environment Protection and Biodiversity Conservation Act 1999

Greenhouse and Energy Minimum Standards Act 2012

National Greenhouse and Energy Reporting Act 2007

Net Zero Economy Authority Act 2024

New Vehicle Efficiency Standard Act 2024

Safeguard Mechanism (Crediting) Amendment Act 2023

Treasury Laws Amendment (Financial Market Infrastructure and Other Measures) Act 2024



Executive summary

Executive summary

New policies have improved Australia’s prospects of cutting emissions in line with the national 2030 target. But only the delivery of their promised outcomes will get us there. Deployment of renewable electricity must accelerate and emissions need to fall faster.

We all want to live in a safe, clean and thriving Australia. Today’s choices and actions will make this a reality, or risk putting it far out of reach. To keep families and communities safe from dangerous climate change, Australia must join with the rest of the world in cutting emissions deeply and permanently across the economy. To enable this, and to seize the clean energy opportunities that lie ahead for businesses, workers and households, Australia must deploy wind, solar and energy storage at a new scale. The policies and practical steps to deliver this can be complex, but the markers of success are clear: clean electricity scaling up fast and emissions coming down rapidly.

Momentum is growing in both these areas but has not yet reached the speed and scale we need. The Australian Government has made significant progress over the past year in implementing and delivering new policies designed to reduce emissions. The expanded Capacity Investment Scheme, reformed Safeguard Mechanism and New Vehicle Efficiency Standard are now in place or will start soon. The government’s \$22.7 billion Future Made in Australia package of measures, announced in the 2024–25 Budget, seeks to facilitate major new private sector investment in the emerging clean industries that can power Australia’s next era of prosperity.

These and other government policies have improved the prospects of cutting emissions in line with Australia’s 2030 emissions reduction target. But they must deliver the forecast outcomes on time for emissions to fall fast enough to get there. Every additional tonne of emissions adds to the greenhouse gases in the atmosphere and increases the risk of dangerous climate impacts. Cutting emissions as far and as fast as possible is an urgent priority.

Emissions in 2023–24 fell by 0.7% (3 Mt) on the previous year. Transport emissions continue to rise and emissions from the electricity and resources sectors were flat, while

the agriculture, industry and waste, and built environment sectors recorded modest declines in emissions.

Emissions must fall by 15 Mt CO₂-e per year on average to reach Australia’s 2030 target of 43% below 2005 levels. Currently, Australia’s emissions are 28% below 2005 levels. This fall has been driven almost entirely by the land sector, as a result of reductions in land clearing and improved vegetation and soil management practices. Emissions have been declining in the electricity and energy sector since 2009, with strong growth in the share of renewables in electricity generation. Agriculture, built environment, resources, transport, industry and waste emissions combined are 13% above 2005 levels.

The authority’s 2024 Sector Pathways Review highlighted that every sector already has some technologies available that can reduce emissions. Each sector must do its part to deliver the reductions needed across the Australian economy. The Review also emphasised that decarbonising electricity must be a strong and immediate focus, because this will be a key determinant of how much is possible, and how soon, in other sectors. More renewable energy will support manufacturers and households to confidently go all-electric, enable businesses and families to switch to cleaner vehicles, and help farmers and miners accelerate efforts to cut their emissions.

The federal government’s expanded Capacity Investment Scheme has been a major step in the right direction. However, the authority considers that further action is required to ensure its 82% renewable electricity target is met. Accelerating the rate at which more renewables are brought online is essential for decarbonising Australia’s electricity grid and preparing for the projected closure of up to 90% of existing coal generation capacity over the next decade.

The nation’s coal generators are ageing and becoming increasingly unreliable, while demand for electricity is

rising with ongoing population growth and technological change. Expert analysis from the CSIRO and the Australian Energy Market Operator has consistently found that wind and solar backed by energy storage and peaking gas generation is the most cost-effective and timely way to renew Australia's electricity supply.

This is why in this year's Annual Progress Report the authority has prioritised recommendations for accelerating Australia's progress on deploying renewable electricity.

Generating more electricity than ever before while transitioning to renewables that are connected by transmission and firmed with a mix of technologies (batteries, pumped hydro, gas peaking generators and potentially hydrogen in the longer term), requires a major national effort. Sequencing, integrating and optimising the deployment of these technologies, while ensuring reliability and security of supply, is crucial for the successful and timely renewal of Australia's electricity system.

The authority recommends a major focus on removing barriers to the deployment of clean energy infrastructure - to strengthen and accelerate the forward pipeline of large-scale, commercial and industrial, and community-scale generation and storage. This includes providing firmer and longer-term foundations for the Capacity Investment Scheme, seizing more of the untapped potential of commercial and industrial distributed energy resources, and accelerating the delivery of essential system security services. Increasing the uptake of distributed rooftop solar and battery storage is a particular opportunity to bring more clean electricity into the system quickly, with less need for new enabling infrastructure. Larger systems deployed on commercial and industrial facilities can augment the world leading rate of take-up of rooftop solar by Australian households.

The authority also recommends the Minister appoint an Energy Transition Coordinator to work with governments, regulators and energy system participants to more effectively weave together the many different threads of activity needed to deliver a clean, reliable and affordable electricity grid.

As Australia accelerates progress towards a renewable grid, energy efficiency continues to be a major

opportunity to balance rising demand from households, businesses and industry. The authority recommends additional measures be taken to improve the energy efficiency of Australia's buildings and appliances.

The government is requiring major industrial facilities to meet progressively tighter caps on emissions under the Safeguard Mechanism - an important way to drive necessary technology and market change.

Preliminary data shows that in 2023–24 emissions at Safeguard facilities were 135.8 Mt CO₂-e, down 2.9 Mt CO₂-e (2.1%) from 2022–23.

The authority's assessment for this report is that net Safeguard emissions are declining consistent with the safeguard outcomes, while noting uncertainties associated with:

- the reformed scheme only having been in place for one full year
- final information on the outcomes of the scheme in 2023–24 not yet being available
- the authority's assessment relying in part on projections of outcomes to 2030.

The authority recommends improving visibility of facilities' intended balance of effort between deploying technologies to reduce emissions and using carbon credits. This would shed more light, sooner, on whether and how the Safeguard Mechanism reforms are driving industrial transformation.

The government has made significant progress with its national climate risk assessment and developing a new national adaptation plan. These are vital areas of work. Australia must strive to cut emissions as far and as fast as possible now, while taking action to adapt to the climate change impacts communities are already experiencing, and the unavoidable changes in our natural environment to come. The authority recommends it be tasked with monitoring and evaluating the National Adaptation Plan once in place.

Australia is responding to one of the most significant economic shifts since the Industrial Revolution, in a geopolitical context characterised by heightened global tensions, shifting alliances and complex economic and security challenges.

Nations are racing to dominate green technologies and competing for resources such as rare earth minerals critical for those technologies. Climate change is increasingly understood to be a security threat, exacerbating issues like water scarcity, food insecurity and forced migration. It is also directly impacting Australians' costs of living through rising prices for insurance as the risks of climate-fuelled extreme weather mount, and for essentials like food due to more frequent disruptions of production and distribution systems.

It is in this dynamic and interconnected landscape that nations are developing their next emissions reduction targets under the Paris Agreement, due in 2025. The authority will provide advice on the 2035 greenhouse gas emissions reduction targets it considers should be included in Australia's next Nationally Determined Contribution, taking account of the geopolitical context, the latest science and Australia's unique national circumstances. Our recommendations in this report, together with those made in the Sector Pathways Review and other recent work, aim to position Australia to drive deep and sustained reductions in emissions well beyond 2030.

Recommendations

Recommendations

Recommendations on accelerating the decarbonisation of electricity

Australia must accelerate the deployment of a stronger forward pipeline of large-scale commercial and industrial, and community-scale generation and storage, to ensure grid decarbonisation targets are met and enable deeper cuts to emissions across the economy.

01.

Strengthen, broaden, lengthen and embed the Capacity Investment Scheme (page 52).

To realise the 82% renewable electricity by 2030 target and meet Australia's increasing electricity demands, the Capacity Investment Scheme should be enhanced by:

- substantially accelerating and broadening the scheme to:
 - close the gap to the 82% renewable electricity target
 - make an ambitious 2035 abatement target achievable, consistent with Australia's international obligations, and support the clean energy transition required across the economy for Australia to achieve net zero by 2050
- as the authority suggested in the Sector Pathways Review, embedding the scheme in legislation and, subject to the outcomes of the post-2030 future market design review commissioned by energy ministers, either extend the scheme or replace it with an alternative mechanism beyond 2030 to increase confidence that subsequent emission reduction targets will be met
- prioritising projects that do not require extensions of the shared transmission network, in particular combined solar and battery projects.

02.

Enable the rapid and large-scale deployment of combined synchronous condenser functionality with back-up generation capability, to provide the system security and reliability services needed for the accelerated deployment of renewables and timely coal power station closures, through analysis and tenders run by the Australian Energy Market Operator (AEMO) (page 56).

As identified in the 2024 Integrated System Plan, synchronous condensers will be needed to provide essential security services (inertia and system strength) to enable the rapid growth of wind and solar, and the timely closure of coal-fired generation. Limited gas-fired generation peaking capacity will also be needed to maintain reliability as a back-up for wind, solar, batteries and pumped hydro at times of low renewable output and/or high demand.

To ensure the delivery of these services is efficient and timely, the authority recommends that AEMO be authorised to assess the efficient level of these services and conduct periodic tenders to accelerate their provision by market participants through deployment of synchronous condensers which can be operated as generators. AEMO would tender for this capacity with sufficient lead time to meet any forecast shortfall that has not stimulated a sufficient industry response. Funding would come from market sources, and AEMO would not own the plant.

The power generation capability of these installations should be able to operate on natural gas and renewable gases, and if gas network and storage constraints require, liquid fuels including fuels derived from renewable sources (such as hydrogen).

AEMO's assessment and procurement role should include the upgrade of gas network and storage capacity to ensure an adequate supply of gas for peaking needs.



03.

Speed up connection approval processes for large-scale generators in the National Electricity Market, while enhancing the transparency of those processes (page 63).

With an unprecedented roll-out of renewables, storage and firming needed to deliver 82% renewable electricity by 2030, an unprecedented volume of capacity will seek connection.

However, AEMO and transmission network service providers (TNSPs) appear to lack sufficient capacity to handle the quantity of new connection applications that will need to be assessed, and it is not clear how long different types of projects are currently taking to obtain connections. Improving this information could set realistic expectations for project proponents, and better support progress tracking. Better information about connection times will also enable more informed consideration of resourcing needs for AEMO and TNSPs.

04.

Make full use of the potential contribution of electricity distribution networks, and commercial and industrial customers' premises, to host renewable electricity generation and storage (page 66).

Australia's electricity distribution networks and commercial and industrial (C&I) customers should be empowered to play a much greater role in the deployment of renewable electricity generation and storage.

This would complement the vital contribution of transmission-connected and household generation and storage.

Key initial actions are:

- develop and implement a scheme to incentivise C&I electricity customers to invest in large rooftop solar PV and battery storage installations (to add capacity without worsening the 'duck curve' phenomenon - high solar energy production during the middle of the day when grid demand is relatively low)
- require distribution network service providers (DNSPs) to plan and deliver timely and efficient connections for C&I rooftop solar and battery storage
- empower DNSPs to plan and install batteries in their networks, including in partnership with market participants, to complement and not crowd out behind-the-meter storage, and allow their efficient costs to be recovered through DNSPs' regulated network charges
- establish a framework for the integrated planning by DNSPs and TNSPs of major network asset and service upgrades, and create a complementary mechanism for DNSPs and TNSPs to invest in minor network upgrades that will accelerate deployment of renewables and storage
- accelerate the mandatory, regulated deployment of smart meters by distributors, and require them to provide leading-edge data services to their customers and retailers.

05.

Endorse the provision of further advice on recommendations 1-4 (page 66).

The authority proposes to seek additional expert input about its electricity system recommendations to refine and focus them, and provide a further report by no later than April 2025.



06.

Through the National Cabinet, task relevant ministers to work together to overcome barriers to the energy transition (page 67).

Collaboration across levels and portfolios of government should be driven by first ministers and central agencies through National Cabinet. The Energy and Climate Change Ministerial Council (ECMC) will continue to hold substantial accountability for the energy transition, but many other national ministerial forums will also need to make key contributions.

The ECMC should collaborate with other relevant ministerial forums (such as Planning, Environment, Infrastructure and Transport Ministers, and Education Ministers Meetings) to prioritise:

- the implementation and monitoring of planning reforms to address approval delays and social licence concerns that are impeding the rollout of renewable generation, transmission and other infrastructure, and decarbonisation projects
- planning and delivery of port, rail and road upgrades to ensure the timely and efficient movement of unprecedented volumes of heavy energy equipment to renewable energy zones
- building workforce capacity and capability to support the rapid growth of energy infrastructure and services.

07.

The Minister appoint an Energy Transition Coordinator to drive and monitor the delivery of economically efficient, reliable and low emissions electricity grids (page 68).

The scale, complexity and interdependence of investment and action required by many bodies for decarbonising the electricity system necessitates strong coordination – across the energy market, across levels of government, and across portfolios within governments. The authority recommends a new, senior, full-time role — Energy Transition Coordinator — be created within the Minister's department. The Energy Transition Coordinator, backed by a small team of experts, would support the Minister (and through the Minister, the Energy and Climate Ministerial Council) and liaise with stakeholders to drive Australia towards its energy and emissions targets, including by:

- advising on Capacity Investment Scheme (CIS) targets
- facilitating effective delivery of priority actions involving multiple jurisdictions and/or levels of government
- tracking progress and identifying measures to overcome barriers and accelerate action.

A key focus of the Energy Transition Coordinator would be the priority renewable energy projects for the transition currently being identified by the government.

Recommendation on improving energy efficiency

Australia needs to balance growing electricity demand from households, businesses and industry by unlocking scalable opportunities for energy efficiency.



08.

Uplift national building energy efficiency and drive the acceleration of building retrofits through improved information, regulated standards and further national policy support (page 73).

Priority actions are:

- expanding the number of products covered by the Minimum Energy Performance Standards under the *Greenhouse and Energy Minimum Standards Act 2012* and accelerating timelines for making Greenhouse and Energy Minimum Standards determinations
- establishing a national rebate or grant mechanism to finance building energy efficiency upgrades for low-income earners
- aligning Australian Government-owned, -managed and -financed building portfolios with the Australian Public Service Net Zero 2030 target
- working with state and territory governments to expand the scope of existing building disclosure schemes and to mandate the public reporting of building energy ratings.

Energy efficiency is a powerful tool for reducing emissions, reducing energy consumption and improving wellbeing.

Australian buildings have some of the poorest energy efficiency in the world, with houses built before 2003 having an average Nationwide House Energy Rating Scheme (NatHERS) rating of less than 3 stars compared to a 7 star minimum requirement for new builds. Poor energy efficiency means buildings drive unnecessary emissions from electricity generation, increase the need for expensive generation and transmission infrastructure and are not resilient to the physical impacts of climate change (e.g. extreme heat events). Efforts to improve the energy efficiency of individual buildings face significant barriers such as high upfront costs, long timeframes to recoup investments and information gaps.

09.

Require Safeguard facilities to report rolling 5-year compliance strategies on the expected annual weight of effort between on-site reductions and carbon credit use. The Clean Energy Regulator (CER) should publish this data aggregated to an appropriate level (page 100).

The authority considers that Safeguard facilities should report their forward compliance strategies to the CER. Compliance strategies could include planned abatement measures over the next 5 years, including the share of onsite reductions and/or carbon credit use.

The authority notes some of this information may be included within annual sustainability reports such as those required under the new mandatory climate-related financial disclosures, which will be rolled out progressively beginning in 2025 (ASIC, 2024). To minimise reporting burdens, the CER should consider allowing Safeguard facilities to submit such reports where the relevant information is provided, and the ongoing need for the facility level reporting requirements recommended by the authority should be reviewed periodically.

The publication of data from compliance strategies would assist policymakers and other interested parties in undertaking future assessments of the Safeguard Mechanism's performance and implications for the Australian Carbon Credit Unit market.

Facilities that trigger the existing 30% reporting threshold should include in their written explanation to the CER the reasons why their ACCU use was either more or less than they reported in their most recent compliance strategy. This information would provide valuable insights into the barriers to onsite emissions reduction activities.

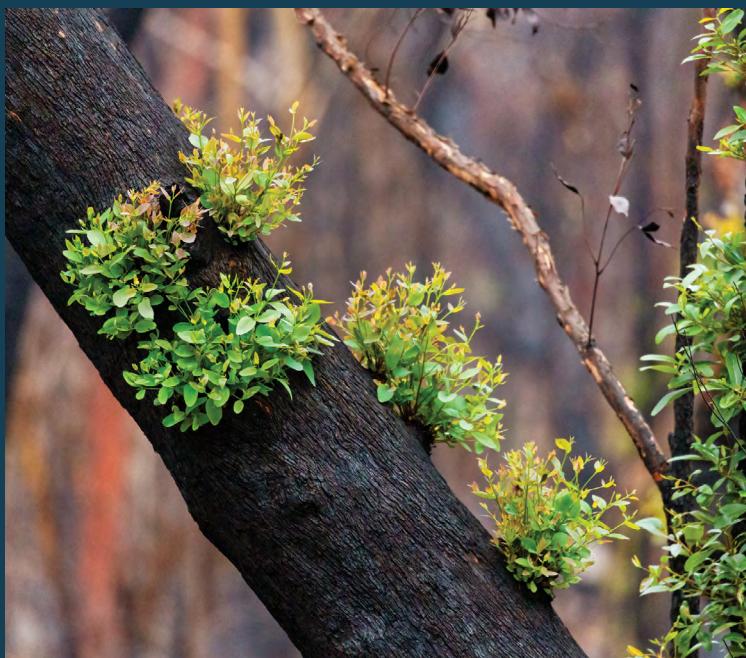
Recommendations on effective reporting and planning

Australia needs to closely monitor progress on implementation of key national emissions reduction policies and adaptation planning, to ensure these get and stay on track.

10.

Legislate and resource the Climate Change Authority to implement the monitoring and evaluation framework for the National Adaptation Plan (page 21).

Australia should align with best practice established by international peers and implement regular periodic reviews of progress against the National Adaptation Plan and National Climate Risk Assessment framework. Both the United Kingdom and New Zealand have legislated respective independent bodies (i.e. the UK Climate Change Committee and the NZ Climate Change Commission) to report on progress on delivering each country's national adaptation plan or program every 2 years.



Introduction

Introduction

The Climate Change Authority is a federal statutory agency established on 1 July 2012. It provides independent, evidence-based expert advice to the Australian Government on climate change policy. This is the authority's third Annual Progress Report.

Climate change is no longer a distant risk but a pressing reality. Extreme weather events have again affected Australia throughout the past year.

Widespread flooding accompanying Cyclone Jasper in Far North Queensland, a catastrophic storm in Victoria, a record warm August in northern Australia and flooding in Tasmania had resounding impacts on communities, businesses and biodiversity (BOM, 2023b; King, 2024; Tasmanian Government, 2024; Victorian Government, 2024d). The costs will continue to be felt for years to come.

Box 1: Emissions cause warming, warming causes impacts

Greenhouse gas emissions are adding to the growing stock of these gases in the atmosphere. These gases act like a blanket around the Earth, trapping some of the heat that would normally radiate back to space. Because the heat gets trapped, the Earth stays warmer than it would be without the gases.

More heat means more energy in the atmosphere and oceans. This energy fuels many types of weather systems, making them more intense. For example, warming can lead to more intense rainfall events because warmer air can hold more moisture. This includes the rainfall occurring in tropical cyclones.

Increased heat causes ice to melt and sea levels to rise. It also causes more evaporation, which means more water in the air leading to heavier rainfall and floods. On the flip side, increased evaporation also dries the land, making agricultural and ecological droughts more severe.

Impacts are already being felt and impacts are locked in because of emissions that have already occurred. The best way to stop impacts getting worse and worse is to stop more warming. And the best way to halt warming is to stop emitting greenhouse gases now, rather than waiting to stop them in the future (Climate Council, 2019; UNEP, 2024b).

Global records have been broken in 2023 for surface air temperature, ocean heat, sea level rise, ocean acidification, Antarctic sea-ice loss, ice sheet melt, and glacier retreat (WMO, 2024). Extreme weather events around the world have continued to lead to injuries, sickness and fatalities, adverse socioeconomic outcomes, destruction of property and infrastructure, adverse impacts to natural ecosystems, and displacement for many communities (WMO, 2024). Some of these events are listed below.

- Canada experienced extreme wildfires and a record-breaking fire season in the northern hemisphere summer of 2023, with an estimated 18.4 million hectares burned (compared to an annual long-term average of 2.5 million hectares burned) (NASA Earth Observatory, 2023).
- In South America, the Pantanal and Amazon regions have seen the worst fires in decades in late 2024 (Copernicus, 2024).
- Nigeria experienced the worst flooding in a decade in September 2024. The floods submerged over half a million hectares of cropland and raised the risk of diseases such as cholera and typhoid (FAO, 2024; IRC, 2024).
- There were widespread marine heatwaves in the North Atlantic Ocean and Mediterranean Sea during 2023, with surface and near-surface temperatures 3 °C above long-term averages (WMO, 2024).
- South East Asia experienced extreme, record-breaking heat in April and May of 2024, affecting millions of highly vulnerable people (Zachariah et al., 2024).

Australia's land surface has warmed by about 1.51 °C since 1910, and surface ocean waters have warmed by about 1.08 °C since 1900 (CSIRO & BOM, 2024). These temperature rises have led to an increased frequency of extreme heat events on land and in the ocean (CSIRO & BOM, 2024). Other long-term climate change trends include the drying of southwest Australia, increasing rainfall in northern Australia and increased extreme fire weather across large parts of the country (CSIRO & BOM, 2024).

The 2024 State of the Climate report shows climate change and its impacts continuing to affect Australia (BOM, 2024). In 2024, record winter land temperatures marked the second-warmest winter on record since 1910, second only to the 2023 winter season (BOM, 2024; BOM, 2023a).

Over the past year, parts of Australia experienced drought and water shortages, flooding, extreme heat events, bushfires and intense storm events with devastating impacts on Australian communities (Breen & Briscoe, 2024; DHA, 2024; Fisher, 2024; Logan & Lynch, 2024; Maloney, 2023; Readfern, 2024).

The livelihoods, health, wellbeing and economic security of Australian communities have been affected, particularly those experiencing preexisting disadvantage, inequality and vulnerability (ICA, 2024; Wheeler et al., 2023; Xu et al., 2023). Regional and rural Australians, farmers and First Nations peoples are particularly impacted by climate change and related extreme weather events. These groups suffer more impacts to physical and mental health as a result.

Australia's natural environments and ecosystems are also suffering from the effects of rising temperatures and extreme weather events. Australia's alpine regions have seen reduced snowfall and increased temperatures over the past year. This impacts local ecosystems, tourism and community wellbeing (Grose and Hennessy, 2024; Olsson et al., 2024). One of Australia's most iconic natural features, the Great Barrier Reef, has experienced multiple bleaching and mortality events linked to warming driven by climate change (GBRMPA, 2024). While the reef has shown some improvement over the past year, future warming locked into the climate system will continue to place the reef's biodiversity at risk. This has consequences for cultural heritage, local ecosystems, and the social and economic benefits derived from the reef (GBRMPA, 2024).

Climate change is impacting Australian people, businesses and our natural environment, and the impacts are likely to intensify. Urgent action is needed to limit impacts and to protect Australian communities. Rapid emissions reductions and innovative adaptation measures are needed for Australia to realise a prosperous and resilient future.

Policy reflection: National Climate Risk Assessment, National Adaptation Plan and Review of the Australian Climate Service

The Australian Government is progressing key climate adaptation policies, including the National Climate Risk Assessment (the Risk Assessment), the National Adaptation Plan (NAP) and the response to the independent review of the Australian Climate Service (ACS).

The Risk Assessment will identify to what degree Australia's people, infrastructure, economy and landscapes are exposed and vulnerable to climate change now and over the rest of the century. It will also inform national priorities for climate adaptation and resilience actions through the NAP. The government published the first pass assessment report for the Risk Assessment in April 2024, identifying 56 nationally significant climate risks and 11 priority risks (DCCEEW, 2024r).

The government will respond to these risks in the upcoming NAP, and consulted on this earlier in 2024 through its associated issues paper (DCCEEW, 2024q).

The independent review of the Australian Climate Service concluded in April 2024. The final report to government found that there is an urgent and rapidly growing demand for climate and disaster risk information, which the ACS is unable to support in its current form. It made 11 recommendations for reform (O'Kane et al., 2024). The government has established a taskforce to consider the review's recommendations.

The government has also recognised that monitoring and evaluation is an important part of the adaptation policy cycle. However, it has not yet developed the relevant governance arrangements or evaluation. Both the UK and New Zealand have legislated independent bodies (the UK Climate Change Committee and the New Zealand He Pou a Rangi Climate Change Commission) to report to their respective Parliaments on progress delivering each country's National Adaptation Plan or Programme every 2 years (CCC, 2023; He Pou a Rangi Climate Change Commission, 2024).

The authority holds the view that Australia should align with best practice established by international peers and implement regular periodic reviews of progress against the NAP and Risk Assessment framework. While a 2-year cycle may not be suitable for Australia, regular and independent monitoring and evaluation is an essential element of strong and transparent institutional structures.

Recommendation: Legislate and resource the Climate Change Authority to implement the monitoring and evaluation framework for the National Adaptation Plan.

Australia should align with best practice established by international peers and implement regular periodic reviews of progress against the National Adaptation Plan and National Climate Risk Assessment framework. Both the United Kingdom and New Zealand have legislated respective independent bodies (i.e. the UK Climate Change Committee and the NZ Climate Change Commission) to report on progress on delivering each country's national adaptation plan or program every 2 years.

International developments

Current climate action plans give a 66% chance of the world tracking to a temperature increase of 2.6–3.1 °C during the 21st century (UNEP, 2024a). The temperature increase could be held to 1.9 °C if all countries' pledges are implemented – including conditional pledges and net zero pledges.

The first Global Stocktake of progress under the Paris Agreement, released late last year at the 28th Conference of the Parties (COP28) found that while progress has been made, countries' collective efforts have not put the world on track to meet the long-term goals of the Paris Agreement. Time is running out to get on track. In response, Parties to the Paris Agreement reaffirmed their commitment to pursue efforts to limit the temperature increase to 1.5 °C, emphasising the impacts of climate change would be much lower at that level than at greater warming levels (UNFCCC, 2023a). Minister Bowen reiterated Australia's support of the first global stocktake noting '[w]e stand behind its call for future NDCs to be aligned with 1.5 degrees. This is the guiding 'North Star' as countries prepare their most ambitious NDCs' (DCCEEW, 2023e).

Countries agreed to contribute to global efforts to triple renewable energy and double energy efficiency improvements to 2030 (UNFCCC, 2023b). They agreed to transition away from fossil fuels in energy systems, phase out inefficient fossil fuel subsidies as soon as possible and substantially reduce non-CO₂ emissions globally by 2030 (UNFCCC, 2023a). They also noted significant finance flows continue being directed towards investments in high-emissions activities and infrastructure that lacks resilience (UNFCCC, 2023c).

At COP29 this year, Parties are aiming to agree on a New Collective Quantified Goal on Climate Finance (UNFCCC, n.d.).

Countries are due to submit their next Nationally Determined Contributions containing ambitious 2035 emissions reduction targets to the UNFCCC in 2025, ahead of COP30 in Brazil. This is taking place within the context of several recent and upcoming government elections (UNFCCC, 2024). The United States is one of the world's biggest economies and largest emitters, and the outcome of the federal election in November 2024 will likely have significant implications for climate change policy domestically and abroad.

At the time of writing this report, Australia is bidding to host COP31 in 2026 in partnership with Pacific neighbours.

Energy accounts for more than three quarters of total global greenhouse gas emissions. Generation from renewable sources is already a proven solution to achieve zero emissions energy generation in developed and developing countries alike (IEA, 2024b). Global electricity demand is forecast to grow by 4% in 2024, up from 2.5% in 2023 (IEA, 2024a).

Renewable electricity's contribution to global electricity generation is growing at pace. Estimated to be 30% in 2023, renewables are projected to grow to 35% next year, eclipsing the amount generated by coal (IEA, 2024a). In 2024, global investment in clean energy is projected to reach \$2 trillion, double the \$1 trillion going to coal, gas and oil (IEA, 2024c).

For the world to reach net zero by 2050, renewable energy generation and investment will need to continue to accelerate. The International Energy Agency estimates annual clean energy investment must more than double from the current \$2 trillion of investment to reach \$4.5 trillion per year by 2030 based on global emissions reaching net zero by 2050 (IEA, 2024d).

Major economies are competing to attract and retain the tens of billions of dollars invested each year in transition technologies such as battery components, wind and solar equipment and electric vehicles (RMI, 2024). China currently dominates global manufacturing and production of most clean energy technologies (IEA, 2023). The US Inflation Reduction Act (IRA) is drawing critical inputs to the US. The US has seen significant levels of investment in green industries and technologies (US DoE, 2024).

Countries are also using trade policies to ensure their industries remain competitive in the context of nationally determined decarbonisation plans. The EU's Carbon Border Adjustment Mechanism (CBAM), taking full effect in 2026, aims to incentivise a shift in trade to Europe away from products with higher embedded emissions toward those with lower embedded emissions (European Commission, 2024; PWC, 2024). As Australia's main policy to reduce industrial emissions, the Safeguard Mechanism is designed to smooth the transition to net zero for Australia's biggest exporters (CER, 2024o). The Australian Government is also considering carbon leakage risks for Australia, with a second consultation paper for its carbon leakage review released in early November 2024 (DCCEEW, 2024d). Policy options recommended by the review could inform the government's Net Zero 2050 Plan (DCCEEW, 2024d).

Australia is reliant on global supply chains for manufactured products and technologies that underpin its net zero transition (DISR, 2024b). Australia's strong relations with countries that produce and receive these goods provide a level of economic security. The new Future Made in Australia plan is designed to support onshoring aspects of the clean energy value chain to provide greater energy and economic security (Australian Treasury, 2024b).

The global shift to renewables is an important part of achieving the Paris Agreement goals and the United Nations Sustainable Development Goals (SDGs). Goal 7 of the SDGs is about universal access to clean and affordable energy, which is key to the development of agriculture, business, communications, education, healthcare and transportation (UN, 2024). The UN Sustainable Development Goals Report published in 2023 estimated that by 2030 around 660 million people would still lack access to electricity (UN, 2024). Building capacity in renewable energy and circular economy policies would support developing nations like Pacific Island States to bridge this gap and achieve greater self-sustaining prosperity and sustainability.

Report roadmap

This report sets out the state of Australia's progress towards its 2030 targets.



Part 1

outlines important policy developments and emissions trends over the reporting period.



Part 2

explores the barriers that are slowing decarbonisation of the electricity sector and the opportunities for acceleration.



Part 3

reports on the performance of the Safeguard Mechanism.



Policy reflection: Future Made in Australia

The 2024–25 Budget included \$22.7 billion for the Future Made in Australia (FMIA) plan (Australian Treasury, 2024b). The FMIA plan aims to create new low emissions industries in Australia through attracting investment, building Australia's innovation capabilities, promoting the development of sustainable finance markets, strengthening approval processes, and supporting workforce development (Australian Treasury, 2024b). The Future Made in Australia Bill 2024, aims to establish a National Interest Framework comprising a Net Zero Transformation Stream and Economic Resilience and Security Stream. These streams identify sectors of the economy aligned with Australia's national interest, and seek opportunities to address barriers to private investment in such sectors.

While the FMIA plan has the potential to drive significant green industrial development in Australia, the priority industries are still nascent. Securing a share of global markets will require substantial private investment. As the world decarbonises, Australia will need to develop and maintain a world leading investment landscape to contend with international competition. It must also ensure industrial policy is consistent with the competitive advantage of Australian industries.

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1. Australia's progress

1. Australia's progress

Key points



Emissions are falling but not yet at the rate required to meet Australia's 2030 emissions reduction target

To reach its 2030 target, Australia's emissions must fall by an average of 15 Mt CO₂-e each year, starting now. Australia's emissions declined by 3 Mt CO₂-e over 2023–24 and have declined by an average of 12 Mt CO₂-e per year since 2006.



Australia's strong policy progress continued in 2024

Policy developments include the expansion of the Capacity Investment Scheme (CIS) for renewable generation and energy storage, the commencement of the reforms to the Safeguard Mechanism to reduce emissions at Australia's largest industrial facilities, and the introduction of the New Vehicle Efficiency Standard (NVES) to reduce motor vehicle emissions. The impacts of these policies will take time to flow through to Australia's reported emissions.



Every sector has an important role to play. Land has led in the past but other sectors now need to increase their pace of emissions reductions

Emissions in the land sector have fallen by an average of 11 Mt CO₂-e each year from FY 2006 to FY 2024, thanks to increasing sequestration of carbon on the land.

Electricity and energy sector emissions have declined by 3 Mt CO₂-e per year on average since FY 2006. The government is implementing several policies to accelerate reductions in this sector, including the expanded CIS and the Rewiring the Nation program. Combined emissions in the industry and waste, transport, resources, agriculture and built environment sectors have increased by 13% in the same period.



In 2024, Australia made progress across a number of leading indicators of emissions

Electric vehicle sales, electric vehicle charging station numbers and imports of heat pumps all increased, while fossil fuel combustion in the manufacturing sector saw a modest decrease.



Revisions to the emissions inventory bring Australia closer to its 2030 target, but should not be mistaken for signs that the transformations required for decarbonising the economy have commenced

The 2024 refinements in emissions accounting in the land and agriculture, and electricity and energy sectors resulted in cumulative emissions from 2020 to 2023 being estimated to be 79 Mt CO₂-e lower than was reported in 2023.

Australia's strong policy progress continued in 2023–24, with key developments including the expansion of the CIS, commencement of the reforms to the Safeguard Mechanism, introduction of the NVES, establishment of the Net Zero Economy Authority, expansion of corporate reporting requirements to include climate-related financial risk disclosures, development of the National Climate Risk Assessment, and introduction in the Parliament of the Future Made In Australia Bill.

The impacts of these policies are yet to materialise in Australia's reported emissions. The NVES will commence on 1 January 2025, it will be some years before projects supported under the expanded CIS commence operating, and the low emissions industries targeted under the Future Made in Australia program will take time to establish (Australian Treasury, 2024a; DCCEEW, 2024aa; DITRDCA, n.d.). The impact of the reformed Safeguard Mechanism is discussed in Part 3.

Policy announcements do not automatically lead to real world outcomes. For that reason the authority tracks progress in 3 ways:

- i. **Policy tracker** – This year we expanded the authority's Climate Policy Tracker to include state and territory and international climate change policies, as well as many new federal policies. This is in recognition of the importance of international and interjurisdictional cooperation.
- ii. **Leading indicators** – The authority is continuing to establish and use leading indicators that show where, emissions are heading, track the necessary transformations, and identify where action is needed to address insufficient progress. (see leading indicators section below).
- iii. **Emissions trends** – The latest inventory data and the government's emissions projections reveal trends in how Australia is tracking to meet its targets.

In the year to June 2024, Australia's emissions were 28% below 2005 levels (DCCEEW, 2024u). Emissions reductions will need to accelerate for Australia to meet its legislated targets of 43% below 2005 levels by 2030 and net zero emissions by 2050. This report focuses on progress towards the 2030 targets and sits alongside the authority's recent review of technology transition and emissions pathways to net zero emissions by 2050, and its forthcoming advice on Australia's 2035 emissions reduction targets (CCA, 2024h). The authority holds the view that setting and meeting mid-term targets will help ensure an orderly and efficient transition to net zero.

Box 2: The authority's Climate Policy Tracker

Reporting on greenhouse gas emissions year-by-year helps track Australia's progress towards a prosperous, resilient, net zero future. Emissions inventories by themselves do not provide a comprehensive account of climate action, and some policies, like adaptation and international measures, won't show up in Australia's inventory at all (DCCEEW, 2024x).

Implementation of climate policies can be a lengthy process and it can take years for impacts to appear in national inventories. Regular reporting and progress-tracking of policies helps to monitor government progress on climate commitments and acts as an early indicator of policy effectiveness.

The authority's Climate Policy Tracker is a tool for monitoring Australian climate policies. It allows the authority to track policy progress before outcomes are visible in emissions inventories or policies have been completely implemented. It also helps to identify policy gaps and policies relevant to specific issues.

In 2024, the authority has expanded the scope of the Climate Policy Tracker to include state and territory policies. It also includes an expanded suite of Australian Government policies including international partnerships.

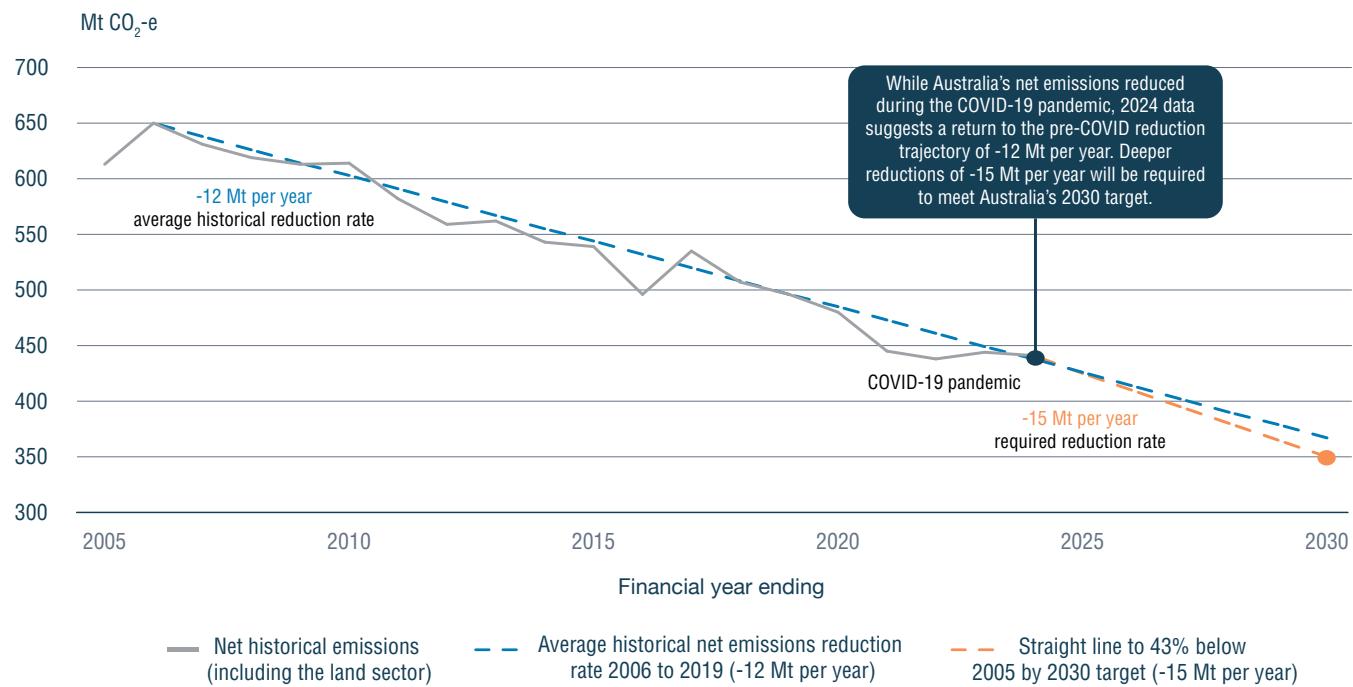
The Climate Policy Tracker is comprised of publicly available information. Each policy is broken down by jurisdiction, responsible agency, sector, description, its intended outcome, status, and key developments where available.

It can be found here: <https://www.climatechangeauthority.gov.au/climate-policy-tracker>

To reach 43% below 2005 by 2030, Australia's emissions need to decline by an average of 15 Mt CO₂-e each year, starting now. Since peaking in 2006, Australia's emissions have declined by 12 Mt CO₂-e per year on average (Figure PRG.1). Emissions declined rapidly when COVID hit, largely due to the drop in transport emissions, and have plateaued over the 3 years since (Figure PRG.1).

In 2024, Australia's emissions were broadly in line with the level they might have been had the COVID pandemic not occurred (see Figure PRG.1). If the post-COVID plateau continues, even faster decarbonisation will be needed in future years to get on track. Returning to Australia's pre-COVID decarbonisation rate would be an acceleration on the last 3 years. However, this would not quite be fast enough to achieve the 2030 target.

Figure PRG.1: Progress to Australia's 2030 emissions reduction target, 2005–2030

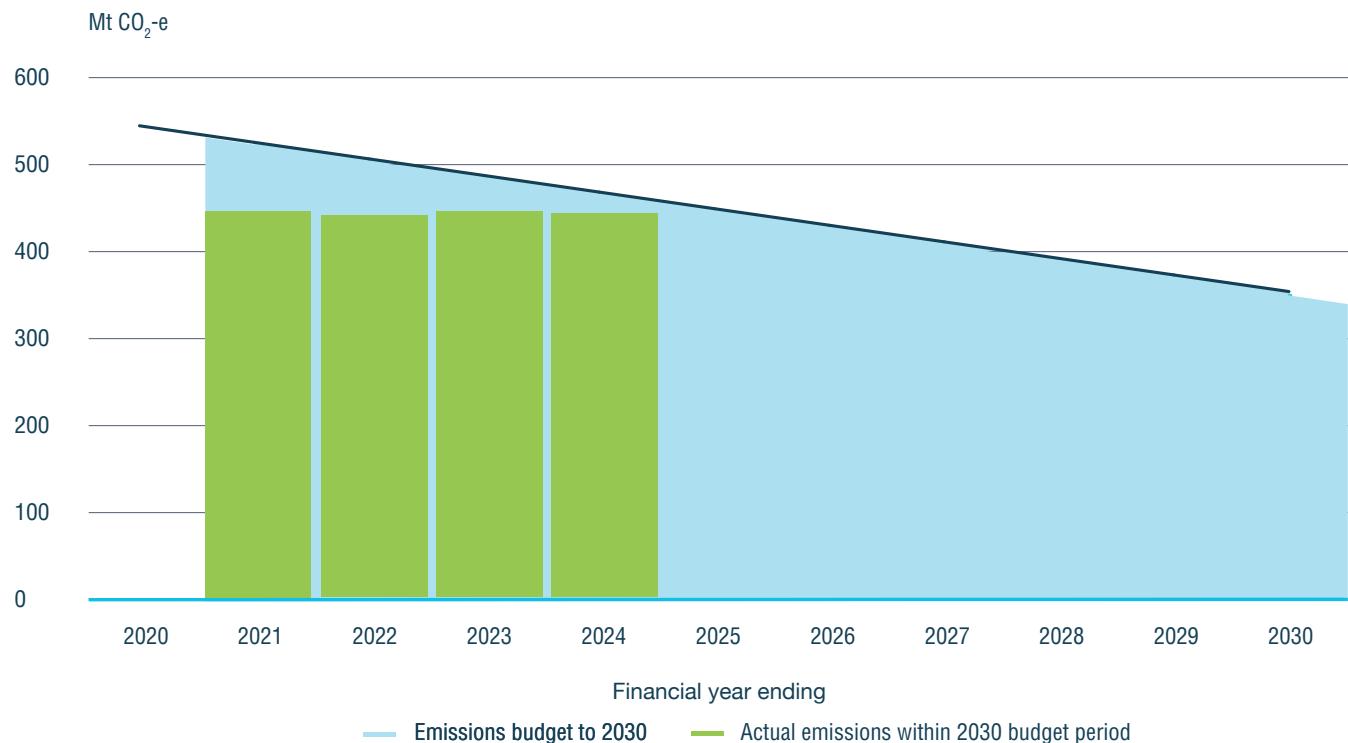


Source: Authority analysis of DCCEEW (2024u).

Australia also has an emissions budget for cumulative emissions from 2021 through 2030. Australia's emissions budget is calculated using a straight-line trajectory from the 2020 target (5% below 2000 levels) to the 2030 target (43% below 2005 levels) (DISR, 2022). Following 2024 revisions to Australia's historical emissions estimates, Australia's implied emissions budget is 4,377 Mt CO₂-e. In the period to June 2024 (40% through the budget period), Australia had emitted 1,767 Mt CO₂-e or 40% of its emissions budget.

Figure PRG.2 shows Australia's annual emissions compared to its emissions budget. Emissions have remained relatively flat since the beginning of the budget period in 2021. However, because Australia overachieved on its 2020 emissions target, Australia's emissions at the beginning of the budget period were well below the budget trajectory. In total, Australia is 218 Mt CO₂-e below the amount implied by the budget up to 2024.

Figure PRG.2: Progress to Australia's 2021–2030 emissions budget



Source: Authority analysis of DCCEEW (2024u, 2024y).

A significant effort to reduce emissions across all sectors will give Australia the best chance of achieving the 15 Mt CO₂-e per year of emissions reductions needed to meet the 2030 target. The authority's 2024 Sector Pathways Review provides a comprehensive analysis of the emissions profile of each sector, the technologies currently available to reduce emissions and technologies that have potential in the longer term, and the barriers and opportunities for getting on pathways to net zero. The leading indicators section below presents the outlook for near term emissions reductions in each sector.

2024 saw mixed progress in emissions reductions across sectors. Small reductions in emissions in the industry and waste, agriculture and land, and built environment sectors were somewhat offset by an increase in transport sector emissions, resulting in a modest overall decrease of 3 Mt CO₂-e, as set out in Table PRG.1.

Table PRG.1: Sector emissions in 2023 and 2024 and the annual change in emissions

Sector	Emissions in FY 2023 (Mt CO ₂ -e)	Emissions in FY 2024 (Mt CO ₂ -e)	Change in emissions (%), FY 2023 to FY 2024	Average annual change in emissions from FY 2006 to FY 2024 (Mt CO ₂ -e)
Electricity and energy	146	145	0% 	-3 
Transport	98	100	2% 	1 
Industry and waste	65	62	-4% 	-1 
Agriculture and land	5	4	-14% 	-11 
Resources	102	102	0% 	2 
Built environment	28	27	-3% 	0 
Australia-wide (net)	444	441	-1% 	-12 

Source: Authority analysis of Australia's quarterly greenhouse gas inventory (DCCEEW, 2024u).

Note: Totals may not sum due to rounding. For the 2024 Annual Progress Report, the authority has allocated emissions to different sectors based on a methodology consistent with the Sector Pathways Review (CCA, 2024h). This differs from the sector emissions allocation used in previous iterations of the Annual Progress Report, which broadly reflected the sector allocation used in Australia's National Greenhouse Gas Inventory (CCA, 2023a).



Policy reflection: Climate-related financial risk disclosures

In September 2024 the government legislated the *Treasury Laws Amendment (Financial Market Infrastructure and Other Measures) Act 2024*, which included provisions requiring large companies to prepare and publish climate statements in addition to existing mandatory reporting obligations.

These requirements include:

- declaration of the entity's climate related risks and opportunities
- metrics and targets relating to scope 1, 2 and 3 emissions
- information about governance
- strategy and risk-management by the entity regarding climate risks
- information about the entity's climate resilience in the form of scenario analyses using scenarios of warming of 1.5 °C above pre-industrial levels and warming well exceeding 2 °C above pre-industrial levels (meaning an increase of 2.5 °C or higher) (ASIC, 2024).

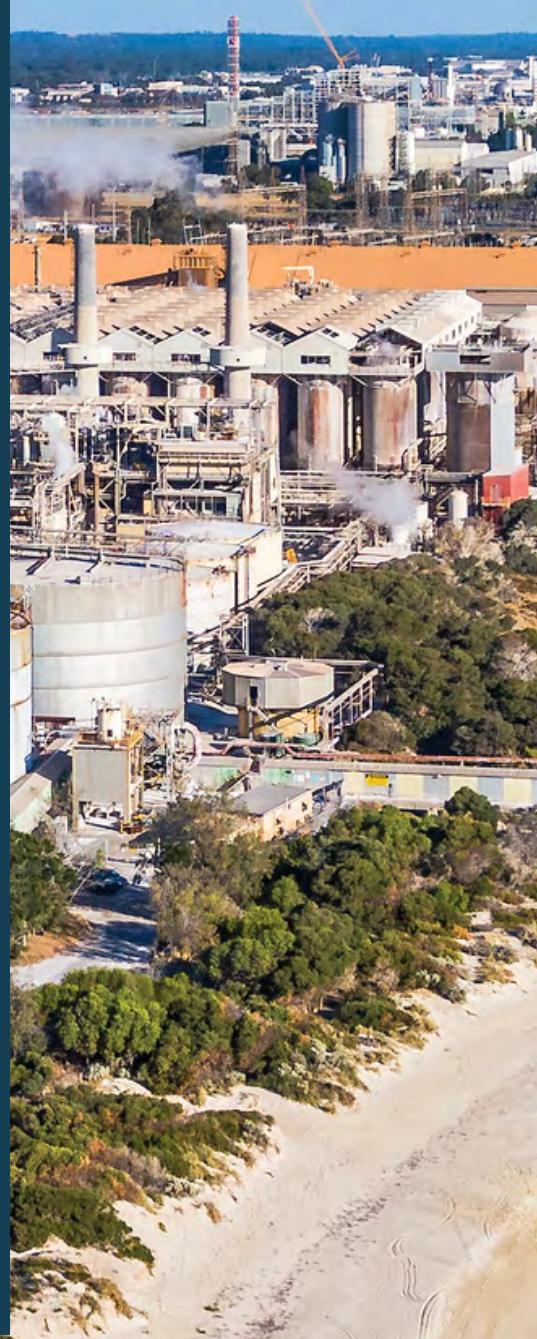
These requirements align Australian reporting requirements with the International Sustainability Standards Board standards (Button et al., 2024), and aim to improve the international interoperability of the Australian green investment landscape. Establishing mandatory digital reporting is a sensible next step to give investors, financial institutions, businesses, developers, governments and end-users ready access to data about emissions in their supply chains (CCA, 2024h).

Policy reflection: Net Zero Economy Authority

In September 2024 the government legislated the Net Zero Economy Authority (NZEA). *The Net Zero Economy Authority Act 2024* establishes the NZEA to promote Australia's orderly and positive economic transformation by facilitating investment, supporting workers, coordinating policy and engaging with communities. One of the NZEA's immediate priorities will be supporting communities at risk of job losses due to closure of coal-fired or gas-fired power stations.

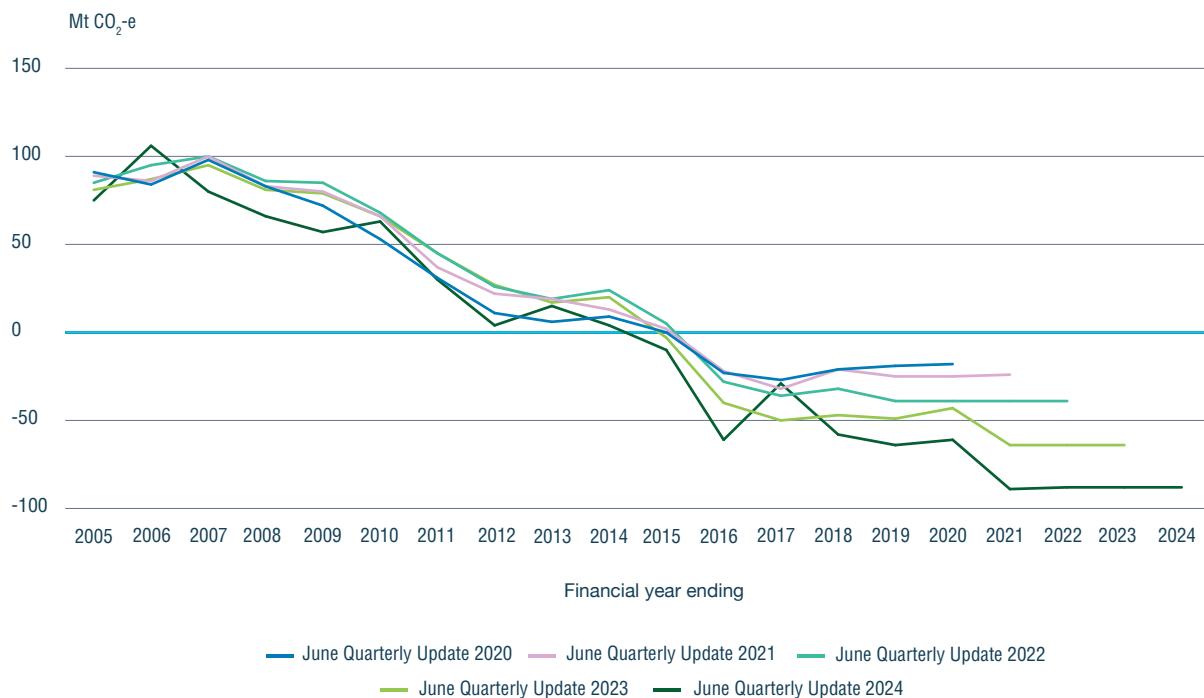
The NZEA has an essential role in supporting emissions-intensive regions through the transition. Its focus could also be expanded to regions experiencing the roll-out of renewables, transmission and new industries. Communities hosting these new infrastructure projects face significant transition impacts (Colvin et al., 2023). The NZEA could help to ensure procedural and distributional fairness for the impacted communities, which would help these projects to earn social licence and support their timely delivery. A coordinated approach from all levels of government could also help align policies to deliver key projects. The functions of the NZEA described in the legislation suggest it could have a wide coordination role in the net zero transition. The authority considers that resourcing the NZEA to assist in the coordination of renewable energy zones could improve the speed of renewable energy deployment in Australia.

The NZEA also has a function for supporting communities to gain skills to improve employment prospects in transition regions. This could be linked to recommendations from the Dyer Community Engagement Review (AEIC, 2023) and the ECMC's guidelines for transmission projects (ECMC, 2024c) to coordinate regional training initiatives to meet skills demand in key regions.



For the fifth year in a row, revisions to Australia's National Greenhouse Gas Inventory (NGGI) in 2024 identified additional land sector sequestration (Figure PRG.3). Revisions to the inventory are an important part of ensuring the accuracy of emissions estimates, accounting for improvements in data, technologies, practices and science over time. Australia's inventory, including revisions, is subject to quality control and assurance checks to ensure accuracy. Checks include international and independent expert reviews (DCCEEW, 2024t). Most recently, in 2023, an UNFCCC Expert Review Team undertook a review of the 2022 Inventory Report and did not identify any material issues with the inventory (UNFCCC, 2023b).

Figure PRG.3: Revisions to Australia's land sector emissions over time, 2005–2024



Source: Authority analysis of DCCEEW national inventory quarterly reporting (DCCEEW, 2020, 2021, 2022a, 2023g, 2024u).

The 2024 refinements in the land, agriculture and electricity and energy sectors accounting resulted in cumulative emissions from 2020 to 2023 being estimated to be 79 Mt CO₂-e lower than was reported in 2023 (CER, 2024k; DCCEEW, 2023g). Importantly, while these refinements result in lower net emissions estimates, the results do not necessarily indicate progress towards the transformations required for decarbonising the economy. Furthermore, inventory methods will continue to be refined over time, with the potential to make the task smaller or larger.

In 2023, Australia's 'baseline' emissions projection scenario showed Australia reaching 37% below 2005 levels by 2030 (DCCEEW, 2023c).

Since the 2023 projections, the government has expanded the CIS and legislated the NVES, among the broad range of policy initiatives outlined above.

Leading indicators

Electricity and energy

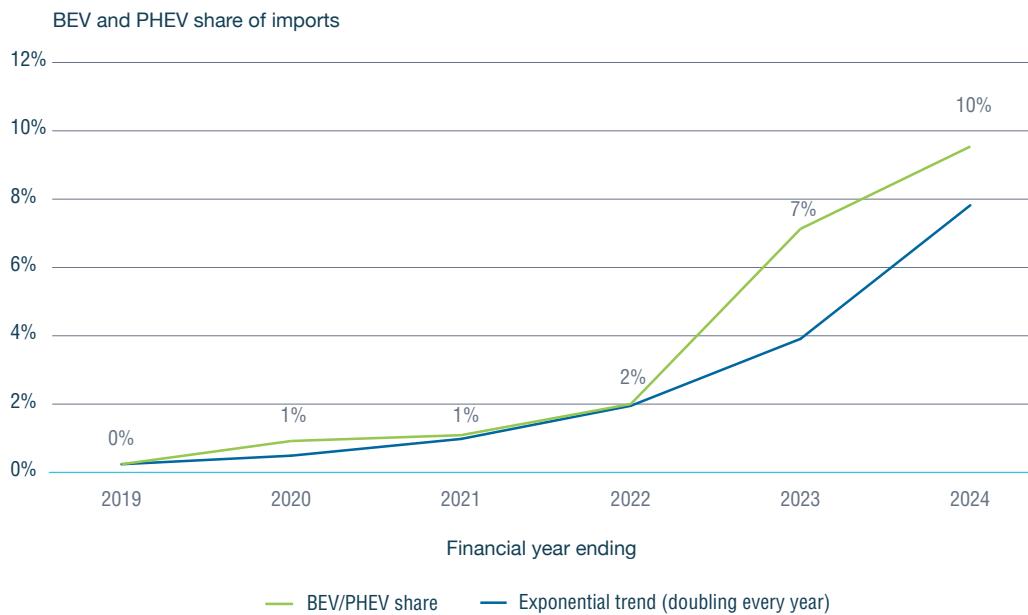
See Part 2 for a detailed analysis of the Electricity and energy sector.

Transport

Australia imported over 1.4 million light vehicles in the 2023–24 financial year, of which 9.5% (133,843 vehicles) were battery electric (BEV) or plug in hybrid electric vehicles (PHEV), up from 7.1% in 2022–23 (Figure PRG.4).

To support Australia achieving its emissions reduction targets, the year-on-year growth rate of BEV/PHEV imports needs to remain high. While growth in the share of imports remained above a theoretical exponential increase, there was a deceleration of growth in 2023–24 when compared to 2022–23. The authority also notes this growing share is supported by imports of hybrid electric vehicles, and will monitor the comparative uptake between hybrid and battery vehicles.

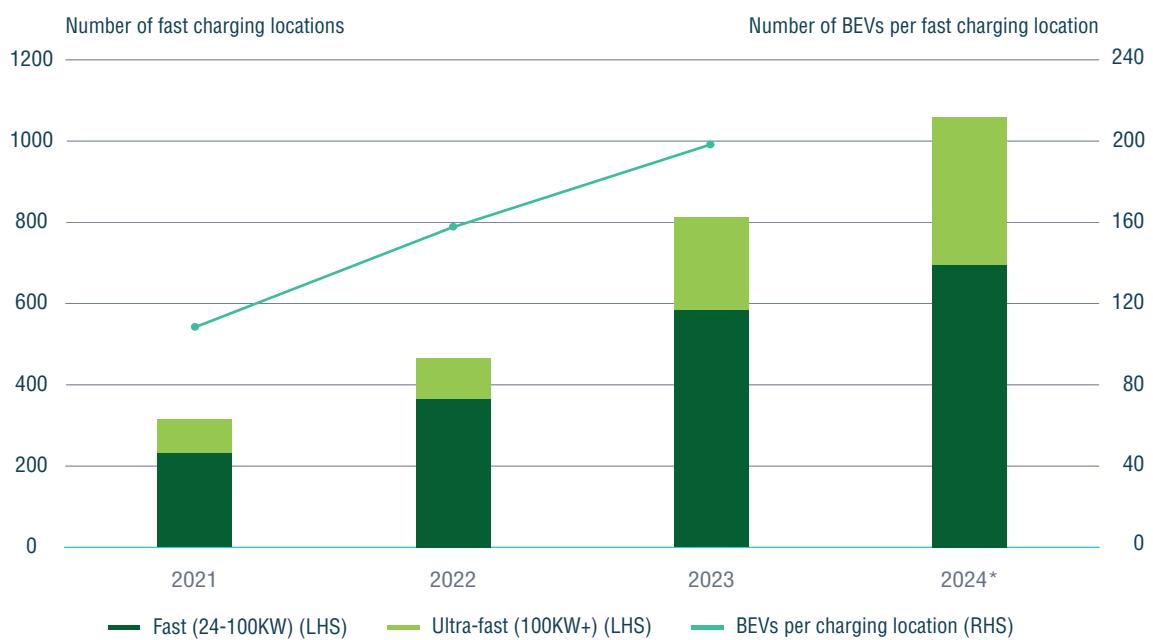
Figure PRG.4: Electric vehicle imports as a proportion of total car imports, 2019–2024



Source: Authority analysis of ABS (2024c) *International Trade in Goods: Customised Report*.

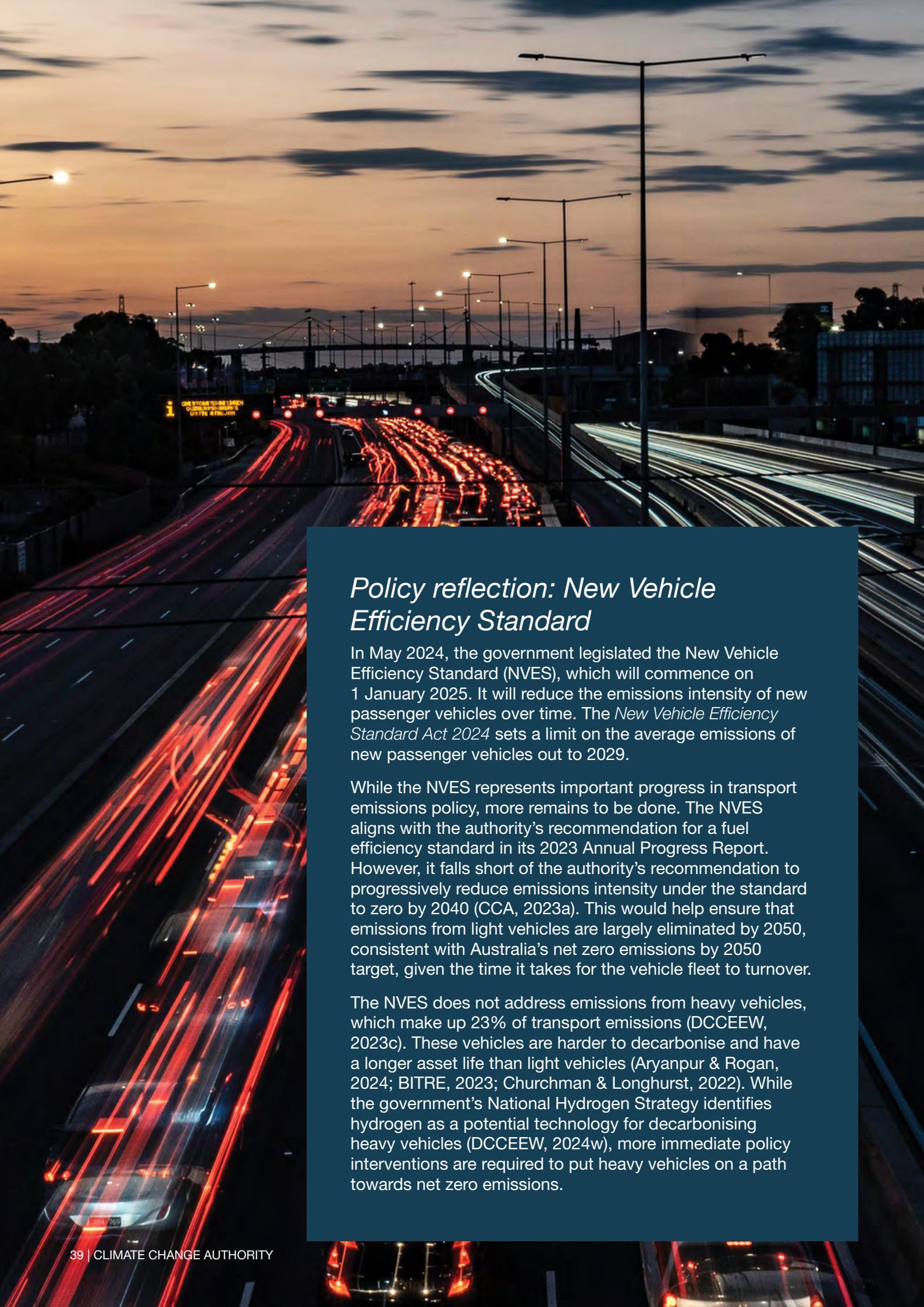
While the number of public fast charging locations has tripled, from 317 in December 2021 to 1059 in June 2024, the ratio of registered BEVs to public charging locations continues to rise (Figure PRG.5). This trend suggests that growth of the fast charging network is not keeping pace with growth in the BEV fleet, which is likely to limit EV uptake if not addressed.

Figure PRG.5: Number of electric vehicles per public fast charging location, 2021–2024



Source: Authority analysis based on data from EV Council (2023), EV Council (2024), BITRE (2024a), BITRE (2024b), unpublished DCCEEW 2024.

Note: * Approximate data



Policy reflection: New Vehicle Efficiency Standard

In May 2024, the government legislated the New Vehicle Efficiency Standard (NVES), which will commence on 1 January 2025. It will reduce the emissions intensity of new passenger vehicles over time. The *New Vehicle Efficiency Standard Act 2024* sets a limit on the average emissions of new passenger vehicles out to 2029.

While the NVES represents important progress in transport emissions policy, more remains to be done. The NVES aligns with the authority's recommendation for a fuel efficiency standard in its 2023 Annual Progress Report. However, it falls short of the authority's recommendation to progressively reduce emissions intensity under the standard to zero by 2040 (CCA, 2023a). This would help ensure that emissions from light vehicles are largely eliminated by 2050, consistent with Australia's net zero emissions by 2050 target, given the time it takes for the vehicle fleet to turnover.

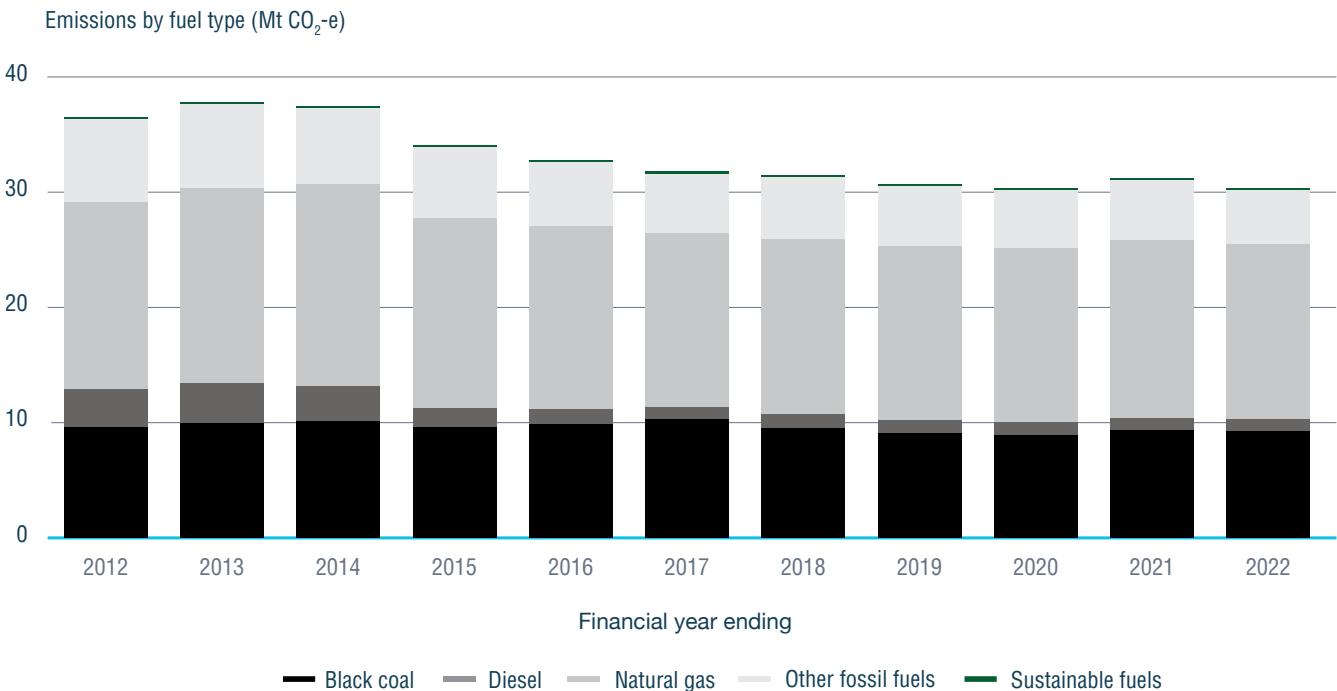
The NVES does not address emissions from heavy vehicles, which make up 23% of transport emissions (DCCEEW, 2023c). These vehicles are harder to decarbonise and have a longer asset life than light vehicles (Aryapur & Rogan, 2024; BITRE, 2023; Churchman & Longhurst, 2022). While the government's National Hydrogen Strategy identifies hydrogen as a potential technology for decarbonising heavy vehicles (DCCEEW, 2024w), more immediate policy interventions are required to put heavy vehicles on a path towards net zero emissions.

Industry and waste

There has been a modest decline in reported fossil fuel combustion from the manufacturing sector from 2021 to 2022, shown in Figure PRG.6. For the same year, emissions from the waste sector rose by 0.4 Mt CO₂-e with the reported proportion of methane capture at landfills captured and combusted decreasing marginally

from 45% in 2021 to 43% in 2022 (DCCEEW, 2024x). Progress indicators for the industry sector include use of flexible compliance options by facilities covered under the Safeguard Mechanism, ACCU holdings by Safeguard and Safeguard related entities, and electricity use as a proportion of final energy use (see Part 3).

Figure PRG.6: Fuel combustion emissions in manufacturing industries, 2012–2022



Source: Authority analysis informed by DCCEEW inventory analysis (CCA, 2024g).

Resources

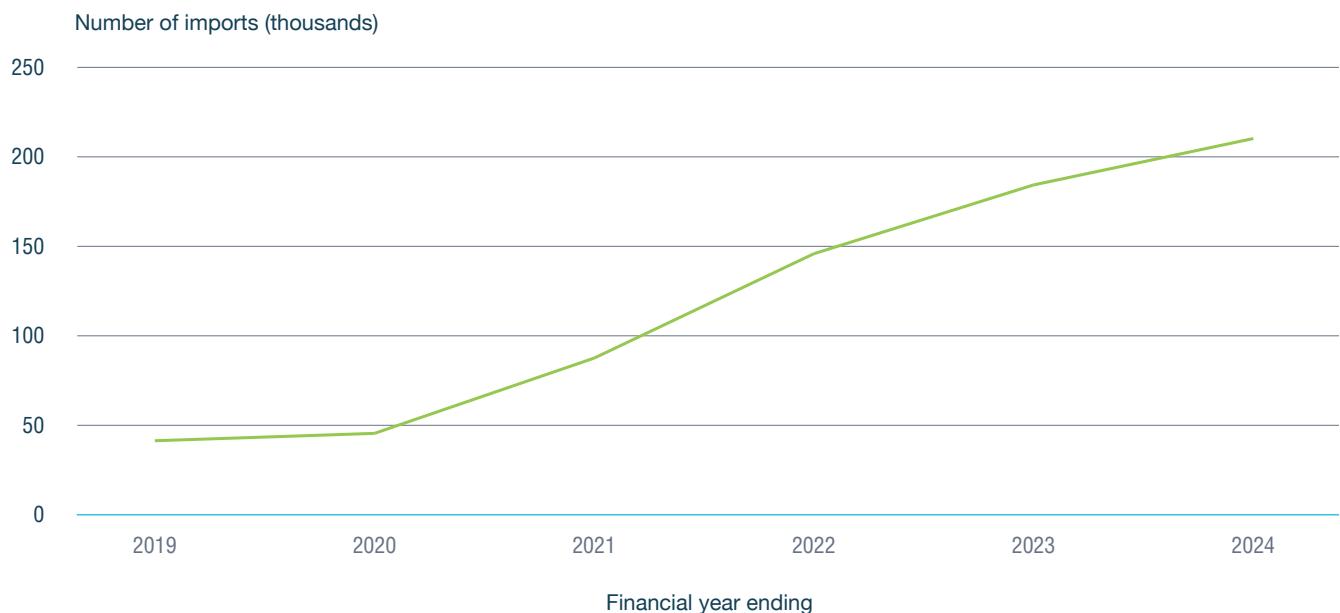
In 2023, approximately 84% of emissions from the resources sector were covered by the reformed Safeguard Mechanism (CCA, 2024a). The Safeguard reforms are expected to drive on-site emissions reduction measures at covered facilities and demand for Australian Carbon Credit Units (DCCEEW, 2024ae). Progress indicators for the resources sector include ACCU holdings by Safeguard Facilities and gross methane emissions reported under the Safeguard Mechanism use (see Part 3)

Built environment

The built environment is decarbonising, but ambitious and coordinated policy is needed to accelerate the rate of change. This includes, expanding disclosure schemes, financial incentives for retrofits, regulation to prioritise electrification and information provision (CCA, 2024h).

The number of heat pump imports continues to increase with a 14% increase between 2022–23 and 2023–24. This likely reflects a range of financial incentive schemes across the country, refer to Figure PRG.7.

Figure PRG.7: Heat pump imports, 2019–2024



Source: ABS (2024c) *International Trade in Goods: Customised Report*.

Agriculture

The latest quarterly update to the National Inventory shows a decrease in agriculture emissions of 0.7 Mt CO₂-e in the year to March 2024 (DCCEEW, 2024v). The decrease was driven by lower emissions from crop production and slightly declining livestock numbers.

According to the latest Australian Bureau of Statistics estimates, the Australian beef cattle herd was 29.9 million head of cattle in 2023–24. The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) projects the cattle herd will reduce by 4% in 2023–24 due to an increase in processing rates and export volumes (ABARES 2024b).

Figure PRG.8: Estimated number of cattle in Australia, 2005–2025



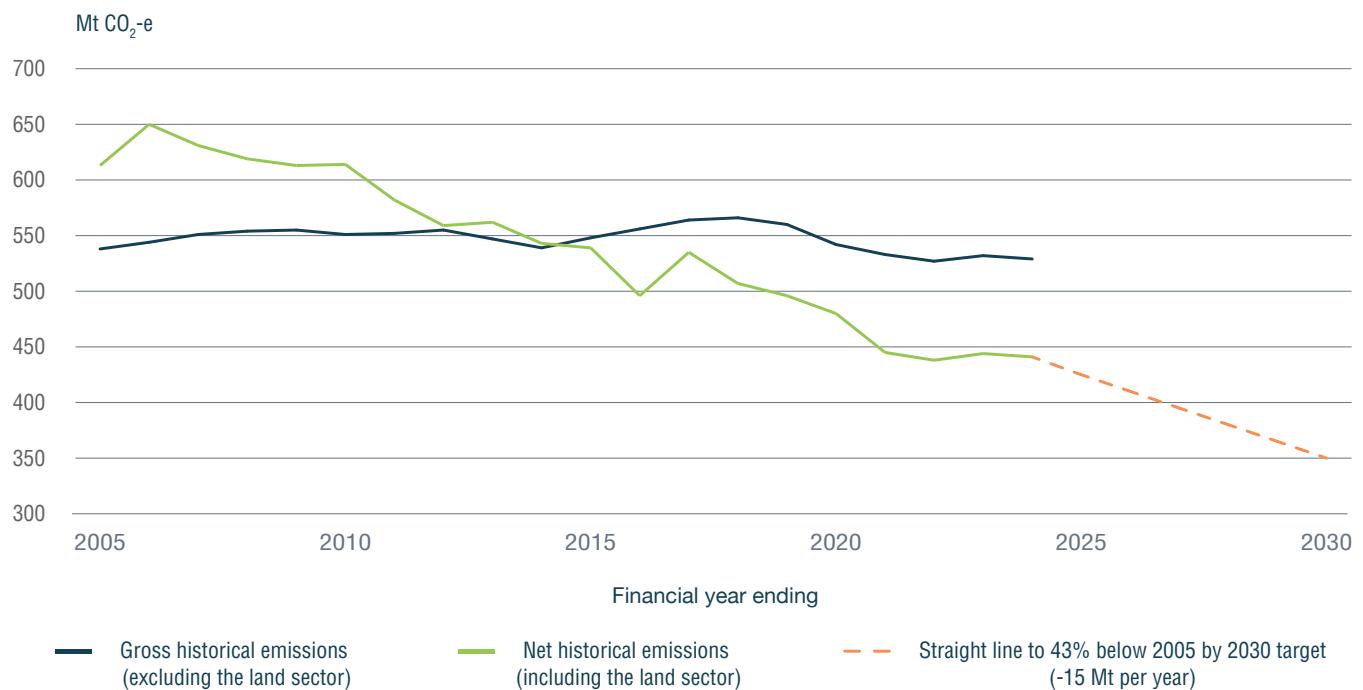
Source: (ABARES, 2024a; ABS, 2024a).

Land

The land sector has dominated Australia's decarbonisation trajectory to date, as can be seen in Figure PRG.9. The clear downward trajectory in Australia's emissions is much less evident with the land sector excluded. This highlights the importance of the growth in the land sector sink to Australia's overall emissions over the past 20 years. However, long-term limitations on the size of the land sink and potential impacts on other land uses need to be managed. This means emissions reductions from other sectors must accelerate to limit over-reliance on land sector abatement into the future.

Although the level of carbon stored on the land is variable (for example, due to seasonal conditions) and at a greater risk in a changing climate (increasing risk from bushfires, droughts and floods), it offers a range of other benefits (Williams et al., 2021). The importance of land-based employment like cultural fire practices (Atkinson & Montiel-Molina, 2023), First Nations Indigenous business enterprises, plantation forestry and habitat restoration for biodiversity is increasingly being recognised in policy developments in 2024. This includes establishment of the Nature Repair Market that will incentivise actions to restore and protect the environment (DCCEEW, 2024z).

Figure PRG.9: Australia's gross and net greenhouse gas emissions since 2005



Source: Authority analysis of DCCEEW (2024u).

Note: Gross historical emissions (excluding the land sector) refers to total national emissions less LULUCF (land-use, land-use change and forestry).

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2. Decarbonising electricity

2. Decarbonising electricity

Key points



Rapid decarbonisation and expansion of the electricity and energy sector is the key to meeting Australia's economy-wide emissions reduction targets.

The government made important progress in its policy support for the roll-out of renewables in Australia in 2023-24, including significantly expanding its Capacity Investment Scheme (CIS) for renewable generation and energy storage.

The authority considers that the government needs to pursue additional policy measures to ensure its 82% renewable electricity target is met. In the National Electricity Market (NEM) alone an additional 33 GW of utility-scale variable renewables needs to be installed by 2030 to achieve the target.

The authority recommends the government take the followings steps to provide the additional support needed to drive renewables deployment, remove the barriers limiting the roll-out of renewables and improve energy efficiency:

- strengthen, broaden, lengthen and embed the CIS
- support the rapid and large-scale deployment of synchronous condensers
- speed up connection approval processes for large-scale generators
- make full use of the potential contribution of electricity distribution networks
- through the National Cabinet, task relevant ministers to work together to overcome barriers to the energy transition
- the Minister appoint an Energy Transition Coordinator to drive and monitor the delivery of economically efficient, reliable and low emissions electricity grids
- unlock scalable opportunities for energy efficiency.



The electricity sector is playing a leading role in Australia's progress to its 2030 emissions reduction target of 43% below 2005 levels. From current emissions levels, it is likely to contribute more than 80% of the emissions reductions needed to achieve this target (DCCEEW, 2023c).

The Australian Government is implementing several key policies to support its 82% renewable electricity target. These include the expanded CIS to accelerate the roll-out of renewable generation and energy storage capacity, and the Rewiring the Nation program to support the expansion of the transmission network (DCCEEW, 2024g, 2024ac). There are several state and territory government initiatives also supporting the decarbonisation of the sector (see the authority's Climate Policy Tracker).

Decarbonising Australia's electricity supply as soon as possible will address Australia's largest source of emissions. It is also vital to unlocking further emissions reductions in other sectors through electrification—replacing vehicles, appliances and industrial equipment powered by fossil fuels with new, efficient electric versions (CCA, 2024h).

In this chapter the authority examines progress with, and barriers standing in the way of, the rapid deployment of the clean energy infrastructure required to meet the government's renewable electricity target. The chapter draws on the Australian Energy Market Operator's (AEMO) Integrated System Plan (ISP) for the NEM (AEMO 2024b).

The challenges to the deployment of clean energy infrastructure that the authority identified in last year's annual progress report remain a concern. These include the pace of the roll-out required and barriers to be overcome relating to earning social licence, the timeliness of approval processes and labour force requirements (CCA 2023a). As discussed in the remainder of this chapter, the authority recommends the government pursue additional initiatives to overcome these challenges and maximise the prospects of achieving its renewable electricity target including:

- strengthening the CIS to ensure the 82% renewable electricity target and Australia's increasing electricity demand are met
- accelerating deployment of synchronous condensers, which can also provide peaking generation, to provide the security and reliability services needed for the accelerated deployment of renewables and timely coal power station closures
- speeding up connection approval processes for large-scale generators in the NEM
- adopting measures to realise the full potential of Australia's electricity distribution networks to connect distributed solar and storage appointing of an Energy Transition Coordinator to drive and monitor the delivery of economically efficient, reliable and low emissions electricity grid including through advising on targets for capacity investment, facilitating actions across jurisdictions and identifying measures to overcome barriers.

A faster roll-out of renewables, storage and transmission is needed

The pace and scale of deployment of the renewable generation capacity, and accompanying network and storage infrastructure, required to achieve the 82% renewable electricity target is unprecedented.

The 'step-change scenario' in AEMO's ISP models the NEM reaching an 82% renewables share by 2030. It indicates that 48 GW of variable renewable generation capacity, including 33 GW of utility renewables and 16 GW of small-scale solar, needs to be installed between now and 2030 to reach the target in the NEM (CCA analysis based on CER, 2024f, 2024h; AEMO, 2024b). This is 60% more than the 30 GW installed in the NEM between 2018 and 2023¹ (inclusive) (CCA analysis based on CER, 2024f, 2024h). At August 2024, there is approximately 13 GW of utility-scale² renewable capacity that is expected to be built in coming years (Table ELC.1).

¹ Previous 6 years (calendar years based on CER data). This is in comparison to 6 financial years starting in 2024–25 to the end of 2029–30.

² Utility-scale was defined as 30 MW or greater in this analysis, with solar units between 100 kW–30 MW included in 'distributed PV' as part of PV non-scheduled generators (AEMO, 2023).

Table ELC.1: Utility-scale variable renewable capacity pipeline, GW³

	Region	Committed	Anticipated (AEMO)	Probable (CER)	Total
AEMO	NEM	5.7		2.4	8.1
CER	Australia-wide	7.8		4.7	12.6

Source: (AEMO, 2024d; CER, 2024h).

When accounting for projects in the pipeline that are also eligible for the CIS, a gap of approximately 8 GW is projected to remain to reach the additional 33 GW the authority considers is necessary for the 82% renewable electricity target (see Figure ELC.1).

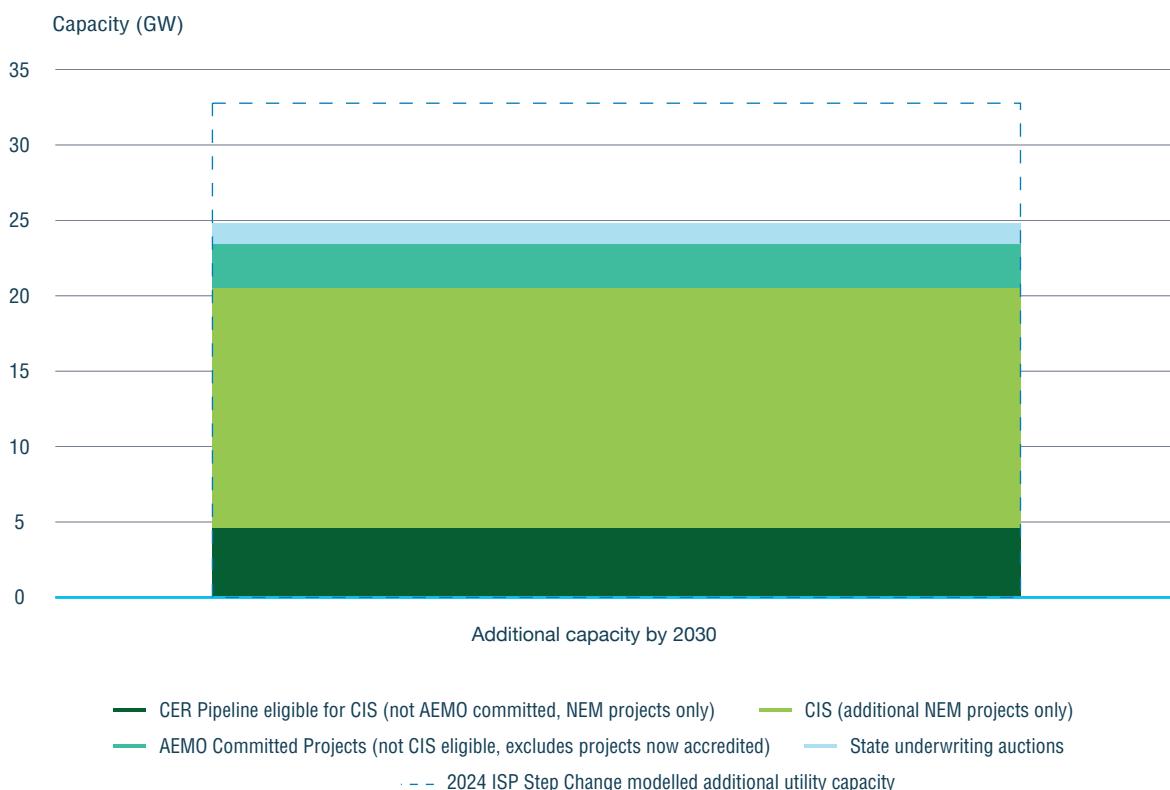
Projects already under development may be competitive under the CIS as criteria for the scheme favour projects that can present financial assurances (DCCEEW, 2024h). The authority has assumed for the purpose of this analysis that these existing projects will participate in CIS tender rounds if eligible. The gap may be an underestimate if:

- projects in the pipeline do not proceed due to non-financial factors, reducing overall deployed capacity
- rooftop solar capacity does not match projected levels, meaning utility renewable capacity deployment would need to be larger to reach the same share of overall renewable generation.

³ AEMO committed projects have secured land, contracts for supply and construction, planning consents and connection contracts, financing, and construction must either have commenced or a firm commencement date been set. AEMO anticipated projects meet 3 of these criteria (AEMO 2024). CER committed projects have reached final investment decision. Probable projects have reached evidence of funding such as power purchasing agreement (CER 2024).



Figure ELC.1: Pipeline of utility-scale projects and generation capacity additions in the NEM under announced government schemes



Sources: CCA analysis based on (ACEN, 2024; AEMO, 2024b, 2024d, 2024e; CER, 2024f, 2024h; DCCEEW, 2024g; Victorian Government, 2024c).

Note: The authority notes the relevant bilateral Renewable Energy Transformation Agreement with the Western Australian (WA) Government agrees to deliver 6.5 TWh of new wind and solar projects in Western Australia (DCCEEW, 2024f). This agreement will result in some CIS supported capacity being deployed outside the NEM, which has been estimated and excluded from the amount of capacity under the CIS in the figure.

This approximately 8 GW gap could be reduced to the extent that state underwriting schemes continue to run and stimulate investment in addition to the CIS. The federal government is currently negotiating with states and territories on responsibilities through the Renewable Energy Transformation Agreements (RETAs). It has stated it intends for 18 GW of the CIS's total 32 GW generation and storage capacity to be delivered under these agreements through the CIS (DCCEEW, 2024m). At the time of writing, the federal government had negotiated RETAs with South Australia, Western Australia and the Australian Capital Territory (DCCEEW, 2024f, 2024p).

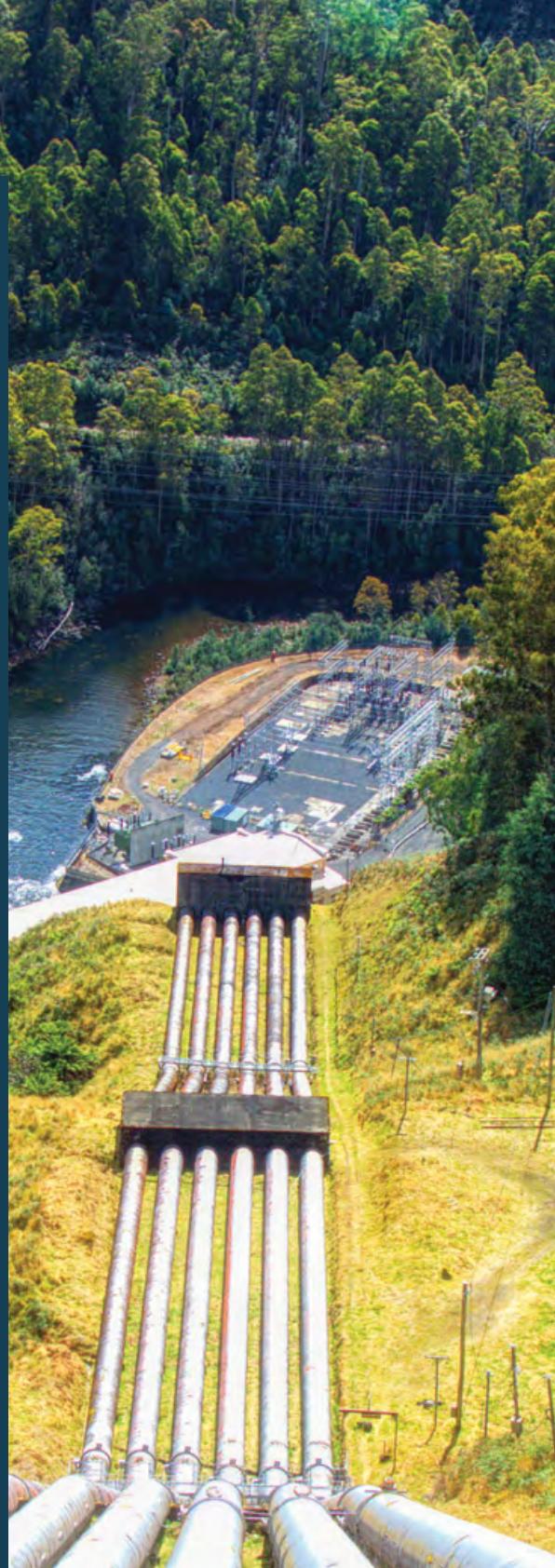
The approximate 8 GW gap could also be reduced if projects in the existing pipeline that are eligible for CIS support, but don't secure funding under the scheme, still proceed. The oversubscription of completed tender rounds, with the first national auction for generation attracting 40 GW worth of registrations (DCCEEW, 2024o) is a positive sign for the pipeline of projects and the potential success of future rounds. It also indicates proponents' interest in receiving support through the scheme and that projects may be unlikely to otherwise proceed.

Policy reflection: Expansion of the Capacity Investment Scheme

The Capacity Investment Scheme (CIS) uses a competitive tender process to encourage new investment in renewable capacity and dispatchable capacity, such as battery storage. The CIS was significantly expanded in November 2023. The expanded CIS aims to roll-out 23 GW of renewable energy capacity and 9 GW of clean dispatchable capacity in support of the 82% renewable electricity by 2030 target (DCCEEW, 2024g). Competitive tenders have begun for the NEM and the Western Australian Wholesale Electricity Market (WEM) (DCCEEW, 2024aa).

While the expanded CIS will assist in meeting the 2030 renewables target, the government will need to determine what policies or market reforms will be needed to support renewable deployment and stable electricity systems post-2030. Both the CIS and the Renewable Energy Target (RET) are due to end by 2030 (CER, 2024m; DCCEEW, 2024g). Meeting rising demand from the electrification of buildings, industries and transport will require significant growth in renewable energy resources in the decades following 2030. This need will be even more pronounced if Australia pursues a low emissions export future (AEMO, 2024b).

The ongoing development of the voluntary renewable energy Guarantee of Origin scheme, designed to support Australia's green industries and facilitate investment in renewable energy, will assist with policy certainty (DCCEEW, 2024l). On its own, however, it is unlikely to drive the scale of investment required. The government's Future Made in Australia program comprises several measures designed to facilitate private sector investment in priority industries for the net zero transition and Australia's economic security (Australian Treasury, 2024a).



In 2023–24, installation of utility-scale solar PV generating capacity slowed significantly compared to the previous 2 years and installation of wind generating capacity was less compared to the previous year (Table ELC.2).

Table ELC.2: New installed capacity of utility-scale solar and wind over the past 3 years as at 31 August 2024

Year	Installed capacity (MW)	
	Utility-scale solar	Wind*
2021–22	1527	565
2022–23	1541	841
2023–24	839	722

Source: Clean Energy Regulator (2024h).

Note: Installed capacity figures for 2023–24 could increase if projects approved by the Clean Energy Regulator after 31 August 2024 have an accreditation start date that is within 2023–24 financial year.

* Figures represent wind installations of all sizes.

Financial commitments for large scale generation fell from \$6.5 billion in 2022 to \$1.5 billion in 2023 (CEC, 2024a). The Clean Energy Council (CEC) has suggested this reflects a challenging landscape for investment decisions due to several factors including a constrained grid, slow planning and approval processes, higher costs and tighter supply chains (CEC, 2024a). This further emphasises the importance of the CIS in supporting renewable deployment. The approximately 8 GW capacity gap could represent an additional approximate \$18 billion of investment to 2030 beyond the current size of the CIS.⁴

⁴ This analysis assumes the ratio of capacity to investment is consistent with the estimate that the current 23 GW of renewable capacity supported by the scheme represents \$52 billion in investment (DCCEEW, 2024g).

Recommendation: Strengthen, broaden, lengthen and embed the Capacity Investment Scheme.

To realise the 82% renewable electricity by 2030 target and meet Australia's increasing electricity demands, the Capacity Investment Scheme (CIS) should be enhanced by:

- substantially accelerating and broadening the scheme to:
 - close the gap to the 82% renewable electricity target, and
 - make an ambitious 2035 abatement target achievable, consistent with Australia's international obligations, and support the clean energy transition required across the economy for Australia to achieve net zero by 2050;
- as the authority suggested in the Sector Pathways Review, embedding the scheme in legislation and, subject to the outcomes of the post-2030 future market design review commissioned by energy ministers, either extend the scheme or replace it with an alternative mechanism beyond 2030 to increase confidence that subsequent emission reduction targets will be met
- prioritising projects that do not require extensions of the shared transmission network, in particular combined solar and battery projects.



Preparing for the retirement of coal plants

Risk of insufficient infrastructure investment

The NEM was designed as a centralised system based on a small number of fossil fuel and hydro power stations (Nexa, 2022). A NEM based on renewables requires a more decentralised system.

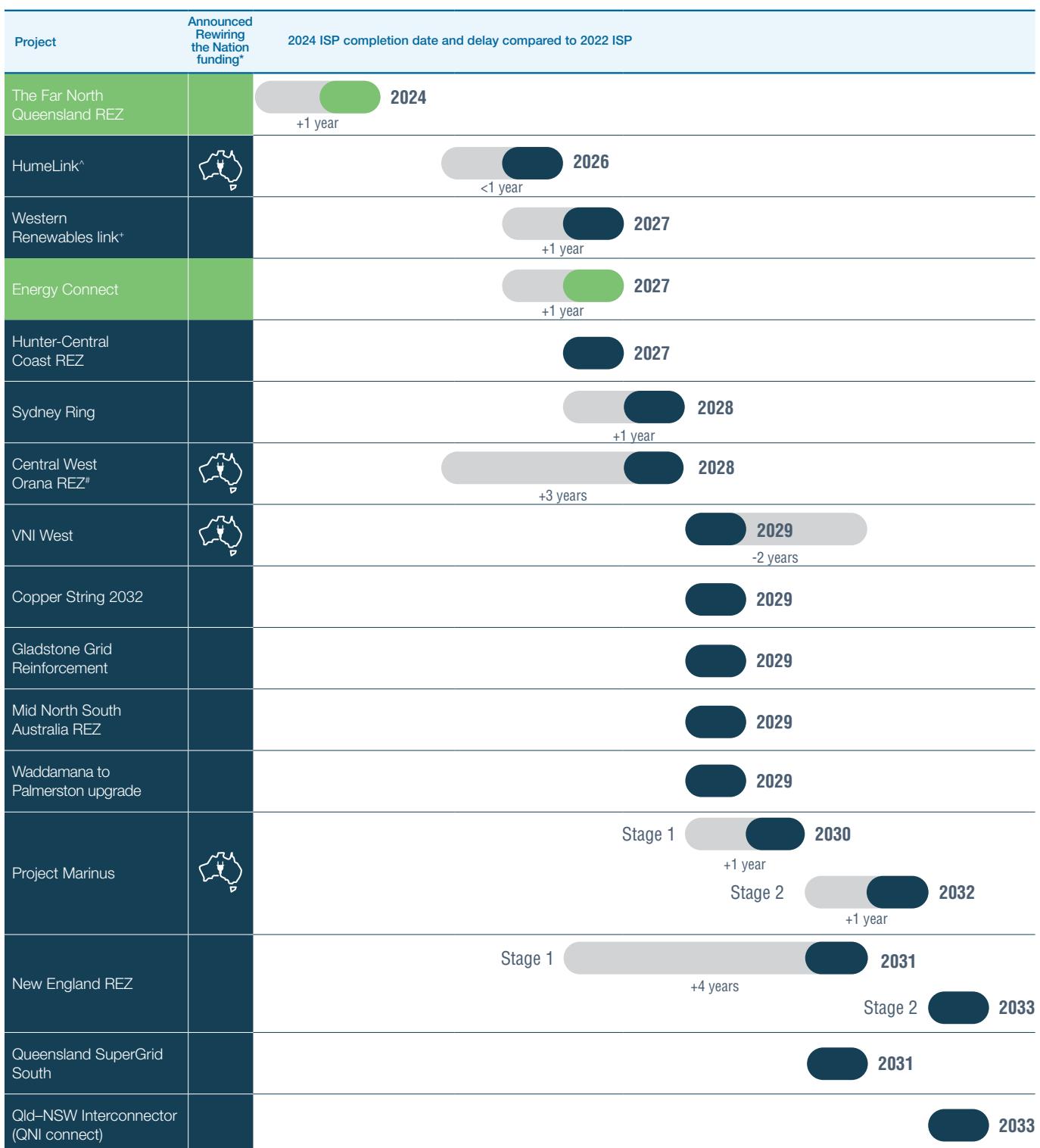
The transition to clean energy depends on a significant expansion of Australia's transmission networks to connect new renewable power stations to the grid and transport the electricity to where it is needed.

AEMO identifies that about 4,600 km of new and upgraded transmission lines are required by 2030 in the optimal development path (ODP)⁵ that best optimises costs and benefits under its central (Step Change) modelling scenario (AEMO, 2024b). Of this 4,600 km, about 900 km is under construction, completed or commissioned, leaving about 3,700 km of new and upgraded transmission lines across 14 projects to be constructed from 2024 to 2030 (Figure ELC.2). However, transmission buildup is falling behind the timeframes that were projected by AEMO in 2022 (Figure ELC.2). While key projects still have delivery dates before 2030, the authority notes many are now expected to be delivered just in time. Further delays would increase the risk of not achieving the 82% renewable electricity target.

5

The optimal development path described in AEMO's 2024 Integrated System Plan is a combination of the size, place and timing of NEM assets, including generation and transmission, that will meet the NEM power system's reliability and security needs, that is aligned with government emissions reduction and other policies, doing so at the lowest long-run cost to consumers.

Figure ELC.2: Network projects under the 2024 ISP optimal development path



 Commenced  Not yet commenced  Delay compared to the 2022 ISP (years)

Sources: (AEMO, 2022b, 2024b, 2024f; CCA, 2023a; DCCEEW, 2024ac).

Note: The figure only captures changes in delivery dates where projects were mentioned in both the 2022 and the 2024 ISP as network projects in the ODP. Status of funding under the Rewiring the Nation program and changes to ISP completion dates are not intended to be read as correlated.

* The figure provides current funding status, noting all of the projects in the table are eligible for consideration under the Rewiring the Nation program subject to the independent investment decision making of the Clean Energy Finance Corporation (CEFC).

[†] Under the 2024 ISP the southern component of HumeLink will be delivered 5 months after the northern component.

[‡] The planned capacity of the project has increased to allow harnessing of 1460 MW of renewable capacity rather than the original design of 600 MW.

[#] The scope of the project has increased to include additional 1500 MW of network capacity, connection lines from Central West Orana REZ to energy hubs and synchronous condensers.

Comparing expected timeframes for transmission projects between the 2022 and 2024 ISPs, the only project now tracking to an earlier completion date is the VNI West project (Figure ELC.2). This follows changes to the planned route for the transmission line based on advice from AEMO (AEMO, 2023f).

The authority notes currently 4 projects have announced public funding under the government's Rewiring the Nation program. This program is investing \$20 billion to deliver new and upgraded transmission infrastructure. The program is providing finance at concessional rates to minimise the costs of these investments, with the aim of lowering the cost of this essential infrastructure to consumers (DCCEEW, 2024ac) (see the authority's Climate Policy Tracker).

Only 2 projects are under construction (Figure ELC.2). Out of these 2, the Far North Queensland REZ was due for delivery in June 2024, with AEMO's Electricity Statement of Opportunity confirming this has been completed (AEMO, 2024a).

Risk of early retirements of coal-fired generators

Around 90% of coal-fired generators in the NEM are expected to cease operations by 2035 (AEMO, 2024b). To maintain system reliability, sufficient renewable generation capacity, together with the requisite network and energy storage infrastructure, must be in place as coal plants exit.

The authority supports the orderly exit of coal-fired generation from Australia's electricity grids. A disorderly process would create risks for the community and decrease community support for the transition to renewables. Australian Energy Ministers are working on an Orderly Exit Management Framework (DCCEEW, 2024ab) for the NEM to create a transparent process to inform government decisions about the closure or life extension of coal-fired power stations. The framework is still under development. Implementing legislation is planned to be considered by the South Australian Parliament by the end of 2024.

AEMO's ISP projects that gas generation capacity is maintained through to 2030 and beyond to provide reliability as coal plants close (AEMO, 2024b). However, this will challenge Australia's gas supply infrastructure (AEMO, 2024b). The CEC has assessed that this reliance is a material risk, particularly in southern parts of the NEM (CEC, 2024c). The authority has previously recommended a coordinated phase-out of residential and commercial gas connections (CCA, 2023a), which could help ease gas supply pressures, and that infrastructure for peaking gas generation could be developed with provisions for hydrogen blending and eventual conversion (CCA, 2024h).

Risk that market and power system operations are not ready for 100% renewables

The NEM is one of the first power systems of its size in the world to face the challenge of balancing very high amounts of renewable energy generation with maintaining system security (AEMO, 2024b). Inverter-based solar and wind resources require, but do not typically provide, system security services such as inertia⁶ and system strength,⁷ which are provided by the spinning turbines of coal- and gas-fired generators.

AEMO estimates that 22 synchronous condensers (which can provide system security by spinning as a generator does) are needed across the NEM. Much of this investment will be needed by 2030 for periods of more limited thermal generation, even before plants formally retire (AEMO, 2024g). Combining hydrogen ready back-up generation which can operate on gas or liquid fuels with these synchronous condensers would form a strong support network for grid system reliability and security. The authority is of the view that AEMO should play a stronger role in the planning and delivery of such a network of synchronous condensers with generation backup (including necessary fuel). The authority considers this is in keeping with AEMO's existing role in ensuring system reliability and security.

⁶ Power system 'inertia' acts to resist changes to grid frequency following a sudden change in grid supply or demand. With more inertia the rate of frequency change is reduced as the kinetic energy stored in the heavy synchronous generators, spinning in sync with the grid frequency, is exchanged with the grid as electrical energy as the generator speeds up or slows down.

⁷ System strength is a characteristic of an electricity grid that relates to the stability of the voltage, at any point in the grid, during normal operations or following a fault or disturbance. Low system strength can cause the maloperation of protection equipment, instability of generator control systems and damage to equipment. System strength is high in well interconnected transmission systems or in network areas with many synchronous generators (AEMO, 2020).

Recommendation: Enable the rapid and large-scale deployment of combined synchronous condenser functionality with back-up generation capability, to provide the system security and reliability services needed for the accelerated deployment of renewables and timely coal power station closures through analysis and tenders run by AEMO.

As identified in the 2024 Integrated System Plan, synchronous condensers will be needed to provide essential security services (inertia and system strength) to enable the rapid growth of wind and solar, and the timely closure of coal-fired generation. Limited gas-fired generation peaking capacity will also be needed to maintain reliability as a back-up for wind, solar, batteries and pumped hydro at times of low renewable output and/or high demand.

To ensure the delivery of these services is efficient and timely, the authority recommends that AEMO be authorised to assess the efficient level of these services and conduct periodic tenders to accelerate their provision by market participants through deployment of synchronous condensers which can be operated as generators. AEMO would tender for this capacity with sufficient lead time to meet any forecast shortfall that has not stimulated a sufficient industry response. Funding would come from market sources, and AEMO would not own the plant.

The power generation capability of these installations should be able to operate on natural gas and renewable gases, and if gas network and storage constraints require, liquid fuels including fuels derived from renewable sources (such as hydrogen).

AEMO's assessment and procurement role should include the upgrade of gas network and storage capacity to ensure an adequate supply of gas for peaking needs.

AEMO notes the remaining system strength services (beyond those delivered through the identified synchronous condensers above) needed in a future grid could be met by emerging technologies such as 'grid-forming' inverters (AEMO, 2024g).⁸ This is provided they can support system security as part of their normal operations. However, these inverters have additional engineering and control system requirements. For example, the provision of 'synthetic' inertia requires sufficient overcurrent levels, suitable control systems and headroom to facilitate the fast exchange of energy with the grid (AEMO, 2023e).

There is no standard that currently applies to grid-forming inverters in Australia to give operators assurance they could provide these services in a consistent and predictable manner. An absence of specifications also makes it challenging for developers to specify their requirements, and for manufacturers to design inverter offerings (AEMO, 2021). AEMO has outlined a set of voluntary specifications for a product to be broadly categorised as 'grid-forming'. However, AEMO notes these specifications are only an interim step as regulatory standards are developed (AEMO, 2023g). Further testing is required of the ability of advanced inverter systems to grid-form at scale in the absence of synchronous generation (AEMO, 2021). This could underpin an appropriate Australian standard. It would require testing in the 'real-world' conditions this technology will need to operate, meaning testing with energy sources and loads at the size of Australian networks.

The government could look to expand the work of the National Measurement Institute, which currently undertakes testing and research for high voltage and high current instruments (DISR, n.d.), and of real-time testing at institutes such as the University of New South Wales (UNSW) (UNSW, n.d.). This expansion will likely require the coordination under a dedicated workstream or strategy to support the standards and testing required. Longer-term, as the need to incorporate new and novel technologies into the grid is likely to continue, the government could consider international examples of large-scale testing facilities such as the Power Networks Demonstration Centre (PNDC) in the United Kingdom. The PNDC has a remit on derisking technologies across the energy sector through open-access facilities (University of Strathclyde, n.d.).

Development of grid-forming battery capacity in the NEM is expected to be world-leading, providing the opportunity to demonstrate these capabilities at scale and share learnings both domestically and internationally (AEMO, 2023c).

The authority's *Sector Pathways Review* also recognises Australia will need to rapidly develop emerging technologies such as new long duration storage solutions in the longer-term (CCA, 2024h). However the current financial support for storage under the CIS is unlikely to bring these technology types forward (CCA, 2024h). The CEC notes some new forms of long duration storage can supply synchronous generation such as compressed air energy storage or could use grid-forming capabilities (for example with alternatives to lithium battery chemistries) (CEC, 2024c). Costs remain a barrier, and the CEC suggests new financing mechanisms are needed (CEC, 2024c). The government can consider what further support is needed now for technologies that could support systems in the future, particularly valuing those that already bundle storage with other services.

Risks that development timeframes for utility scale renewable generation projects are too long to replace coal capacity in time

Following the initial site access and testing phases for potential renewable generation projects, key phases in the development of a project where timeliness is a concern are:

1. landholder agreements
2. environmental and planning approvals
3. financing
4. connection approvals
5. construction

⁸ AEMO had previously estimated that up to 40 synchronous condensers would be required if they provide all system strength requirements (AEMO, 2022a).

Landholder agreements

The Australian Energy Infrastructure Commissioner's Community Engagement Review, published in 2024, identified several important observations and issues in relation to how transmission and generation project developers are interacting with land holders (AEIC, 2023). The Commissioner was able to identify some of the issues that are contributing to negative perceptions of transmission and other renewable energy projects:

- The potential for new transmission lines and associated corridors has unleashed a plethora of wind and solar farm developers, descending on the planned routes. They are attempting to sign up nearby landholders with exclusive contracts over their land.
- While a potential host for a wind or solar farm is usually presented with the potential revenues in the first meeting with a developer, a potential transmission host may have to wait years before an amount is determined and an offer is made.
- Entrepreneurial generation project developers are signing up landholders that have contiguous land parcels along a proposed transmission corridor. This could result in the generation project developer effectively holding control of a very large length of land along the transmission corridor easement.

The Commissioner's report included the following recommendations:

- encourage best practice and select reputable developers for new projects
- reduce unnecessary and onerous community engagement by improving the selection of project sites
- make engagement more efficient by revising planning and approval processes
- improve complaint handling processes
- keep communities informed about the transition, including its goals, benefits and requirements
- equitably share the benefits of the transition.

In July 2024, the Energy and Climate Change Ministerial Council (ECCMC) released a full response to the review and 'agreed' or 'agreed in principle' to all the Commissioner's recommendations (ECCMC, 2024a). The authority welcomes the ECCMC's response to the review and encourages governments at all levels to take coordinated action on the Commissioner's recommendations.

In the Sector Pathways Review, the authority identified the need to strengthen the foundations for social licence and a just transition to net zero. It noted that the impacts of climate change and climate-related policies affect the wellbeing of Australians in different ways. In turn, climate-related wellbeing affects the social licence granted by communities, for example in support of new renewable electricity projects and installation of transmission lines.

The low emissions transition in Australia presents opportunities to secure existing, and grow new, export markets. It could also deliver an energy system operating with the renewable energy as the lowest cost fuel source. These opportunities are important for all Australians.



Box 3: Central West Orana Renewable Energy Zone

EnergyCo, the infrastructure planner for the Central West Orana (CWO) Renewable Energy Zone (REZ), conducted extensive consultation with community stakeholders. This ensured the project delivered genuine shared benefits that aligned with the community's priorities (NSW Government, 2024e, 2024b).

Local councils, First Nations organisations and community stakeholders were consulted to inform the funding priorities and design of the NSW government's \$128 million Community and Employment Benefit Program (NSW Government, 2024e). The consultation uncovered concerns across the community including the need to retain local populations and cost-of-living. It also identified new benefit priorities related to the strategic visioning of the program. These included delivering large, long-term legacy benefits and ensuring equitable benefits that were fair and locally appropriate (NSW Government, 2024b). The consultation found that issues and priorities differed between locations within CWO REZ and between stakeholder groups.

EnergyCo also carried out engagement with the community to inform how impacts and benefits will be coordinated in the REZ. It established a Community Reference Group for the CWO REZ to provide ongoing open forum for discussions between EnergyCo, community and key stakeholders about the REZ transmission project and broader REZ issues (NSW Government, 2024e).

In July 2024, the first tranche of funding was made available to local community groups, councils and First Nations organisations (NSW Government, 2024a). The funding includes:

- Local Community Small Grants for small-scale projects that deliver tangible benefits for local communities
- a First Nations fund for projects that empower local Aboriginal organisations, create employment and participation opportunities
- a Local Community Fund to improve local amenities and foster stronger community connections
- a Legacy Infrastructure Fund for eligible councils to work with communities to deliver infrastructure projects to boost liveability and drive regional economic development (NSW Government, 2024c).

In response to community consultation feedback, EnergyCo and the NSW Government also provided grant writing workshops across the region, with dedicated support for First Nations applicants (NSW Government, 2024c).

Environmental and planning approvals

State and territory planning and environmental approvals

Project delivery timeframes matter for delivering enough generation to meet the 82% renewable electricity target. For new wind farms, the average time between project decision and project completion is more than 5 years in all NEM states (Table ELC.3). Consequently, with little more than 5 years remaining until 2030, these timelines need to be shortened if most new wind projects are going to contribute to the achievement of the target.

Table ELC.3: Windfarms: average timeframes from project decision* to completion

State	Average (years)	Number of projects
NSW	9	16
QLD	8	5
SA	7	19
TAS	7	5
VIC	8	35
National average (discrepancy due to rounding)	8	80
National average weighted by capacity	9	80
National average for projects post 2009 only [#]	6	23
National average for projects post 2009, weighted by capacity [#]	7	23

Source: CCA analysis based on Clapin & Longden (2024), database.

Note: * Refers to the earliest point in time when a decision to start a project could be ascertained;

Refers to projects where the decision to start the project was made after 2009.

There is broad agreement in the sector that approval timeframes (including environmental and planning approvals) are a key barrier to the timely roll-out of renewable generation (Australian Energy Council, Stromlo Energy, Blue Carbon Lab, AGL, submissions, 2024). Industry stakeholders have noted that approvals are delayed because of inconsistent requirements. For example, requests for information being spread out over the approvals process rather than concentrated at the initial stages, and a lack of coordination between government departments (HSF & CEIG, 2024). The authority notes that unless there are changes, the problems may become exacerbated as the number of project proposals grows as intended under federal and state policy initiatives.

Some state governments are pursuing initiatives to improve approval processes:

- NSW is developing a new energy policy framework, which is intended to provide greater clarity about the development assessment of wind, solar and transmission infrastructure projects (NSW Government, 2024d).
- Victoria has announced the extension of its Development Facilitation Program, to eligible renewable energy projects (Victorian Government, 2024b, 2024a). This provides an accelerated pathway which could mean that projects receive a decision within 4 months.
- Western Australia has a dedicated major projects facilitation unit, which acts to streamline approvals for major green energy projects under the Green Energy Approvals Initiative (WA Government, 2023).

The authority's analysis of NSW wind projects indicates state approval processes take on average 4 years (Table ELC.4).

Table ELC.4: Windfarm state approval timeframes, NSW, State Significant Developments only*

Project	Time from proponent's first document or report (to planning authorities) to development consent (months) [#]	Time from proponent's first report to development consent (years, rounded)	Max. capacity (MW)
Hills of Gold	71	6	372
Thunderbolt	42	4	224
Bowmans Creek	57	5	335
Yanco	20	2	1,500
Ungula	96	8	414
Crookwell 3	116	10	50
Liverpool	44	4	962
Rye	40	3	396
Crudine Ridge	63	5	134
Yass Valley	88	7	289
Flyers Creek	63	5	145
Bodangora	34	3	113
Collector	39	3	226
Sapphire	19	2	270
Capital Stage 2	15	1	143.5
Boco Rock	15	1	113
Silvertown	16	1	200
Capital	9	1	140.7
Spicers Creek [^]	27	2	700
Median	40	3	-
Average (mean)	46	4	-

Source: NSW Government (2024f).

Note: Project developers put forward environmental assessment reports as one of the first steps of the approvals process, however the time of the report does not always coincide with the project application itself.

* State Significant Development (SSD): under the NSW planning regime, projects with a capital investment value over \$30 million, or environmental significance, typically fall under the SSD assessment framework (NSW Government, 2021). Whereas earlier in this century some wind projects were too small to fall under the SSD framework, in recent years wind projects are typically large enough for SSD assessment to come into force.

Due to limited data, the authority has estimated timeframes based on the available information. For example, scoping reports or environmental assessment reports are assumed to indicate the commencement of the approvals process.

[^] At the time of writing, the project was referred to the NSW Independent Planning Commission with a recommendation.

Commonwealth environmental approvals

The Samuel Review of the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* found that the assessment and approvals process for projects under the Act could be improved in terms of timeliness, transparency and efficiency (Samuel, 2020). In 2023, the authority recommended that the government build on the recommendations in the Samuel Review to prioritise and expedite the EPBC Act assessment process for large-scale renewable energy generation projects, while maintaining rigorous consideration of environmental impacts (CCA, 2023a).

The government is reforming environmental approvals in response to the Samuel Review, by simplifying and streamlining environmental laws to improve the speed and transparency of approval processes (DCCEEW, 2022b). However, this is taking some time. In early 2024, the government deferred the third and final stage of reforms without a timeline for implementation (Gibson, 2024). Stage 3 involves reforming the environment protection and biodiversity laws and setting the legally enforceable standards underpinning the laws (DCCEEW, 2024j).

The government's planned environmental reforms to improve the speed and efficiency of project assessments and approvals are a critical enabler for the timely transition to a lower emissions energy system. As the authority has observed in last year's annual progress report, delays in planning and approvals need to be addressed in a way that appropriately balances competing objectives. This includes preserving biodiversity, which is integral to the functioning of Australia's natural environments, ecosystem services and human survival (Cresswell et al., 2021; Harrison et al., 2014), while recognising the threat that climate change itself represents to biodiversity. The authority considers there may be a role for governments to take more responsibility for offsetting biodiversity impacts of projects located in areas that are deemed acceptable for priority development.

The authority understands that the government is in the early stages of identifying priority renewables projects for an EPBC assessment initiative that will involve increased regulatory capacity being provided to support timely and robust assessments under the EPBC Act (see the authority's Climate Policy Tracker). The authority recommends there be further efforts to expedite these projects through enhanced coordination, tracking and problem-solving across and within governments, through the National Cabinet and the appointment of an Energy Transition Coordinator (see below).

Financing

See the earlier discussion in this chapter about supporting the rollout of renewables, synchronous condensers and backup generation capacity, and also the authority's Sector Pathways Review (CCA, 2024h).

Connection approvals

AEMO tracks timeframes for projects to progress through its grid connections process via its Connections Scorecard (AEMO, 2024c). In the 2023–24 financial year there was a significant increase in the number of approved applications while approved registration numbers remained relatively steady (Table ELC.5).

Table ELC.5: Results of AEMO's connections score card for utility-scale projects

	2022–23	2023–24	% change
Approved applications	6.8	12	77
Approved registrations	2.4	2.4	1
Full output achieved	na	2.2	na

Source: AEMO (2024c).

AEMO does not currently publish connection application timeline data disaggregated by type of project – e.g., wind, solar, battery, hydro. Making such data available would assist the authority and others better understand the nature of any delays or bottlenecks during the connection application period across different project types.

The Australian Energy Market Commission (AEMC) (2024b) published a rule to speed up the pre-connection process for renewable generation and storage that commenced in July 2024⁹. The rule change places greater information and transparency obligations on AEMO and Network Service Providers, and timeframes for decision making. In consultation with the authority, the CEC observed that the rule change should reduce occurrences in which proponents are required to re-do modelling analysis of their proposed projects submitted as part of registration applications, which are creating bottlenecks in the connection queue (CEC, 2023).

9

The pre-connection registered data due diligence process can be lengthy due to generators often having little clarity as to why a large number of modelling iterations are needed to demonstrate that the generator will perform as expected (AEMC, 2024b).

Recommendation: Speed up connection approval processes for large-scale generators in the National Electricity Market, while enhancing the transparency of those processes.

With an unprecedented roll-out of renewables, storage and firming needed to deliver 82% renewable electricity by 2030, an unprecedented volume of capacity will seek connection.

However, AEMO and transmission network service providers (TNSPs) appear to lack sufficient capacity to handle the quantity of new connection applications that will need to be assessed, and it is not clear how long different types of projects are currently taking to obtain connections. Improving this information could set realistic expectations for project proponents, and better support progress tracking. Better information about current connection times will also enable more informed consideration of resourcing needs for AEMO and TNSPs.



Construction

There will be global competition for the components and materials Australia will rely on to decarbonise its electricity sector. This will create a risk for the timely delivery of critical energy infrastructure (AEMO, 2024b).

The authority noted in its Sector Pathways Review that whole-of-Commonwealth coordination could be leveraged to secure Australia's position in global supply chains and avoid companies across different states competing for the same international supply of components (CCA, 2024h). This could involve the 'bundling' of similar or identical products across projects and proponents, with the support and coordination of governments, as well as strategies led by governments. This could include technologies such as synchronous condensers, which AEMO expects to deliver essential grid services for grids with high shares of renewable generation (CCA, 2024h). Aggregated orders for certain technology and components could also make Australia a more attractive market for global suppliers.

Such strategies may also be relevant for transmission projects. Transgrid has announced it is bundling procurement for the Project EnergyConnect, VNI West and HumeLink projects to deliver works faster and cheaper (Transgrid, 2024). Easing financial pressures for transmission projects may be especially beneficial as relevant cost estimates have risen by approximately 30% in real terms over the past 2 years (AEMO, 2024b). AEMO expects costs to continue to rise beyond inflation over the coming years due to global demand and lags from supply-side ramp-up (AEMO, 2023b).

Noting AEMO has recognised Australia will need access to these technologies over the next 15 years in particular, and purchase lead times can be over 5 years, governments could look to prioritise a strategy immediately through the ECMC (AEMO, 2023a, 2024b). This could be done while reviewing whether the quantity of funding under Rewiring the Nation remains adequate noting cost increases since the policy was announced.

Risk that insufficient consumer energy resources are integrated into grid operations

Orchestrating consumer energy resources can make a significant contribution to meeting the 82% renewable electricity target while delivering cost savings to consumers. AEMO projects 3 GW of household and business battery and solar systems to be installed each year by 2030 in the NEM to be consistent with reaching 82% renewable electricity (AEMO, 2024b). The CEC has estimated savings of over \$22 billion and \$35-\$71 in average annual savings on energy bills if Australia achieves AEMO's projections of consumer energy resources (including distributed solar PV and batteries) under the ISP (CEC, 2024b). Australia is on track to record around 3 GW of installed distributed solar PV capacity in 2024 (CER, 2024j). The authority made a recommendation in its 2023 Annual Progress Report that the government considers extending the Small-scale Renewable Energy Scheme (SRES) to provide support for small-scale battery systems to overcome the barrier of upfront costs (CCA 2023a).

Electricity distribution networks and commercial and industrial (C&I) electricity consumers should be empowered to deploy more renewable electricity generation and storage, to complement utility-scale and household-scale generation and storage. Australia has the potential for up to 28 GW of solar generation on C&I rooftops that is unlikely to be fully realised without appropriate incentives (Roberts et al., 2019). AEMO projects that by 2030, less than 5% of C&I annual electricity consumption will be met by rooftop solar (or on-site generation) compared to nearly half for residential consumption (AEMO, 2024b). Projects with registered capacity below 30 MW are not eligible to participate under the CIS (DCCEEW, 2023d, 2024h, 2024i). Commercial systems may range from below 30 kW to over 250 kW depending on the enterprise (Smart Commercial Solar, 2024). The government should develop and implement a mechanism to incentivise C&I customers to invest in rooftop solar installations and require distribution network service providers (DNSPs) to plan and deliver timely and efficient connection for C&I rooftop solar.

The government should also further support the roll-out of community-scale batteries to achieve more energy storage at the distribution network level. Research suggests community-scale batteries can increase hosting capacity for additional rooftop solar exports (Shaw et al., 2024a). Ensuring these batteries operate in ways that ‘soak’ up this additional solar and making projects financially viable may depend on reform of solar tariff arrangements (Shaw et al., 2024a, 2024b). Energy Networks Australia has suggested allowing DNSPs to share battery capacity with third parties could allow for faster community-scale battery roll-out (ENA, 2024).¹⁰ The AER could consider if current exemptions to market rules that allow DNSPs to do this for projects under the government-funded community battery initiatives are more broadly appropriate to bring more batteries online outside of those funded by the government (AER, 2023).

Vehicle-to-grid (V2G) technology may play an important role in orchestrated consumer energy resources. V2G allows the use of an electric vehicle as a battery for energy storage, which electricity retailers can call on to supply electricity back to the grid. V2G may also play a role in stabilising Australia’s grids through participation in Frequency Control Ancillary Services (FCAS) markets (ARENA, 2024). In its 2023 Annual Progress Report, the authority suggested that appropriate regulation for V2G could increase the uptake rate of V2G charging technology and interest from car manufacturers in incorporating this technology in a wider range of vehicles (CCA, 2023a). This could in turn make electric vehicles more appealing to consumers. The CEC has suggested the government set targets for the level of uptake and orchestration of consumer energy resources (CEC, 2024b).

Rolling out smart meters that provide real time electricity use data could support the energy system transition and benefit consumers (DCCEEW, 2023a; Henriot, 2023; NSW Government, n.d.-b). They would provide information to distribution network operators to help manage their systems efficiently and enable consumers to make informed decisions on electricity use to save on their bills. The AEMC has a draft rule for ‘accelerating smart meter deployment’ in place, which seeks to achieve uptake of smart meters by all electricity users in the NEM by 2030 (AEMC, 2024a). The authority considers there is considerable merit in accelerating the deployment of smart meters and making leading-edge data services available to electricity retailers and customers to better inform consumer choices.

Government can also look for other ways to more suitably classify charging as a service under electricity regulation to better utilise Australia’s existing grid infrastructure. The authority emphasised in its *Sector Pathways Review* the importance of a faster roll-out of public charging for electric vehicles (CCA, 2024h). ARENA has provided funding for trials of electric vehicle chargers on street side power poles and some DNSPs have begun their own trials using their existing assets (ARENA, 2022; Ausgrid, 2023; Essential Energy, 2024). Government can look to encourage competition and faster roll-out of this infrastructure, which can support uptake for those without access to off-street parking. Energy Networks Australia has suggested the current exclusion of charging as a distribution service restricts DNSPs from deploying this infrastructure on the assets they already manage and maintain (ENA, 2024).

¹⁰ Currently rules do not allow DNSPs to lease spare battery capacity to third parties to realise this additional value from the battery. This restriction falls under the rules separating distribution services and unregulated or contestable services by a DNSP to ensure they do not cross-subsidise the cost of unregulated services, or discriminate in contestable markets in favour of affiliated entities (AER, 2023).

Recommendation: Make full use of the potential contribution of electricity distribution networks, and commercial and industrial customers' premises, to host renewable electricity generation and storage.

Australia's electricity distribution networks and commercial and industrial (C&I) customers should be empowered to play a much greater role in the deployment of renewable electricity generation and storage.

This would complement the vital contribution of transmission-connected and household generation and storage.

Key initial actions are:

- develop and implement a scheme to incentivise C&I electricity customers to invest in large rooftop solar PV and battery storage installations (to add capacity without worsening the 'duck curve' phenomenon - high solar energy production during the middle of the day when grid demand is relatively low)
- require distribution network service providers (DNSPs) to plan and deliver timely and efficient connections for C&I rooftop solar and battery storage
- empower DNSPs to plan and install batteries in their networks, including in partnership with market participants, to complement and not crowd out behind-the-meter storage, and allow their efficient costs to be recovered through DNSP's regulated network charges
- establish a framework for the integrated planning by DNSPs and TNSPs of major network asset and service upgrades, and create a complementary mechanism for DNSPs and TNSPs to invest in minor network upgrades that will accelerate deployment of renewables and storage
- accelerate the mandatory, regulated deployment of smart meters by distributors, and require them to provide leading-edge data services to their customers and retailers.



Recommendation: Endorse the provision of further advice on the electricity recommendations.

The authority proposes to seek additional expert input about its recommendations to refine and focus them, and provide a further report by no later than April 2025.

Whole-of-system coordination and delivery

Without a stronger approach to coordinating efforts across the energy system, across different levels of government, and across portfolios within governments, the authority considers there is a high risk that efforts to accelerate the roll-out of clean energy infrastructure will come up short of what is required.

There is work underway aimed at improving the planning and approval process for renewable energy-related infrastructure. Accelerating the delivery of nationally significant transmission projects is currently listed as a National Cabinet priority and the ECMC is responsible for delivery of this priority (PM&C, n.d.). In the 2024–25 budget, the government provided \$19.9 million to DCCEEW to ‘agree and maintain a national priority list of renewable energy related projects and process assessments for priority projects’ (Australian Treasury, 2024b).

Several states are also working on this issue. For example, NSW is currently developing a new energy policy framework which is intended to provide greater clarity about the development assessment of renewable energy projects (NSW Government,

n.d.-a). Also, the Commonwealth is entering into Renewable Energy Transformation Agreements with states and territories (DCCEEW, 2024g). Within these agreements the jurisdictions will be asked to work with the Commonwealth to ‘address non-market barriers to investment, such as planning and environmental approvals’.

Planning and approvals for renewable energy have been discussed at Planning Ministers’ Meetings and Environment Ministers’ Meetings (DCCEEW, 2023f; DITRDCA, 2023). However, the authority is not aware of a collaborative effort between these Ministerial Councils and the ECMC to address this issue. Due to the cross-portfolio nature of this issue, and the urgent need to speed up renewable energy deployment, these parties could collaborate to monitor ongoing work improving planning and approvals to ensure it is effective. The authority notes the importance of coordinating capacity successful in tendering under the CIS with the required transmission upgrades, to ensure there is no mis-match in timing for additional capacity and the grid’s capabilities to connect to these sources to the network.

Recommendation: Through the National Cabinet, task relevant ministers to work together to overcome barriers to the energy transition.

Collaboration across levels and portfolios of government should be driven by first ministers and central agencies through National Cabinet. The Energy and Climate Change Ministerial Council (ECMC) will continue to hold substantial accountability for the energy transition, but many other national ministerial forums will also need to make key contributions.

The ECMC should collaborate with other relevant ministerial forums (such as Planning, Environment, Infrastructure and Transport, and Education Ministers Meetings), to prioritise:

- the implementation and monitoring of planning reforms to address approval delays and social licence concerns that are impeding the rollout of renewable generation, transmission and other infrastructure and decarbonisation projects
- planning and delivery of port, rail and road upgrades to ensure the timely and efficient movement of unprecedented volumes of heavy energy equipment to renewable energy zones
- building workforce capacity and capability to support the rapid growth of energy infrastructure and services.

The authority notes the steps taken by the United Kingdom in establishing a ‘Mission Control for Clean Power’ to coordinate the clean energy transition (see box below). A similar role, tailored to the context of the governance of Australia’s energy system, could enhance

transition efforts here. The scope of the role would include all major projects relating to the transition to renewables while maintaining the reliability and security of the electricity system, including generation, transmission, storage, and synchronous condensers.

Recommendation: The Minister appoint an Energy Transition Coordinator to drive and monitor the delivery of economically efficient, reliable and low emissions electricity grids.

The scale, complexity and interdependence of investment and action required by many bodies for decarbonising the electricity system necessitates strong coordination – across the energy market, across levels of government, and across portfolios within governments. The authority recommends a new, senior, full-time role – Energy Transition Coordinator – be created within the Minister’s department. The Energy Transition Coordinator, backed by a small team of experts, would support the Minister (and through the Minister, the Energy and Climate Ministerial Council) and liaise with stakeholders to drive Australia towards its energy and emissions targets, including by:

- advising on CIS targets
- facilitating effective delivery of priority actions involving multiple jurisdictions and/or levels of government
- tracking progress and identifying measures to overcome barriers and accelerate action.

A key focus of the Energy Transition Coordinator would be the priority renewable energy projects for the transition currently being identified by the government.

Box 4: UK government establishes Mission Control for Clean Power, to coordinate the transition to clean energy.

The Government of the United Kingdom and Northern Ireland has established project Mission Control and appointed its first lead, Chris Stark, to drive the UK government's goal to provide the UK with cheaper and clean power by 2030 (UK Government, 2024).

The UK has a number of 2030 goals for its energy system, including delivering a cheaper, zero-carbon electricity system by 2030.

Project Mission Control will initially focus on 4 areas of activity:

- setting and tracking the overall approach to delivering on the 2030 energy system goal
- real time monitoring of progress on UK infrastructure projects critical to the 2030 goal
- acting as an innovation centre by encouraging discussion among experts
- serving as a convener for the Mission Control approach across government and with industry.

Although there are barriers to overcome, there are enablers and opportunities for reducing electricity emissions

There are a range of opportunities to support the rapid deployment of the renewable energy capacity required to reduce electricity emissions. These measures can also provide benefits and support to ensure Australian communities are not left behind. These include:

- unlocking energy performance and energy efficiency for consumers, which has added benefits for grid stability and transmission build out
- empowering and resourcing First Nations Australians to lead on solutions for the energy transition in their communities.

Unlocking energy efficiency and demand management

Energy performance is a powerful tool for reducing emissions and improving levels of comfort and wellbeing. A key component of energy performance, energy efficiency also plays a vital role for consumers by reducing the amount of energy they are paying for. The authority has heard in consultation that demand management and flexibility can help to shift overall energy demand and reduce the pressures on the electricity system. By reducing the amount of generation and transmission capacity needed, these measures can also minimise costs in the power sector (ASBEC, 2022; White et al., 2023). The Sector Pathways Review found there are immediate opportunities to drive energy efficiency improvements, support demand management and accelerate electrification, particularly for the built environment (CCA, 2024h).



Energy prices, cost of living and climate resilience

The cost of electricity and energy has increased for many Australian consumers (ABS, 2024b; ACCC, 2024). The affordability of electricity is part of wider cost-of-living pressures, with many Australian households struggling to pay their energy bills (ABS, 2024b; AER, 2024).

In most cases, the technologies and actions required to electrify buildings and improve energy performance are demonstrated and commercially available (CCA, 2024h). Opportunities include installing more energy-efficient electric appliances, improving building thermal efficiency, managing energy demand, optimising the use of existing appliances and behaviour changes or automation to facilitate load shifting (shifting demand for power to when it is more readily available from renewable sources during the middle of the day) (CCA, 2024h).

The authority heard through consultation that minimum energy efficiency standards are effective mechanisms for achieving many of these goals. This also has the co-benefit of minimising costs, with the Energy Efficiency Council estimating that minimum appliance energy efficiency standards saved Australian consumers between \$9.4 billion and \$18.8 billion between 2000 and 2020 (DCCEEW, 2019; EEC, 2023).

Energy efficiency measures not only provide energy bill relief by reducing the need for heating and cooling but can also improve resilience to climate-related hazards. This is because these measures can reduce the energy needed to maintain comfortable indoor temperatures across the year, including during periods of extreme heat (Climateworks Centre, 2023). Improving building energy efficiency is critical for improving thermal comfort, health and wellbeing. This is particularly pertinent for people experiencing vulnerability, who are more likely to live in inefficient and poorly insulated dwellings (ACOSS, 2024).

Box 5: Housing and heat stress

Climate change is exacerbating the need for energy efficient housing, cooling and energy security to cope with rising temperatures. More people in Australia are dying from extreme heatwaves than any other natural hazard (Coates et al., 2022; KCLS, 2023).

Low quality housing and lack of reliable supply of electricity are common issues in remote First Nations communities (Quilty et al., 2022). Low-income households may also struggle to manage high temperatures and heatwaves due to not being able to afford to run air-conditioning systems (Farbotko & Waitt, 2011; QCOSS, 2014). Maintenance issues and crowding can also further inhibit public housing tenants in some remote areas from being able to control energy efficiency and temperature in homes (KCLS, 2023). These factors can have severe consequences for health and well-being, including higher mortality rates (Longden et al., 2022; Quilty et al., 2022).

Temperature extremes are also exacerbating energy insecurity for low-income and remote First Nations households, particularly during extreme heat events (Longden et al., 2022; Quilty et al., 2022). Many remote First Nations households also face unique challenges when they rely on prepaid metering. This is widely used in the Northern Territory, and is associated with high rates of energy disconnections (McKenzie, 2013; QCOSS, 2014; Quilty et al., 2022).

Policies, incentives, regulation, and barriers

The Australian Government and many states and territories have some policies for improving energy performance outcomes (refer to the Climate Policy Tracker for more details). However, further policy action is needed to drive economy-wide improvements. The authority heard through expert consultation that a lack of adequate incentives and regulations, especially nationally consistent regulation and standards, impedes the adoption of energy performance measures.

The National Energy Performance Strategy (NEPS) provides a national long-term framework for managing energy demand (DCCEEW, 2024s). Many experts support the NEPS and consider it to be important and necessary; however, some experts have brought attention to gaps in the strategy and an urgent need to further develop targeted policies and programs, as well as national targets (EEC, 2024; City of Sydney, IEEFA, Climateworks Centre, submissions, 2024). Suggested policies include:

- scaling up home thermal efficiency improvements
- expanding commercial building rating and disclosure frameworks to cover all building types
- improving industrial energy performance
- accelerating the roll-out of appliance ratings and standards
- trialling and incentivising load shifting and grid integration
- encouraging the uptake of energy efficient appliances (e.g. heat pumps)
- setting of explicit energy efficiency targets.

Australia's houses have some of the poorest energy efficiency ratings in the developed world (Castro-Alvarez et al., 2018). Homes built prior to national energy efficiency standards in 2003 are estimated to have an average NatHERS rating of less than 3 out of 10 (Rajagopalan et al., 2023).

Regulations to improve these ratings for existing buildings could include:

- introducing minimum standards for homes and rental properties
- mandatory energy rating disclosures
- improved building standards across jurisdictions through the National Construction Code (NCC) and jurisdictional schemes (CCA, 2024h; Renew, 2023).

Minimum energy efficiency standards for rental properties are most developed in the ACT, requiring properties meet minimum standards for ceiling insulation (ACT Government, 2024). In Victoria, similar requirements have been proposed (Healthy Homes for Renters, 2024).

Upgrading appliances is another method of improving a building's energy efficiency. Minimum appliance standards are an effective way of improving appliance energy efficiency, reducing emissions and providing long-term cost savings (CCA, 2024h). In Australia, the Greenhouse and Energy Minimum Standards (GEMS) program establishes minimum energy efficiency requirements for certain appliances (Australian Government, 2024a). However, more appliances and equipment could be covered by GEMS determinations and the program expanded with more resources. It is also concerning that it takes a minimum of 3 years for determinations to be made. To improve appliance energy performance this decade, new GEMS determinations are needed to fill critical gaps (e.g. LED lighting). This needs to happen on an accelerated timeline.

Financing energy efficiency improvements of dwellings remains a challenge. Although energy efficiency measures yield returns on investment and save occupants money in the medium to long-term, upfront costs remain a significant barrier to upgrading homes and appliances, and thus to realising these long-term benefits (Renew, People's Climate Assembly, Labor Environment Action Network, ACOSS, Australian Gas Infrastructure Group, submissions, 2024).

The authority's Sector Pathways Review identified that high upfront costs of home energy efficiency upgrades are cost prohibitive for low-income earners (CCA, 2024h). The government provides no comprehensive supports tailored to the needs of low-income earners. This means this cohort is experiencing high energy costs as well as poorer health outcomes.

During consultation, the authority heard that immediate payments such as rebates and grants are the most effective support for this cohort. The authority heard that government financing for electrifying and retrofitting social and public housing is considered 'low-hanging fruit' and a key means of creating economies of scale and building market capacity (ACOSS submission, 2024; ACOSS, 2024). This is a significant opportunity, with approximately 450,000 social housing dwellings currently operating in Australia, as at June 2023 (AIHW, 2024). While schemes like the CEFC Household Energy

Upgrades Fund reduce these barriers for medium and high-income earners, barriers for low-income earners remain. In consultation, the authority heard that loans were not a viable financing option for this cohort. It is critical that low-income earners are provided targeted support through either a national rebate or grant mechanism.

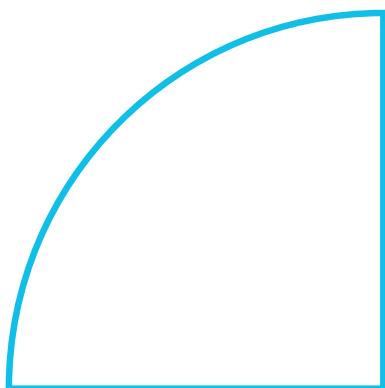
Electrification is also lagging in Australia. The current rate of change from gas to electric appliances is slower than is required to meet Australia's net zero targets (DISR, 2024a). Currently, over 5 million homes are connected to the gas network and an estimated 750,000 use bottled gas each year (Grattan Institute, 2023).

Electrification, energy efficiency upgrades, demand flexibility and grid interoperability of government owned assets present immediate opportunities to reduce emissions before 2030. The government has set a net zero target for government operations by 2030 (Department of Finance, 2024). However, this does not apply to Corporate Commonwealth Entities (Department of Finance, 2024). The authority has heard that this means many government-owned, managed or financed buildings are not required to reduce their emissions. They are also not achieving modern energy efficiency standards. For example, there are approximately 17,000 properties managed by Defence Housing Australia (DHA), as well as many of the approximately 450,000 social housing dwellings, that are not covered by emissions targets (AIHW, 2024; DHA, 2022).

The authority also heard during consultation that a key barrier is a lack of policy direction and targets. This could be addressed by expansion of the Net Zero in Government Operations Strategy. As the largest building owner and operator in Australia, the government has the levers to drive systemic change. By aligning government building portfolios (e.g. Housing Australia and Defence Housing Australia) with a net zero target, procurement and management teams can focus on uplifting building stock to all electric, high efficiency buildings.

The authority heard from stakeholders that the availability and accessibility of high quality, comprehensive, and nationally consistent data has been a key barrier to improving building energy efficiency in Australia. A lack of metrics and data also prevents the authority and others from independently measuring progress. Data gaps include efficiency ratings for many appliances (e.g. LED lighting), information on the benefits of improving energy efficiency, costs and returns-on-investment, as well as some basic information such as energy efficiency ratings for all Australia's buildings and building types. During consultation, the authority was repeatedly told that data gaps are leading to poor decision-making by consumers as well as policy makers. The authority also heard in consultation that information gaps are barriers to implementing standards and mandatory disclosures. This is because accurate data is a necessity for monitoring and evaluating energy efficiency.

This lack of information means that the benefits of energy efficiency are often difficult for consumers and asset owners to measure and realise. This prevents consumers, businesses and policy makers from making investment decisions (CCA, 2024h). Consumers typically do not have the information they need to understand how to upgrade the energy efficiency of their assets or to understand the return on investment (both monetary and non-monetary) they receive from this.



Recommendation: Uplift national building energy efficiency and drive the acceleration of building retrofits through improved information, regulated standards and national policy support.

Priority actions are:

- expanding the number of products covered by the Minimum Energy Performance Standards under the *Greenhouse and Energy Minimum Standards Act 2012* and accelerating timelines for making Greenhouse and Energy Minimum Standards determinations
- establishing a national rebate or grant mechanism to finance building energy efficiency upgrades for low-income earners
- aligning Australian Government-owned, managed and financed building portfolios with the Australian Public Service Net Zero 2030 target
- working with state and territory governments to expand the scope of existing building disclosure schemes and to mandate the public reporting of building energy ratings.

Energy efficiency is a powerful tool for reducing emissions, reducing energy consumption and improving wellbeing.



First Nations energy security and self-determination

The First Nations Clean Energy Strategy (FN CES) being developed by Commonwealth, state and territory energy and climate change ministers presents an opportunity to enhance First Nations' equity, prosperity and self-determination in the roll-out of clean energy technology (DCCEEW, 2024k). With appropriate resourcing and capacity building, First Nations can lead the delivery and maintenance of projects on their land and share in the wealth generated by them.

The authority notes the strategy framework, endorsed by energy and climate ministers in July 2024, aims to deliver self-determined opportunities for social and economic benefits to First Nations people, resource equitable partnerships, and power First Nations communities with clean energy (ECMC, 2024b). The authority supports the intention of the Commonwealth, state and territory governments in this initiative and welcomes the strategy and implementation plan, supported by budget measures, to be considered by Commonwealth, state and territory energy and climate change ministers in December 2024.

The authority considers that the FN CES represents an opportunity to deliver important outcomes for First Nations Communities, including:

- Resourcing and empowering communities, particularly through First Nations representative bodies such as Prescribed Bodies Corporate (PBCs), to effectively engage, advocate, negotiate and communicate to capture the benefits of the transition, including through equity ownership in projects.
 - PBCs have direct access to communities and potential to elevate First Nations priorities in transition projects. PBCs need resourcing to build internal capacity and access expertise to self-determine how clean energy projects are rolled out. Governments have an important role to play in supporting this capability uplift. The National Indigenous Australians Agency (NIAA) has several initiatives in place to support PBCs that could be built on.
- Working with remote communities to build renewable energy microgrids and satellite internet connectivity. This includes ownership and participation in the projects and their ongoing management and maintenance.
 - Existing programs like Community Batteries and the Regional and Remote Communities Reliability Fund could be built on to deliver reliable renewable electricity and internet connectivity to remote communities and replace costly and unreliable diesel generators.
- Engaging consistently and deeply with First Nations to enable leadership, ownership and participation for First Nations people in projects located on the First Nations estate.

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3. Performance of the Safeguard Mechanism

3. Performance of the Safeguard Mechanism

Key points



The Safeguard Mechanism is the government's key policy measure for largest industrial facilities, and it creates demand for carbon offsets.



Commencing in 2023–24, reforms to the Safeguard Mechanism mean that facilities covered by the scheme are subject to annual emissions limits, known as baselines, that fall each year.



The government is relying upon the reformed scheme to make a significant contribution to the achievement of Australia's 2030 emissions reduction target – as much as 41 Mt CO₂-e in 2030.

The authority has assessed net Safeguard emissions against legislated safeguard outcomes, including annual net Safeguard emissions declining to no more than 100 Mt CO₂-e by 2030 and net Safeguard emissions over the decade to 2030 not exceeding 1,233 Mt CO₂-e.



Preliminary data shows covered Safeguard emissions in 2023–24 were 135.8 Mt CO₂-e, a reduction of 2.9 Mt CO₂-e (2.1%) from 2022–23 levels.



The authority's assessment for this report is that net safeguard emissions are declining consistently with the safeguard outcomes, while noting:

- uncertainties associated with the reformed scheme only having been in place for one full year
- final information on the outcomes of the scheme in 2023–24 not yet being available
- the authority's assessment relying in part on projections of outcomes to 2030.

An important ongoing watchpoint will be the extent to which Safeguard facilities rely on Australian Carbon Credit Units (ACCUs), and Safeguard Mechanism Credits (SMCs), to meet their declining baselines, as opposed to reducing their onsite emissions.

- Preliminary data shows 153 of the 215 covered facilities had emissions higher than their baselines, by an estimated aggregate amount of 10.7 Mt CO₂-e.
- 60 facilities reported emissions below their baseline and could be eligible to apply for a total estimated 9.2 million SMCs in 2023–24.

The government's Safeguard Mechanism policy requires Australia's largest industrial emitters to reduce emissions in line with legislated targets (DCCEEW, 2024ad). The framework sets legislated limits on emissions, known as baselines, for each facility.¹¹ In 2023, the government passed reforms to gradually reduce the baselines of covered facilities using set decline rates, with effect from 1 July 2023.

In 2022–23, facilities under the Safeguard Mechanism were responsible for 31% of Australia's emissions (CCA, 2024a). Preliminary data for 2023–24 shows covered emissions were 135.8 Mt CO₂-e (see Table SGM.1 for the authority's summary of the preliminary 2023–24 Safeguard data). This is a reduction of 2.9 Mt CO₂-e compared to 2022–23 levels and an increase of 4.5 Mt CO₂-e compared to 2016–17 (Figure SGM.1).

Note for readers:

This is the first year of the authority's in-depth analysis of the performance of the reformed Safeguard Mechanism. It is based on the best data available to the authority as at the time of writing. Some of the data used are preliminary only - for example the 2023–24 emissions data provided by the Clean Energy Regulator, which are yet to be subject to full quality control and may be adjusted in due course as a result of mechanisms and decisions that are yet to be applied. Further, advising on projects and changes that are yet to occur, and likely emissions in future years, necessarily involves the making of various assumptions. Accordingly, while the authority has endeavoured to assemble the best available data and test its conclusions, there is necessarily some uncertainty in the figures and conclusions presented in this chapter. Relevant limitations, assumptions and associated uncertainties are explained further in the body of this chapter. The authority expects that this uncertainty will reduce in subsequent Annual Progress Reports as the reforms mature and the available dataset grows.

Figure SGM.1: Covered emissions by sector reported under the Safeguard Mechanism, 2017–2024¹²



Source: CCA, 2024b.

¹¹ A baseline applies to a facility's scope 1 emissions – the emissions resulting directly from activity at the facility.

¹² The covered emissions data does not account for revisions to reported emissions, or the change in global warming potential (GWP) when the NGER legislation was amended to update GWP values in 2020 (*National Greenhouse and Energy Reporting Amendment (2020 Measures No. 1) Regulations 2020*) except for a small number of baselines that have been adjusted by the CER to account for the change in GWP.

Safeguard terminology

Covered emissions – scope 1 emissions of one or more greenhouse gases (t CO₂-e), other than emissions specified in Part 2 of the Safeguard Rule.

Safeguard Rule – *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015*.

Safeguard baseline – the legislated limits on the greenhouse gas emissions of covered safeguard facilities. Baselines will decline on a trajectory consistent with achieving Australia's emission reduction targets. In general, baselines will fall by 4.9% each year to 2030.

Net Safeguard emissions – for the purpose of this report, net Safeguard emissions are estimated as either the:

- covered emissions where the facility's covered emissions are below its baseline, or
- facility's baseline where the facility's covered emissions are above its baseline.

Projected covered emissions – projected future covered emissions.

Projected baseline – projected future Safeguard baseline value calculated using estimates for future production.

Projected net Safeguard emissions – projected future net Safeguard emissions.

Aggregate projected net emissions – sum of all projected net Safeguard emissions to 2029–30 (summed over the period 2024–25 to 2029–30 for this year).

Aggregate projected baseline – sum of all projected Safeguard baselines to 2029–30 (summed over the period 2024–25 to 2029–30 for this year).

Production variable (PV) – the range of products produced at Safeguard facilities as defined in Schedule 1 of the Safeguard Rule. Under the Safeguard Mechanism, baselines are production-adjusted, meaning that they increase and decrease as a facility's production varies.

Safeguard Mechanism Credit (SMC) – a unit representing one tonne of carbon dioxide equivalent (tCO₂-e) emissions below a facility's baseline. SMCs are tradeable credits and can be sold to other Safeguard facilities or surrendered to stay within baseline for a facility.

Multi-year monitoring period (MYMP) – responsible emitters can apply for a MYMP for a facility. If a MYMP is granted, the baseline emissions number for the facility is calculated as a single baseline number that applies across the entire MYMP, which can be from 2 and up to 5 years.

Trade-exposed baseline adjusted (TEBA) facilities – Safeguard facilities whose main production variable is trade exposed, as set out in Schedule 2 of the Safeguard Rule, and face an elevated risk of carbon leakage. TEBA facilities are provided a reduced decline rate for 3 years based on an assessment of the cost impact of the Safeguard Mechanism on a facility relative to the facility's revenue in a financial year.

Reforms to the Safeguard Mechanism

The Australian Government made changes to the Safeguard Mechanism in 2023 which aim to deliver emissions reductions to support the achievement of Australia's targets of 43% by 2030, and net zero by 2050, as outlined in the supplementary explanatory memorandum of the *Safeguard Mechanism (Crediting) Amendment Bill 2023* (Safeguard Crediting Bill). The first year of operation of the reformed scheme was 2023–24. The reforms included requiring facilities' baselines to decline by 4.9% per year to 2030 (DCCEEW, 2024ad), and the introduction of 5 new 'safeguard outcomes' (b) to (f) in the objects of the NGER Act.¹³

- b. net Safeguard emissions between 1 July 2020 and 30 June 2030 do not exceed 1,233 Mt CO₂-e.
- c. net Safeguard emissions decline to:
 - i. no more than 100 Mt CO₂-e for the financial year beginning 1 July 2029, and
 - ii. zero for any financial year beginning after 30 June 2049.
- d. the 5-year rolling average of (gross) Safeguard emissions for each financial year beginning after 30 June 2024 is lower than the past 5-year rolling average.
- e. the responsible emitter for each designated large facility has a material incentive to invest in reducing covered emissions from the operation of the facility
- f. the competitiveness of trade-exposed industries is appropriately supported as Australia and its regions seize the opportunities of the move to a global net zero economy

As outlined in the supplementary explanatory memorandum of the Safeguard Crediting Bill, outcomes (b) and (c)(i) seek to ensure the reduction of net emissions under the Safeguard Mechanism is consistent with Australia's 2030 legislated targets. Outcome (d) seeks to ensure that at least some portion of the emissions reduction is from direct onsite abatement.

Under section 14 of the *Climate Change Act 2022*, the authority is required to advise on whether gross and net Safeguard emissions are declining consistently with the safeguard outcomes (b), (c) and (d). If they are not, the authority must include advice about whether any amendments to the *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* (Safeguard Rule) are needed to achieve each of the outcomes. This assessment of net and gross Safeguard emissions must consider the impact of new or expanded Safeguard facilities for the financial year, or any expected new or expanded facilities for future financial years. The authority's assessment must also consider any emissions estimates provided to the authority by the Minister for the Environment for approvals under the *Environment Protection and Biodiversity Conservation Act 1999*.

Compliance under the Safeguard Mechanism

Safeguard facilities that exceed or expect to exceed their baseline have several options (flexibility mechanisms) to manage their excess emissions (CER, 2024g; DCCEEW, 2024ad), including:

- surrendering Australian Carbon Credit Units (ACCUs) or Safeguard Mechanism Credits (SMCs)¹⁴, noting that if a facility surrenders ACCUs equal to or more than 30% of its baseline, it must provide a statement to the Clean Energy Regulator setting out why more onsite abatement has not been undertaken
- borrowing up to 10% of the baseline from a future year with interest of 10% p.a. applied in the year after borrowing occurs (noting only a 2% interest rate is applied in 2024–25 and 2025–26)
- applying for a 2–5-year multi-year monitoring period (MYMP)¹⁵
- applying to become a trade-exposed baseline-adjusted (TEBA) facility to receive a discounted baseline decline rate for up to 3 years (based on a prescribed scheme impact metric)
- applying for an exemption if the exceedance is as a direct result of natural disaster or criminal activity.

¹³ The existing 'safeguard outcome' retained in the reformed legislation is: a) net covered emissions of greenhouse gases from the operation of a designated large facility do not exceed the baseline applicable to the facility.

¹⁴ ACCUs and SMCs are both tradeable carbon credits (CER, 2024h). Eligible ACCU scheme projects can earn ACCUs when they reduce or avoid emissions (CER, 2024f). In comparison, SMCs are generated when a Safeguard facility's gross emissions are below its baseline. SMCs are not offsets (CER, 2024k).

¹⁵ A facility with an MYMP is required to have a plan to reduce cumulative emissions over the duration of the monitoring period. If the facility's emissions are in exceedance at the end of the period, a commensurate number of units (ACCUs and/or SMCs) must be surrendered (DCCEEW, 2024f).

The authority's assessment of preliminary Safeguard data for 2023–24

The Clean Energy Regulator (CER) provided the authority with preliminary Safeguard data for 2023–24. A summary of the preliminary estimates for baselines, unadjusted net emissions and SMC generation can be found in Table SGM.1. A summary of the preliminary estimates for covered emissions, net emissions and estimated exceedances can be found in Table SGM.2. The authority notes this data is still to undergo the final quality assurance processes by the CER and is therefore likely to differ slightly from the final data published by the CER in April 2025. It also does not include the final use of possible flexibility mechanisms described above.

Preliminary data for 2023–24 shows the sum of all facilities' baselines was 132.3 Mt CO₂-e and covered emissions were 135.8 Mt CO₂-e.

The deadline for facilities to surrender units (ACCUs or SMCs) to address emissions that exceed baselines is not until 31 March 2025 (CER, 2024g). To estimate net emissions for 2023–24, the authority compared each facility's baseline to its preliminary net emissions value (reported covered emissions taking into account any ACCUs issued or surrendered to date). Where the baseline is lower, the authority has taken the baseline as the best estimate for net emissions. This estimate for net emissions assumes all facilities will be compliant in managing excess emissions. The authority has also considered expected unit surrender for facilities on MYMP arrangements that finish in 2023–24, and preliminary estimates of reduced baseline decline rates from expected TEBA applications. The authority notes this assessment of net emissions for 2023–24 also does not consider the full impact of all possible flexibility mechanisms described above due to the data not being available.

An estimated 9.2 million SMCs could be issued in 2023–24 (see Table SGM.1). The final number of SMCs issued will be affected by possible baseline variations, due to changes in methods used to calculate emissions. The use of flexibility mechanisms, including TEBA arrangements, will also affect facility baselines and impact the final number of SMCs generated.

Table SGM.1: Preliminary estimates for baselines, unadjusted net emissions and SMC generation from Safeguard facilities for 2023–24

2023–24	
Emissions	(Mt CO ₂ -e)
Baselines ¹⁶	132.3
Unadjusted net emissions ¹⁷	123.1
Other	(millions)
Possible SMC generation	9.2

Source: CCA, 2024d.

The maximum amount of total exceedances is estimated to be 10.7 million in 2023–24 (see Table SGM.2), however the exact number will be determined once any use of the flexibility mechanisms is finalised by the CER. The use of these mechanisms, including MYMP and TEBA, will affect the number of units (ACCUs or SMCs) that will be required to be surrendered by 31 March 2025.

Table SGM.2: Preliminary estimates for covered emissions, net emissions and maximum total exceedances from Safeguard facilities for 2023–24

2023–24	
Emissions	(Mt CO ₂ -e)
Total covered emissions	135.8
Net emissions	125.1
Other	(millions)
Estimated maximum total exceedances	10.7

Source: CCA, 2024d.

¹⁶ Excludes baselines from MYMP facilities

¹⁷ Excludes impacts from flexibility mechanisms such as MYMP or TEBA, and ACCU issuances under grandfathering arrangements

Preliminary data shows 71% of facilities had covered emissions higher than their baselines, with 14% of facilities exceeding their baseline by more than 30% (see Table SGM.3). The authority estimated maximum amount of total exceedances were 10.7 Mt CO₂-e, equivalent to 8.1% of total baselines in 2023–24 (132.3 Mt CO₂-e, Table SGM.1; CCA. 2024g).

Table SGM.3: Preliminary estimates on the number of Safeguard facilities with exceedances for 2023–24

	Number in exceedance	Total facilities in sector	Share of facilities in exceedance (%)
All facilities	153	215	71%
Facilities with over 30% exceedance	31	215	14%

Source: CCA, 2024d.

The authority's assessment of the safeguard outcomes

Data sources used within the authority's assessment

To complete its assessment, the authority looked at both historical emissions reported by covered facilities to date and projected emissions to 2030.

Historical emissions:

The authority used historical Safeguard emissions published by the Clean Energy Regulator (CER) for all years up to 2022–23. For 2023–24, the authority used the preliminary gross and net emissions estimates presented above.

Projected emissions to 2030:

The authority needs to consider projections of Safeguard emissions to 2030 to fulfil its requirements under the *Climate Change Act 2022*.

The authority has drawn upon several estimates of projected net and gross Safeguard emissions. These include the government's most recent projections developed by the Department of Climate Change, Energy, the Environment and Water (DCCEEW, 2024d), analysis conducted by Reputex commissioned by the authority (RepuTex & SJT Consulting, 2023), and internal analysis conducted by the authority (CCA Internal Analysis

Assessment of net Safeguard emissions against safeguard outcomes (b) and (c)

To assess safeguard outcomes (b) and (c)(i), the authority must consider net Safeguard emissions from 2020–21 to 2022–23, estimate net Safeguard emissions for 2023–24, and make projections of net Safeguard emissions from 2024–25 to 2029–30.

In accordance with section 14 of the *Climate Change Act 2022*, the authority considered the 4 emissions estimates referrals it received under section 15A of the *Climate Change Act 2022* during 2023–24 within its assessment of the safeguard outcomes. The 4 actions which were approved under the EPBC Act provided to the authority were:

- Gregory Crinum Coal Mine M-Block Extension Project (EPBC 2021/9127)
- Ashton Coal Operations Ravensworth Underground Mine (EPBC 2022/09208)
- Mount Pleasant Optimisation Project (EPBC 2020/8735)
- Narrabri Underground Mine Stage 3 Extension Project (EPBC 2019/8427)

The authority included these emissions estimates within its assessment. The authority determined the Gregory Crinum Mine and Mount Pleasant projects were expansions and included them within the assessment of new and expanded facilities. The other two projects were determined to be extensions and included within the assessment of continuing facilities.

Net Safeguard emissions reported from 2020–21 to 2023–24

For 2023–24, the authority estimates net Safeguard emissions were 125.1 Mt CO₂-e. Net Safeguard emissions for a facility are estimated as either the covered emissions where the covered emissions are below the facility's baseline or the baseline where the facility's covered emissions are above its baseline. Total net Safeguard emissions reported since 2020–21 are estimated to be 537.3 Mt CO₂-e, shown in Table SGM.4. This corresponds to 43.6% of the 1,233 Mt CO₂-e net emissions budget to 2030, leaving 695.7 Mt CO₂-e remaining for the years 2024–25 to 2029–30 (CCA, 2024a).

Table SGM.4: Overview of net emissions for the Safeguard Mechanism from 2020–21 to 2022–23, and preliminary 2023–24 emissions data

	2020–21	2021–22	2022–23	2023–24	Total from 2020–21 to 2023–24
Net emissions (Mt CO₂-e)	136.9	137.4	137.9	125.1	537.3
Share of 1,233 Mt CO₂-e (%)	11.1	11.1	11.2	10.1	43.6%

Source: CCA, 2024b.

Projected net Safeguard emissions from 2024–25 to 2029–30

The authority has assessed projected net Safeguard emissions to 2029–30, considering continuing facilities and taking into account the potential impact of any new or expanded facilities. Future net Safeguard emissions for all facilities (continuing, new and expanded) are projected by aggregating:

- each facility's expected covered emissions, where facility emissions are projected to be below the facility's baseline, and
- each facility's baseline, where the facility emissions are projected to be above its baseline.

Projected baselines are estimated by considering future production levels and relevant emissions intensity values of production for each facility. This projection of net emissions accounts for expected SMC generation at facilities. The authority's approach for analysis of continuing, and new and expanded facilities is outlined below.

Authority's approach to the analysis of continuing facilities:

For the purposes of the authority's analysis, a continuing facility is defined as a facility that exceeded the Safeguard Mechanism emissions threshold of 100 kt of CO₂-e per annum in any year between 2016–17 and 2022–23 and is continuing operations in 2023–24. The authority's assessment of continuing covered facilities was informed by the most recent projections by DCCEEW (DCCEEW, 2024e). Estimates for expected covered emissions include the impact of onsite abatement projected to occur at Safeguard facilities. The level of onsite abatement was based on DCCEEW's assessment.

From next year the authority will conduct its own assessment of projected net Safeguard emissions from continuing facilities.

Authority's approach to the analysis of new and expanded facilities:

The authority conducted its own analysis of net emissions from new and expanded facilities. As defined in section 5 of the *Climate Change Act 2022*, a new facility is one that has not been covered by the Safeguard Mechanism for any previous year. An expanded facility is a continuing facility that carries out an existing activity to a greater extent or begins a new activity for the first time. The authority notes these definitions differ from those which determine whether a facility is new or existing under the Safeguard Rule, and will therefore be subject to an international best practice baseline, hybrid default/facility-specific baseline, or a default (industry average) baseline. Table SGM.5 outlines the definitions of the various terms.



Table SGM.5: Examples of new and expanded facilities according to the *Climate Change Act 2022*, and new and existing facilities and the corresponding approach to baseline setting, according to the Safeguard Rule

New and expanded facilities (Defined in section 5 of the <i>Climate Change Act 2022</i>)		
Relevant to the authority's assessment of the safeguard outcomes		
New facility	A facility that has not been covered by the Safeguard Mechanism for any previous year.	
Expanded facility	A facility that has been covered by the Safeguard Mechanism previously and is carrying out an existing activity to a greater extent or beginning a new activity for the first time.	
New and existing facilities (Defined in sections 12 and 20 of the Safeguard Rule)		
Relevant to how a facility's baseline will be calculated. This classification determines whether baselines are based on emissions intensity values set at international best practice levels or set at the hybrid facility-specific/default emissions levels.		
Facility status	Definition of facility type ¹⁸	Approach to baseline setting
New facility	A facility that did not have a production variable (PV) in any year between 2017–18 and 2022–23. ¹⁹	International best practice value Emissions intensity (EI) for the relevant production variable (PV) is determined by international best practice, adapted for an Australian context.
Existing facility ²⁰	A facility that has previously been a Safeguard facility between 2017–18 and 2021–22. OR A facility that had a production variable (PV) in any year between 2017–18 and 2021–22. A facility that began commercial production in 2022–23 will have a transitional production variable.	Hybrid default/facility-specific value Emissions intensity (EI) for the relevant production variable (PV) is determined by combining the site-specific EI with the default (industry average) EI. This is initially weighted towards the site-specific value and progressively transitions towards the default value, reaching 100% industry average in 2029–30 ²¹
	A facility that began commercial production in 2022–23 will have a transitional production variable	Default value Emissions intensity (EI) for the relevant production variable (PV) is determined by the default (industry average) EI.

¹⁸ The authority notes that strictly these definitions apply at the production variable level
¹⁹ This includes historical PVs from 2017–18 to 2021–22, and transitional PVs allocated from the year commencing 2022–23. Facilities with historical and transitional PVs may continue to use these PVs for Safeguard reporting.
²⁰ If an existing facility starts reporting against a new production variable after 1 July 2023, it will be subject to the international best practice emissions intensity value for that activity.
²¹ Coal facilities have a slower rate of transition, reaching 50:50 by 2029–30.

In its assessment of new and expanded facilities, the authority included future projects that were considered probable to proceed and likely to be covered by the Safeguard Mechanism before 1 July 2030. A project was considered probable to proceed if it met two of the following criteria:

- Positive Final Investment Decision (FID) has been taken by the project proponent(s)
- The project has received the necessary state or federal regulatory approvals
- The project has received funding or other direct support from federal, state or territory governments (e.g. grant funding, concessional finance)

The authority also considered some projects which did not strictly meet the above criteria but where an imminent financial commitment is expected or where the authority deemed a high likelihood of project development. The authority also considered facilities that currently report under the National Greenhouse and Energy Reporting (NGER) scheme that are expected to meet the 100 kt CO₂-e threshold before 1 July 2030.

The list of new and expanded facilities included within the authority's analysis can be found in Table SGMA.1. The list of projects excluded from the authority's analysis on the grounds of being an extension or reactivation of a previous Safeguard facility²² can also be found in Table SGMA.2. The list of early-stage projects considered by the authority which did not meet the above criteria can be found in Table SGMA.3. The authority will continue

to monitor these projects and report on them in future assessments.

For included new and expanded facilities, the authority determined projected covered emissions using company reported gross emissions estimates, taking into account any planned onsite abatement activities where relevant. If gross emissions estimates were unavailable, a production-based estimate of gross emissions was calculated using industry average emissions intensities. Projected baselines were calculated using company reported production estimates. Where yearly production estimates were unavailable, the authority assumed an increase in production to reach nameplate capacity. The authority notes this assumption may result in a more conservative (higher) projection of facility baselines, as production may not reach nameplate capacity due to a range of factors.

Net Safeguard emissions for all facilities to 2029–30 (safeguard outcome b):

The authority's projection for net Safeguard emissions over the period to 2029–30 is presented in Table SGM.6. Estimates from the recent projections by DCCEEW (DCCEEW, 2024e) and results published by Reputex in 2023²³ (RepuTex & SJT Consulting, 2023) are also presented in Table SGM.6. The results vary based on differing assumptions for future production levels, emissions intensities of production, facilities entering or leaving the scheme, and use of flexibility mechanisms such as reduced baseline decline rates.

22 The emissions impacts of extensions and reactivations of existing safeguard facilities with no increase in nameplate capacity are reflected in safeguard emissions projections.

23 The Reputex results presented here relate to the modelled "Moderate Emissions" case which represents a scenario in which facilities take a progressive approach to implementing on-site emissions reductions (in comparison to a "slower" or "accelerated" approach in the high or low emissions scenarios).



Table SGM.6: Comparison of projected net Safeguard emissions in 2030 and aggregate net Safeguard emissions from 2020–21 to 2029–30 from authority analysis, most recent projections by DCCEEW, and Reputex

	Net emissions in 2029–30 (Mt CO ₂ -e)	Aggregate net emissions from 2020–21 to 2029–30 (Mt CO ₂ -e)	Emissions outcome for the period 2020–21 to 2029–2030 (Mt CO ₂ -e)
CCA Internal Analysis	Continuing facilities	82	1,150
	New facilities	5	25
	Expanding facilities	2	5
	Total	89	1,181
DCCEEW Projections (unpublished) 2024	88	1,180	53
Reputex SJT Analysis 2023	88	1,180	53

Source: CCA, 2024f, DCCEEW, 2024e, RepuTex & SJT Consulting, 2023.

Note: Totals may not sum due to rounding.

The authority found net Safeguard emissions in 2029–30 are projected to be 89 Mt CO₂-e, and total net Safeguard emissions from 2020–21 to 2029–30 are projected to be 1,181 Mt CO₂-e with a net emissions outcome of 52 Mt CO₂-e. The net Safeguard emissions projections by the authority are consistent with achieving safeguard outcomes (b) and (c)(i).

Impact of new and expanded facilities:

Preliminary data shows new and expanded facilities accounted for 1.0 Mt CO₂-e in 2023–24. The majority of these facilities are in the coal and gas sectors. The authority estimates that new and expanded facilities will contribute 31 Mt CO₂-e to net emissions from 2023–24 to 2029–30. Table SGMA.1 outlines the share of these emissions from various sectors. The majority of net emissions (68%) are from new and expanded coal and gas facilities.

Baseline setting approach used within the authority's analysis of new and expanded facilities:

Within the analysis of new and expanded facilities, the authority applied its best estimate of whether each project would be subject to an international best practice baseline, a hybrid facility-specific/default baseline or a default (industry average) baseline (outlined in Table SGM.5). In doing so, the authority considered whether the project had previously reported under the NGER scheme²⁴ or whether the project could be incorporated into a continuing Safeguard facility. Out of the 38 new facilities considered, the authority estimated up to 7 would be subject to a hybrid facility-specific/default baseline²⁵, having reported under the NGER scheme previously, and up to 7 would be subject to a default (industry average) baseline, having began production in 2022–23. All of the 8 expanded facilities were estimated to be subject to a hybrid facility-specific/default baseline, including the Crux Project and Pluto Train 2, which were considered expansions of the continuing Prelude FLNG and Pluto LNG facilities, respectively.

²⁴ In any year between 2017–18 and 2021–22.

²⁵ If a continuing facility commences production of one or more new PVs as part of an expansion, the contribution of this production to the facility's overall baseline will be determined using the international best practice emissions intensity value.

There are several gas projects within the analysis presented above which, in accordance with currently available information, were considered to be subject to an international best practice baseline. The authority has identified some uncertainty in the type of baseline these facilities will receive, noting this is a matter to be determined by the CER. The authority estimates that total net emissions between 2024–25 and 2029–30 could be between 0.5 – 2.5 Mt CO₂-e²⁶ higher as a result of these facilities being treated as existing, as outlined under Part 3, Division 2 of the Safeguard Rule (and therefore receiving hybrid facility-specific/default emissions intensity value for applicable production variables, (Table SGM.7). The authority will continue to monitor the most likely final baseline type of such projects and any possible impact on net Safeguard emissions in future assessments.

Table SGM.7: Difference in projected net emissions to 2029–30 if several gas projects are treated as existing facilities under the Safeguard Mechanism

Authority's current best estimate for baseline type	Alternate baseline type	Estimated difference in net emissions if classified as an existing facility, to 2029–30*
Barossa	Best Practice	Hybrid
Scarborough	Best Practice	Hybrid
Waitsia Stage 2	Best Practice	Hybrid

*Note: See footnote 26 regarding uncertainty in this range.

Projected SMC generation and total unit (ACCU or SMC) surrender from 2024–25 to 2029–30:

The authority projected possible future SMC generation by looking at the difference between aggregate projected baselines and aggregate projected net emissions. As shown in Table SGM.8, over 2024–25 to 2029–30 the authority projects Safeguard facilities could generate 40 million SMCs.

The authority also projects future maximum total exceedances to be 143 million over 2024–25 to 2029–30. Responsible facilities would need to surrender the equivalent number of units (either ACCUs or SMCs), or otherwise further reduce emissions over the period of an arranged flexibility mechanism such as a MYMP, to be compliant with the scheme. Projected covered emissions over 2024–25 to 2029–30 assumed a level of onsite abatement at Safeguard facilities. The authority notes this level of total exceedances for this period will change if this level of onsite abatement differs.

26 The authority has estimated this range based on data available at the time of writing, some of which is preliminary in nature, and a range of assumptions relating to applicable baselines. The baseline that will ultimately apply to the facilities will depend on steps taken in future by their proponents and assessments and decisions to be made by the CER. Accordingly, the actual emissions difference from the facilities may fall outside of the estimated range.

Table SGM.8: Projected baselines, net emissions, covered emissions, SMC generation and maximum total exceedances from Safeguard facilities over 2024–25 to 2029–30

	CCA Internal Analysis Aggregate of 2024–25 to 2029–30 (Mt CO ₂ -e)	DCCEEW Projections 2024 Aggregate of 2024–25 to 2029–30 (Mt CO ₂ -e)
Emissions		
Baselines	684	679
Net emissions	644	641
Covered emissions	786 ²⁷	786
Other		
SMC generation (baselines minus net emissions)	40	39
Estimated maximum total exceedances (covered emissions minus net emissions)	143	146

Source: CCA, 2024f.

Impact of reduced baseline decline rates for TEBA facilities:

As outlined above, applications for reduced baseline decline rates for 2023–24 have not been finalised. TEBA facilities have 3 years of their annual decline rates reduced to 1% for manufacturing facilities, and 2% for all other facilities, per Part 3, Subsection C, Section 34 of the Safeguard Rule. The authority has included preliminary estimates of reduced baseline decline rates for TEBA facilities within its analysis of net emissions for 2023–24, assuming the lowest possible 1% decline rate for these manufacturing facilities. The authority estimates net emissions in 2023–24 are higher by 0.45 Mt CO₂-e due to reduced baseline decline rates. The impact of expected future use of reduced decline rates for TEBA facilities is incorporated within DCCEEW's projections. The authority projects that total baselines for 2024–25 and 2025–26 are up to 2.25 Mt CO₂-e higher due to the use of this flexibility mechanism from the preliminary assessments of TEBA facilities in 2023–24.



Assessment of outcomes (b) and (c):

The authority's assessment is that:

- outcome (b): Net Safeguard emissions are declining consistently to remain within the emissions budget of 1233 Mt CO₂-e between 1 July 2020 and 30 June 2030.
- outcome (c)(i): Net Safeguard emissions are declining to no more than 100 Mt CO₂-e for the financial year beginning 1 July 2029.
- outcome (c)(ii): Performance against this outcome will depend on how the policy framework evolves over time. The authority will continue to monitor how policy settings are calibrated, particularly any changes adopted following the scheme-wide review in 2026–27.

In making this assessment, the authority notes uncertainties associated with the reformed Safeguard Mechanism having only been in place for one full year, final information on the outcomes of the scheme in 2023–24 not yet being available, and the authority's assessment relying in part on projections of outcomes to 2030.

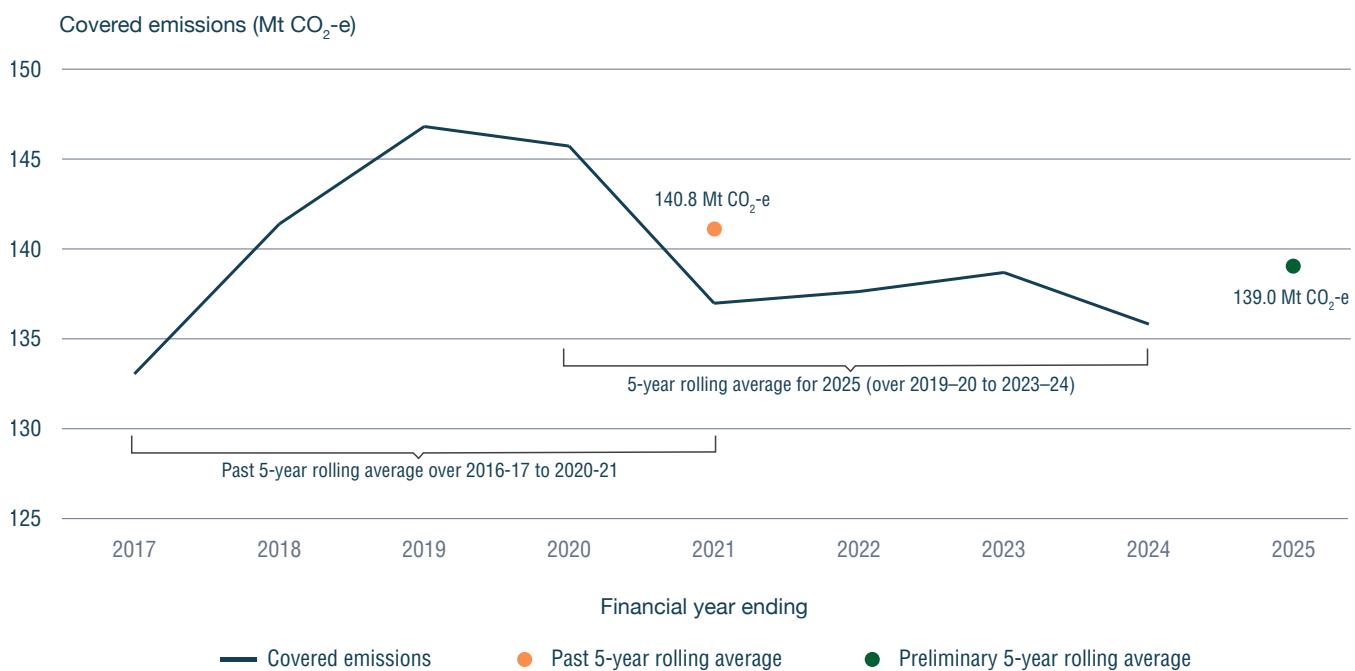
Preliminary assessment of Safeguard emissions against safeguard outcome (d)

Safeguard outcome (d) requires the 5-year rolling average of Safeguard emissions for each financial year that begins after 30 June 2024 to be lower than the past 5-year rolling average. The authority's first formal assessment of this outcome will relate to the 2024–25 financial year and will be included in the 2025 Annual Progress Report. The authority has completed a preliminary assessment of this outcome using the currently available covered emissions data for 2023–24.

The 5-year rolling average value for the 2024–25 financial year is defined as the average of the covered emissions for the 5 previous financial years (from 2019–20 to 2023–24). Consistent with section 7 of the *National Greenhouse and Energy Reporting Act 2007* (NGER Act), the 'past' 5-year rolling average for the 2024–25 financial year is defined as the average of the covered emissions for the 5 previous financial years that ended 3 years before the start of the 2024–25 financial year (from 2016–17 to 2020–21).

Figure SGM.2 shows the covered emissions reported under the Safeguard Mechanism from 2016–17 to 2023–24. The reduction in covered emissions from 2018–19 to 2020–21 is driven by decreased transport emissions due to the COVID-19 pandemic and decreased emissions from the resources sector due to coal mine flooding and the pandemic impacting market conditions (DCCEEW, 2023h, 2023c). Preliminary results show covered emissions in 2023–24 were 135.8 Mt CO₂-e. This is a reduction of 2.9 Mt CO₂-e (2.1%) from 2022–23 levels. As can be seen in Figure SGM.2, the preliminary 5-year rolling average for 2025 is 139.0 Mt CO₂-e. This is a decrease of 1.3% relative to the past 5-year rolling average of 140.8 Mt CO₂-e.

Figure SGM.2: Comparison of the 5-year rolling average and past 5-year rolling average for the 2024–25 reference year²⁸



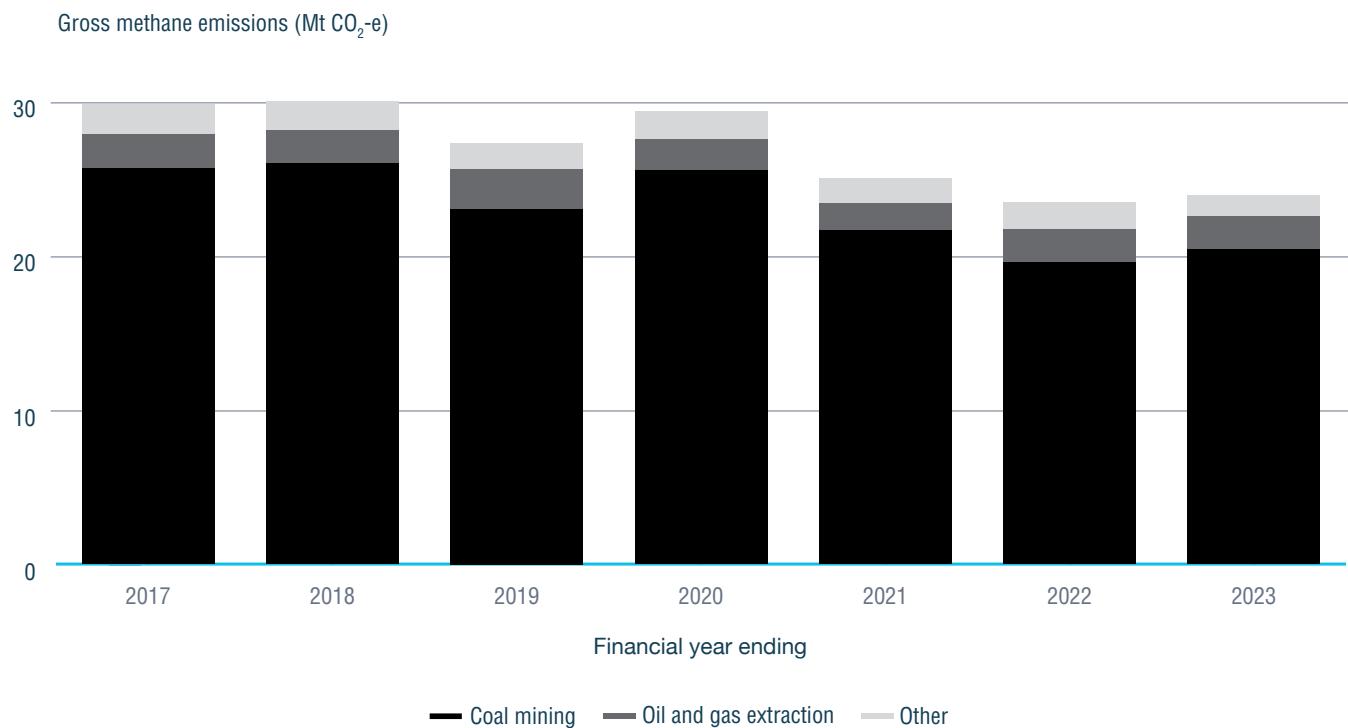
Source: CCA, 2024c.

Methane emissions reported under the Safeguard Mechanism

Methane emissions have a significantly higher short-term global warming potential relative to carbon dioxide, meaning immediate and large-scale reductions in methane emissions can have near-term effects on the climate in the next few decades. Accurate measurement and reporting of methane emissions is essential to underpin abatement efforts and to track progress in emissions reduction.

Methane emissions from the oil and gas extraction and other sectors, such as waste and gas supply, have remained relatively stable since 2017 (Figure SGM.3). In comparison, methane emissions from coal mining declined from 2020 to 2023 due to mines impacted by flooding and other operational outages (DCCEEW, 2023c, 2023h). From 2017 to 2023, the annual average decline in methane emissions reported under the Safeguard Mechanism is 3.3%.

Figure SGM.3: Gross methane emissions by sector²⁹ reported under the Safeguard Mechanism, 2017–2023



Source: CCA, 2024c.

The National Greenhouse and Energy Reporting scheme, Australia's national framework for reporting facility-level emissions, is reviewed by the authority every 5 years. The methods to calculate and report greenhouse gas emissions are subject to annual technical review and update. Method updates are informed by a range of factors including the latest available science, data, research and reviews by the authority.

The authority has made several methane measurement and mitigation recommendations

The authority made several methane-related recommendations in both the 2023 Review of the National Greenhouse and Energy Reporting Legislation (NGER Review) and the 2023 Annual Progress Report (APR) (CCA, 2023b, 2023a). These recommendations sought to improve the accuracy of methane measurement, reporting and verification (MRV) and support methane mitigation across the coal and oil and gas subsectors. The government responses to these recommendations are summarised in Table SGM.9.

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Based on ANZSIC codes as defined in the National Greenhouse and Energy Reporting (NGER) data.

Table SGM.9: Methane measurement and mitigation recommendations previously made by the authority and corresponding response by the government

Recommendations	Government Response
<p>2023 NGER Review: Recommendations to improve the accuracy of fugitive methane emissions reporting. Through:</p> <ul style="list-style-type: none"> • moving measurement and reporting of fugitive methane emissions in Australia to higher order methods, • urgently reviewing Method 2 for open cut coal mining, and • developing a policy framework for implementing independent verification of facility-level fugitive methane emissions estimates using top-down measurements. 	<ul style="list-style-type: none"> • Agreed to all recommendations (either in full or in principle). • Phasing out of Method 1 estimation methodologies for open cut coal mines for Safeguard facilities, commencing in 2025–26. • Agreed to review Method 2 for open cut coal mines. • Appointed Chief Scientist Dr Cathy Foley to lead an expert panel to advise government on whether new atmospheric measurement approaches could further enhance Australia's estimation of fugitive methane emissions. • Amended NGER legislation to require publication of the method used by Safeguard facilities to report fugitive methane emissions.
<p>2023 Annual Progress Report: Recommendations to support fugitive methane mitigation.</p>	<ul style="list-style-type: none"> • Agreed-in-principle to review the opportunities and barriers for pre-mine drainage from open cut coal mines. • Identified “enhanced coal mine methane drainage” as one of the various priority technologies for the Resources Methane Abatement Fund. • Noted the recommendation to implement measures complementary to the Safeguard Mechanism for reducing fugitive emissions from the oil and gas sectors.

Source: DCCEEW, 2023b, 2024c.

In the 2024 Sectoral Pathways Review, the authority found there are commercially available fugitive methane abatement measures for oil and gas operations that could be readily deployed to achieve methane abatement in the near term (CCA, 2024h). The authority also notes the 2 projects which have received grants under the Resources Methane Abatement Fund relate to ventilation air methane abatement technologies (Australian Government, 2024). The authority will continue to monitor relevant developments, including the development by the government of the resources sector plan as part of the Net Zero Plan.



Role of ACCUs for offsetting

Interaction with the ACCU Scheme and Safeguard facilities use of ACCUs

Subsections 72C (4), (5) and (6) of the Safeguard Rule permit Safeguard facilities to use ACCUs to offset up to 100% of their liabilities, but they must report to the Clean Energy Regulator if the number of ACCUs surrendered is equal to or greater than 30% of baseline emissions. The use of SMCs and ACCUs to meet compliance obligations under the Safeguard Mechanism allows

a smooth transition for facilities with hard-to-abate emissions while they move to decarbonise and supports higher overall ambition for emissions reductions. *The Safeguard Mechanism (Crediting) Amendment Act 2023* added safeguard outcome (e) to section 3(2) of the NGER Act, which seeks to ensure there is a material incentive for responsible emitters to invest in reducing covered emissions. The authority is of the view that direct emissions reductions should be prioritised (CCA, 2023c).

Box 6: Australian Carbon Credit Unit (ACCU) Market Dynamics

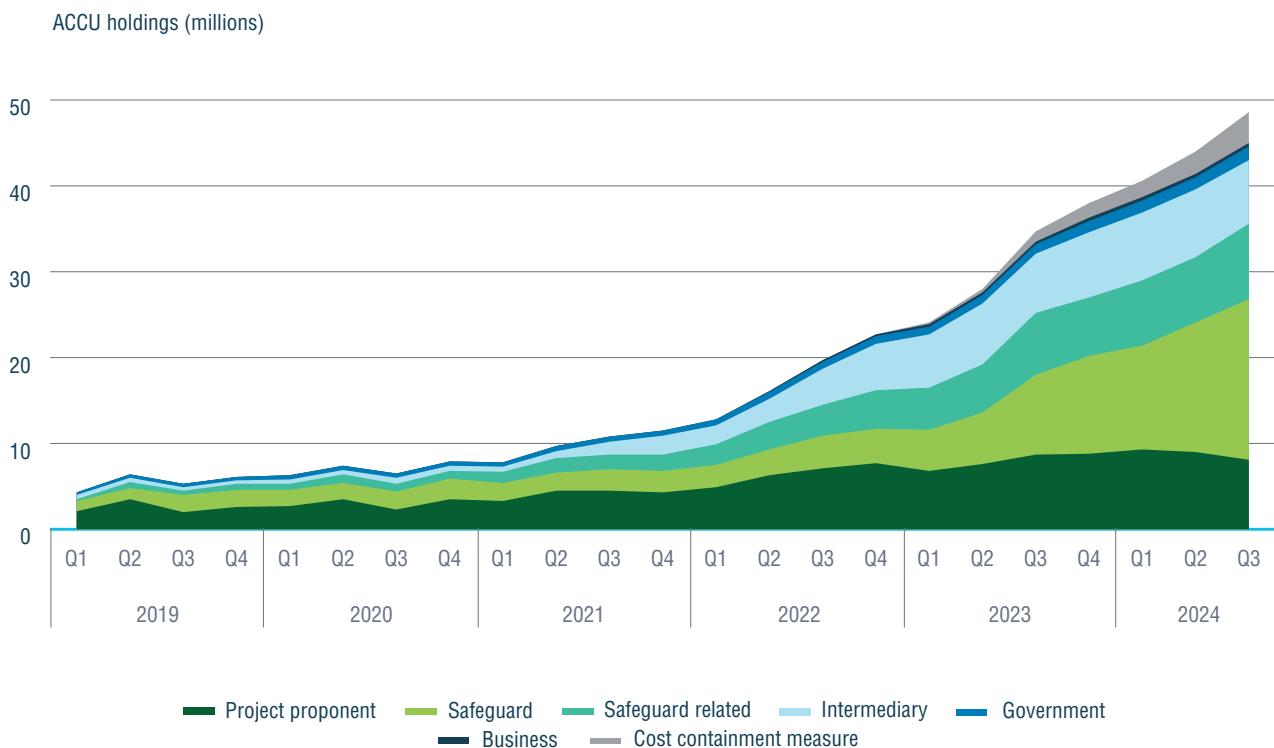
The ACCU market has been steadily growing over the past few years, characterised by large increases in secondary market trades, a growing number of projects registered and more market participants (CER, 2024k, 2024j). Total ACCU cancellations have also risen from around 1 million in 2021 to around 2 million in 2023. Over the same period, ACCU issuances have remained relatively stable at around 17-18 million ACCUs. ACCU issuances are expected to increase to around 20 million in 2024 (CER, 2024j).

ACCU holdings have increased from 10.9 million in Q3 2021 to 45 million in Q3 2024 (see Figure SGM.4). More than half of these ACCUs (~27.5 million) are held in accounts owned by Safeguard entities or related companies. Safeguard entities are likely accumulating ACCUs now for use against future compliance obligations. ACCU holdings in Safeguard and related entities' ANREU accounts provide a leading indicator to the extent to which Safeguard facilities may rely on ACCUs to acquit their compliance obligations (see below for leading indicators the authority will monitor).

Another 3.6 million ACCUs are in the cost containment measure (CCM) as of Q3 2024 (see Figure SGM.4). The CCM aims to provide facilities with certainty around the maximum compliance costs they may face if they exceed their baselines and ACCU prices increase substantially (DCCEEW, 2024ad). ACCUs purchased from the CCM are fixed at \$75 in 2023–24, increasing each year with the Consumer Price Index plus 2%.

ACCU sold under the CCM are sourced from those delivered to the government under carbon abatement contracts from 12 January 2023 (DCCEEW, 2024ad). In early 2024, the CER announced a fourth window for fixed delivery exit arrangements, which included a requirement to deliver at least 20% of the applicable ACCUs under the delivery milestone (CER, 2024e). This could see the CCM increase to 4.4 million ACCUs under the current exit arrangements (CER, 2023, CER, 2024e).

Figure SGM.4: Australian carbon credit unit (ACCU) holdings (in millions) by market participation, Q1 2019 – Q3 2024



Source: Authority analysis of CER (2024j).

In 2024, to September, ACCU prices have remained relatively stable at around \$35 for generic ACCUs (CER, 2024l not CER, 2024j). CORE Markets, 2024.³⁰

Recently, the Australian Securities Exchange (ASX) began listing ACCU futures contracts (ASX, 2024), which should assist in increasing transparency of forward ACCU prices and improve market liquidity. To support market liquidity, access and transparency, the CER is working to improve carbon market interoperability. This includes the consolidation of carbon credits into a singular, new Unit and Certificate Register and working with the ASX to establish an Australian Carbon Exchange (CER, 2024b, 2024q). Initial consultation on the proposed design of the exchange-trading model and registry was undertaken by the CER from October to November 2024 (CER, 2024d).

³⁰ Generic ACCUs are a group of ACCUs sold in the secondary market where the project or method of origin is not specified (CER, 2024c; CER, 2024).

Safeguard facilities may rely heavily on ACCUs to meet their declining emissions baselines

Given that the reformed Safeguard Mechanism has been in operation for just over one year, there is limited evidence available to assess the balance between onsite abatement and the use of units to meet compliance obligations. As per preliminary data for 2023–24, a total of 31 facilities had exceedances greater than 30% of their baselines (CCA, 2024d). The surrenders of ACCUs to acquit liabilities are generally not expected until early 2025, ahead of the compliance deadline on 31 March (CER, 2024g). The CER is required to publish outcomes from the first compliance period under the reformed Safeguard Mechanism by 15 April 2025 (CER, 2024n).

Modelling carried out separately for the government and the authority found the majority, 58% and 68%, respectively, of compliance obligations under the Safeguard Mechanism could be met using ACCUs over the period to 2030 (Authority analysis of DCCEEW (2023c) and Reputex & SJT Consulting (2023)).

Although facilities may use both ACCUs and SMCs to meet obligations, the bulk of units surrendered are likely to be ACCUs. Preliminary data shows that an estimated 9.2 million SMCs will be issued in 2023–24 (CCA, 2024f). This is 4-6 times higher than previous projections (DCCEEW, 2023c; RepuTex & SJT Consulting, 2023). SMC issuances are projected to be around 40 million over the 2025 to 2030 period (CCA, 2024f).

Comparatively, 20 million ACCUs are expected to be issued in 2024 (CER, 2024j). Over the 2025 to 2030 period, projected ACCU issuances are around 147-165 million (DCCEEW, 2023c; RepuTex & SJT Consulting, 2023). Safeguard entities also already hold large volumes of ACCUs and there is an established secondary market for ACCUs.

Safeguard facilities' reliance on ACCUs to meet obligations is forecast to drive ACCU demand out to 2030. ACCU prices are forecast to increase as a result of the growth in demand for ACCUs, but are generally not expected to breach the CCM price before the end of the decade (EY, 2023; RepuTex & SJT Consulting, 2023).

Recommendation: Require safeguard facilities to report rolling 5-year compliance strategies on the expected annual weight of effort between on-site reductions and carbon credit use. The Clean Energy Regulator (CER) should publish this data aggregated to an appropriate level.

The authority considers that Safeguard facilities should report their forward compliance strategies to the CER. Compliance strategies could include planned abatement measures over the next 5 years, including the share of onsite reductions and/or carbon credit use.

The authority notes some of this information may be included within annual sustainability reports such as those required under the new mandatory climate-related financial disclosures, which will be rolled out progressively beginning in 2025 (ASIC, 2024). To minimise reporting burdens, the CER should consider allowing Safeguard facilities to submit such reports where the relevant information is provided, and the ongoing need for the facility level reporting requirements recommended by the authority should be reviewed periodically.

The publication of data from compliance strategies would assist policymakers and other interested parties in undertaking future assessments of the Safeguard Mechanism's performance and implications for the Australian Carbon Credit Unit market.

Facilities that trigger the existing 30% reporting threshold should include in their written explanation to the CER the reasons why their ACCU use was either more or less than they reported in their most recent compliance strategy. This information would provide valuable insights into the barriers to onsite emissions reduction activities.

The authority will also monitor the operation of the Safeguard Mechanism through other indicators

Since the Safeguard Mechanism reforms commenced, \$1 billion in dedicated grant funding has been made available through the Powering the Regions Fund (PRF) for Safeguard facilities to support and decarbonise their operations (DCCEEW, 2023i, 2023j, 2024a). Over \$620 million in PRF funding has been announced to date (DCCEEW, 2024a, 2024n, 2024g). Safeguard facilities may also be eligible to apply for grants under the \$400 million Industrial Transformation Stream of the PRF, and access grant finance and concessional loans through the CEFC, ARENA and the National Reconstruction Fund.

The authority intends to monitor the extent to which onsite abatement is being driven by the Safeguard reforms through the following indicators and determine whether any additional policy measures are required.

Use of flexible compliance options

ACCU and SMC use as a proportion of total compliance activities will provide an indication of the extent to which the Safeguard Mechanism is encouraging onsite abatement by facilities (Table SGM.10). Applications for TEBA status and use of other flexible compliance options will indicate when emissions reductions under the scheme will occur as well as whether measures are required to encourage additional abatement. Data is not yet available for this leading indicator.

Table SGM.10: Use of multi-year monitoring periods and ACCU surrender from 2016–17 to 2022–23

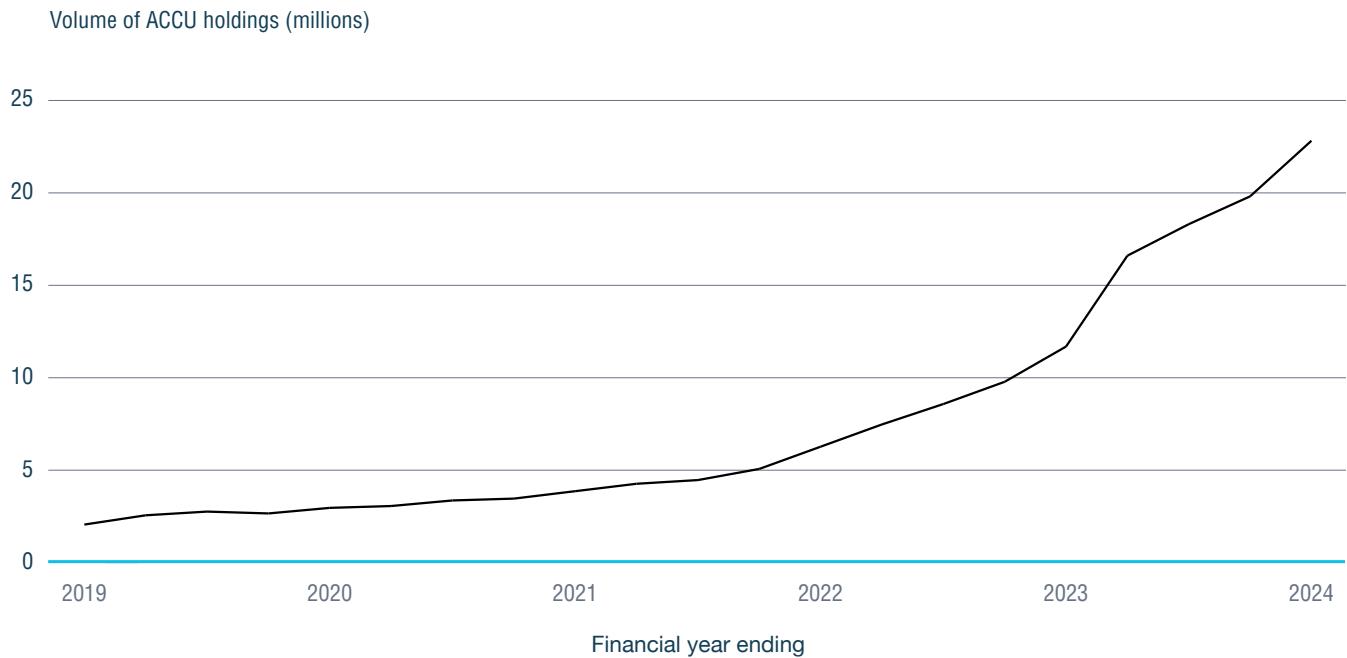
Year	Multi-year monitoring periods		ACCUUs surrendered as share of total covered emissions (%)
	Facilities (number)	Facilities (%)	
2016–17	6	3	0.3
2017–18	17	8	0.2
2018–19	31	15	0.1
2019–20	28	13	0.2
2020–21	40	19	0.3
2021–22	31	14	0.5
2022–23	25	11	0.9

Source: CCA, 2024e.

ACCU holdings by Safeguard and Safeguard-related entities

The level of ACCU holdings by Safeguard and Safeguard-related entities provides an indication of future intended use of offsets to meet compliance obligations under the Safeguard Mechanism (Figure SGM.5).

Figure SGM.5: ACCU holdings by Safeguard and Safeguard-related entities, 2019–2024

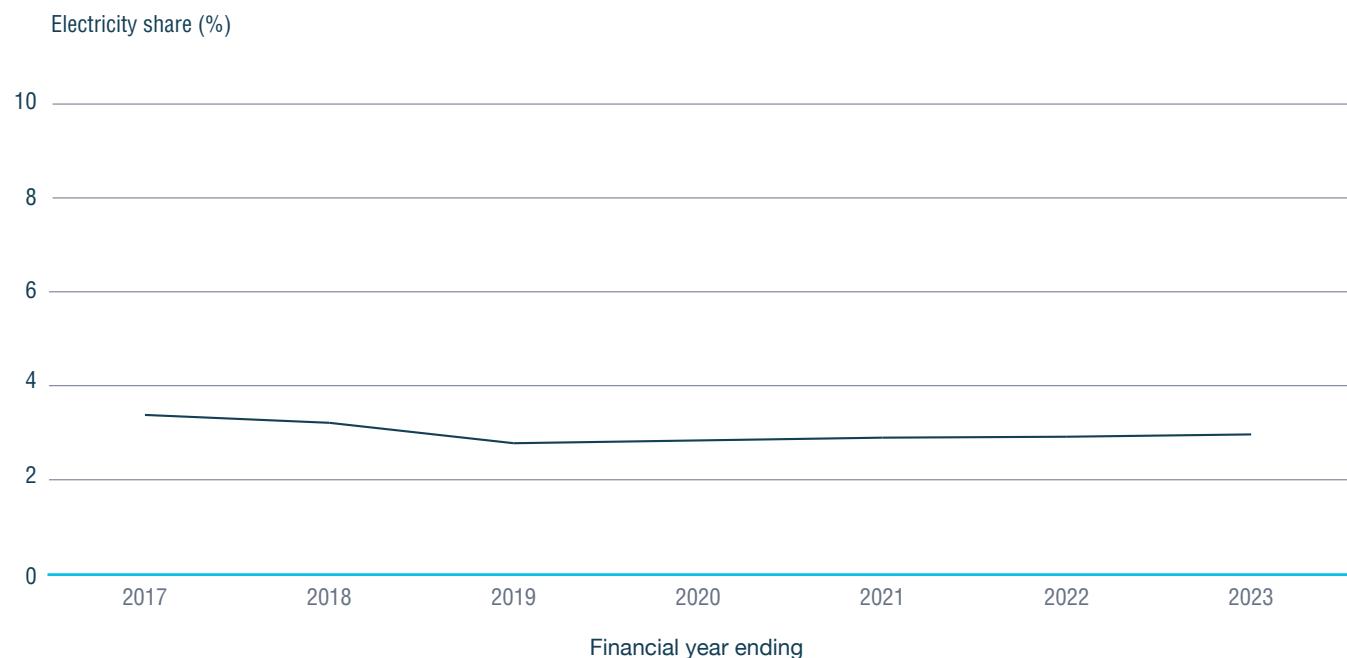


Source: Authority analysis of CER (2024).

Electricity use as a proportion of final energy use at Safeguard facilities

In the Sector Pathways Review, the authority identified electrification as a critical decarbonisation lever for the industry and resources sectors. Monitoring electricity use as a share of total energy use could indicate the impact of the scheme in driving electrification at covered facilities. Figure SGM.6 shows the share of electricity use has been steady between 2.6 - 3.2% of final energy use at Safeguard facilities since 2016–17. The authority will continue to monitor electricity use as a proportion of final energy use at Safeguard facilities to assess the effectiveness of the scheme in incentivising electrification.

Figure SGM.6: Electricity use as a share of final energy use at Safeguard facilities, 2017–2023



Source: CCA, 2024c.

Appendix SGM

The tables below summarise the authority's analysis of new and expanded facilities covered by the Safeguard Mechanism before 2029–30

Table SGMA.1: Facilities commencing operations between 2023–24 and 2029–30 deemed as new or expanding under the *Climate Change Act 2022* that were considered in the authority's analysis

All new and expanded facilities	Net emissions over 2023–24 to 2029–30	31 Mt CO₂-e	
Coal	Net emissions over 2023–24 to 2029–30	12 Mt CO₂-e	
New facilities		Expansions	
Facility Name	Baseline Type	Facility Name	Baseline Type
Blair Athol Operations	Hybrid	Caval Ridge Mine Horse Pit Extension	Hybrid
Burton	Default	Mt Pleasant Optimisation Projec	Hybrid
Hillalong	Best Practice	Rolleston (Phase 2)	Hybrid
Ironbark No 1	Default	Gregory Crinum Coal	Hybrid
Maxwell Underground Mine	Default	Tahmoor South	Hybrid
New Acland	Hybrid		
Norwich Park Mine	Default		
Olive Downs South	Best Practice		
Vickery	Hybrid		
Vulcan South	Best Practice		
Wilkie Creek	Best Practice		
Wilton-Fairhill	Best Practice		
Oil and gas	Net emissions over 2023–24 to 2029–30	9 Mt CO₂-e	
New facilities		Expansions	
Facility Name	Baseline Type	Facility Name	Baseline Type
Arcadia	Hybrid	Crux Project	Hybrid
Barossa backfill to Darwin LNG	Best Practice	Pluto Expansion (Train 2)	Hybrid
Beetaloo (Empire Energy)	Best Practice		
Beetaloo (Tamboran/Santos)	Best Practice		
Dorado Oil Project	Best Practice		
Narrabri coal seam gas project	Best Practice		
Scarborough	Best Practice		
Surat Gas Project (Phase 1)	Hybrid		
Waitsia (Stage 2)	Best Practice		
West Erregulla (Phase 1)	Best Practice		

Metal ore mining		Net emissions over 2023–24 to 2029–30	6 Mt CO ₂ -e
New facilities		Expansions	
Facility Name	Baseline Type	Facility Name	Baseline Type
Ashburton Hub/Onslow Iron Ore Project	Hybrid	Western Range	Hybrid
Greenbushes Lithium Operation	Hybrid		
Iron Bridge	Default		
Marillana Mine	Best Practice		
McPhee Creek	Best Practice		
Mt Todd	Best Practice		
NiWest Nickel-Cobalt Project	Best Practice		
Nolans Project	Best Practice		
Saint Elmo Vanadium Project	Best Practice		
Thunderbird (Stage 1)	Best Practice		
West Musgrave	Best Practice		
Other	Net emissions over 2023–24 to 2029–30	4 Mt CO ₂ -e	
New facilities		Expansions	
Facility Name	Baseline Type	Facility Name	Baseline Type
BP Renewable Fuels	Best Practice		
Covalent Lithium Hydroxide Refinery	Best Practice		
Kemerton Lithium Refinery	Default		
Kwinana Lithium Refinery	Default		
Perdaman Urea Plant	Best Practice		

Table SGMA.2: Projects assessed that were considered to be extensions or reactivations of previous Safeguard facilities and excluded from the authority's analysis of new and expanding facilities

Project Name	Final investment decision	Regulatory approvals	Direct government support	Emissions over threshold by 2029–30	Extension (E) or reactivation (R)
Coal					
Ashton Coal Operations Ravensworth	Y	Y	N	Y	E
Bulga Optimisation Project mod 3 and Bulga Underground mod 7	Y	Y	N	Y	E
Dartbrook	Y	Y	N	Y	R
Isaac Plains Complex (Isaac Downs)	Y	Y	N	Y	E
Lake Vermont (Open Cut)	Y	Y	N	Y	E
Mandalong Southern Extension	Y	Y	N	Y	E
North Goonyella	Y	Y	N	Y	E
Iron Ore					
Mesa B,C & H (Robe Valley)	Y	Y	N	Y	E

Table SGMA.3: Projects assessed that were considered either not probable to proceed or not likely to become a Safeguard facility before 1 July 2030, and were excluded from the authority's analysis of new and expanded facilities

Project Name	Positive final investment decision taken	Received regulatory approvals	Direct government support
Coal			
Alpha (mine and rail)	N	Y	N
Angus Place West	N	N	N
Baralaba South	N	N	N
Blackwater North Ext.	N	N	N
Blackwater South	N	N	N
Boggabri Coal Extension	N	N	N
Chain Valley Extension	N	N	N
Clarence Colliery Expansion	N	N	N
Coppabella Mine	N	N	N
Corvus (formerly Teresa)	N	N	N
Curragh Extension Project	N	N	N

Project Name	Positive final investment decision taken	Received regulatory approvals	Direct government support
Dysart East	N	Y	N
East Olive Downs South Extended/Willunga	N	Y	N
Elimatta	N	N	N
Gemini coal mine	N	N	N
Grosvenor Phase 2	N	Y	N
HVO Continuation	N	N	N
Isaac River Coal Mine	N	Y	N
Karin	N	N	N
Kevin's Corner	N	Y	N
Lake Vermont Meadowbrook Extension	N	N	N
Meandu King 2 East Project	N	N	N
Minyango	N	Y	N
Moolarben CHPP upgrade	N	N	N
Moorlands	N	N	N
Mt Arthur Coal Mine	N	N	N
Mt Thorley	N	Y	N
Narrabri (Stage 3)	N	Y	N
New Lenton Coal	N	N	N
Newstan Mine Extension	N	N	N
Peak Downs Continuation	N	N	N
Saraji East	N	N	N
South Galilee	N	Y	N
Springsure Creek	N	Y	N
Spur Hill	N	N	N
Taroborah	N	Y	N
Vulcan South	N	N	N
Wallarah 2 ³¹	Y	Y	N
Wards Well	N	N	N

31 Wallarah 2 is not expected to exceed the Safeguard Mechanism threshold before 1 July 2030.

Project Name	Positive final investment decision taken	Received regulatory approvals	Direct government support
Washpool	N	N	N
Winchester South	N	Y	N
Gas			
Atlas (Stage 3)	N	Y	N
Bowen Gas Project	N	Y	N
Browse to North West Shelf	N	N	N
Enterprise Project ³²	Y	Y	N
Ichthys Expansion (Train 3)	N	N	N
Otway (Phase 3) Development Project	N	N	N
Otway Offshore Gas Project	N	N	N
Spartan Development ³³	Y	Y	N
Surat Gas Project (Phases 2-5)	N	Y	N
Towrie Gas Project	N	Y	N
Transborders Energy's Generic FLNG Solution	N	N	N
Iron ore			
Balmoral South	N	N	N
Cashmere Downs	N	N	N
Rhodes Ridge	N	N	N
West Pilbara Iron Ore Project ³⁴	Y	Y	N ³⁵
Western Ridge ³⁶	Y	Y	N
Other			
Cadia PC 1-2	Y	N	N
Cape Flattery Silica Sands	N	N	N
Kathleen Valley Refinery	N	N	N ³⁷
Northern Silica Project	N	N	N
Sconi	N	N	N

³² Enterprise project is not expected to exceed the Safeguard Mechanism threshold before 1 July 2030.

³³ Spartan Development is not expected to exceed the Safeguard Mechanism threshold before 1 July 2030.

³⁴ West Pilbara Iron Ore Project is not expected to exceed the Safeguard Mechanism threshold before 1 July 2030.

³⁵ Some indirect funding of manufacturing projects in the region to support iron ore transport activities.

³⁶ Western Ridge is not expected to exceed the Safeguard Mechanism threshold before 2030.

³⁷ Kathleen Valley mine (associated project) received loans from CEFC and EFA to support mining operations.

Project Name	Positive final investment decision taken	Received regulatory approvals	Direct government support
Sun Metals Zinc Refinery (Stage 2)	N	N	N ³⁸
Thunderbird (Stage 2)	N	Y	N ³⁹
Wingellina	N	Y	N

Table SGMA.4: Treatment of new projects and expansions referred to the authority under section 15A of the EPBC Act

Project Name	Proponent	EPBC Reference	Treatment of Project
Coal (4 projects)			
Gregory Crinum Coal Mine M-Block Extension	Sojitz Blue	EPBC 2021/9127	Expansion
Mt Pleasant Optimisation Project	Mach Energy	EPBC 2020/8735	Expansion
Ashton Coal Operations Ravensworth	Ashton Coal	EPBC 2022/09208	Extension
Narrabri Stage 3 Extension	Whitehaven Coal	EPBC 2019/8427	Extension

38 Indirect support through CEFC funding of SunHQ project, which will deliver renewable electricity to refinery

39 Stage 1 of project received NAIFF investment.

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Appendix

Appendix: Purpose and context

About the Climate Change Authority

The Climate Change Authority is a statutory agency established under the *Climate Change Authority Act 2011* to provide independent, evidence-based advice to the Government on Australia's climate change targets, policies and progress. The authority is made up of a Chair, the Chief Scientist and seven other members appointed for their substantial experience or knowledge and significant standing in fields that contribute to responding to the climate challenge.

Independent advice to government on the preparation of the Annual Climate Change Statement

Under the *Climate Change Act 2022*, the authority provides advice to the Minister for Climate Change to inform preparation of the Minister's annual climate change statement. Preparation of our advice is guided, at a minimum, by the requirements for the annual climate change statement in section 12 of the *Climate Change Act 2022*, as well as section 12 of the *Climate Change Authority Act 2011*, which sets out principles to which the authority must have regard in performing its functions.

The annual climate change statement addresses progress towards achieving Australia's greenhouse gas emissions reduction targets, international developments, climate change policies (including their effectiveness and their impact on rural and regional Australia), and risks to Australia from climate change impacts. The authority provides its advice to the Minister in the form of an annual progress report.

Under the 2023 reforms to the *National Greenhouse and Energy Reporting Act 2007* and *Climate Change Act 2022*, the Minister's annual climate change statement is also required to address whether emissions from the operation of facilities under the Safeguard Mechanism are declining consistently with these outcomes. The authority is required to advise on this matter in its annual progress report. This advice must consider the impact of new or expanded facilities for current and future years, as well as any emissions estimates provided to the authority by the Minister for the Environment and Water for projects approved under the EPBC Act.

If the authority finds that Safeguard emissions are not declining consistently with the safeguard outcomes, the authority is required to provide advice on whether any amendments to the Safeguard Rule are needed to achieve each of those outcomes.

Framework underpinning the authority's advice

To understand how Australia is progressing towards net zero, the authority has developed its methodology for preparing its advice, including data collection, consultation and analysis, guided by the framework set out in Figure A.1. It shows how the Annual Progress Report addresses each of the components the Minister must report on in the annual climate change statement, as described in section 12 of the *Climate Change Act 2022*. The methodology includes assessments and analysis across five core elements:

- **Wellbeing** – The authority assesses social, environmental and economic impacts, positive and negative, through the concept of wellbeing. This includes considering the impacts in Australia of the response to climate change – policies and decisions implemented here and abroad – as well as the physical impacts of climate change.
- **Emissions** – The authority uses indicators, such as data about skills and jobs, secure supply chains, and investment needed for the transition, to assess progress towards Australia's emissions targets, realising opportunities and managing risks.

- **Policies** – The authority considers the assessment of policy effectiveness to go beyond simply observing annual emissions reductions. The authority also considers broader impacts and benefits climate change policies have on the economy, the environment, and society, both positive and negative.
- **Context** – The authority considers factors that affect Australia's progress that are largely beyond the direct control of our governments and citizens, such as geopolitical factors, the science and global impacts of climate change, decisions of other nations, and voluntary corporate action.
- **Consultation** – The authority consulted on its 2024 projects in its issues paper titled *2024 Issues Paper: Targets, Pathways and Progress*, and undertook separate targeted consultation. The authority considers all feedback on its consultation processes and is constantly evolving its framework and methods.



Figure A.1: Framework for tracking progress

Climate Change Act 2022					
Progress towards a just transition and resilient nation					
 WELLBEING	s 12(e), s 12(1)f	Economic impacts and opportunities	Physical impacts and adaption	First Nations	Regional and rural Australia
Progress towards national greenhouse emissions reduction targets					
 EMISSIONS	s 12(1)a	Leading indicators of change	Point target compliance	Emissions budget tracking	Emissions sectoral trends
Progress in implementing policies					
 POLICIES	s 12(1)c, s 12(1)d	Mitigation and adaptation policy stocktake	Policy gap analysis	Indicators of direct effectiveness	Indicators of indirect effectiveness
Developments in the broader operating environment					
 CONTEXT	s 12(1)b	Climate science and global impacts	Geopolitics	International ambition and policies	Voluntary corporate action

Advice on Australia's emissions reduction targets

Section 15 of the *Climate Change Act 2022* also requires the authority to 'advise the Minister on greenhouse gas emissions reduction targets to be included in a new or adjusted nationally determined contribution'. Australia's next NDC is due in 2025.

The authority's advice will include complex whole-of-economy modelling, policy analysis, consultation and consideration of international trends in climate action.

