



Becoming a Net Zero Nation

The Australian Academy of Technological Sciences and Engineering (ATSE) calls for the immediate prioritisation and deployment of existing mature, low-carbon technologies that can make deep cuts to high-emitting sectors before 2030.

ATSE calls for a national net zero emissions policy and implementation framework that prioritises the challenge and addresses the opportunity to transform Australia's economy.

ATSE commits to working across government and industry leadership to advise on best practice policy settings and supports urgently decarbonising the nation.

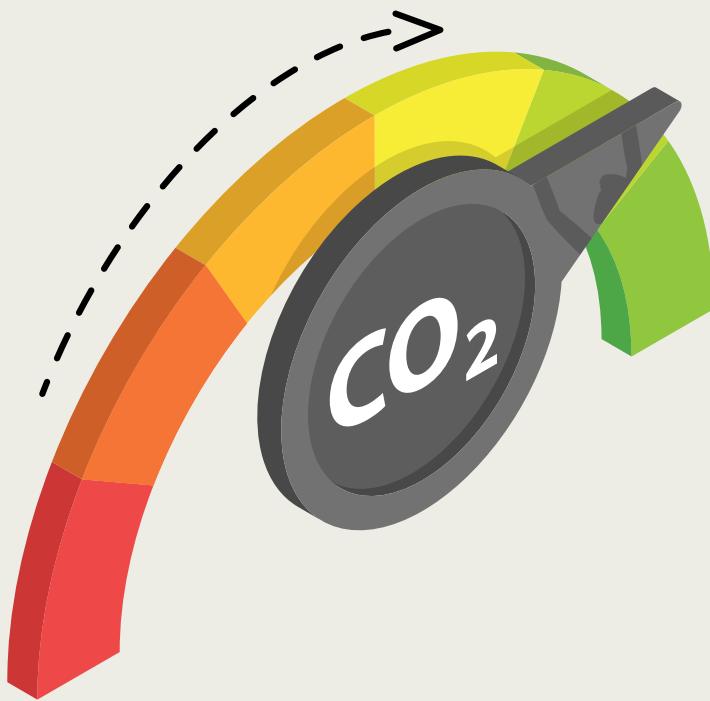
The following actions are top priorities:

1. **Develop the technologies and policy settings required for a net zero emissions energy network.**
2. **Create and implement circular supply chains to reduce waste and remove emissions at every stage of production, from raw materials to recycling.**
3. **Develop sustainable technologies and regulations for a resilient and net zero-emissions built environment.**
4. **Support electrification of the transport network and urgent development of emerging technologies to allow for net zero emissions land, sea, and air freight and travel.**
5. **Grow research, development and implementation of technologies to support carbon-neutral primary industries including in the agricultural and minerals sectors.**
6. **Protect the natural environment and reduce impacts of human activity on biodiversity.**

The science of climate change is unequivocal. Australia is increasingly experiencing its impacts, including extreme weather and bushfire events. There is an opportunity to limit climate change to current levels through immediate action. The March 2023 IPCC Climate Change Synthesis Report outlined a rapidly closing window to limit global warming to 1.5 degrees. Australia contributes a disproportionate amount of carbon emissions, as the 14th highest emitter globally (CSIRO, 2021).

Meeting net zero commitments requires the cooperation of governments at all levels, all industry sectors, and the research sector. It also brings opportunities for Australia to develop new leading-edge technologies, exports and economic sectors. To succeed in decarbonisation, Australia must take a multifaceted approach, with a common goal to develop and urgently apply solutions across all industry sectors, and in particular in energy, transportation, manufacturing, construction, minerals and agriculture.

International collaboration on innovation and technology solutions will be essential to accelerate Australia's progress towards net zero targets, contribute to global efforts on this shared challenge, access emerging opportunities and bring Australian solutions to the world. Australia's work towards net zero targets help to advance more than half the UN Sustainable Development Goals that call for action to address climate change, either directly or indirectly.



ATSE recommends the following strategies to reach net zero:

1. Develop the technologies and policy settings required for a net zero emissions energy network.

The shift to low- and zero-emissions energy generation is critical for Australia to meet its net zero commitment and provide clean, reliable energy to every Australian, and can open up new export markets for the nation. Innovations in the energy sector have seen the maturation of renewable energy sources such as solar and wind, as well as a suite of energy storage technologies. At the same time, the Safeguard Mechanism introduced in 2023 is a lever to reduce emissions from electricity, oil and gas as well as mining. All levels of government and industry must work together to step up the decarbonisation of the energy sector.

There is promising initial work on reducing existing atmospheric carbon. Further advancements in carbon capture and storage must be achieved while concerted efforts continue to develop technological solutions to emissions reduction in difficult-to-abate sectors and processes.

2. Create and implement circular supply chains to reduce waste and remove emissions at every stage of production, from raw materials to recycling.

A whole-of-supply-chain approach is needed across the economy to reduce emissions in the provision of goods and services, as well as reduce waste, a source of emissions itself.

Governments, researchers and the manufacturing sector must cooperate to create the necessary policy settings, technology and infrastructure for a genuinely circular economy, and design products and supply chains to support re-use, recycling, and emissions reduction. These efforts can be greatly accelerated through collaboration internationally. A circular economy will reduce emissions and improve the sustainability of high-emitting sectors including health, infrastructure, and transport, observing the whole-of-supply chain, including for those products and services that we import and export.



3. Develop sustainable technologies and regulations for a resilient and net zero-emissions built environment.

Infrastructure and the built environment are major contributors to carbon emissions. Infrastructure is one of the most difficult-to-abate sectors globally. While new technologies for construction are being developed, the true level of emission production resulting from the built environment is unknown. A standardised carbon accounting framework must be developed and required for all built environment projects, with a whole-of-life carbon budget attached to each project. At the same time, the sector must develop and implement new construction technologies and design methods to reduce embodied and operational emissions.

4. Support electrification of the transport network and urgent development of emerging technologies to allow for net zero emissions land, sea, and air freight and travel.

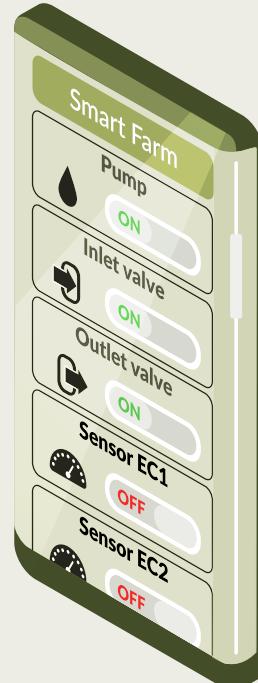
The introduction and uptake of electric vehicles is an important step in consumer emissions reduction. The introduction of fuel efficiency standards and establishing national standards for charging infrastructure are key; further action will be needed to increase uptake of electric vehicles and electrify public transport, and reduce emissions from freight transport.

Research and development for emissions-free transport must urgently prioritise heavy industry, ocean and air transport. This must include technological advancements in industrial processes that currently require fossil fuels due to the energy density required.



5. Grow research, development and implementation of technologies to support carbon-neutral primary industries including in the agricultural and minerals sectors.

Reaching net zero will only be possible with a technology-led approach, targeting difficult-to-abate emissions in the sectors that support the Australian population and economy. Agriculture and mineral resources are high-emitting sectors with the potential for significant reductions to carbon emissions. In agriculture, reductions could be achieved through feed additives, electrification of equipment, and offsetting through trees and soil carbon sequestration. In mineral resources, the focus should be on electrification and green hydrogen power for some aspects of processing, and the development of new lower-carbon processes. There is an opportunity for Australia to collaborate in the Asia-Pacific region to accelerate progress.



6. Protect the natural environment and reduce impacts of energy generation on biodiversity.

All energy sources have impacts on water and the environment. In the transition to renewable energy sources such as solar and wind, the effects of land use changes and large infrastructure on biodiversity must be accounted for and mitigated. Traditional Knowledge will be key to understanding effects on biodiversity and building sustainable approaches, and Aboriginal and Torres Strait Islander people must be consulted. Australia should strive to be a world leader in best-practice sustainable energy generation while protecting our environment.





References

Australian Academy of Technological Science and Engineering (ATSE) 2021, 'Australia's technology-led transition to net zero emissions', accessed from <[https://www.atse.org.au/research-and-policy/publications/publication/australias-technology-led-transition-to-netzero-emissions](https://www.atse.org.au/research-and-policy/publications/publication/australias-technology-led-transition-to-net-zero-emissions)>

CSIRO 2021, 'What are the sources of Australia's greenhouse gases?', accessed from <<https://www.csiro.au/en/research/environmental-impacts/climate-change/climate-change-qa/sources-of-ghg-gases>>

Intergovernmental Panel on Climate Change (IPCC) 2023, 'AR6 Synthesis Report: Climate Change 2023', accessed from <<https://www.ipcc.ch/report/sixth-assessment-report-cycle/>>



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