Australian Government

Department of Climate Change, Energy, the Environment and Water

Annual Climate Change Statement 2024

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Acknowledgement of Country

In delivering this Annual Climate Change Statement to Parliament, we pay our respects to our First Nations peoples, their Elders and their ancestors who cared for the lands before our time, their communities who continue to care for Country today, and the young ones who are following in their footsteps.

First Nations peoples have loved, cared for, and listened to Country for thousands of generations, so it is important to reflect on these ancient and ongoing connections and guardianship. These enduring cultures are the oldest on Earth. They have used their traditional knowledge to adapt as Australia's climate has changed over the millennia, and the resilience of these cultures is a source of inspiration for this Government.

First Nations peoples' voices and knowledge are critical to addressing the impacts of climate change and responding to the challenges we all now face. In the spirit of reconciliation, we look forward to improving how these voices are heard and represented in Australian Government action and decision-making, especially in our current climate and environmental crisis.

Australia recognises and pays its respects to First Nations peoples as the Traditional Owners of Australia. I would like to thank the Traditional Owners for their continuing custodianship of the lands, waters, skies, and communities that we live and work within today.

Foreword

I am very proud to present Australia's Annual Climate Change Statement 2024.

This is the third Annual Statement I have delivered to Parliament under the *Climate Change Act 2022.* It acts as an account of our commitment to transparency regarding our climate actions.

This Annual Statement reports progress on the Government's climate change and energy initiatives in 2024. It is informed by advice from the independent Climate Change Authority (CCA). This advice, and our response to the CCA's recommendations, is released alongside the latest emissions projections and results from the National Greenhouse Gas Inventory.

This Annual Statement also reflects how far Australia has come over the past few years.

2024 saw some key developments in the energy, transport and industry sectors.

The renewable electricity transition has picked up pace, with the share of renewable generation rising to average more than 45% of the National Electricity Market (NEM) – Australia's largest electricity market – in the months of September and October 2024, with similar numbers expected in November 2024.

The Government's expanded Capacity Investment Scheme (CIS) will deliver an additional 32 gigawatts (GW) of renewable capacity and storage by 2030, roughly half the size of Australia's largest grid. Over half of this will be achieved through new Renewable Energy Transformation Agreements (RETAs) negotiated with states and territories.

The Government has also introduced a New Vehicle Efficiency Standard (NVES), which will reduce emissions and improve our air quality and health. And the Safeguard Mechanism reforms have been in effect for over a year, with the CCA estimating a reduction of almost 13 million tonnes in net emissions between 2022-23 and 2023-24.

As the world transitions to net zero, we are setting up for a future made in Australia. A future where our nation can capitalise on its vast renewable energy sources to create and export green resources the net zero world needs – such as renewable hydrogen and green metals. The Government announced more than $22 billion over the next decade to help grow these essential industries.

In 2024, Australia's emissions decreased by 2.9 million tonnes of carbon dioxide equivalent (Mt CO_2-e)[1] – comparable to taking roughly 900,000 cars off the road for one year. This year's projections demonstrate that we are on track to deliver our 2030 emissions reduction target of 43% below 2005 levels. We are projected to beat our 10-year emissions budget by 3% or 152 Mt CO_2-e. We have done the work to put the right policies in place and I am confident we will now start to see more significant declines in emissions as the decade progresses and these policies take effect.

Australia is especially vulnerable to the impacts of climate change, which is already impacting our environment, communities and economy.

To address these impacts, our climate adaptation polices will guide decisions on how Australia should respond to climate risks, and strengthen our climate resilience.

I look forward to more hard work leading our nation towards a safer, cleaner and more prosperous future.

The Hon Chris Bowen MP
Minister for Climate Change and Energy

1 The emissions data presented in this Annual Statement comprise estimates on an Australian financial year basis, i.e. the period 1 July to 30 June of the next year, where 2024 represents the 2023-24 financial year.

Acronyms

ACCU	Australian Carbon Credit Unit
ADF	Australian Defence Force
AEMO	Australian Energy Market Operator
ARENA	Australian Renewable Energy Agency
BTR	Biennial Transparency Report
CCA	Climate Change Authority
CCU	Carbon capture and use
CEFC	Clean Energy Finance Corporation
CIS	Capacity Investment Scheme
COP	Conference of the Parties
CSIRO	Commonwealth Scientific and Industrial Research Organisation
ECMC	Energy and Climate Change Ministerial Council
EMM	Environment Ministers' Meeting
EPA	Environment Protection Australia
EV	Electric vehicle
FNCES	First Nations Clean Energy Strategy
G20	Group of 20
GW	Gigawatt
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
LCLF	Low carbon liquid fuels
LNG	Liquefied natural gas
Mt CO_2-e	Million tonnes of carbon dioxide equivalent
NABERS	National Australian Built Environment Rating System
NatHERS	Nationwide House Energy Rating Scheme
NCQG	New Collective Quantified Goal
NDC	Nationally Determined Contribution
NEM	National Electricity Market
NGER	National Greenhouse and Energy Reporting Scheme
NVES	New Vehicle Efficiency Standard
OECM	Other Effective area-based Conservation Measures
PV	(Solar) photovoltaic
RETA	Renewable Energy Transformation Agreement
SME	Small and medium-sized enterprise
SRES	Small-scale Renewable Energy Scheme
UNFCCC	United Nations Framework Convention on Climate Change
WAM	The 'with additional measures' scenario in the 2024 Emissions Projections

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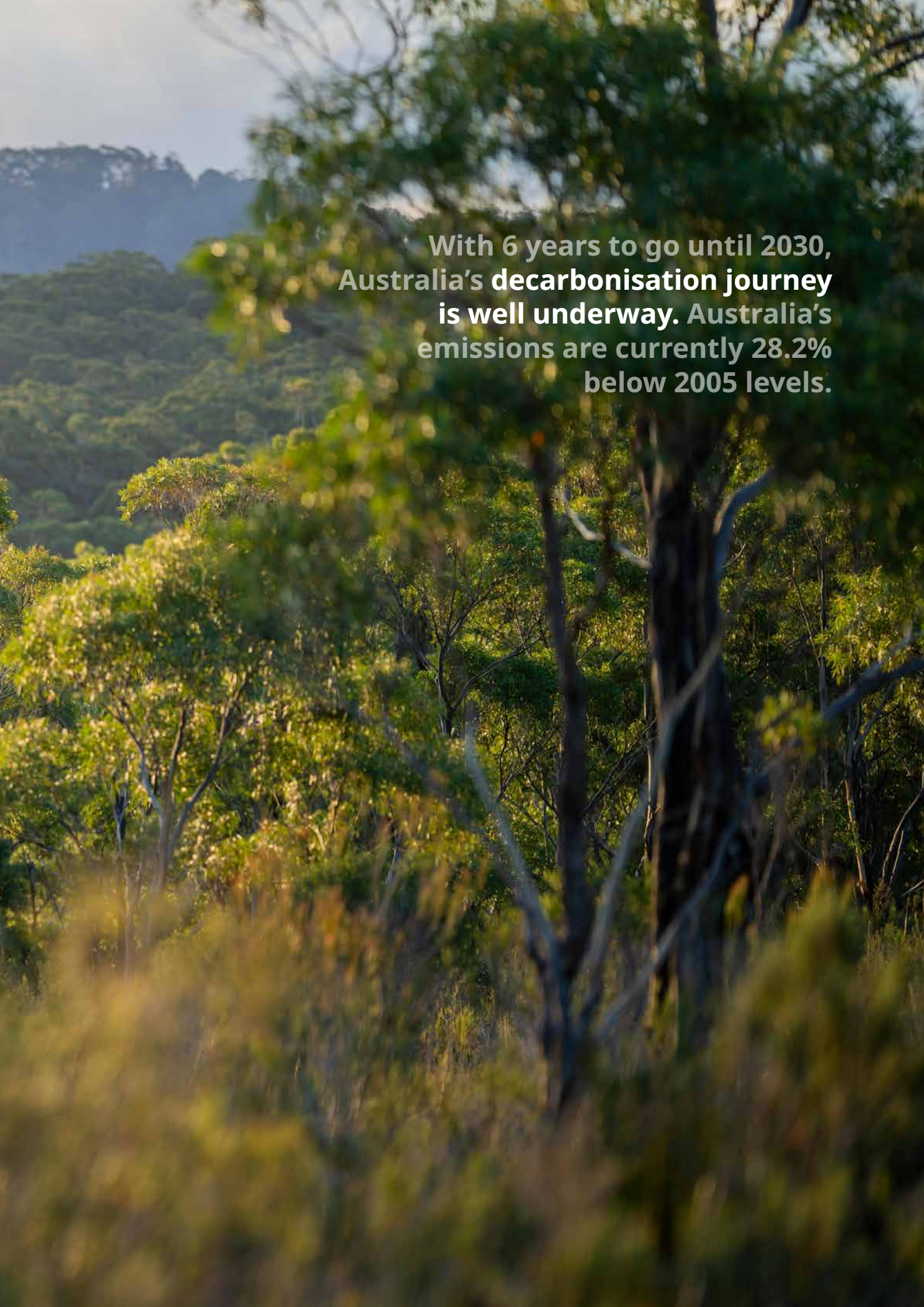


With 6 years to go until 2030, Australia's **decarbonisation journey is well underway.** Australia's emissions are currently 28.2% below 2005 levels.

Executive summary

This Annual Climate Change Statement provides an overview of Australia's progress in 2024 and – building on the previous 2 Annual Statements – reports on the Government's initiatives, programs and plans to support Australia's path to net zero emissions.

2024 has seen the continued rollout of policies across all sectors to decarbonise our economy. The majority of Australia's emissions are now covered by legally binding emissions reduction policies calibrated to the 2030 target. Public and private investment has increased in sectors such as renewable electricity generation since 2023, which helps set Australia up to build a stronger, diversified and more resilient economy that will support our – and the world's – net zero transformation.

In 2024, the Government legislated Australia's first New Vehicle Efficiency Standard, which will reduce road transport emissions. It has agreed several new Renewable Energy Transformation Agreements with the states and territories, as part of the plan to deliver an additional 32 GW of renewable generation and storage by 2030 in the electricity sector. The Safeguard Mechanism reforms have now been in operation for a full year and Australia's latest emissions projections estimate that net emissions from the scheme will be 88 Mt CO_2-e in 2030 – below the legislated target of 100 Mt CO_2-e.

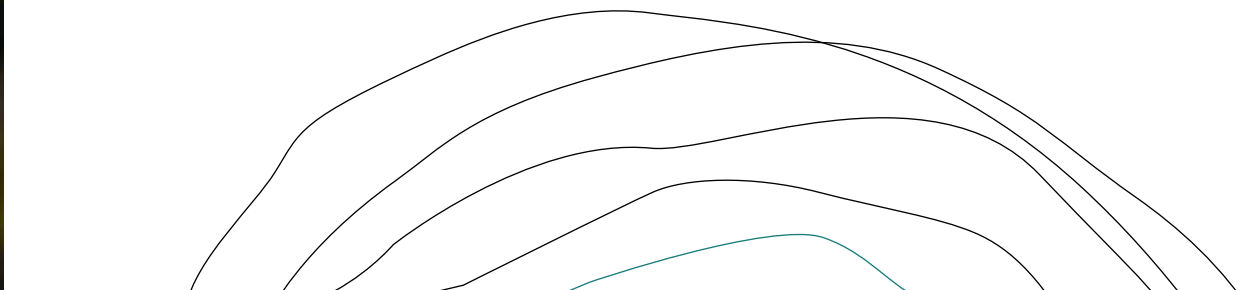
The Government is also focused on leveraging our abundant renewable energy resources to contribute to global emissions reduction and secure Australia's place in a changing economic and strategic landscape. The Future Made in Australia plan will help Australia unlock private investment at scale in net zero industries, including renewable hydrogen, green metals and low carbon liquid fuels (LCLF). In the 2024–25 Budget, the Government announced investments of $22.7 billion over the next decade to support the Future Made in Australia plan.

In 2024, the trend towards renewable electricity continued. In the National Electricity Market (NEM) covering eastern Australia, renewable energy is expected to average around 40% in 2024, up from 30.5% in 2021. Around 3.2 GW of rooftop solar and 4.2 GW of large-scale wind and solar is expected to be installed in 2024, including the recently-approved 923 MW Macintyre wind farm, Australia's largest to date. The NEM also reached a new maximum share of 75.6% renewable energy at 1pm on 6 November 2024, while the Wholesale Electricity Market in Western Australia had periods with over 80% renewable energy (AEMO 2024a). The Government expects these trends to continue as the electricity grid transitions to 82% renewable electricity by 2030, spearheaded by policies such as the Capacity Investment Scheme (CIS) and Rewiring the Nation.

With 6 years to go until 2030, Australia's decarbonisation journey is well underway. Australia's emissions are currently 28.2% below 2005 levels. *Australia's Emissions Projections 2024* indicate the 2030 target is now within reach. The baseline scenario, which includes policies which have now been implemented, projects Australia's emissions to be 42.6% below 2005 levels in 2030 – just shy of our point-in-time target of 43%. This is an improvement from last year, when the baseline scenario projected emissions to fall to 37% below 2005 levels in 2030, and an improvement on the year before that too. Australia's emissions outlook continues to improve as more significant policies are implemented.

On an emissions budget basis, Australia is projected to beat its target. Cumulative emissions from 2021 to 2030 are projected to be 152 Mt CO_2-e or 3% below the budget for this period. This is equivalent to the total emissions from the electricity sector in 2024.

We expect to see substantial reductions in Australia's emissions in the second half of this decade. Under the baseline scenario, Australia's emissions are projected to decline from 441 Mt CO_2-e in 2024 to 352 Mt CO_2-e in 2030. Emissions in the electricity sector are projected to more than halve in the 6 years between 2024 and 2030.



The ‘with additional measures’ scenario incorporates additional policies that have been announced but where detailed design is still under development. These include some measures announced as part of the Future Made in Australia plan, which support development of the hydrogen and critical minerals industries to strengthen Australia’s economic position as the world moves to a net zero economy. These additional measures improve emissions reductions projections slightly to 42.7% below 2005 levels by 2030, and remain at 3% below the budget.

Emissions must continue falling across all sectors, but each is on a different pathway to net zero. Some sectors, like electricity, can reduce emissions relatively quickly given the availability of mature, scalable technology. This will then enable emissions reduction in other sectors through switching from other forms of energy to renewable electricity. However, some sectors, including agriculture, will take longer to decarbonise as they currently have limited commercially viable technology options to reduce emissions.

We will need action by all governments, communities and companies to achieve net zero. Increasingly, action is being taken by governments, communities and companies to achieve net zero. All state and territory governments are pursuing net zero by 2050 or earlier. More communities and households are also taking action. Electric vehicle (EV) purchases have increased roughly four-fold from 2021 to September 2024 (EVC 2024, FCAI 2024). Installations of small-scale solar water heaters and air source heat pumps increased by roughly a third in 2023. The Government is installing more than 420 community batteries across Australia. And around two-thirds of ASX200 companies have now made net zero commitments, an increase of 8 percentage points since last year (ACSI 2024).

There are challenges to meeting our targets, including workforce and supply chain issues, approval timeframes, and social licence constraints. The Government is working with states and territories through the Energy and Climate Change Ministerial Council (ECMC) and bilateral RETAs to overcome these and stay the course.

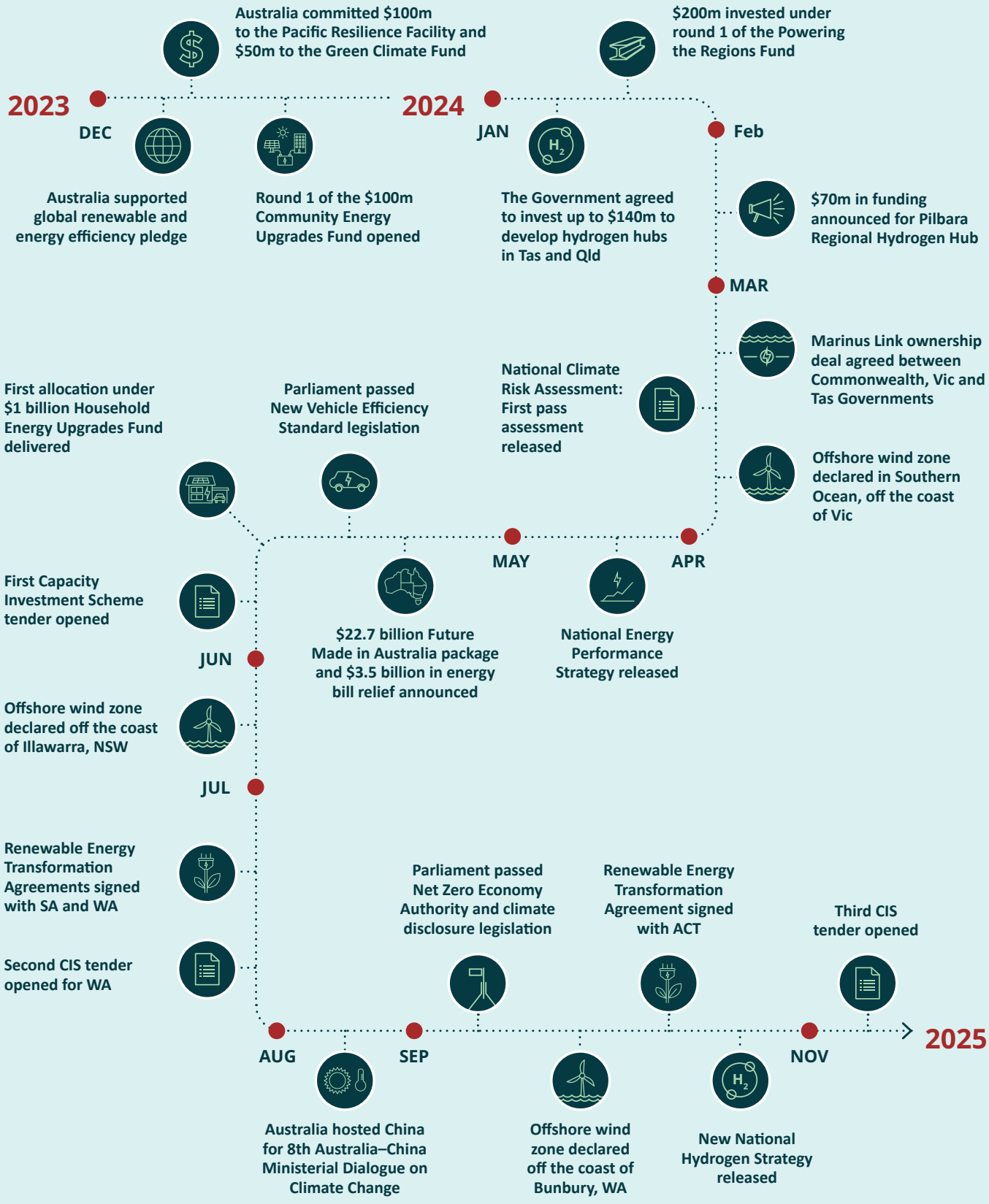
All Australians should benefit from the opportunities afforded by emerging net zero industries, including First Nations peoples and rural and regional communities. In 2024, the Government passed legislation to establish the Net Zero Economy Authority. The Authority will ensure that regions, workers and communities are supported to manage the impacts, and share in the benefits, of Australia’s transition to a net zero emissions economy. The Future Made in Australia Bill 2024 also establishes Community Benefit Principles to ensure public investment, and the private investment it attracts, flows to communities.

Climate action extends beyond reducing emissions. Australia must also adapt to the impacts of climate change. In the coming decades we can expect an increase in the risk of disasters. This is due to more extreme weather, a longer fire season for much of the south and east of Australia and more intense short-duration heavy rainfall events. To plan for and adapt to the impacts of climate change, the Government is taking action to reduce climate risk, strengthen resilience and enhance wellbeing. The Government is working on Australia’s first National Adaptation Plan and National Climate Risk Assessment to guide decisions on how Australia should respond to climate risks. Looking forward, the Government will release an ambitious and achievable 2035 emissions reduction target. It will also release plans that will guide Australia’s path to net zero by 2050 across each sector of the economy.

Australia has continued to work closely with other countries to support global action on climate change. Over 97% of Australia’s trade goes to destinations with net zero targets. Australia and 132 other signatories, pledged to triple global renewable energy capacity to at least 11,000 GW and double the global average annual rate of energy efficiency improvements from around 2% to over 4% by 2030 at the UNFCCC Conference of the Parties (COP) 28 in 2023. Australia is committed to working with international trading partners and Pacific partners to support emissions reduction efforts and adapt to climate change.

Key Achievements

December 2023 – November 2024



Transformation of our electricity grids

The Government's Reliable Renewables Plan is putting Australia on track to a cheaper and more secure electricity system. The plan delivers both on the need to urgently reduce emissions, and provide a foundation for Australian industry's ongoing competitiveness. Developments in 2024 confirmed the imperative of delivering this plan.

The Australian Government and all states and territories are committed to this national transformation, underpinned by renewable energy, because:

- With the increasing unreliability and ageing of coal generation, system security must be maintained by investment in new capacity, storage and transmission to keep the lights on.
- Rapidly decarbonising electricity supply in this decade is essential to address the global climate emergency and enable decarbonisation across the economy to reach net zero.
- Renewable energy, firmed by storage and transmission, backed up by flexible gas generation, is the cheapest and quickest way to transform our electricity system for households and businesses.
- The rapid transformation of the system – to deliver reliability, low emissions and affordable electricity – is central to underpinning the competitiveness of Australian industry in a net zero global economy, delivering a Future Made in Australia.

Australia's ageing fleet of coal-fired generation has become increasingly unreliable. In the past 3 months, there have been more unplanned outages at coal fired power stations in the NEM, Australia's largest electricity grid, compared to any 3-month period since October 2021. 90% of this coal capacity is forecast to exit the NEM before 2035 under the Australian Energy Market Operator's (AEMO) most likely future scenario. This means that Australia cannot wait and deliberate for decades on unaffordable and risky nuclear reactors that have never been deployed in Australia, cannot be deployed in time to replace the existing coal fleet, and are incompatible with our renewables-intensive energy system.

Even without considering greenhouse gas emissions, coal generation's inflexible operation and business model of baseload generation has been irreversibly undermined by the rise of renewables including solar. In 2024, household solar reached 4 million installations, and now exceeds the capacity of the remaining national coal fleet. Renewable electricity, supercharged by household solar, has reached a new maximum of over 75.6% of our largest grid at 1pm on 6 November 2024 (AEMO 2024a). Additionally, AEMO's Integrated System Plan has confirmed there will soon be periods where 100% of grid demand can be met with renewables, with renewable potential exceeding 100% for the first time at 12.30pm on 18 September 2024 (AEMO 2024b).

Without continuing to urgently address electricity sector emissions by 2030, Australia will not be making its agreed contribution to address dangerous climate change in this critical decade for action. Nor will it be able to unlock decarbonisation across the economy to reach net zero by 2050. The CCA's *Sector Pathways Review* made clear that '[d]ecarbonising Australia's electricity supply as soon as possible will address Australia's largest source of emissions and is vital to unlocking emissions reductions in other sectors through electrification — replacing vehicles, appliances and industrial equipment powered by fossil fuels with new, efficient electric versions' (CCA 2024a). The electricity sector has scalable and cost-effective emissions reduction opportunities that are more readily deployable than other sectors. The CCA noted that '[w]aiting for new, better, cheaper technologies is tantamount to choosing to continue to emit' (CCA 2024a).

Increased renewable energy supply has been driving down wholesale electricity prices. 19.5% of all dispatch intervals showed negative or zero prices across the 5 regions of Australia's NEM in quarter 3 2024, up from 9% in the same quarter 2022. This year's Commonwealth Scientific and Industrial Research Organisation (CSIRO) GenCost Report provided further expert evidence that firmed renewable generation is the cheapest way to deliver the capacity needed to power Australia. This analysis took into account the additional investment in network and storage capacity to support wind and solar in our grid, even as the levels of variable generation increase.

CSIRO confirmed that both large-scale nuclear and small modular reactors would be significantly more expensive and subject to first-of-a-kind capital cost premiums of up to 100%, noting that 'the first full operation would be no sooner than 2040' (CSIRO 2024a).

Reliable renewable electricity supply at internationally competitive prices – taking advantage of Australia's abundant renewable energy resources – is fundamental to maintaining Australia's comparative advantage in a net zero global economy. The Government's National Interest Framework under the Future Made in Australia plan has identified this advantage in low-cost renewable electricity as opening new opportunities in Australia in renewable hydrogen and green metals. Secure, low-cost and decarbonised electricity is also fundamental to broader competitiveness of businesses across the economy.

Demand for electricity in the NEM is expected to more than double as the economy grows, transport and industrial processes become increasingly electrified, and new industries like renewable hydrogen emerge. The release of AEMO's Integrated System Plan in June 2024 confirmed that renewable energy connected by transmission and distribution, firmed with storage and backed up by gas-fired generation is the lowest-cost pathway for Australia's national grid to meet these challenges and maintain reliable electricity supply.

2024 has seen the delivery of key policies that put Australia on track to transform the electricity grid to reach 82% renewable electricity by 2030. This includes Rewiring the Nation, the expanded CIS, RETAs, Community Batteries for Household Solar, offshore wind zones, legislating the Net Zero Economy Authority, energy savings initiatives and household energy bill relief. Australia's progress is outlined further in the electricity sector section of this Annual Statement.

A Future Made in Australia

The Future Made in Australia plan ensures Australia can capture the economic and employment opportunities of the global net zero transformation and use its renewable potential to help drive global decarbonisation.

The global economy is changing and it is vital that Australia is not left behind. The vast majority of Australia's exports now go to economies with net zero commitments, and competition to attract investment in net zero industries is increasing. Australia has world-class renewable energy and mineral resources, a highly skilled population and a track record as a reliable investment destination and trading partner. This positions us to be a major beneficiary of these global shifts, and to become a renewable energy superpower. Achieving this potential will help support decarbonisation by our trading partners and strengthen global ambition. Innovation and public support are needed to unlock private investment and develop the benefits of new net zero industries.

Unlocking investment in net zero industries

The Future Made in Australia plan will encourage the significant private sector investment needed to harness global net zero transformation opportunities and ensure Australia's future prosperity. Guided by the National Interest Framework in the Future Made in Australia Bill 2024, targeted public investment will strengthen the alignment of economic incentives with Australia's national interest and encourage the private investment at scale needed for net zero opportunities and Australia's economic resilience.

The 2024–25 Budget invested $22.7 billion over the next decade in the Future Made in Australia package.

The Future Made in Australia Bill 2024 also establishes the Community Benefit Principles to ensure Future Made in Australia support, and the private investment it attracts, flows to communities in ways that benefit them. Decision-makers must have regard to these Principles when making investment decisions, to ensure that the benefits of these programs will be widely shared.

The 2024–25 Budget Future Made in Australia package

In the 2024–25 Budget, the Government announced a **$22.7 billion Future Made in Australia Package**. Some key measures include:

Net Zero Transformation Stream

Renewable hydrogen

- an additional **$2 billion** for the Hydrogen Headstart program
- the Hydrogen Production Tax Incentive will provide a refundable tax offset of **$2 per kilogram** of renewable hydrogen produced. This incentive will be available in respect of each eligible facility for up to 10 years between 2027–28 and 2039–40.

Green metals

- **$18.1 million** over 6 years from 2024–25 for initiatives to expedite the emergence of Australia's green metals industry.

Economic Resilience and Security Stream

Critical minerals refining and processing

- the Critical Minerals Production Tax Incentive will provide a refundable tax offset of **10% of eligible processing costs** for the 31 minerals on Australia's Critical Minerals List. This incentive will be available in respect of each eligible facility for up to 10 years between 2027–28 and 2039–40.

Clean energy manufacturing, including battery and solar panel supply chains

- the **$1 billion** Solar Sunshot program to develop Australia's solar manufacturing capabilities, diversify and improve supply chain resilience, and support solar technologies innovations
- the **$523.2 million** Battery Breakthrough Initiative will transform Australia's battery industry by promoting the development of battery manufacturing capabilities and helping manufacturers move up the battery value chain.

Supporting a Future Made in Australia

The Future Made in Australia plan is supported by measures to ensure Australia remains an attractive investment destination. This includes the Government's commitment to establish a 'front door' for investors with major, transformational investment proposals to make it simpler to invest in Australia and attract more global and domestic capital. Additional funding will accelerate the development of the Guarantee of Origin (GO) scheme. The scheme tracks and verifies the emissions intensity of products like hydrogen, green metals and low-carbon liquid fuels to enable producers, exporters and users to make claims about a product's embodied emissions, supporting the development of markets for low emissions products. The GO scheme would also establish eligibility for other Government programs such as the Hydrogen Production Tax Incentive.

The Government has also committed $1.7 billion for a Future Made in Australia Innovation Fund to support innovation, commercialisation and early stage development in priority sectors. These sectors include green metals, LCLF, and clean energy technology manufacturing.

The National Interest Framework

There are 2 'streams' under the framework that will help to guide these investment decisions. The Government has initially identified several industries that are important for the economic opportunities of the net zero transformation or for Australia's economic resilience through the transition.

Net Zero Transformation Stream

The framework's 'net zero transformation' stream will identify priority sectors where:

- Australian industry is expected to have a sustained comparative advantage in a net zero global economy, and
- public investment is needed for the sector to make a significant contribution to emissions reduction at an efficient cost.

Three sectors were identified in the 2024–25 Budget as being aligned with the net zero transformation stream.

Renewable hydrogen

Australian hydrogen can be exported as an energy carrier to countries less able to generate renewable electricity. It can also be exported through low-emissions products that have been manufactured locally using hydrogen as a chemical or heat input to the production of green metals, ammonia and low carbon liquid fuels.

Investment in renewable hydrogen aims to accelerate industry scale-up to drive costs down.

Green metals

Australia's iron, steel, alumina and aluminium production was estimated to be responsible for 41 Mt CO_2-e in 2023, including process emissions and stationary energy emissions used in production. Metals industries also make a significant contribution to global emissions. Establishing a domestic green metals industry, including for export, presents an opportunity for Australia to make an outsized contribution to global decarbonisation. The Government is considering measures to help support a green metals industry.

Low carbon liquid fuels

LCLF offer a decarbonisation pathway for many hard-to-abate sectors, including aviation, shipping and heavy transport.

Australia's large landmass, advanced farming practices, access to renewable feedstocks, established supply chains and renewable energy potential are assets for developing domestic LCLF production. The Government is considering measures to help establish a domestic LCLF industry.

Economic Resilience and Security Stream

The 'economic resilience and security' stream will identify sectors where:

- some level of domestic capability is a necessary or efficient way to deliver Australia's economic resilience and security, and
- the private sector will not deliver the necessary investment in the absence of government support.

Two sectors were identified in the 2024–25 Budget as being aligned with the economic resilience and security stream.

Critical minerals refining and processing

Global demand for critical minerals will need to increase by around 350% by 2040 for the world to reach net zero emissions by 2050.

Australia has some of the largest deposits of critical minerals in the world – including cobalt, lithium, manganese, rare earth elements, tungsten and vanadium. This creates an opportunity for Australia to capture more value by moving along global supply chains, while contributing to their resilience.

Clean energy manufacturing, including battery and solar panel supply chains

Global battery and solar supply chains are highly concentrated, and disruptions to these supply chains would pose risks to Australia's economic resilience.

Building the clean energy workforce

Australia's net zero transformation will require a skilled workforce including trades, engineers, educators and other professionals. In 2023, Jobs and Skills Australia estimated that Australia will need over 2 million workers economy-wide in occupations critical for clean energy 2050, an increase of over 30% (JSA 2023). Building this workforce – and avoiding skills shortages – will require a substantial uplift in training and skills infrastructure. It will also be essential to attract and retain workers long-term, including through addressing barriers to the participation of women and First Nations peoples in relevant trades.

The Government's Skilling the Clean Energy Workforce package is an important step in delivering the workforce needed to support clean energy investment under a Future Made in Australia. It includes:

- $50 million over 3 years for the Clean Energy Capital Investment Fund to pay for new and existing facility upgrades across a broad set of clean energy occupations including wind, solar, pumped hydro, grid battery storage, electricity networks and hydrogen, as well as electrical and construction trades.
- $30 million to turbocharge the vocational education and training teacher, trainer and assessor workforce for clean energy.

Industries key to addressing climate change remain male dominated. In order to secure the workforce needed for the net zero transition, we must ensure women's equitable participation. A $60.6 million investment over 4 years to establish the Building Women's Careers Program will support women to access training in key industries like clean energy and advanced manufacturing. In addition, the Government released *Working for Women: A Strategy for Gender Equality* in March 2024, prioritising actions to minimise gender segregation across the workforce, including in clean energy.

The New Energy Apprenticeships Program provides $10,000 to apprentices to encourage upskilling in net zero sectors. From 1 June 2024, the program was expanded to encompass more clean energy activities – including EV maintenance and solar and battery installations – and to provide greater flexibility and clarity on the eligibility for a new energy apprenticeship. More than 3,900 apprentices have benefited from the program as of 30 September 2024, including 158 First Nations peoples.

The Government is also developing a National Energy Workforce Strategy to work with the states and territories to better attract and retain a diverse clean energy workforce. The strategy will seek to improve coordination across Australia in addressing clean energy workforce challenges. This includes utilising accurate workforce data to inform decision making and planning. It is expected to be delivered to the ECMC at the end of 2024.

Rural and regional opportunities and impacts

Establishing the Net Zero Economy Authority

Most of Australia's ageing coal-fired power stations have now announced closure dates. As these power stations close and further renewable energy industries emerge the industry mix will change significantly, impacting rural and regional economies and communities.

The Government is working to support communities to navigate these challenges and seize the economic opportunities of the net zero transformation. In 2024, the Government established the Net Zero Economy Authority. The Authority will engage with transitioning communities to understand their needs and aspirations. It will work to ensure the workers, industries and regional communities that have powered Australia for generations can seize the net zero transformation's opportunities

The Net Zero Economy Authority will deliver:

- the Energy Industry Jobs Plan – to provide customised employment and skills services to employees in eligible closing power stations, as well as support their families and communities.
- the Net Zero Jobs Plan – which will set out the Government's vision of achieving a smooth workforce transition, informed by extensive consultation with impacted communities. This will be co-developed between the Authority and the Department of Employment and Workplace Relations.
- Regional Workforce Transition Plans – which will outline the employment and skills support available in specific regions, so workers and communities can access support for their unique circumstances. These will be co-developed between the Authority and the Department of Employment and Workplace Relations.

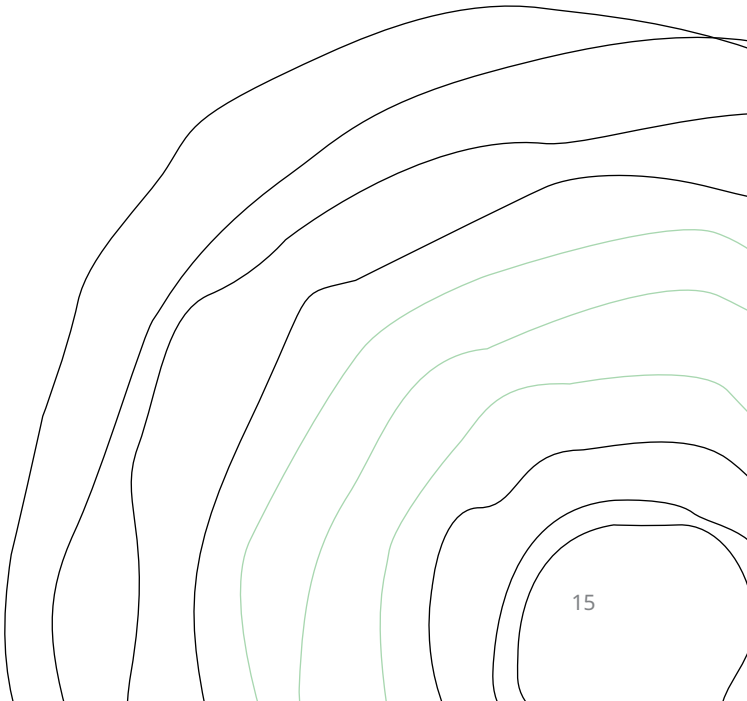
The Authority will also support and facilitate public and private sector participation and investment in net zero transformation initiatives in Australia. To ensure communities share in the benefits of the net zero economy, it will work directly with industry, First Nations peoples, workers and state and local governments.

Unlocking regional investment

The Government is unlocking investment in renewable energy industries to strengthen and diversify regional economies. One example is a $35 million contribution towards building a grid-scale battery at the former site of the coal-fired power station in Liddell, NSW.

The development of Australia's renewable hydrogen industry and related exports is projected to produce around 33,000 direct and indirect jobs by 2040, including prospects in regional communities. The Regional Hydrogen Hubs program is investing around half a billion dollars to encourage the growth of this industry. In 2024, the Government finalised a $140 million agreement with the Western Australian Government to build a hydrogen hub in the Pilbara and a $300 million project with the Tasmanian Government for a hub at Bell Bay.

The Powering the Regions Fund is also helping establish new clean energy industries and supporting existing employment. The fund assists industrial facilities to reduce emissions. In 2024, the Government awarded $621 million to 17 projects across Australia, including projects in the aluminium, mining, fuel refining and chemical production industries in locations such as Gladstone (Queensland) and Kwinana (Western Australia).



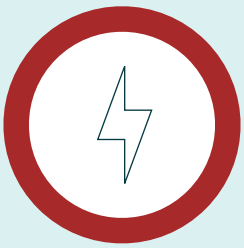
Opportunities through the Australian Carbon Credit Unit (ACCU) Scheme

The ACCU Scheme is central to the rural and regional opportunities of Australia's transition to net zero. There are now over 2,000 registered projects across Australia. Over 1,700 ACCU scheme projects use agriculture, savanna fire management or vegetation methods, covering a total area of 77.2 million hectares. Around 19 million ACCUs, each representing a tonne of carbon abatement, are expected to be issued in 2024. Their market value is approximately $750 million as of 11 November 2024, reflecting a crucial investment in rural and regional Australia.

Since the 2023–24 Budget, the Australian Government has allocated $66 million to continue essential reforms to the ACCU Scheme. This includes up to $12 million to support First Nations peoples to participate in upfront Native Title consent negotiations for ACCU projects. Savanna fire management methods are used in over 24 million hectares of north Australian savanna and abate around 1.2 Mt of emissions a year. The 34 Indigenous owned and operated savanna fire management projects account for 70% of the area of all savanna fire management projects and around 74% of the credits issued (ICIN 2024).

In December 2023, the CCA released their review of the scheme. They confirmed it is well designed with robust governance, compliance, and enforcement structures. In April, the Australian National Audit Office released their performance report of the scheme. The report found that the scheme administration and development of methods was effective and was being effectively enforced by the Clean Energy Regulator. Compliance under individual methods has also been reviewed. Associate Professor Cris Brack reviewed regeneration compliance checks, and 2 published reports confirmed the process and projects were working as intended.

Around 19 million ACCUs, each representing a tonne of carbon abatement, are expected to be issued in 2024.



Electricity sector

Since May 2022

Transport sector

9.5% of new car sales in September 2024 were **EVs**

78 utility solar projects started generating, with a total capacity of more than 3.6 GW

19 wind projects started generating, with a total capacity of more than 3.1 GW

Over 770,000 small-scale solar systems were installed, with a total capacity of more than 7.2 GW

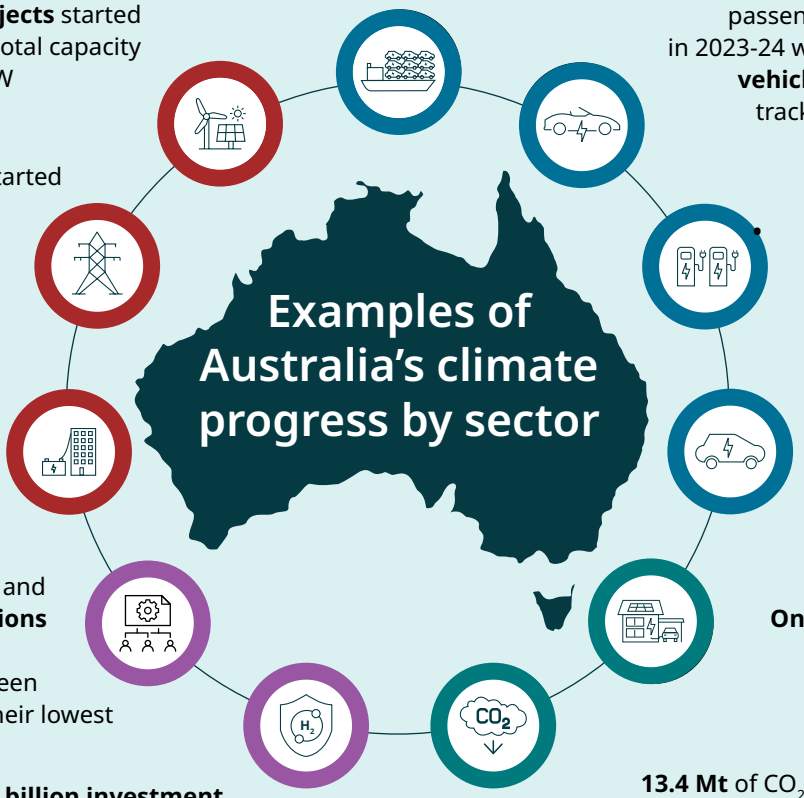
Industry, resources and waste sector **emissions declined by 1.3%** (2.2 Mt CO_2-e) between 2023 and 2024 to their lowest level since 2017

72% of Government's passenger vehicle orders in 2023-24 were **low-emission vehicles** – putting us on track to meet the 2025 target of 75%

Over 1,000 public EV fast charging sites at June 2024

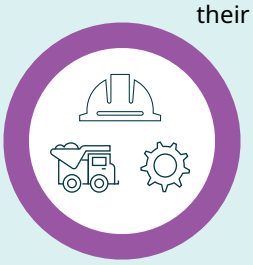
106 EV models available in September 2024

One in 3 homes with rooftop solar PV



$1.4 billion investment through the Powering the Regions Fund to assist Safeguard Mechanism and other industrial facilities to reduce their emissions and energy use

13.4 Mt of CO_2 emissions saved over two decades through the National Australian Built Environment Rating System



Industry and resources sectors

Buildings sector

Tracking towards our targets

In the year to June 2024, emissions decreased by 2.9 Mt CO_2-e or 0.7%. This reflects a decline in electricity and agriculture sector emissions, partially offset by rising transport sector emissions caused by a continued return to pre-COVID levels of transport activity.

The Government notes the CCA's view that the Government has made significant progress over the past year in implementing and delivering new policies designed to reduce emissions. The Government also agrees with the CCA that it is important to hold course on delivering these policies, so that emissions fall faster than they have to date to reach the 2030 target (CCA 2024b).

Australia's emissions are now 28.2% below 2005 levels.

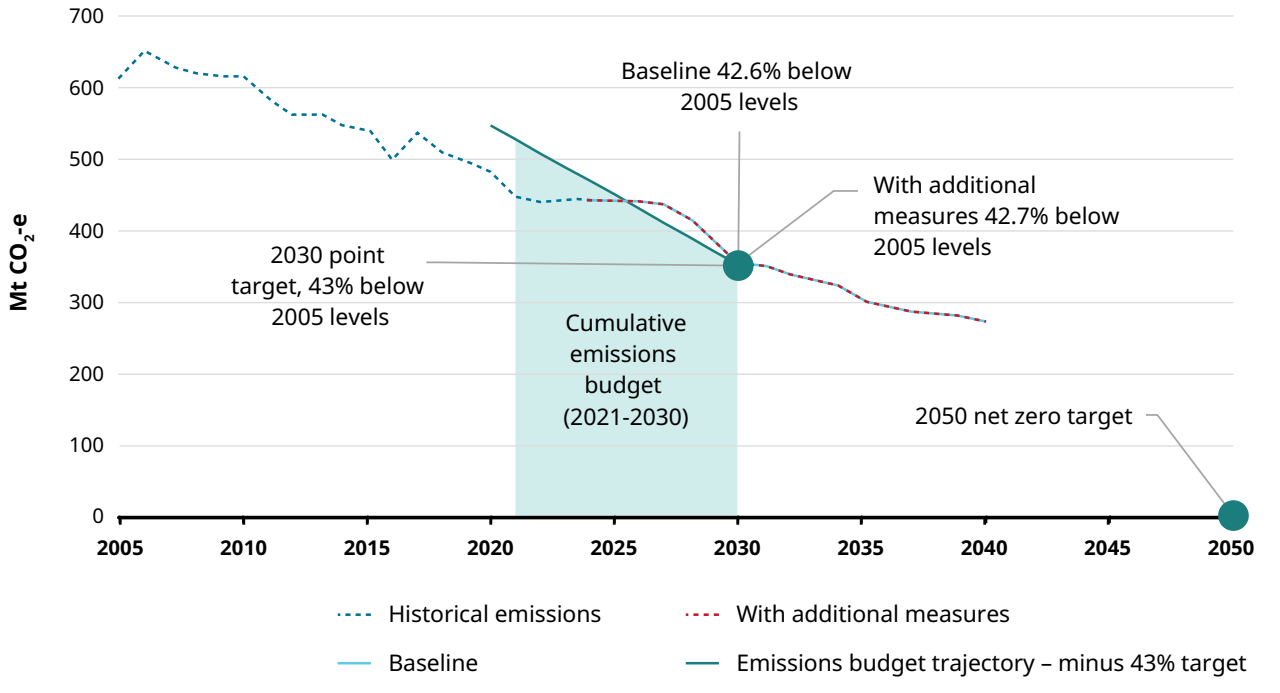
Australia's 2024 emissions projections

Progress against the 2030 target

Australia's Emissions Projections 2024 provide the latest estimates of Australia's greenhouse gas emissions to 2040. They show how Australia is tracking against its emissions reduction commitments by examining the anticipated impacts of policies and measures to reduce Australia's emissions.

The projections include a baseline scenario and a 'with additional measures' (WAM) scenario. The baseline scenario includes federal, state and territory policies which are now being implemented or where detailed policy design is well progressed. This scenario shows a 42.6% reduction in emissions on 2005 levels by 2030 – an improvement from 37% in the 2023 baseline projections. This reflects the good design and implementation of significant new policies, such as the expanded CIS to support the delivery of more renewable electricity generation by 2030, and the New Vehicle Efficiency Standard. This scenario demonstrates that Australia is just shy of meeting the 2030 point-in-time target based on current policies.

Figure 1: Tracking against the 2030 target, 2005 to 2050, Mt CO_2-e



Source: DCCEEW (2024a)

The WAM scenario builds on the baseline. It includes some Future Made in Australia measures which support the development of the hydrogen and critical minerals industries. It accounts for policies that have been announced but which are undergoing detailed design, and/or were subject to the outcome of grant rounds yet to be announced at the time of finalising the 2024 projections. These include:

- the National Hydrogen Strategy, released in September 2024, supported by Hydrogen Headstart and the Hydrogen Production Tax Incentive,
- the Critical Minerals Production Tax Incentive, and
- the Industrial Transformation Stream (round 1) of the Powering the Regions Fund.

Under the WAM scenario, Australia's emissions are projected to be 351 Mt CO_2-e or 42.7% below 2005 levels in 2030. This is an improvement from 42% under the 2023 projections WAM scenario. This demonstrates that Australia can sustain strong emissions reductions whilst simultaneously developing new hydrogen and critical minerals industries which are expected to be energy intensive.

Australia's 2030 target also includes a 10-year net emissions budget, calculated across 2021 to 2030. Australia is projected to beat its 2030 target on a budget basis under both the 'baseline' and WAM scenarios. Both scenarios are 3% below the budget between 2021 and 2030.

Emissions trends to 2040

From 2024 to 2040, emissions are projected to decline in almost all sectors of the economy in both the baseline and WAM scenarios.

The strongest decline is projected in the electricity sector, where emissions are projected to decline by 94 Mt CO_2-e between 2024 and 2030 and by a further 29 Mt CO_2-e by 2040. This is driven by the expanded CIS, which is included in the baseline emissions projections for the first time, as well as state and territory renewable energy targets. Together these policies are expected to result in 82% renewable generation penetration on-grid nationally, by 2030. Electricity emissions decline further to 2040 driven by post-2030 renewable energy targets and plans in Victoria and Queensland,[2] and the closure of coal-fired power stations.

Continuing both the baseline and WAM scenarios projections to 2040 without accounting for any future emissions reduction policies, Australia's annual emissions are projected to fall to 271 Mt CO_2-e in 2040, from 441 Mt CO_2-e in 2024 (56% below 2005 levels).

Both scenarios project the same aggregate outcome in 2040. In the WAM scenario, Future Made in Australia measures show increased hydrogen production and critical minerals processing, which is expected to result in higher emissions in the electricity (because of increased electricity generation from electrolysers to produce hydrogen), stationary energy, and Industrial Processes and Product Use (IPPU) sectors.

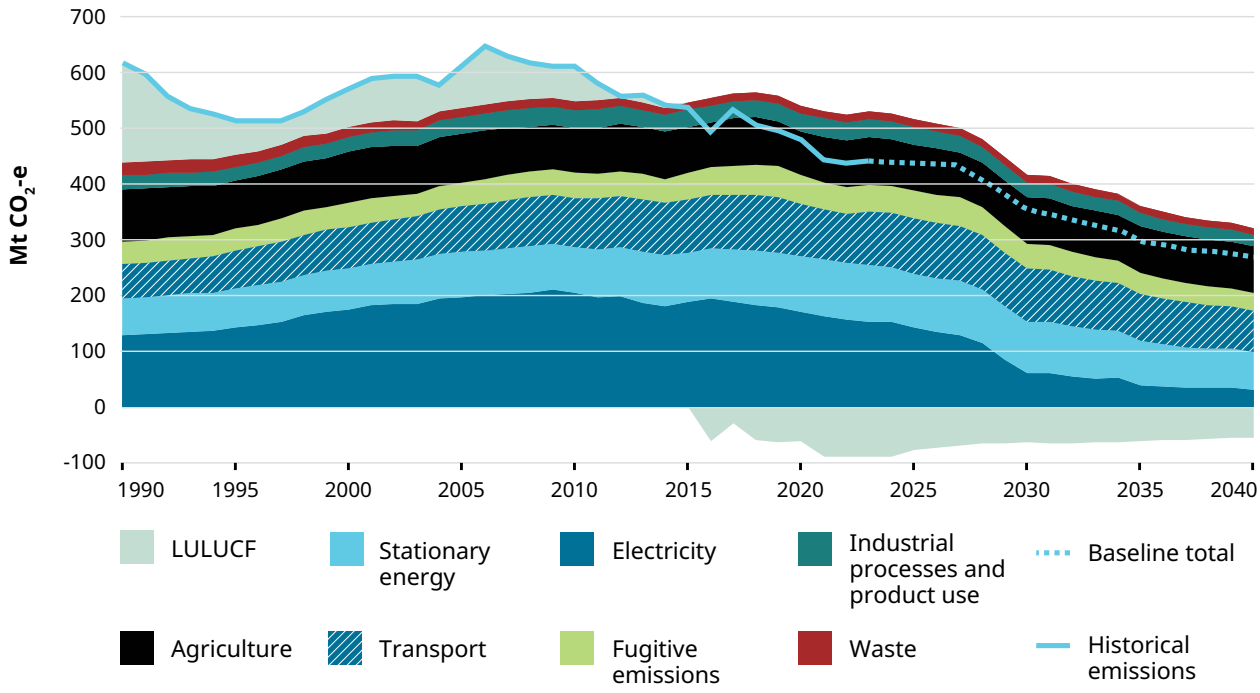
However, as hydrogen production is increasingly produced by off-grid renewable powered electrolysers to 2040, and because the NEM is largely decarbonised, emissions increases are relatively modest. These emissions increases are offset by emissions reduction from the substitution of fossil fuels by hydrogen. There is also a net increase in LULUCF emissions because of reduced sequestration activities under the ACCU scheme.

Transport emissions are projected to decrease from 98 Mt CO_2-e in 2024 in the baseline scenario to 95 Mt CO_2-e in 2030 and 80 Mt CO_2-e in 2040. The NVES is projected to reduce transport emissions, which have been one of the fastest-growing sources of emissions since 1990 (with the exception of COVID-19 impacts over 2020 to 2022). The NVES, which will commence on 1 January 2025, is projected to reduce transport emissions by 3% from 2024 to 2030 and 19% from 2024 to 2040, as the efficiency of the stock of cars and light commercial vehicles improves. Emissions fall further in the WAM scenario due to the increased use of hydrogen in trucks and other vehicles.

Emissions from the stationary energy, fugitives and IPPU sectors are projected to decline by 14 Mt CO_2-e from 2024 to 2030. This is due to investment in efficiency, fuel switching, methane capture and technology improvements incentivised by the Safeguard Mechanism. Greater levels of clean technology uptake and deployment continue in these sectors to 2040 as Safeguard baselines decline to zero by 2050. In the WAM scenario, emissions from the stationary energy and IPPU sectors fall further as hydrogen replaces more fossil fuels used in the production of alumina, ammonia and other manufacturing.

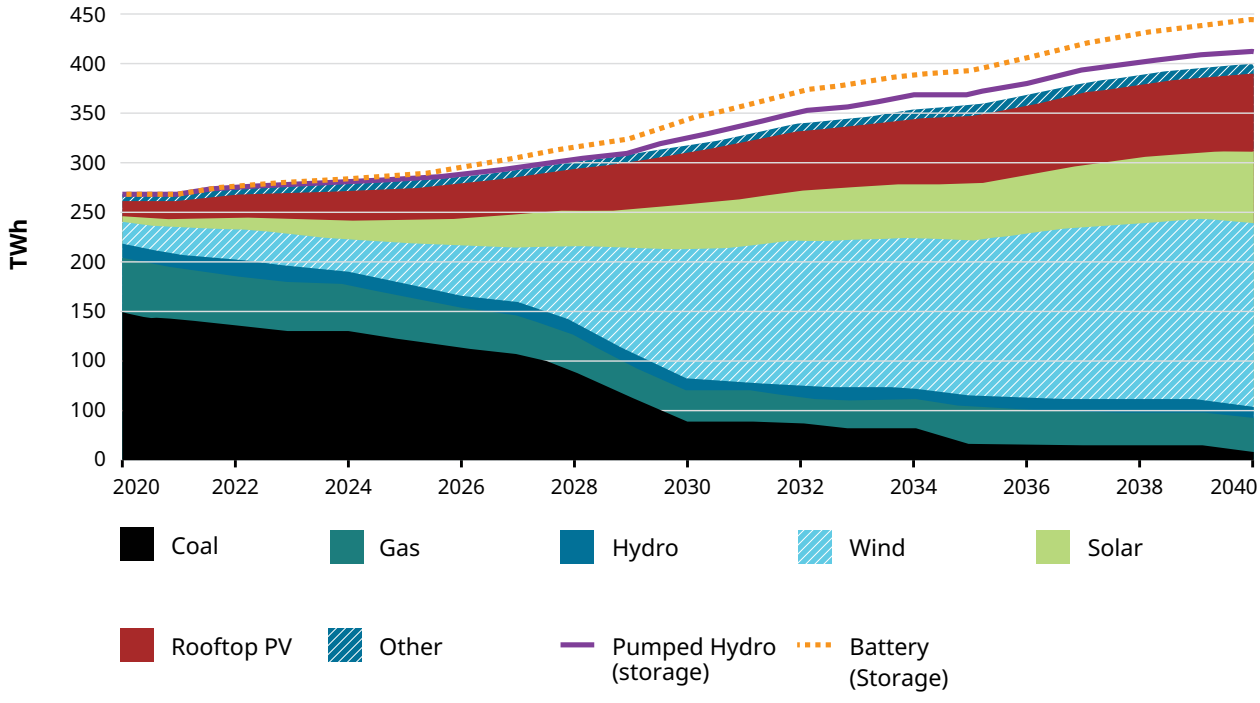
2 The electricity emissions projections modelling was finalised prior to the Queensland 2024 State General Election and reflects the policies and targets of the Government at that time.

Figure 2: Australia's emissions projections in the baseline scenario,1990 to 2040, Mt CO_2-e



Source: DCCEEW (2024a)

Figure 3: Electricity generation mix in Australia in the baseline scenario, by fuel, 2020 to 2040, TWh



Source: DCCEEW (2024a)

These reductions more than offset emissions increases associated with additional critical minerals processing when compared to the baseline scenario.

Emissions in the agriculture and waste sectors remain relatively flat to 2030 and 2040. Agriculture emissions are projected to decline from 85 Mt CO_2-e in 2024 to 83 Mt CO_2-e in 2030, as agricultural output eases from the recent strong levels associated with 3 consecutive La Niña events. Agriculture emissions are projected to remain at 84 Mt CO_2-e in 2035 and in 2040. Emissions from the waste sector are projected to decline by 5% from 14 Mt CO_2-e in 2024 to 13 Mt CO_2-e in 2030. Recycling and recovery targets and the introduction of Food Organic and Garden Organic waste bins have reduced methane emissions at landfills. However, the impact of a growing population means that waste emissions are projected to remain flat to 2040.

The land use, land use change and forestry (LULUCF) sector is projected to remain a net sink in 2030 and 2040. That is, more carbon is projected to be sequestered than emitted from this sector each year. From a current peak of -88 Mt CO_2-e, the net carbon sink is projected to reduce as carbon sequestered through forest growth and soil carbon declines from the high levels experienced during the recent high-rainfall La Niña events. The net sink remains to 2035 and 2040, due in large part to an overall reduction in native forest harvesting driven by policies in Western Australia and Victoria, continued lower rates of land clearing, and sequestration activities incentivised by the ACCU scheme.

In the WAM scenario, the LULUCF sector remains a net sink, but Safeguard facilities are expected to rely less on ACCUs due to greater on-site abatement through the wider uptake and deployment of hydrogen. This is expected to reduce sequestration activity under the ACCU scheme and result in a net increase in LULUCF emissions.

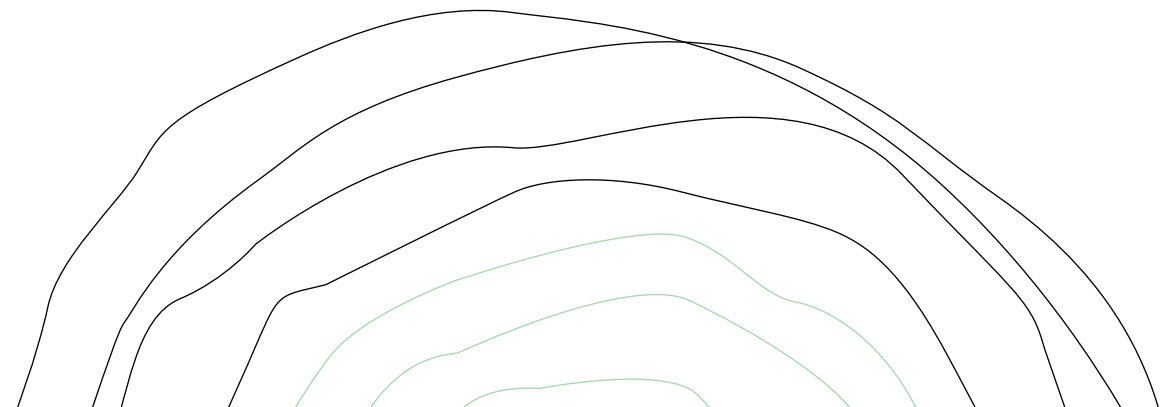
Getting to net zero by 2050

The Government is working on a Net Zero Plan, which will guide our transition to the legislated target of net zero emissions by 2050. The Net Zero Plan will set out the key actions Australia needs to take over the next 25 years to decarbonise its economy. These are likely to include how Australia can:

- decarbonise and expand the electricity grid using firmed renewables, enabling greater decarbonisation across other sectors through electrification.
- electrify activities across the economy wherever possible while improving energy performance and material efficiency, including through implementing circular economy principles.
- switch remaining energy uses to low emissions fuels where possible.
- innovate to expand the availability and affordability of low or zero emissions technology options for remaining sources of emissions
- expand options for carbon sequestration, including nature-based and engineered, to balance residual emissions and lower costs of abatement, while opening new economic opportunities for landholders.

Work to develop the Net Zero Plan will support the development of Australia's 2035 emissions reduction target, which will be set in 2025. This target will be informed by the CCA's independent advice which will reflect public consultation undertaken by the Authority.

This target and the Government's Net Zero Plan will be underpinned by 6 sectoral decarbonisation plans that cover all major sources of emissions across the economy. The plans will be informed by the CCA's *Sector Pathways Review*, released on 5 September 2024, and extensive consultation across sectors and the community.



Assessing the effectiveness of our policies

The Government is continuing to track its progress towards our targets and assess what additional policy action is required to meet them. Updates to Australia's emissions inventory are published quarterly. Emissions projections tracking progress against our targets are updated annually. This Annual Statement articulates how Commonwealth policies are contributing to the achievement of emissions reduction targets.

The Government is continually improving its capabilities to track progress. For example, in August 2024, an updated Measuring What Matters dashboard was released. It tracks Australia's progress towards a more healthy, secure, sustainable, cohesive and prosperous Australia. Climate resilience, emissions reduction and the circular economy are each indicators under the framework. Australia's net greenhouse gas emissions and the renewable share of electricity generation are metrics tracked under the emissions reduction indicator.

Additionally, the CCA recently reviewed legislation underpinning the Government's National Greenhouse and Energy Reporting (NGER) scheme and made 25 recommendations for improvement. The Government has agreed or agreed in principle to 24 and noted 1. Among other things, these recommendations will enhance the NGER scheme's ability to track emissions from Safeguard Mechanism facilities, particularly in the resources sector.

This Annual Statement is published alongside the CCA's Annual Progress Report. This report provides an independent assessment of the Government's climate policies and makes recommendations for the way forward. The CCA also identifies progress of the Government's climate-related measures through its publicly available climate policy tracker.

Embedding emissions reduction targets in legislation

The Climate Change (Consequential Amendments) Act 2022 amended 14 Acts to embed Australia's emissions reduction targets in their objects. These amendments were made to direct organisations to fulfil their functions in line with these targets and to provide certainty to industry and the broader community.

Throughout 2024, the Government continued to identify opportunities to embed Australia's emissions reduction targets in other legislation. These targets were embedded in the *Higher Education Support Act 2003*, the *New Vehicle Efficiency Standard Act 2024*, the *Net Zero Economy Authority Act 2024*, the Future Made in Australia Bill 2024 and the Future Made in Australia (Guarantee of Origin) Bill 2024.

Throughout 2024, the Government continued to identify opportunities to embed Australia's emissions reduction targets in other legislation.

Climate change policy developments by sector

Electricity

Decarbonising the electricity sector – Australia's largest source of emissions, representing 34.6% of Australia's emissions in 2024 – is vital to reaching our 2030 emissions reduction target. This sector is also vital to unlocking emissions reductions in other sectors, as electrification is often the lowest cost way to reduce emissions.

Electricity sector emissions have declined 22.4% since 2005 and are down by 0.4% between 2023 and 2024, reflecting continuing renewable deployment and the displacement of fossil fuel power.

The Government's current policies, particularly its expansion of the CIS, provide a pathway to meet the 82% renewable electricity target. Continued commitment will be needed to ensure we stay on course to achieve the target.

Generation, storage and transmission

The total capacity of Australia's wind and solar assets is now around 40% greater than it was before May 2022. This amounts to about 14 GW of wind and solar capacity installed over this time, roughly a quarter the size of the NEM, Australia's largest grid. This has been driven in part by the rapid take-up of rooftop solar photovoltaic (PV) systems across Australia which is supported by the Government's Small-scale Renewable Energy Scheme (SRES). The number of installed rooftop systems reached 4 million this year. These total almost 25 GW of capacity, more than Australia's current fleet of coal-fired generators. As ageing and increasingly unreliable coal generators exit, flexible gas generation will continue to play an important role maintaining reliability in the electricity system. It will support energy supply during periods of renewable drought and extreme peak demand.

To facilitate Australia's transition to renewables, 4,000 kilometres of new transmission lines are needed in the next decade. Over 900 kilometres are now complete or well under construction. And several large batteries that will amplify the benefits of residential solar PV systems for households and the grid – by shifting this generation to when households need it – are now in place. Utility battery capacity has increased more than three-fold since May 2022.

The number of installed rooftop systems reached 4 million this year. These total almost 25 GW of capacity, more than Australia's current fleet of coal-fired generators.

Boosting investment in renewables through the Clean Energy Finance Corporation (CEFC) and Australian Renewable Energy Agency (ARENA)

CEFC

The CEFC is a specialist investor in Australia's transition to net zero emissions. It works with co-investors, industry and government to drive economy-wide investment in decarbonisation. The 3 strategic investment priorities for the Government's CEFC are:

- decarbonising energy
- energy efficiency
- natural capital and carbon sequestration.

The *Climate Change (Consequential Amendments) Act 2022* amended the CEFC's establishing legislation to state that its objects include the achievement of Australia's greenhouse gas emissions reduction targets. Since it was established in 2012, the CEFC has invested $8.3 billion in renewable energy and grid infrastructure projects. This includes $3.6 billion in large-scale wind and solar PV projects totalling 5.9 GW of generating capacity. In 2023–24 alone, the CEFC committed $1.3 billion in new and follow-on investments in renewable energy.

Since its inception, the CEFC has received $5.2 billion in payments and returns on its investments, and this capital is available for re-investment. Each dollar of CEFC capital committed over its lifetime has attracted an additional $3.01 from other investors. In 2023–24, each CEFC dollar committed attracted an additional $4.01 from the private sector.

ARENA

ARENA supports innovation in renewable energy, energy efficiency and electrification. Also established in 2012, it has provided $2.7 billion in funding for 740 projects over its lifetime, unlocking total investment of over $12.7 billion in Australia's renewable energy industry (as of October 2024). These projects span several technology types, including solar PV, hydrogen, solar thermal, storage, and grid integration.

The 2024–25 Budget included $7.1 billion for programs to be administered by ARENA. This includes a $1.9 billion boost to ARENA's baseline funding. The Future Made in Australia (Omnibus Amendments No. 1) Bill 2024 reinstates guaranteed statutory funding of $6.2 billion, with the ability to add a further $4.0 billion by regulations. It also recognises ARENA's role in contributing to global emissions reductions and Australia's targets. The amendments also formally confer ARENA with functions relating to electrification and energy efficiency technologies. One example of ARENA's key role to help prove and scale electrification is the recently-announced Electrify 2515 project to pilot electrifying 500 homes in the north Illawarra region of NSW.

Growing Australia's renewable electricity capacity

The NEM currently has a 46 GW pipeline of 211 renewable energy projects, which is more than two-thirds of the NEM's total existing generation capacity. The Clean Energy Regulator estimates between 7.2 and 7.5 GW of renewable electricity capacity will be installed in 2024. This includes the approval of the 923 MW Macintyre wind farm, Australia's largest to date.

In its Integrated System Plan 2024, AEMO projects electricity demand in the NEM to increase by 23% by 2030 and more than double by 2050, as the economy becomes increasingly electrified and new industries such as renewable hydrogen production emerge.

The expanded CIS is expected to significantly increase the rate of investment in utility-scale renewable projects in coming years, with all tenders in the market for new projects being oversubscribed.

It is supporting investment into 23 GW of new renewable generation capacity representing $52 billion in investment, and 9 GW of clean dispatchable capacity representing $15 billion in investment.

The Government's first national CIS tender in May 2024, seeking 6 GW of renewable electricity generation, received bids from more than 80 projects with over 25 GW of capacity. This is a strong indication of the pipeline of renewable energy projects across the country.

The next CIS tenders, due to commence in November 2024, will build momentum on the first tender and will seek an additional 4 GW of dispatchable capacity and 6 GW of renewable electricity generation capacity in the NEM. New dispatchable capacity is also being sought in Western Australia with the July 2024 launch of the CIS tender for 500 MW 4-hour equivalent (2,000 MWh) in the Wholesale Electricity Market.

The CIS works in tandem with RETAs with states and territories to ensure projects can and will be delivered by 2030, with parties to the RETAs undertaking particular obligations around reducing or removing existing roadblocks to the renewable rollout in their respective states or territories.

The Australian Government has signed or is finalising RETAs with Western Australia, South Australia, New South Wales, Victoria, Tasmania and the ACT.

Renewable Energy Transformation Agreements

The Government is negotiating RETAs with states and territories to achieve shared objectives in the renewable energy transformation.

RETAs will commit state and territory governments to work with the Commonwealth to:

- increase renewable energy generation to deliver enough clean, cheap, reliable renewables by 2030 to meet demand and Australia's 82% renewable energy target
- maintain electricity system reliability through an orderly and timely exit of ageing coal generators
- address non-market barriers to investment, such as planning, and environmental approval bottlenecks
- improve community engagement
- drive better long-term social and economic outcomes for host communities and regions.

RETAs will work to:

- support an affordable, reliable and resilient energy system for Australian consumers that addresses the unique needs of each state and territory
- help secure investment certainty
- ensure progress continues across states and territories, with governments collaborating to address barriers to delivering energy infrastructure.

In Western Australia, for example, the Commonwealth will underwrite the development of both 1.1 GW of new storage to help maintain grid stability, and 6.5 terawatt hours of new wind and solar projects, enough to power over a million average Australian households for one year. The Western Australian Government will retire its state-owned coal-fired power stations by 2030 and replace them with reliable renewable electricity generation and storage.

The Government also supports renewable electricity supply and stability in other ways. In March 2024, the Commonwealth purchased a 49% equity stake in the Marinus Link transmission project. Marinus will enable surplus wind and solar power generated in the NEM to be stored in Tasmania's hydro storage and returned to the mainland when it is needed most.

Improving affordability

Empowering consumers is another key element of the Government's approach to decarbonising the electricity sector. Community Solar Banks are expanding access to rooftop solar. The Community Batteries for Household Solar program provides the benefits of home battery ownership across the community. These measures come with the added benefits of strengthening the grid and supplementing the roll out of grid-scale renewables and storage projects.

The Government has committed $3.5 billion to extend Energy Bill Relief for 12 months. From 1 July 2024, Australian households are receiving a $300 rebate on their electricity bill and eligible small businesses are receiving $325. These temporary relief measures will help to reduce the impact of cost-of-living pressures facing Australians.

This extension builds on the $1.5 billion in energy rebates provided by the Australian Government in 2023–24 under the Energy Bill Relief Fund.

Launch of Ausgrid's community battery in Bexley North (NSW), funded by ARENA on behalf of the Australian Government. Photo credit: Ausgrid

Rolling out renewable projects

The development of an Australian offshore wind industry is steadily progressing. The Government declared 3 new areas as suitable for offshore wind energy in 2024 – off the coasts of Victoria, New South Wales and Western Australia. Local consultation led to a reduced footprint for these areas. The Government has also consulted on a zone off Tasmania.

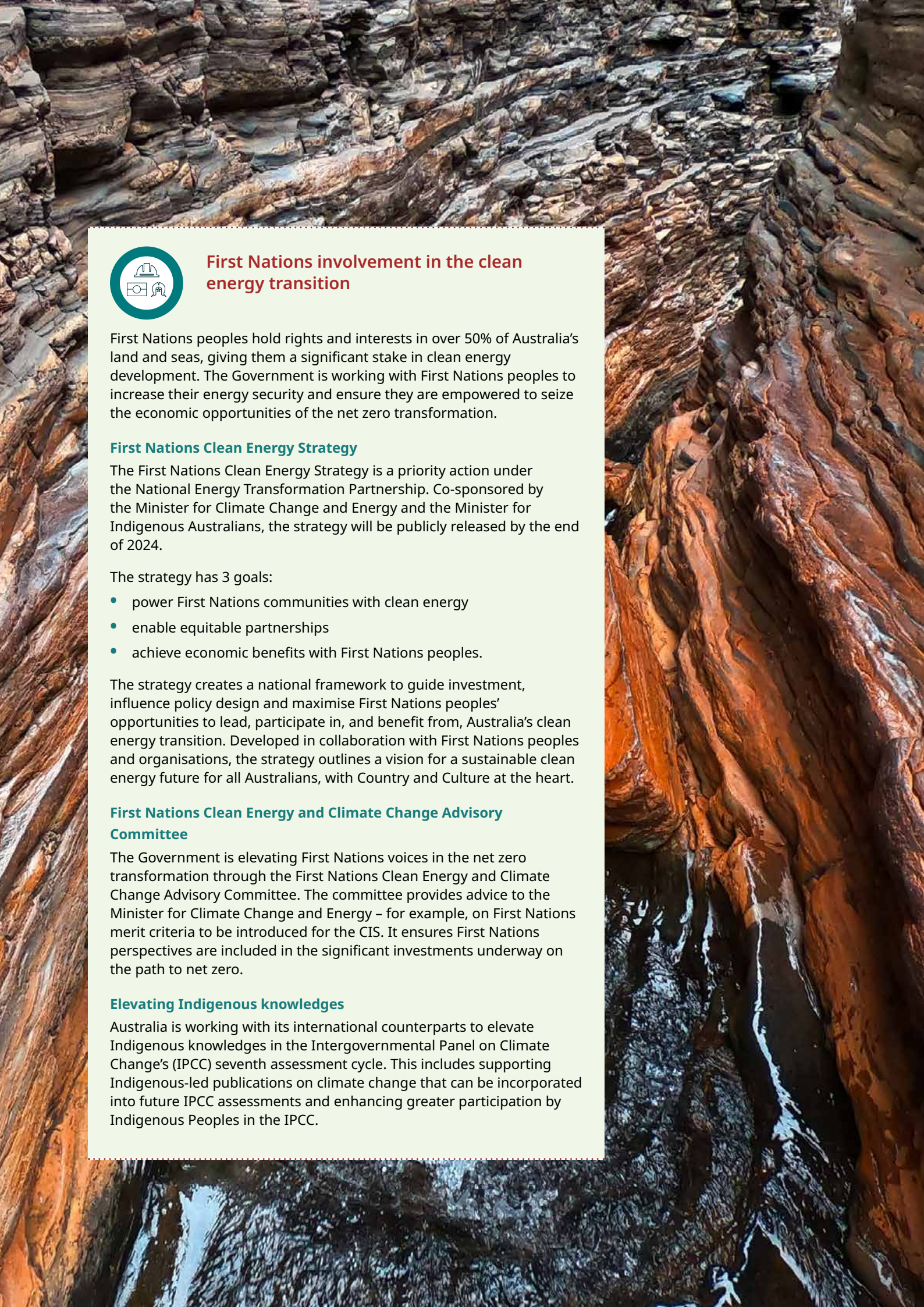
The Government is also providing $182.7 million over 8 years to strengthen approval processes. This includes:

- creating a National Priority List for renewable energy-related projects to address delays in planning approvals
- the permanent establishment of the Australian Energy Infrastructure Commissioner to improve community engagement
- targeted scientific studies to improve the environmental data used in decision-making.

Rolling out renewable energy projects will require social licence and support from communities. In July 2024, Commonwealth, state and territory climate and energy ministers agreed to a response to the Australian Energy Infrastructure Commissioner's Community Engagement Review. The review gathered insights from landholders, First Nations peoples, community members, farmers, developers, and local, state and territory governments. The review made recommendations across 6 broad themes. These include:

- motivating developers to achieve best practice community engagement
- reducing the need for engagement by optimising site selection and planning and environmental approvals
- improving complaint handling
- improving community understanding of the need for the transition
- increasing acceptance of the transition by identifying opportunities for benefit sharing.

Among other actions, the Government has agreed to establish a developer rating scheme. It will provide transparent, periodic ratings of developer engagement as well as fund research on a regulatory package to support community benefits for regions impacted by renewable development. ARENA also released a detailed study on the opportunities and challenges for community-owned renewable energy (ARENA 2024).



First Nations involvement in the clean energy transition

First Nations peoples hold rights and interests in over 50% of Australia's land and seas, giving them a significant stake in clean energy development. The Government is working with First Nations peoples to increase their energy security and ensure they are empowered to seize the economic opportunities of the net zero transformation.

First Nations Clean Energy Strategy

The First Nations Clean Energy Strategy is a priority action under the National Energy Transformation Partnership. Co-sponsored by the Minister for Climate Change and Energy and the Minister for Indigenous Australians, the strategy will be publicly released by the end of 2024.

The strategy has 3 goals:

- power First Nations communities with clean energy
- enable equitable partnerships
- achieve economic benefits with First Nations peoples.

The strategy creates a national framework to guide investment, influence policy design and maximise First Nations peoples' opportunities to lead, participate in, and benefit from, Australia's clean energy transition. Developed in collaboration with First Nations peoples and organisations, the strategy outlines a vision for a sustainable clean energy future for all Australians, with Country and Culture at the heart.

First Nations Clean Energy and Climate Change Advisory Committee

The Government is elevating First Nations voices in the net zero transformation through the First Nations Clean Energy and Climate Change Advisory Committee. The committee provides advice to the Minister for Climate Change and Energy – for example, on First Nations merit criteria to be introduced for the CIS. It ensures First Nations perspectives are included in the significant investments underway on the path to net zero.

Elevating Indigenous knowledges

Australia is working with its international counterparts to elevate Indigenous knowledges in the Intergovernmental Panel on Climate Change's (IPCC) seventh assessment cycle. This includes supporting Indigenous-led publications on climate change that can be incorporated into future IPCC assessments and enhancing greater participation by Indigenous Peoples in the IPCC.

Built environment

The built environment includes residential, commercial and public buildings, structures, parks, and water infrastructure. In Australia, this includes 11 million residential buildings and 1 million non-residential buildings. Built environment direct emissions fell by 1.0 Mt CO_2-e or 4.2% between 2023 and 2024, to their lowest level since 2016.

Buildings have embedded emissions in the materials used to construct the built environment. Buildings also generate direct emissions largely from the combustion of gas for space and water heating and cooking. These direct emissions contribute around 5% of Australia's total emissions, and when emissions generated from electricity use are included, this rises to around 21%.

Key challenges to bringing down buildings sector emissions include variations in building types, designs and uses, and the high upfront cost to consumers of replacing appliances. These challenges are compounded by having many different actors involved in the sector – consumers, landlords, equipment installers and manufacturers, regulatory bodies, as well as local, state and territory governments and the Australian Government.

The Australian Government is progressing several measures to improve the energy performance of residential buildings, including:

- providing $300 million to improve the energy performance of Australia's social housing stock, partnering with state and territory governments
- expanding energy ratings under the Nationwide House Energy Rating Scheme (NatHERS) to existing homes from mid-2025
- $1 billion to the CEFC to deliver the Household Energy Upgrades Fund.

Key measures targeting commercial properties are also being implemented:

- expanding the National Australian Built Environment Ratings System (NABERS) to schools and retail
- $100 million for the Community Energy Upgrades Fund, helping councils cut emissions and reduce energy bills through energy efficiency and electrification upgrades
- $56.7 million for the Energy Efficiency Grants for Small and Medium Enterprises (SME) program.

Many of these measures are already underway. For households, the $1 billion Household Energy Upgrades Fund announced its first investments in 2024, unlocking $60 million through fintech lender Plenti and a second investment of $160 million to support Westpac's Sustainable Upgrades Home Loan. It is also looking to provide $75 million to ING Australia to help finance ING's Green Upgrade Loan. To support businesses, 2 application rounds for the Energy Efficiency Grants for SME have delivered up to $56.7 million in grant funding to over 2,400 SMEs across the country. These small businesses will receive between $10,000 and $25,000 to cover up to 100% of the cost to purchase energy efficient equipment and implement other energy efficiency activities in relation to their building's energy performance.

In June 2024, Building Ministers agreed to include climate resilience as an objective of the Australian Building Codes Board from 2025. This will give the Board a clear mandate to develop future National Construction Code requirements that reduce the impact of disasters on housing and critical community facilities. This change responds to a recommendation from the Royal Commission into National Natural Disaster Arrangements.

In terms of progress, the CCA has identified heat pump imports as a leading indicator for decarbonisation of the buildings sector. Heat pumps are a critical technology for decarbonising the buildings sector. They can replace gas space and water heaters, as well as highly inefficient electric heaters. The 2024 Annual Progress Report notes a 14% increase in imports between 2022–23 and 2023–24 (CCA 2024b).

Transport

In 2024, emissions from the transport sector accounted for 22.4% of Australia's total emissions. Transport emissions increased by 1.9% (1.8 Mt CO_2-e) from 2023, reflecting the continuing recovery from COVID-related movement restrictions.

Light vehicles, including passenger and light commercial vehicles and motorcycles made up 71% of road transport emissions in 2024, and on-road trucks and buses made up 29%.

New Vehicle Efficiency Standard

Reducing road transport emissions is pivotal to achieving Australia's net zero ambitions. The Government has a suite of measures and programs that aim to provide all Australians with access to low-emission transport solutions.

In the past year, these efforts have accelerated. In May 2024, the Parliament passed legislation for the NVES – a historic milestone towards decarbonising the transport sector. The standard will help increase the number of new cars that are fuel-efficient, low- or zero-emissions. To ensure we get the implementation right, the introduction of the scheme is staged. It will commence on 1 January 2025, but manufacturers will not earn credits or penalties until 1 July 2025. This will allow time for the Government and industry to put in place the supporting processes.

By 2030, the Standard will reduce the average emissions from new passenger vehicles by around 60% and new light commercial vehicles by around 50%.

The Government has made substantial progress against the National Electric Vehicle Strategy's 6 outcomes. Released in 2023, the first annual update of the strategy was published in 2024.

Electric vehicles

As of September 2024, 9.5% of light vehicles sold in Australia in 2024 have been EVs, including both battery EVs and plug-in hybrid EVs (FCAI 2024 and EVC 2024). In 2023, 8.4% of all new light vehicle sales were EVs, compared to 3.8% in 2022. The availability and choice of EVs in Australia has expanded, with 106 EV models available for sale in Australia in 2024, compared with 99 in 2023 and 70 in 2022 (AAA 2024; EVC 2023).

The NVES is projected to further increase the supply of a wider range of more efficient vehicles to the Australian market, including EVs. It will make it cheaper to run a new car in Australia over time. Government-led financial incentives such as the Electric Car Discount are also making it cheaper to purchase EVs.

Fast and ultra-fast charging availability is steadily improving across the country. 2024 saw a significant increase in public fast and ultra-fast charging sites, with over 3,500 plugs across 1,000 public charging sites recorded across Australia in June 2024, compared with 464 in 2022 (EVC 2023).

The CCA has identified EV imports as a leading indicator of decarbonisation in the transport sector. 9.5% of Australia's imported light vehicles in 2023–24 were EVs, up from 7.1% in 2022-23 (CCA 2024b).

Other low-emissions solutions for heavy vehicles

While electrification of light vehicles progresses, it is not yet as economically viable for heavy vehicles, particularly articulated trucks used for long distance, interstate transport.

In November 2024, the Government announced a $36 million funding boost to the Driving the Nation program. This brings all available funding to boost uptake of heavy EVs in the logistics and delivery sectors to $100 million.

However, other low carbon alternatives may be required. Through the Future Made in Australia plan, the Government is considering options to support production of low-carbon liquid fuels. The National Hydrogen Strategy published this year also outlined the role that hydrogen is expected to play in the decarbonisation of long-haul heavy vehicles.

Rail, aviation, maritime and transport infrastructure

Beyond road transport emissions, the Government is also developing targeted strategies and investing to decarbonise the rail, aviation and maritime sectors, as well as transport infrastructure.

As a comparatively low-emissions transport mode, the rail system can support Australia's growing freight needs and decarbonisation goals. The Government is investing over $15 billion in major rail projects, including in low-emissions technology and infrastructure for the Inland Rail and High-Speed Rail.

Decarbonising the aviation industry will rely on access to low-carbon, sustainable aviation fuels. The Government has committed to fast-tracking support for a LCLF industry through the Future Made in Australia Plan. An initial focus is on sustainable aviation fuels and renewable diesel. The Aviation White Paper, released in August 2024, outlines how the Government will help the aviation industry meet its emissions reduction commitments.

The first projects have been funded under ARENA's Sustainable Aviation Fuel Funding Initiative. This includes $9 million to Jet Zero Australia to advance sustainable aviation fuel production in Townsville.

The shipping industry is a traditionally hard-to-abate sector. In March 2024, Australia entered into a Green and Digital Shipping Corridor Memorandum of Understanding with Singapore, to help decarbonise shipping routes between both countries. The Government also made a landmark $70 million CEFC investment to finance the electrification of container stevedoring operations at ports in South Australia.

Work is also underway to decarbonise transport infrastructure. The Commonwealth, states and territories have committed to achieving decarbonisation and circular economy objectives through the new Federation Funding Agreement Schedule on Land Transport Infrastructure Projects. Additionally, the Government is investing $100 million in bicycle and walking pathways through the Active Transport Fund.

Industry, resources and waste

Australia's emissions associated with activity in the industry and resources sectors[3] include:

- stationary energy emissions excluding electricity (19.4% of Australia's total emissions in 2024), which arise from burning fuels for direct energy use, in the form of heat, steam or pressure (including mine site transport)
- fugitive emissions (10.8% of Australia's total emissions in 2024), which are the result of losses, leaks and other releases of gas in the atmosphere associated with extracting, processing and transporting fossil fuels (mostly coal and gas production)
- industrial processes emissions (4.6% of Australia's total emissions in 2024) which include emissions from the use of carbonates, chemical feedstocks and reductants
- waste emissions (3.1% of Australia's total emissions in 2024), which include emissions from the decomposition of organic matter in landfills and wastewater treatment plants, and biological treatment of solid waste.

Industry, resources and waste sector emissions are at their lowest level since 2017, having declined by 1.3% (2.2 Mt CO_2-e) between 2023 and 2024.

Fugitive emissions and stationary energy emissions have been rising over the past two decades, primarily due to increased coal and gas production and processing of gas into liquefied natural gas (LNG) for export.

At the end of 2023, the Government allocated $2.05 million for CSIRO and $2.3 million for the University of Newcastle from the Resources Methane Abatement Fund for projects that tackle ventilation air methane.

In 2024, the Carbon Capture Technologies Program announced investments of $65 million in 7 projects. These projects will use emerging technologies like direct air capture and mineral carbonisation to decarbonise hard-to-abate industrial processes and directly remove carbon dioxide from the atmosphere. Captured carbon dioxide from these projects will be stored in permanent geological storage or used to create products like building materials, fuel and inputs for lithium-ion batteries.

Safeguard Mechanism

Australia's largest emitting facilities – representing around 30% of national emissions across the resources, industry, transport, and waste sectors – are required to meet legislated emissions limits (known as baselines) under the Safeguard Mechanism. Reforms to the Safeguard Mechanism require baselines to fall by 4.9% per year from 1 July 2023.

Resource sector facilities accounted for roughly 60% of all emissions covered by the mechanism in 2023, with industry sector facilities making up around a quarter. The Safeguard Mechanism covers approximately 85% of resource sector scope 1 emissions and 60% of industry sector emissions (CCA 2024a).

Under the *Climate Change Act 2022*, the Annual Statement must report on progress against the Safeguard Mechanism outcomes in the *National Greenhouse and Energy Reporting Act 2007*.

Australia's latest emissions projections show that the legislated Safeguard Mechanism outcomes will be met. They estimate that net emissions from the scheme will be 88 Mt CO_2-e in 2030, which is below the required outcome of 100 Mt CO_2-e. Similarly, total net emissions for the decade to 2030 are estimated to be 1,180 Mt CO_2-e, below the legislated budget of 1,233 Mt CO_2-e. In its 2024 Annual Progress Report, the CCA also assessed that these outcomes will be met (CCA 2024b). They also show the Government is on track for the Safeguard Mechanism to reduce gross emissions (that is, excluding carbon offsets) for 2024–25, on a 5-year rolling average, with gross emissions down 2.9 Mt CO_2-e between 2022–23 to 2023–24 on preliminary data from the Clean Energy Regulator.

Compared to projections pre-reforms, the Safeguard Mechanism is expected to deliver over 200 Mt of abatement in the decade to 2030, equivalent to taking two-thirds of the nation's cars off the road.

Longer term, the projections show the Safeguard Mechanism will continue to drive emissions reductions at our largest industrial facilities, amounting to around 500 Mt of reductions onsite to 2040, bringing the total net reductions to over 900 Mt between 2024 and 2040.

3 Emissions figures in this section do not include direct emissions from the built environment, which are reflected separately in the 'Built environment' section.

These include significant reductions in the use of fossil fuels, coal, gas, diesel and aviation fuel, saving around 600 petajoules of fossil fuel use each year by 2040, with energy performance improvements, renewable electricity, hydrogen and low carbon liquid fuels deployed instead.

In 2024, $621 million was allocated under the Powering the Regions Fund to help drive down emissions in sectors such as mining, steel, fuel refining, cement, and aluminium and chemical production, and cut more than 1 Mt CO_2-e each year, including through electrification and switching to renewable energy. The Safeguard Transformation Stream of the Government's Powering the Regions Fund provides grants of up to $50 million to assist trade-exposed facilities in reducing their emissions.

The Government will review its policy settings in 2026–27 to ensure they are appropriately calibrated. In 2024, the Government also released its second consultation paper for its Carbon Leakage Review.

Reducing emissions from the gas industry

A significant share of Safeguard Mechanism emissions is generated by gas extraction and processing, including from naturally occurring carbon dioxide in oil and gas reservoirs. While gas will support the affordability and reliability of energy as we undergo our energy transition, the Safeguard Mechanism reforms encourage gas production to become less emissions-intensive over time.

In the gas industry, fugitive CO_2 and methane emissions are released during gas extraction, transport and processing. These fugitive emissions have been falling in recent years. Given the low cost of some mitigation measures targeting fugitive methane emissions, they are likely to be some of the earliest to be implemented by industry. The International Energy Agency has estimated that between 50% to 80% of such measures can be implemented at no net cost (IEA 2023).

Reducing – and where possible, eliminating – fugitive emissions from gas venting and flaring is one of several actions listed in the government's Future Gas Strategy, released in May 2024. In Australia, most of these are CO_2 emissions released during extraction which require carbon capture and storage technology to eliminate.

The Strategy articulates the role gas can play to support Australian and global emissions reduction efforts to reduce the impacts of climate change and reach net zero emissions by 2050. It also aims to protect Australia's energy security and affordability while helping our trade partners on their paths to net zero.

It will be important for Australia to maintain its reputation as a reliable trading partner for energy, including LNG. Australia's ambition to become a renewable energy superpower as part of the Future Made in Australia plan will involve developing new low-emissions energy exports to support our trading partners' energy security and decarbonisation efforts.

In 2023, the CCA published a review of the legislation underpinning the National Greenhouse and Energy Reporting Scheme. As part of its response to the review, the government will prioritise improvements to the accuracy and transparency of fugitive methane emissions estimation and reporting. In particular, Australia's Chief Scientist, Cathy Foley, is leading an expert panel to advise the government on atmospheric approaches to detecting and estimating fugitive methane emissions.

Displacing domestic gas demand

The industry sector is a large gas consumer. Displacing this demand through a combination of electrification and low carbon alternative fuels will make a significant contribution to decarbonising the sector. Developing fuels such as renewable hydrogen and biomethane, represents a considerable economic opportunity for Australia. This year, the Government announced an $8 billion investment over 10 years to build Australia's renewable hydrogen industry as part of its Future Made in Australia plan.

Electrification is also a key enabler of a Future Made in Australia, supported by the expansion and decarbonisation of electricity grids across the nation. For example, the green metal industry has been identified as aligning with the net zero transformation stream under the Future Made in Australia National Interest Framework. Development of this industry will be supported by electrification approaches demonstrated to work through the Powering the Regions Fund.

Locally made low carbon gases could replace natural gas used in alumina production, a large source of emissions in Australia. Renewable hydrogen could also replace the hydrogen currently derived from gas that is used to produce ammonia, as highlighted by the CCA in its recent *Sector Pathways Review* (CCA 2024a). Reducing industry sector gas demand by substituting with renewable hydrogen will also help to ensure sufficient domestic gas supplies. As existing reservoirs are depleted, east coast gas supplies are projected to decline over the next decade faster than demand is projected to fall, requiring additional investment in demand and supply measures to avoid shortages (AEMO 2024c).

National Hydrogen Strategy

The 2024 National Hydrogen Strategy reaffirms Australia's ambition to be a global hydrogen leader and provides a significant update regarding integration with our emissions reduction policy. The Strategy sets long-term hydrogen production targets and short-term hydrogen export targets, based on the projected role of hydrogen in a net zero Australian economy.

These targets are supported by 34 actions intended to grow the industry. This includes identification of key demand sectors, mechanisms to ensure community benefit and safety, as well as transparent reporting. The Strategy flags the importance of the Government's investment at this early stage of industry development which is needed to accelerate industry scale-up to drive costs down.

Reducing hydrofluorocarbons (HFCs)

Emissions from non-energy related product use include emissions from the use of HFCs, which are mostly used in refrigeration and air conditioning. Emissions from product use account for approximately 3% of Australia's emissions in 2024, largely unchanged from 2023.

Australia's phase down of climate-warming HFCs started in 2018 and is projected to reduce HFC emissions by around 40% by 2035 (from 2022 levels). As part of this, the Government is removing outdated, climate-damaging air conditioning models from the Australian market. Australia has banned the import and manufacture of certain small air conditioning equipment using HFC refrigerants that are potent greenhouse gases from 1 July 2024. From 1 July 2025, this ban will be extended to small multi-head split system air conditioners.

Agriculture and land

In 2024, the agriculture sector was responsible for 19.2% of Australia's emissions, primarily methane and nitrous oxide. Emissions from agriculture decreased by 1% from 2023, mainly due to a decrease in crop production.

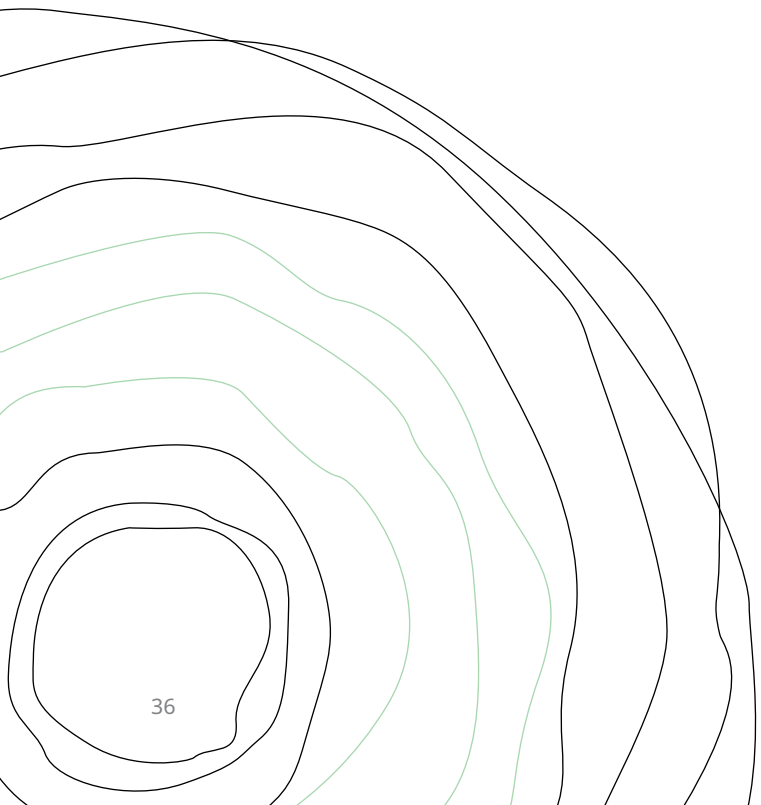
The land use sector is a net 'sink' of emissions (that is, more carbon is sequestered than is emitted from the sector). In 2024, emissions from the land use sector represented a net sink of -88.4 Mt CO_2-e, reflecting the long-term decline in the rate of land clearing and native forest harvesting. It also reflects the ongoing influence of La Niña conditions, leading to increased growth rates in forests and high crop and grass productivity building soil carbon in agricultural regions.

The key challenge to sustained reductions in agriculture emissions is the limited availability of cost-effective and practical low emissions solutions – especially for grazing cattle and sheep, as methane released by animals through the digestion of feed makes up 71% of agricultural emissions. In addition, farmers and land managers may have limited awareness of low emissions and carbon storage practices and the benefits and trade-offs of alternative and complementary solutions, as well as limited capacity to take action.

The Government is investing in solutions to these challenges. This year, the Government announced $63.8 million over 10 years to support initial emissions reduction efforts in the agriculture and land sectors. This includes $30.8 million to expand the Carbon Farming Outreach Program. The program helps farmers and land managers to improve their understanding of options to reduce their emissions and increase carbon storage.

In addition, projects under stages 1 and 2 of the $29 million Methane Emissions Reduction in Livestock Program were completed in 2024. These projects tested a range of feed additives, with methane emissions reductions ranging from 10% to 90%. The Government awarded the final stage 3 funding to projects in August 2024.

Improving soil health to enhance carbon storage is another key goal for the sector. The Government is working to enhance the Australian National Soil Information System and establish a National Soil Monitoring Program. In 2024, grant applications opened under the $302.1 million Climate Smart Agriculture Program, supporting farmers to manage emissions, build resilience to climate change, improve soil health and protect natural capital.



Cross-cutting measures

Energy Performance

Energy performance is the broad management of energy demand, including energy efficiency, electrification or fuel switching and demand flexibility and has an important role to play in supporting sectoral decarbonisation. Demand flexibility and related technologies, like battery storage, will coordinate demand with the supply of variable renewable energy. Energy performance is essential to deliver a least-cost economy wide energy transformation and an electrification pathway.

In 2024, the Government released its National Energy Performance Strategy. The strategy is a national framework for improving Australia's energy performance across the economy. It includes:

- accelerating electrification
- reducing demand through efficiency improvements
- improving the flexibility to shift this demand to make more efficient use of energy infrastructure.

At COP28 in December 2023, Australia – along with 132 other signatories – committed to work together to collectively double the global annual rate of energy efficiency improvements from around 2% to over 4% every year until 2030.

Circular economy

The circular economy is a way of managing resources that focuses on reducing waste and using materials more efficiently. It encourages:

- using fewer new (virgin) materials
- designing products to be long-lasting, easy to repair, and safe
- reusing and recycling materials as much as possible.

Circular economy strategies are being explored in the Government's 6 sectoral decarbonisation plans. The Australian Government is also developing a National Circular Economy Framework to guide the transition.

State and territory climate action

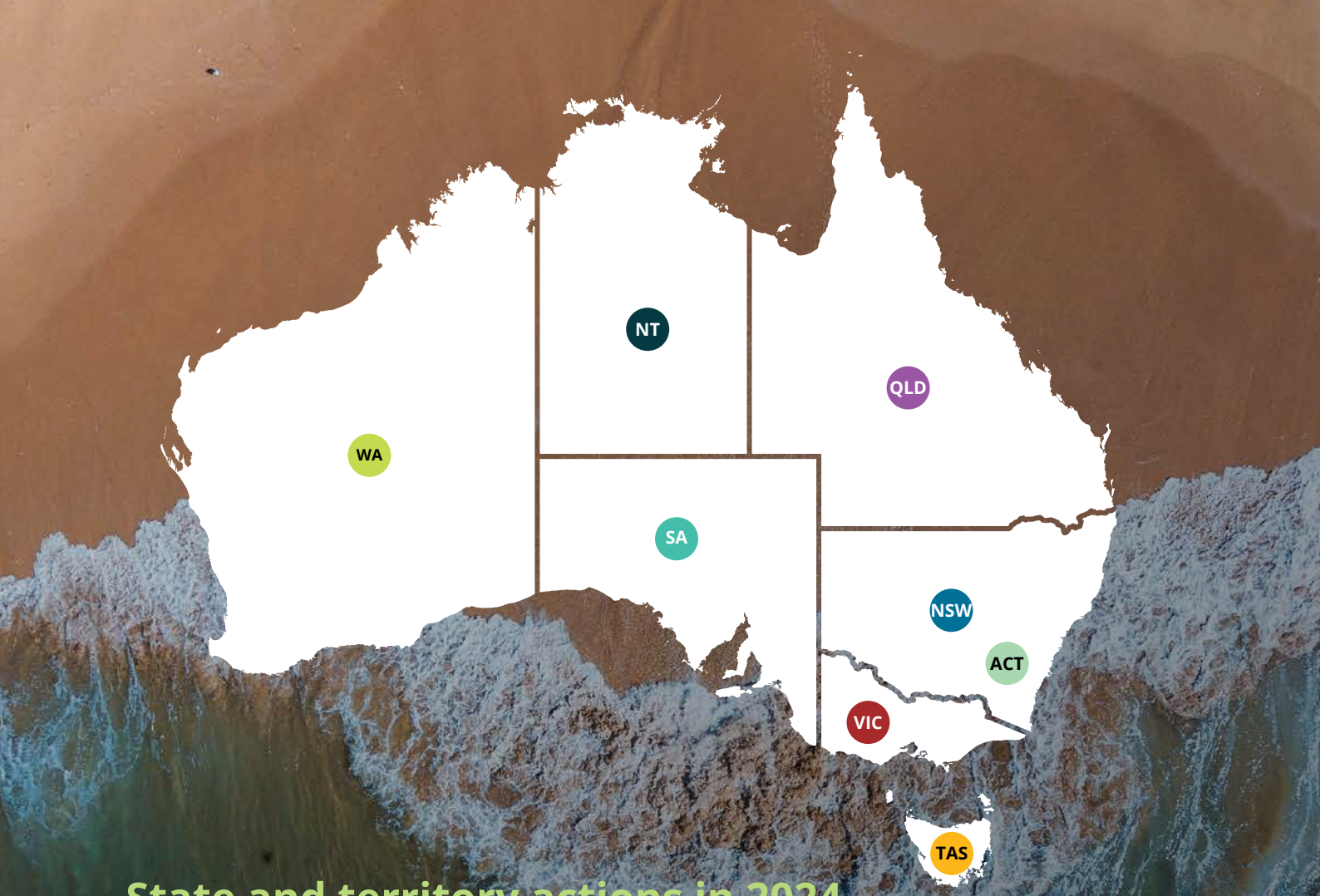
Climate action is a shared responsibility across all levels of government. All Australian state and territory governments have committed to net zero by 2050 or earlier, and most jurisdictions have set interim emissions reduction targets. Progress towards these targets varies.

There are challenges to meeting these targets, particularly in jurisdictions that are highly dependent on the resources sector. The Commonwealth, and state and territory governments are continuing to work together to overcome these.

Table 1: National, state and territory emissions reduction targets and progress since 2005

Jurisdiction	Target reference year	Emissions reduction targets	Percentage change in emissions between 2005 and 2022
Commonwealth	2005	43% by 2030 Net zero by 2050	-29.0%
ACT*	1990	50–60% by 2025 65–75% by 2030 90–95% by 2040 Net zero by 2045	-9.7%
NSW	2005	50% by 2030 70% by 2035 Net zero by 2050	-27.3%
NT	n/a	Net zero by 2050	49.2%
Qld	2005	30% by 2030 75% by 2035 Net zero by 2050	-35.3%
SA	2005	50% by 2030 Net zero by 2050	-56.7%
Tas	n/a	Net zero or lower from 2030 (negative emissions since 2014)	-128.0%
Vic	2005	28–33% by 2025 45–50% by 2030 75–80% by 2035 Net zero by 2045	-31.3%
WA	n/a	Net zero by 2050	8.3%

* **Note:** The ACT's reference year for its emission reduction targets is 1989-90. Based on the UNFCCC/Paris Agreement methodology, in 2021–22 the ACT's emissions (1.284 Mt CO_2-e) were 12.6% higher than in 1989-90 (1.140 Mt CO_2 CO_2-e). The ACT separately reports its greenhouse gas emissions using the Measurement Method determined under its *Climate Change and Greenhouse Gas Reduction Act 2010*. This method is consistent with the GHG Protocols for cities guidance and accounts for the consumption of electricity within the territory and the delivery of the 100% renewable electricity commitment from 2020. This allows understanding of some of the unique circumstances of the ACT. According to the ACT greenhouse gas emissions inventory, in 2022 emissions were down by 47% on 1990 levels. This reduction was largely the result of the ACT reaching its 100% renewable electricity supply target in 2020.



State and territory actions in 2024

In 2024, states and territories across Australia continued to implement policies and strategies to meet their emissions reduction targets. These actions were wide-ranging, with a sample including:

NSW **December 2023** – passed the *Climate Change (Net Zero Future) Act* (NSW), legislating ambitious emissions reduction targets and setting up a strong, independent Net Zero Commission to keep current and future governments on track to net zero by 2050.

VIC **March 2024** – passed the *Climate Change and Energy Legislation Amendment (Renewable Energy and Storage Targets) Act 2024* (Vic), enshrining its ambitious emissions reduction and renewable electricity targets in legislation, including 95% renewable electricity by 2035, and bringing forward the date to achieve net zero emissions from 2050 to 2045.

QLD **April 2024** – passed the *Clean Economy Jobs Act 2024* (Qld) which legislates emissions reductions targets and the development of emissions reduction plans.

ACT **June 2024** – released the *Integrated Energy Plan 2024–30* setting the long-term pathway for the transformation of the ACT's energy system to achieve net zero emissions by 2045, building on the ACT's 100% renewable electricity supply.

SA **July 2024** – operationalised the *Hydrogen and Renewable Energy Act 2023* (SA). The Act is an efficient, flexible, transparent, and consultative framework for hydrogen and renewable energy projects in South Australia, ensuring best practice licencing and regulatory approaches.

NT **August 2024** – the SunCable Australia-Asia Power Link project, which proposes to include a solar farm of 12,000 ha, received its Australian environmental approvals and conditional approval from the Government of Singapore. The project is expected to have a generation capacity of up to 10 GW.

TAS **September 2024** – released the *Transport Emissions Reduction and Resilience Plan 2024–29*. Through the plan, the Tasmanian Government has committed to reduce transport emissions and build resilience in the transport sector.

WA **Late 2024** – the GreenTech Hub will be operational. It will foster collaborative approaches to decarbonisation, working with researchers, industry, and Government to support activities to accelerate research and development, commercialisation and deployment of technologies and services for achieving the Western Australian Government's commitment to reach net zero emissions by 2050.

Adapting to the impacts of climate change

Climate change impacts and risks

A changing global climate

The world's climate continues to change due to greenhouse gases building up in the atmosphere.

- 2023 was the hottest year globally on record by a clear margin, with temperatures 1.45 ± 0.12°C above the pre-industrial baseline.
- Every month from June 2023 to September 2024 set a new monthly temperature record, and it is predicted that 2024 will be the warmest year on record.
- Maximum Antarctic sea ice extent is at a near record low, following the record-setting low of 2023.
- Global mean sea levels have risen by over 22 centimetres since 1900, half of which has occurred since 1970.

The situation in Australia

- Australia's climate has warmed on average by 1.51 ± 0.23°C since national records began in 1910, noting that Australia's average increase refers to land areas, whereas the global thresholds for sustained temperature rise that underpin the Paris Agreement commitments include both land and oceans (CSIRO 2024b).
- Oceans around Australia are rising, acidifying and have warmed by around 1°C since 1900 impacting coastal ecosystems and communities. The rate at which the oceans are taking up heat has increased in recent decades and this is contributing to longer and more frequent marine heatwaves.
- Extreme fire weather and fire season duration have increased across large parts of the country since the 1950s. This trend is projected to continue.
- Rainfall patterns have changed, with declines in cool season rainfall, during the main growing season, across parts of southwestern Australia since the 1970s and southeastern Australia since the 1990s.
- October to April (wet season) rainfall in northern Australia has increased by around 20% since the 1990s.
- Australia's capacity for disaster resilience varies. 52% of the population lives in areas with moderate assessed capacity, 32% in areas with high capacity, and 16% in areas with low capacity.

The outlook for Australia

In the coming decades, it is likely there will be:

- More time spent in drought, and more intense, short duration rainfall and associated flooding events.
- More dangerous fire weather days and a longer fire season in southern and eastern Australia.
- Continued increases in air temperatures, more heat extremes and less cold extremes.

Risks to Australia from these impacts include:

- Harm to human health and wellbeing – including mental and physical impacts resulting from disasters and extreme heat, and risks from changing patterns of infectious diseases.
- Damage to Australia's built environment – such as the destruction of infrastructure and the displacement or isolation of people due to damaged housing or cuts to transport routes.
- Economic impacts – including increases to food prices from livestock and crop loss, decrease in tourism revenue following disasters and supply chain interruptions.
- Harm to the environment from the death and injury of threatened species resulting in loss of biodiversity, destruction of habitat such as old growth forest, and erosion.

Impacts of climate change on health

The impacts of climate change on people's health include psychological distress and mental ill health, as well as illness, injury and death related to disasters and extreme heat. Climate change related anxiety is widespread among children and young people. Worsening climate change also threatens food and water security, facilitates the spread of infectious diseases and impacts air quality.

Australia's first National Health and Climate Strategy was launched in December 2023. It outlines priorities including building community and health system resilience to the impacts of climate change on health and wellbeing, and health system decarbonisation.

The Government is also developing:

- a Health National Adaptation Plan to complement and support the National Adaptation Plan
- a National Heat-Health Action Plan to promote a nationally consistent approach to minimise the health impacts of heat
- guidance on climate risk assessment and adaptation planning for health and aged care services.

Adapting to climate change

Even with strong action to reduce emissions, the impacts of climate change will continue to increase over the coming decades due to past emissions. Adapting to the impacts of climate change – and building resilience to these impacts – is essential for protecting Australia's prosperity, security, and environment. This requires collaboration across all levels of government, industry and communities.

The Australian Government's role in assisting Australians to build resilience to the impacts of climate change includes:

- providing national leadership on climate adaptation
- ensuring the availability of nationally authoritative climate science and information
- managing climate risks to Government assets and services.

The National Climate Risk Assessment and National Adaptation Plan

The Government is developing Australia's first National Climate Risk Assessment to identify and prioritise the things that Australians value the most that are at risk from climate change. The Assessment will provide objective and science-based evidence for decision-making now and into the future, to 2100.

The risk assessment's First Pass Report was published in March 2024. The report delivered the first ever national level assessment of Australia's climate change risks. It identified 56 nationally significant climate risks and prioritised 11 others for further analysis. The second pass assessment will deliver an in-depth analysis of climate hazard, exposure, and vulnerability data for the 11 priority risks.

The Government is also developing a National Adaptation Plan, which will establish a framework for adapting to the risks identified in the risk assessment. The National Adaptation Plan will help Australia 'mainstream' adaptation action, drive private sector investment and support people and communities that are disproportionately vulnerable to the impacts of climate change. The Plan will be informed by consultation with governments, experts, the private sector and other stakeholders.

Adaptation and First Nations peoples

First Nations peoples are among those particularly impacted by climate change and related extreme weather events. This includes extreme temperature events, which exacerbate energy insecurity for low-income and remote First Nations households (CCA 2024b).

In addition, First Nations perspectives are essential for understanding and responding to climate change. The Government is committed to working collaboratively with First Nations peoples to address climate change and its impacts. At the national level, a First Nations-led process to identify, assess and prioritise climate risks is taking place through the National Climate Risk Assessment and National Adaptation Plan processes.

Through the National Environmental Science Program, the Government also part-funded the third National First People's Gathering on Climate Change in Dubbo in October 2024. The First Nations-led event enabled climate scientists and First Nations peoples to exchange ideas on how to respond to the threat of climate change.

The Government has also invested $15.9 million over 6 years to establish the Torres Strait and Northern Peninsula Area Climate Resilience Centre. The centre has been designed by regional leaders and Traditional Owners in collaboration with the Government. The centre is a First Nations-led, coordinated regional response to climate change impacts, prioritising adaptation solutions, including through the Climate Resilience grants program.

Protecting Australia's environment

Protecting and restoring Australia's biodiversity and ecosystems will support Australia's carbon abatement and adaptation efforts. A healthier environment supports higher levels of carbon sequestration and greater resilience to intensifying climatic conditions.

As part of the Nature Positive Plan, which sets out the Government's commitment to reform Australia's environmental laws to better protect, restore and manage our environment, the Government will integrate climate considerations into new laws without duplicating existing mechanisms. Decision-makers will be required to consider climate adaptation and resilience in planning and landscape approaches including regional plans, strategic assessments and conservation planning processes. The Government will also require proponents to disclose their greenhouse gas emissions and explain how these will be managed consistent with Government policy. These reforms will be supported by improved information and guidance, including climate-impact modelling of exposed habitats, species and places.

In an important step to progress the Nature Positive reforms, in May 2024, the Government introduced legislation into Parliament to establish a new, independent, environmental regulatory agency, Environment Protection Australia (EPA). The EPA will restore public trust and integrity in the application and administration of Australia's national environmental laws. The Nature Positive (Environment Information Australia) Bill 2024 has also been introduced to establish the Head of Environment Information Australia to improve access to, and the quality of, national environmental data and information. This will enable transparency in Government decisions and the evaluation of conditions for their effectiveness in environmental protection and rehabilitation.

To ramp up environmental restoration and conservation, the Government has developed a world-first legislated Nature Repair Market to encourage nature positive land management practices which increase biodiversity outcomes. The market, which will operate alongside and provide complementary benefits to the ACCU scheme, is due to open in early 2025.

In 2024, the Environment Ministers' Meeting (EMM) agreed *Australia's Strategy for Nature 2024–2030*. The strategy includes a target to protect and conserve 30% of Australia's landmass and 30% of Australia's marine areas by 2030 (30 by 30). EMM also agreed to:

- the National Roadmap for protecting and conserving 30% of Australia's land by 2030
- the National Other Effective area-based Conservation Measures (OECM) Framework – Australia's first national framework for recognising land-based OECMs, referred to as Conserved Areas.

Adapting to the impacts of climate change will also require the careful management of Australia's water resources in the face of prolonged hotter and dryer conditions. The Government is working with states and territories to develop the new National Water Agreement. It will promote restoring and sustaining the health and integrity of our natural environment and water-dependent ecosystems, particularly in the face of climate change impacts.

Disaster risk management

As climate change drives more frequent and intense hazards, resilience and proactive disaster risk reduction has become increasingly critical. The National Defence Strategy recognises that the increasing frequency of climate events will place higher demands on the Australian Defence Force (ADF) for humanitarian assistance and disaster relief operations regionally and domestically, placing greater stress on ADF capability, capacity and infrastructure. The Strategy also recognises the importance of the Commonwealth working with states and territories to develop alternative capabilities for crisis response and recovery. This would ensure that the ADF is only used as a force of last resort.

Reducing disaster risks

The Australian Government continues to prioritise disaster risk management through initiatives such as the Disaster Ready Fund. The fund is providing up to $1 billion over 5 years from 2023–24, matched by states and territories and other funding sources, to invest in risk reduction and resilience initiatives, such as flood levees, seawalls, and firebreaks.

Successful projects under Round 2 of the fund were announced in August 2024. 164 projects across Australia will receive up to $200 million in Commonwealth funding, as part of a combined investment (including state, territory and partner contributions) of almost $387 million. Projects funded will address the physical and social impacts of disasters on Australian communities.

Australia's disaster management system is under growing pressure as disasters increase in size, scale, cost, and complexity due to climate change. In this context, the National Emergency Management Ministers' Meeting commissioned the Independent Review of National Natural Disaster Governance Arrangements and the Government commissioned the Independent Review of Commonwealth Disaster Funding. These reviews were released on 25 October 2024.

These reviews make recommendations on funding and governance arrangements to ensure that the disaster management system is fit-for-purpose in the face of a changing disaster landscape. They propose a strategic shift towards disaster risk reduction and resilience to reduce the impact of disasters on Australia. The reviews have recommended reforms focussed on clarifying the Australian Government's role in disasters and identifying priority outcomes, uplifting national disaster governance arrangements to support policy and capability requirements, and improving the evidence base from which funding decisions are made. The Australian Government is considering the findings from these reviews.

Better forecasting of hazards and building resilience

The Government is also working to improve its ability to forecast natural hazards. This year, the Government invested $371 million to rebuild and upgrade the research station on Macquarie Island in the Southern Ocean. The upgrades will boost the Government's capability to monitor greenhouse gas emissions and more accurately forecast weather conditions and natural hazards. This will strengthen our understanding of climate risk and enhance our disaster preparedness.

Australia's pathway towards transforming its energy sector also presents the opportunity to ensure new investments are adapted to future climate conditions, and help build resilience to future disruption from natural hazards.

Climate risk management and disclosure for public and private entities

In 2024, the Government commenced reforms to enhance climate risk management and disclosure practices across its operations, and in the private sector. These risks include both the 'physical' risks of climate change and the 'transition' risks associated with policy, regulatory and technological change from efforts to mitigate climate change.

The Government released the Commonwealth Climate Disclosure Policy. The policy will require Commonwealth entities and companies to publicly report on their exposure to climate risks and opportunities, as well as actions to manage them, in their annual reports. This builds on the Government's Australian Public Service Net Zero target and the Approach to Climate Risk and Opportunity Management in the Public Sector 2024–26, released in February 2024.

Implementation of climate risk disclosure reforms will help improve transparency, and define Australia as a leader in public sector climate risk and opportunity management. It will also ensure decision-making is informed by climate risk, so that public sector organisations continue to deliver for Australian communities, the economy and our environment.

In 2024, the Parliament passed legislation requiring mandatory climate-related financial disclosures for large businesses and financial institutions. The Government expects approximately 1,800 entities (across all sectors) will be captured under this scheme once the requirements have been fully phased in during 2027.

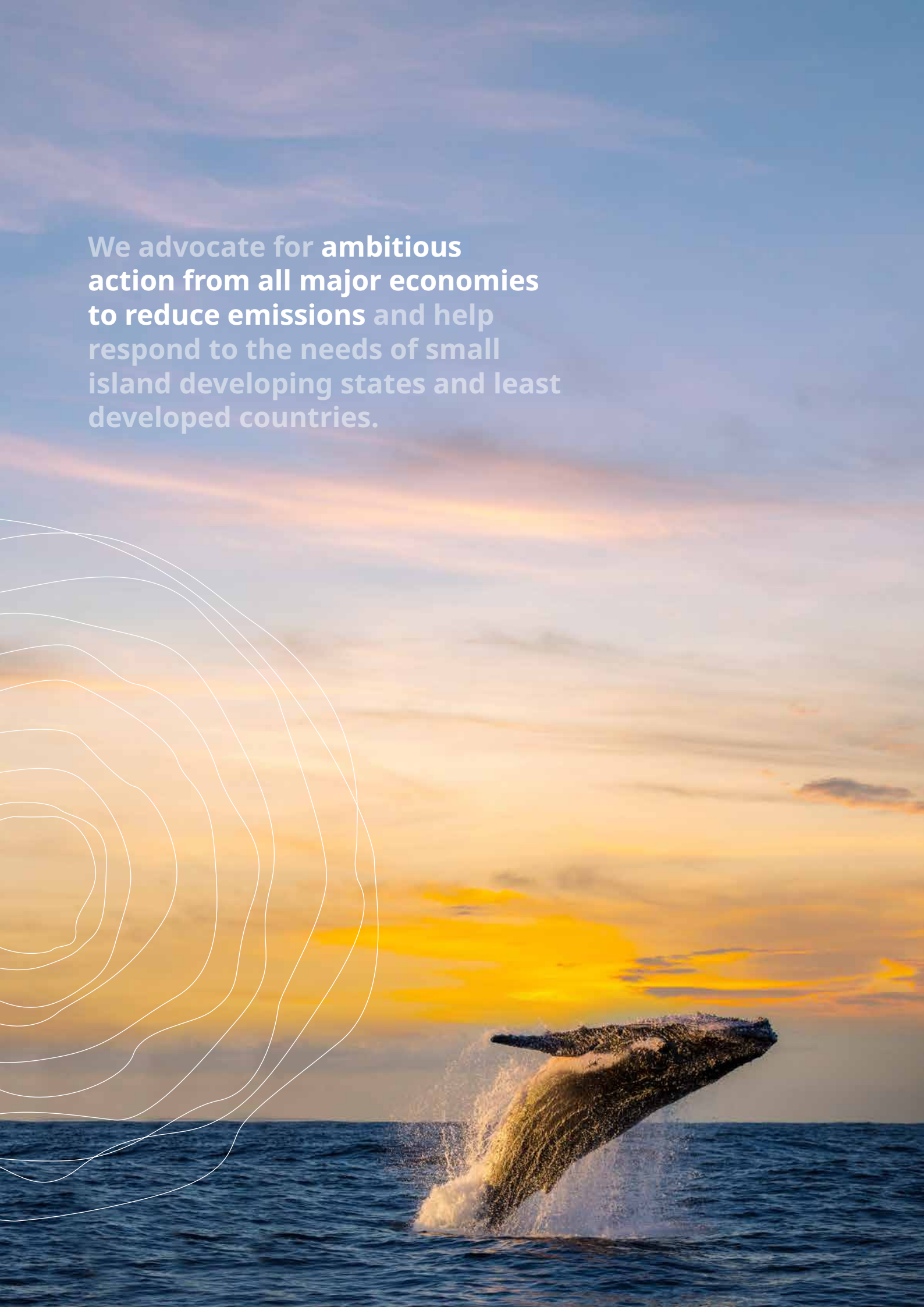
Climate change and national security

The short- and long-term implications of climate change will continue to exacerbate existing national security risks and introduce new risks. The impacts of climate change are amplifying existing stressors across Australia's region with potential national security implications. These implications will cut across Australia's disaster response and recovery, social cohesion, critical infrastructure, supply chains, border security, and access to essential services. These challenges may also manifest in a domestic context through our health and social support, economic, trade and finance, and infrastructure and built environment sectors.

A whole-of-Government effort is underway to better understand and prepare for the spectrum of climate-driven risks to our national security. These efforts will ensure that all levels of government, industry, and communities are better able to manage the scale of climate change impacts, in turn, mitigating potential first and second order risks to our national security. They include the adaptation and disaster management measures described above, examining Australia's exposure, vulnerability and preparedness for crises, and the adoption of climate adaptation and energy resilience strategies across national security agencies and operations.

Additionally, the Future Made in Australia plan is investing to support economic and national resilience in sectors of high priority for Australia, such as clean energy manufacturing. This will help diversify critical supply chains, enhance Australian manufacturing capability, and strengthen our economic resilience.

We advocate for **ambitious action from all major economies to reduce emissions** and help respond to the needs of small island developing states and least developed countries.



International developments

Multilateral engagement

Australia remains deeply engaged across multilateral fora, including the United Nations and the G20. We advocate for ambitious action from all major economies to reduce emissions and help respond to the needs of small island developing states and least developed countries.

The Paris Agreement remains the cornerstone of international collaboration on climate change. Its goals are to:

- limit global temperature increases to well below 2°C while pursuing efforts to limit increases to 1.5°C
- enhance adaptation capabilities
- foster resilience
- align global financial flows with low greenhouse gas emissions and climate-resilient development.

COP29 in Baku, Azerbaijan, was a significant step forward in the history of international climate negotiations. Countries made crucial decisions to enhance global climate efforts by agreeing to a New Collective Quantified Goal (NCQG) on climate finance of USD$300 billion per year by 2035 for developing countries, as part of a global effort. It will scale up financing for climate outcomes in support of the long-term goals of the Paris Agreement. Australia played a key role in delivering the NCQG, including through Minister Bowen's position as ministerial co-facilitator at COP29 and our role as co-chair of the technical negotiation process from 2023 to 2024.

In 2025, countries are expected to submit their next Nationally Determined Contributions (NDCs) under the Paris Agreement. These will include emissions reduction targets beyond 2030. These targets are critical to collectively putting global emissions on a downward trajectory to achieving the Paris Agreement's temperature goal, including keeping 1.5°C within reach. Australia is developing its NDC, supported by the development of 6 sectoral plans and an overarching Net Zero Plan. Australia will track progress against its NDC regularly through National Communications and Biennial Transparency Reports (BTR) submitted to the UNFCCC. Australia's first BTR is due to the UNFCCC before 31 December 2024.

Director General of the Secretariat of the Pacific Regional Environment Programme Sefanaia Nawadra, Minister Bowen, Vanuatu's Minister of Climate Change Adaptation John Salong and Deputy Director General of Science and Capability at the Pacific Community Paula Vivili at the NDC Hub launch event on 1 October 2024. (Photo credit: DFAT)

Working with Pacific partners

Recognising the significant impact of climate change on the Pacific, Australia is strengthening its support for Pacific nations across climate and energy transition initiatives. This includes technical energy transition support through the $50 million Australia–Pacific Partnership for Energy Transition; a $9 million contribution to the Regional Pacific Nationally Determined Contribution Hub for its next phase of work; a $75 million REnew Pacific program to deliver off-grid and community scale renewable energy in remote and rural parts of the Pacific and Timor-Leste; and a $100 million contribution to the Pacific-owned and led initiative for climate finance, the Pacific Resilience Facility.

Australia is also working to secure its bid to host COP31 in 2026 in partnership with the Pacific. COP31 will accelerate global climate action and highlight the unique opportunities and challenges faced by the Indo-Pacific region. On October 1 2024, Pacific Climate Change Ministers convened in Fiji; their discussions advanced work on partnership arrangements to host COP31, should the bid be secured.

In 2023, Australia successfully hosted the UNFCCC's Pacific Regional Gathering of the Local Communities and Indigenous Peoples Platform. Since then, Australia also provided support to the Indigenous Peoples Organisation of Australia to host an Indigenous Community Decision-Making Workshop. This workshop brought together First Nations and Pacific community representatives with academic experts to discuss how mitigation, adaptation and capacity building projects could be implemented to address community-identified climate challenges.

Clean energy cooperation

International cooperation on clean energy and climate change helps bolster collective action to address climate change and supports opportunities for Australian innovation, business and market access.

In 2024, Australia deepened its engagement with the Climate Club – a high-level forum for cooperation on accelerating climate action and increasing ambition, with a focus on industrial decarbonisation. Australia was appointed to the Climate Club's inaugural steering group in September 2024. Australia's landmark decision to join the Statement on International Public Support for the Clean Energy Transition Partnership (commonly referred to as the 'Glasgow Statement') in December 2023 complements this work. It reinforced Australia's commitment to building a global net zero economy and prioritising public support for the clean energy transition.

Australia is advancing international cooperation on clean energy supply chains to increase resilience and further its ambition to become a renewable energy superpower. This includes international cooperation on critical minerals essential for renewable technologies. As the inaugural chair of the International Energy Agency Critical Minerals Working Party, Australia is working to secure a supply of critical minerals, enhance market transparency, and embed environmental, social, and corporate governance considerations into supply chains. Australia is also spearheading the Quad Clean Energy Supply Chain Diversification Program. The program will provide grants to help diversify solar PV, hydrogen electrolyser and battery supply chains in the Indo-Pacific region.

Australia is advancing international cooperation on clean energy supply chains to increase resilience and further its ambition to become a renewable energy superpower.

Australia is also focused on supporting South East Asia's energy transition, crucial for both emissions reduction and economic development. The Government reinforced this commitment at the 2024 ASEAN–Australia Special Summit, with a new $2 billion Southeast Asia Investment Financing Facility. The facility will catalyse Australian private sector investment by providing loans, guarantees, equity and insurance for projects, particularly those in support of the region's clean energy transition and infrastructure development. Australia also committed to an additional $222.5 million over 5 years to the Mekong–Australia Partnership to help partner countries in the Mekong subregion address shared challenges, including water security and climate action.

Australia and Vietnam entered a new Comprehensive Strategic Partnership in 2024, the first of its kind to have a standalone climate and energy pillar. Australia and Singapore also continue to advance green economy cooperation, formalising the Green and Digital Shipping Corridor in March to spearhead our shared goal of accelerating maritime decarbonisation and digitalisation.

In 2024, Australia has continued to strengthen its climate and clean energy cooperation with Austria, China, Germany, India, Indonesia, Japan, the Republic of Korea, the Netherlands, New Zealand, Singapore, the United Kingdom, the United States and Vietnam. For example, Australia agreed elevated climate and energy partnerships with Germany, India, the United Kingdom and Vietnam. In June 2024, Australia agreed a Memorandum of Understanding with the People's Republic of China providing a framework for effective climate cooperation. Additionally, Australia made significant strategic and practical gains in implementing the Australia–United States Climate, Critical Minerals and Clean Energy Transformation Compact under the third pillar of our Alliance.

Australia understands that development finance reform is critical to reducing emissions while supporting economic development. By the end of 2025, Australia will offer Climate Resilient Debt Clauses in our sovereign loans. This will help developing countries build economic resilience in the face of climate change and other shocks, resist coercion and focus on delivering for their citizens.

Australia and Germany advance energy and climate cooperation

Australia and Germany have taken several significant steps to deepen their climate and energy cooperation this year. In September 2024, Minister Bowen and State Secretary Anja Hajduk announced the Australia–Germany Energy and Climate Partnership. The partnership will expand and accelerate climate action by both countries.

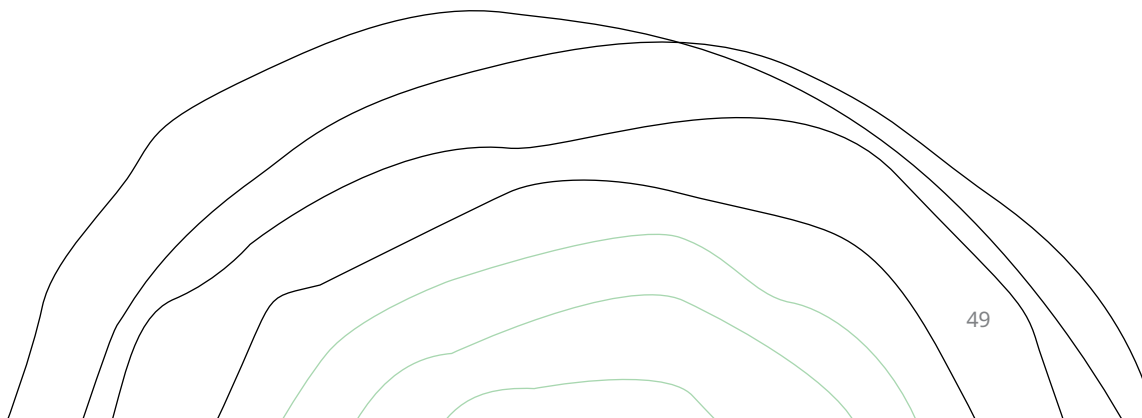
It includes new cooperation on green hydrogen supply chains through a $660 million (€400 million) joint H2Global funding window with Germany's Federal Ministry for Economic Affairs and Climate Action to guarantee European buyers for Australia's renewable hydrogen producers. This new work supports Australia's National Hydrogen Strategy 2024 and reinforces efforts on hydrogen as a key sector of the Future Made in Australia plan.

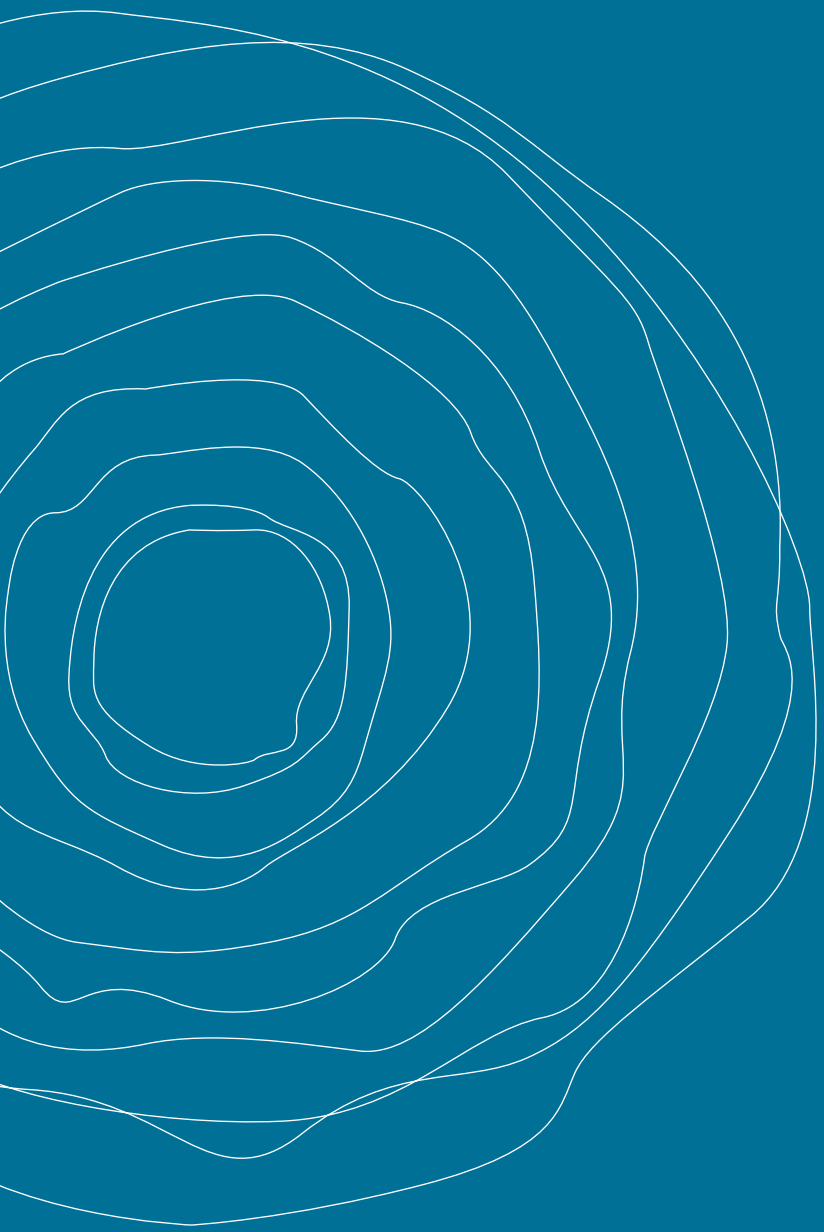
This Partnership builds on previous work, such as HySupply and HyGATE, where German and Australian companies work together to build an international hydrogen industry and market. Australia and Germany are now expanding this work to include a focus on green iron under the Green Metals for Sustainable Steel Initiative. This initiative will examine how Australian green iron can support decarbonisation of Germany's economy, working with Germany's Federal Ministry of Education and Research. This work will help develop the case for lower-cost options for green hydrogen supply chains between Australia and Europe.

Glossary

Abatement	Reducing greenhouse gases in the atmosphere, including mitigation and sequestration.
Adaptation	In human systems, the process of adjustment to actual or expected climate and its effects, to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects.
Capacity Investment Scheme	The Capacity Investment Scheme is an Australian Government program to accelerate investment in new renewable energy generation, such as wind and solar, and clean dispatchable capacity, such as battery storage. The CIS comprises a series of competitive tenders for underwriting contracts to deliver 32 GW of capacity by 2030.
Carbon credit	A tradeable unit that represents 1 tonne of carbon dioxide equivalent (t CO_2-e) stored or avoided by a project.
Carbon farming	The process of changing agricultural practices or land use to increase the amount of carbon stored in the soil and vegetation (sequestration) and to reduce greenhouse gas emissions from livestock, soil or vegetation.
Carbon offset	A type of carbon credit that represents a reduction in emissions – whether prevented from entering the atmosphere or removed from the atmosphere – that is used to compensate for emissions that occur elsewhere.
Circular economy	A way of delivering nature positive outcomes, lifting economic productivity, and supporting Australia's net zero commitments – through the sustainable and efficient use of resources in the economy.
Climate Change Authority	An independent body established under the *Climate Change Authority Act 2011*. The CCA's function is to provide expert, independent advice to the Government on climate change policy.
Mt CO_2-e	Million tonnes of carbon dioxide equivalent. The amount of carbon dioxide emissions that would have an equivalent effect on climate change from other individual or mixtures of greenhouse gas emissions. Is used to standardise different greenhouse gas emissions impacts on climate change to be reported as a single value. Usually shown in tonnes (t CO_2-e) or million tonnes (Mt CO_2-e).
Conference of the Parties (COP)	The decision-making body of the UNFCCC. All States that are Parties to the Convention meet every year and review the implementation of the Convention and any other legal instruments that the COP adopts and take decisions necessary to promote the effective implementation of the Convention, including institutional and administrative arrangements.
Critical mineral	Critical minerals are metallic or non-metallic materials that are essential to our modern technologies, economies, and national security, and whose supply chains are vulnerable to disruption.
Electrification	Switching from energy sources, such as liquid fuels or gas, to electricity.
Emissions budget	A cumulative amount of emissions that can be emitted, e.g. 4,000 Mt CO_2-e during a specified time period, e.g. 2021–2030.
Emissions intensity	A measure of the amount of emissions associated with a unit of output – for example, emissions per unit of gross domestic product or electricity production.
Fugitive emissions	Emissions that are released across the coal, oil, and natural gas supply chains during exploration, production, processing, refining, storage, transmission and distribution of fossil fuels.
Green metal	Iron, steel, alumina and aluminium produced with low or zero greenhouse gas emissions.
Greenhouse gas	Any gas (natural or produced by human activities) that absorbs infrared radiation in the atmosphere, leading to warming effects. Greenhouse gases include carbon dioxide, methane and nitrous oxide.
Industrial Processes and Product Use (IPPU)	Includes emissions from chemical feedstocks, reductants, carbonates and HFCs, which are used in refrigerants and air conditioning.

Intergovernmental Panel on Climate Change (IPCC)	The United Nations body for assessing the science related to climate change.
La Niña	La Niña refers to the extensive cooling of the central and eastern tropical Pacific Ocean, often accompanied by warmer than normal sea surface temperatures in the western Pacific, and to the north of Australia. La Niña events are associated with increased probability of wetter conditions over much of Australia, particularly over eastern and northern areas.
Land Use, Land Use Change and Forestry (LULUCF)	Emissions and sequestration from activities occurring on forest lands, forests converted to other land uses, grasslands, croplands, wetlands, and settlements.
Mitigation	Reducing greenhouse gas emissions in order to stop climate change getting worse.
National Electricity Market (NEM)	Australia's largest electricity grid, suppling the nation's east coast including Queensland, New South Wales (which includes the ACT), Victoria, Tasmania and most of South Australia. Electricity is generated, used in each region and traded across regions. High voltage transmission lines transport electricity from generators to electricity distributors, who deliver it to homes and businesses on lower voltage 'poles and wires'.
National Greenhouse Gas Inventory	Estimates of anthropogenic emissions and removals of greenhouse gases that occur within Australia's jurisdiction, prepared consistent with United Nations Framework Convention on Climate Change and Paris Agreement rules and guidelines.
Nationally Determined Contribution (NDC)	A submission by a party to the Paris Agreement that articulates the party's efforts to contribute to the global task of decarbonisation and adapt to the impacts of climate change.
Net zero emissions	An overall balance between greenhouse gas emissions and removals.
Paris Agreement	An international agreement adopted in 2015. Under the Paris Agreement, the global temperature goal is to keep warming to 'well below' 2°C compared with preindustrial levels, and to 'pursue efforts to limit the temperature rise to 1.5 degrees Celsius'.
Safeguard Mechanism	A legislated scheme that requires Australia's largest greenhouse gas emitters, or 'Safeguard facilities', to keep their net emissions below an emissions limit (a baseline).
Sequestration	Carbon sequestration is the process of capturing and storing atmospheric greenhouse gases. Greenhouse gases can be stored in biological ecosystems, underground geological formations or in manufactured products.
Stationary energy	The burning of fuels for energy used directly, in the form of heat, steam or pressure.
United Nations Framework Convention on Climate Change (UNFCCC)	The United Nations convention that supports the global response to climate change, with the ultimate aim of preventing dangerous human interference with the climate system.





Response to the Climate Change Authority's Annual Progress Report

The Australian Government thanks the Climate Change Authority for its third Annual Progress Report. The report and its recommendations have informed the Annual Statement and are a key element of the accountability framework of the *Climate Change Act 2022*.

The Government agrees with the Authority that the 2030 target can be achieved if all levels of government, industry and the Australian community work together. The Authority's advice has been made as the Government continues to implement key policies and programs to meet its 2030 target. The Government agrees that the transformation of the electricity sector will be critical. It welcomes that 8 of the 10 recommendations made in 2024 relate to the electricity sector and energy performance. The Government agrees, agrees in principle or notes all of the Authority's recommendations.

The Government has responded individually to each of the Authority's 10 recommendations. Where the Government accepts the Authority's advice, the response also provides information about future action it will take. The Government will also bring relevant recommendations to the attention of the Energy and Climate Change Ministerial Council and consider the issues raised in relevant sector plans.

The Government has made strong progress in implementing its response to the Authority's recommendations from its 2023 Annual Progress Report. Some highlights include:

- In the 2023 Annual Statement the Government agreed to the Authority's recommendation to respond to the Community Engagement Review of energy infrastructure in early 2024.
  - In February 2024, the Government released an interim response to the review. In July 2024, Climate and Energy Ministers released their final response, detailing the range of actions taken across jurisdictions to address the review's recommendations.
- The Authority recommended that the Government work with state and territory governments to accelerate the rollout of network infrastructure to support the deployment of large-scale renewable energy projects.
  - The $20 billion Rewiring the Nation program will make a significant contribution towards this, with $134.2 million committed to streamline approvals for priority projects and RETAs with states and territories.
- The Authority also recommended enhancing the delivery of support to landholders to enable them to make informed decisions on sequestering carbon on their farms.
  - In response, the Government's Carbon Farming Outreach Program training package became available in July this year. In addition, the 2024–25 Budget included $30.8 million to build on the existing program by expanding the delivery of training sessions and establishing a knowledge bank to integrate the existing package with new tailored resources.

Framework for Government response

Response	Rationale
Agree	The Government agrees with the recommendation's intended outcome and implementation approach.
Agree in principle	The Government agrees with the recommendation's intended outcome, but further consideration is required on the approach to implementation
Note	Further consideration of all aspects of the recommendation is required.
Do not agree	The Government does not agree with substantive elements of the recommendation.

Recommendation 1

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 should be enhanced by:

- substantially accelerating and broadening the scheme to:
  - close the gap to the 82% renewable energy 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.

Note

Building on the existing pipeline of renewables projects, the Government is working closely with jurisdictions to increase the amount of renewable generation in our grid by 2030. The CIS, plus state and territory commitments, such as formal RETAs are expected to result in Australia achieving 82% renewable electricity on-grid by the end of this decade. Accelerating the deployment of renewable energy is critical to emission reduction goals, and the Government is therefore front-loading early CIS tenders to maximise early delivery of new generation and storage projects.

The post-2030 future market review will recommend future market settings to promote investment in firmed, renewable generation and storage capacity in the National Energy Market following the conclusion of CIS tenders in 2027. The review will make actionable recommendations to support the development and staged implementation of reforms to the NEM wholesale market. The reforms will support the achievement of the National Electricity Objectives – including affordability, reliability and emission reduction in the long-term interests of consumers and prosperity of Australia's economy. The Government will consider the appropriate legislative response considering those recommendations.

The CIS tender assessment considers the amount of curtailment of renewable projects to prioritise good locations for projects on the transmission network. The Government is also exploring the expansion of the eligibility of Virtual Power Plants to utilise the existing distribution network for CIS supported projects.

Recommendation 2

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.

Note

The Government recognises the important role that technologies such as synchronous condensers will play in the security and reliability of our electricity system and will continue to use existing processes to address the issues raised by the CCA.

The National Electricity Rules provide the framework for achieving and maintaining a secure power system. The AEMO is required to publish annually a System Strength Report in which it must indicate the requirements for system strength at nodes throughout the NEM and identify any forecast shortfalls. The System Strength Service Provider in each region (in most cases, the Transmission Network Service Provider) is then required to procure sufficient services (including through installation of synchronous condensers where appropriate) to maintain adequate system strength at each node in its region. This is done through a transparent process, overseen by the Australian Energy Regulator (AER), to ensure the most efficient solution is found. This ensures that both technical and economic aspects of the solution are considered in a technology neutral environment.

The separation of responsibility between the system operator and planner (AEMO) and those responsible for the provision of services (Transmission Network Service Providers with regulatory oversight from the AER) is a characteristic of the current regulatory framework that reduces the risk of conflict of interest in the choice of solution.

AEMO's Electricity Statement of Opportunities (ESOO) provides technical and market data for the NEM over a 10-year period from 2024–25 to 2033–34. The ESOO is a signal for investment and highlights the opportunities for market participants, investors, governments and other jurisdictional bodies to invest in new assets and systems to maintain a reliable and secure supply of electricity in the NEM.

The Government will continue to monitor issues relating to system strength, including through the Energy and Climate Ministerial Council, and is committed to continuing engagement with market bodies, market participants and jurisdictions to address supply chain constraints in relation to synchronous condensers.

Recommendation 3

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 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.

Agree

The Government recognises expediting grid connections is integral to achieving its climate goals. In 2023, the Government established the Capacity and Connections Committee to oversee the Summer Readiness Pilot, which brought an additional 3.2GW of capacity online ahead summer and reduced commissioning timeframes by 53%. The Government continues to work with jurisdictions through the Streamlined Connections Trial which is trialling initiatives from the AEMO-led Connections Reform Initiative.

The Government will also be providing funding for the Accelerated Connections Fund, which will expedite the connection process of generation and storage projects across the NEM. Non-competitive grants will be provided to AEMO and TNSPs for additional resourcing, which has been proven to reduce connections timeframes. This will help to reduce wholesale prices, lower inflationary pressure, and provide consumer cost of living relief while driving progress toward the 2030 renewable energy target.

Recommendation 4

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 connection 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.

Agree in principle

The Government, with the state and territory governments and market bodies, is working to improve the ability of electricity distribution networks to support higher levels of renewable energy and 2-way energy flows. The National Consumer Energy Resources Roadmap agreed by Energy and Climate Change Ministers in July 2024 sets out a series of actions to unlock the full benefits of consumer energy resources for consumers and the electricity system. Early priorities include streamlining network connection processes for commercial-scale consumer energy resources, such as community batteries, and supporting higher solar energy exports.

The Government supports the deployment of small-scale renewable energy systems through the SRES. The SRES supports households and businesses that install rooftop PV and solar water heaters. Larger solar PV systems installed by the commercial and industrial sector may be eligible for support under Large-scale Renewable Energy Target scheme. The Government is supporting increased storage in the distribution network through the Community Batteries for Household Solar program – $200 million in grant funding to support over 400 community batteries. The AER has approved a class waiver for batteries receiving funding under this program, enabling distribution network service providers to lease battery capacity to market participants. The program is in early deployment stages and its outcomes will inform future Government support or enabling actions to support further distribution-level storage.

Incentive schemes established in the National Electricity Law form an important part of our approach to regulating national monopoly electricity and gas networks in Australia. In 2023, the AER reviewed and refined its incentive schemes and guidelines that apply to regulated electricity and gas networks to ensure they remain relevant and fit-for-purpose. A targeted review of the Service Target Performance Incentive Scheme is now underway as part of the AER's commitment to improve its approach to regulation by being more efficient and focusing on outcomes that matter most to consumers.

Smart meters are an essential enabling technology to provide consumers access to the electricity services and market offers of the future. Under current rules, it is electricity retailers' responsibility to ensure that all new and replacement meters are a smart meter. On 28 November 2024, the Australian Energy Market Commission (AEMC) is due to make a final determination on the accelerated roll-out of smart meters by electricity retailers. The AEMC has previously indicated it will seek 100% rollout across the NEM by 2030. Some jurisdictions have moved independently to accelerate smart meter rollout ahead of 2030, such as Western Australia. In addition, on 10 October 2024, the AEMC published a consultation paper to seek feedback on a rule change request submitted by Energy Consumers Australia that seeks to improve consumers' access to real-time data from smart meters.

Recommendation 5

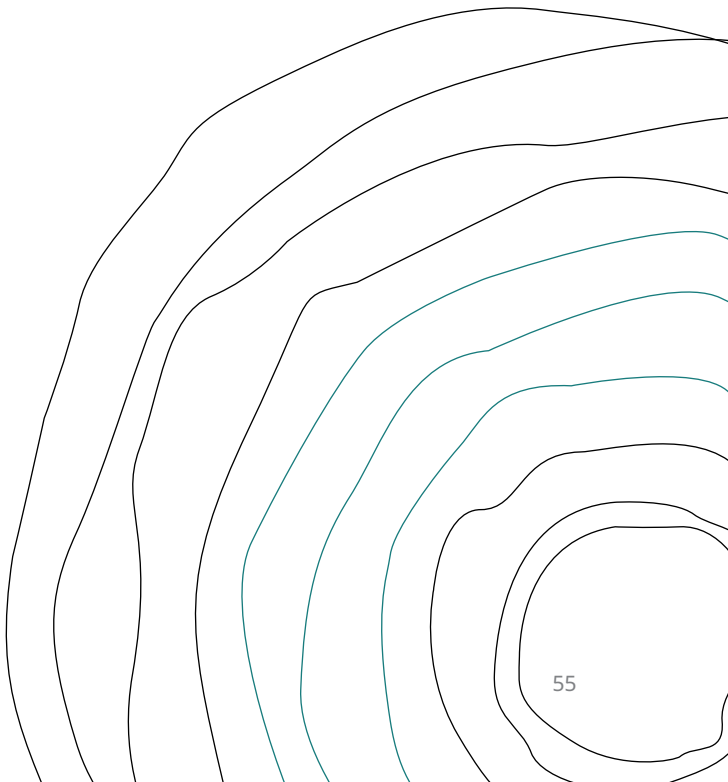
Endorse the provision of further advice on recommendations 1–4.

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.

Agree

The Government welcomes the Authority's advice on reforms to meet our emissions reduction targets.

The Government will work closely with the Authority to ensure that expert work to inform the transition of Australia's electricity system complements the Government's post 2030 market design project and does not duplicate other work undertaken by the department, including relating to the rollout of the CIS.



Recommendation 6

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 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.

Agree in principle

The Government works with states and territories through a range of forums, including National Cabinet – a forum for the Prime Minister, Premiers and Chief Ministers to meet and work collaboratively.

The ECMC holds substantial accountability for the energy transition and collaborates with other relevant ministerial forums as required to prioritise cross-cutting reforms. ECMC reports to National Cabinet annually.

The Government agrees barriers to the clean energy transition should be addressed across portfolios and jurisdictions in a coordinated manner. A range of priority work is already underway through ECMC, including developing a National Priority list of renewable energy projects to drive prioritisation of projects for timely consideration of relevant approvals processes.

Recommendation 7

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.

Note

The Government recognises the central leadership role that it must play in driving the energy transition in close collaboration with energy market institutions and state and territory governments. The role proposed for the Energy Transition Coordinator is already core business for the Energy Group in the Department of Climate Change, Energy, the Environment and Water, led by a full-time senior officer and supported by a team of energy experts.

In August 2022, the National Energy Transformation Partnership was established recognising that decarbonising Australia's energy system and achieving net zero requires collaboration across all governments and a coordinated approach. Reforms of national importance are underway, including on broader enablers such as workforce readiness, clean energy supply chains, and community engagement and social licence.

RETAs build on the successful multilateral collaboration under the partnership and recognise the need to target efforts to address the unique needs of each jurisdiction to accelerate the energy transformation. While the partnership focuses on nationally shared actions to enable the energy transformation, bilateral RETAs set out the actions that the Commonwealth and individual jurisdictions will take to address jurisdiction-specific issues. RETAs are designed to support the expansion of the CIS by providing a mechanism to agree minimum capacity allocations, delivering investment certainty to projects situated in jurisdictions and complementing existing investment under state systems. RETAs detail how respective governments will work together to deliver the national target of 82% renewable electricity by 2030, to ensure reliability through the orderly and timely exit of coal generators, and to address non-market barriers to investment, such as accelerating planning and environmental approval processes.

As the energy transition progresses, DCCEEW will continue to monitor progress against priority actions and will identify further measures as required, including through the partnership, CIS and RETAs and the Electricity & Energy Sector Plan.

Recommendation 8

Uplift national building energy efficiency and drive the acceleration of building retrofits through improved information, regulated standards and further 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.

Australian buildings have some of the poorest energy efficiency in the world, with houses built before 2003 having an average NatHERS rating of less than 3 stars compared to 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.

Agree in principle

The Government's National Energy Performance Strategy provides a long-term framework to coordinate action and accelerate energy performance across all sectors. Supporting the strategy, the $1 billion Household Energy Upgrades Fund and $300 million Social Housing Energy Performance Initiative will collectively support over 170,000 energy upgrades, including in over 60,000 social housing properties.

The Government is also working with states and territories under the National Energy Transformation Partnership to:

- expand the number of products covered by the Greenhouse and Energy Minimum Standards scheme and develop a strategic plan to ensure the scheme remains effective and aligned to priorities
- develop and implement the Trajectory for Low Energy Buildings which provides a strategic pathway to achieve a net zero emissions building sector by 2050
- support the development of the National Australian Built Environment Rating Scheme energy rating tools to enable performance-based ratings for all commercial buildings in Australia and work to broaden mandatory disclosure of NABERS ratings to more major building types
- expand the NatHERS to existing homes and
- facilitate a national approach to disclosing home energy ratings at point of sale or lease, through the Home Energy Ratings Disclosure Framework.

Recommendation 9

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 five 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 its 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.

Agree in principle

The Government recognises the value of transparency in the reformed Safeguard Mechanism, including to ensure ACCU proponents and operators of Safeguard Mechanism facilities make informed decisions. Information on abatement and electrification intentions can also assist with energy sector planning. The Clean Energy Regulator already captures a range of market intelligence about Safeguard compliance strategies and reports this to the market as part of their Quarterly Carbon Market Reports. The Government expects Safeguard facilities to have detailed compliance strategies, including for onsite abatement which is a key objective of the Safeguard reforms and support by a range of complementary programs, such as Powering the Regions.

Given compulsory reporting requirements would impose an additional burden on facilities, implementation details are best considered as part of the review into Safeguard Mechanism scheme settings in 2026–27. In the interim, the Clean Energy Regulator will collect relevant information voluntarily and under existing regulatory powers to provide further consolidated market information in its published reports. This may include information created as part of climate-related financial disclosures, such as transition plans.

Recommendation 10

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.

Agree in principle

The Government is currently developing the National Adaptation Plan along with Australia's first National Climate Risk Assessment. The National Adaptation Plan will contain an approach to monitoring and evaluation and the Government agrees in principle that the Authority, as an independent climate advisory body, is well placed to contribute to monitoring and evaluation of adaptation. The Government will determine the best arrangements for monitoring, evaluation and learning through the finalisation of the National Adaptation Plan.

References

AAA (2024), *Electric Vehicle Index*, Australian Automobile Association.
www.aaa.asn.au/research-data/electric-vehicle

ACSI (2024), *Promises, Pathways & Performance: Climate Change Disclosure in the ASX200*, Australian Council of Superannuation Investors, Melbourne.
https://acsi.org.au/wp-content/uploads/2024/07/Promises-Pathways-Performance-Climate-reporting-in-the-ASX200.Jul24final.pdf

AEC (2024), *Emissions trends and electricity sector*, Australian Energy Council.
www.energycouncil.com.au/analysis/emissions-trends-and-electricity-sector

AEMO (2024a), *NEM Data Dashboard – Renewable Penetration – November 2024*, Australian Energy Market Operator.

AEMO (2024b), *Integrated System Plan For the National Electricity Market: A roadmap for the energy transition*, Australian Energy Market Operator.
https://aemo.com.au/-/media/files/major-publications/isp/2024/2024-integrated-system-plan-isp.pdf?la=en

AEMO (2024c), *Gas Statement of Opportunities March 2024: For Australia's East Coast Gas Market*, Australian Energy Market Operator.
https://aemo.com.au/-/media/files/gas/national_planning_and_forecasting/gsoo/2024/aemo-2024-gas-statement-of-opportunities-gsoo-report.pdf?la=en&hash=4180AD3B977743D028C19254B75997DA

ASIC (2024), *What should your sustainability report contain?* Australian Securities and Investments Commission, Australian Government, Canberra.
https://asic.gov.au/regulatory-resources/sustainability-reporting/for-preparers-of-sustainability-reports/what-should-your-sustainability-report-contain/

CCA (2024a), *Sector Pathways Review*, Climate Change Authority, Australian Government, Canberra.

CCA (2024b), *Third Annual Progress Report*, Climate Change Authority, Australian Government, Canberra.

CEC (2024), *Industry snapshot*, Clean Energy Council.
https://cleanenergycouncil.org.au/advocacy/industry-snapshot

CSIRO (2024a), *GenCost 2023-24: Final report,* the Commonwealth Scientific and Industrial Research Organisation, Australian Government, Canberra.

CSIRO (2024b), *State of the Climate 2024,* the Commonwealth Scientific and Industrial Research Organisation, Australian Government, Canberra.

DCCEEW (2024a) *Australia's Emissions Projections 2024*, Department of Climate Change, Energy, the Environment and Water, Australian Government, Canberra

DCCEEW (2024b) *Quarterly Update of Australia's National Greenhouse Gas Inventory: June 2024*, Department of Climate Change, Energy, the Environment and Water, Australian Government, Canberra.

EVC (2023), *Australian Electric Vehicle Industry Recap 2023*, Electric Vehicle Council.
https://electricvehiclecouncil.com.au/wp-content/uploads/2024/03/EVC-Australian-EV-Industry-Recap-2023.pdf

EVC (2024), *Monthly Sales Reports – September 2024*, Electric Vehicle Council.

FCAI (2024), *September 2024 New Vehicle Sales*, Federal Chamber of Automotive Industries.
https://www.fcai.com.au/september-2024-new-vehicle-sales/

ICIN (2024), *Latest Industry Snapshot*, Indigenous Carbon Industry Network.
www.icin.org.au/latest_industry_snapshot

IEA (2023), *Global Methane Tracker 2023*, International Energy Agency, Paris
www.iea.org/reports/global-methane-tracker-2023

JSA (2023), *The Clean Energy Generation: workforce needs for a net zero economy*, Jobs and Skills Australia, Australian Government, Canberra.

Pollination, commissioned by ARENA (2024), *Community Energy: Hope and Headwinds*