

Australia's technology-led transition to net zero emissions

The science of climate change is unequivocal, and we are already experiencing its impacts on the environment, industry, and everyday life. To avoid the worsening consequences of climate change, the world must take urgent action to reduce greenhouse gas emissions.

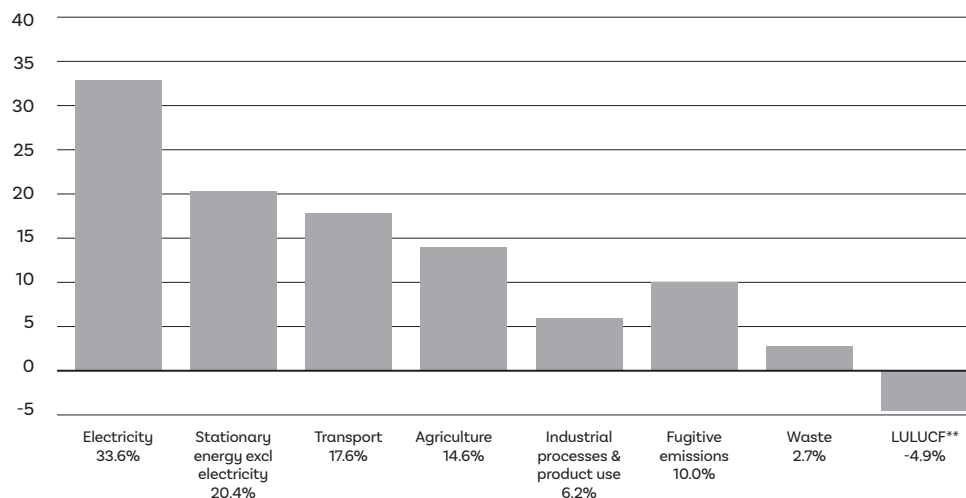
Having considered the scientific evidence, the Australian Academy of Technology and Engineering (ATSE) concludes that Australia should:

1. Commit to achieve net zero emissions* by 2050 at the latest, and set a more ambitious interim emissions target for 2030
2. Prioritise the immediate deployment of existing mature, low-carbon technologies which can make deep cuts to high-emitting sectors before 2030
3. Develop a national net zero emissions policy and implementation framework

Each of these positions is discussed further in this statement.

FIGURE 1 Australian emissions by sector for the year to December in 2020¹

SOURCE: Department of Industry, Science, Energy and Resources



* Net Zero Emissions refers to the accounting balance between a country's greenhouse gas emissions to the atmosphere and any 'negative emissions' - through natural or technological solutions - that remove greenhouse gases from the atmosphere.

** The land use, land use change and forestry (LULUCF) sector accounts for emissions sources and sinks sequestered in living biomass, debris and soils.

ATSE POSITION 1

The Australian Government should commit to achieve net zero emissions by 2050 at the latest, and set a more ambitious interim emissions target for 2030

Climate change is one of the most significant challenges facing the global community. Unequivocal scientific evidence shows that nations must achieve profound cuts to greenhouse gas (GHG) emissions to limit temperature rise to 2°C compared to pre-industrial levels.² If not, there will be significant impacts that will threaten biodiversity, ecosystem and human health, water resources, and food security that in turn have dire effects on all sectors of Australia's economy.^{2,3}

Recent evidence suggests the net amount of energy being absorbed by the planet has doubled over the last 15 years.⁴ This growing imbalance increases the likelihood of triggering climate change tipping points, from which we cannot return, and may exacerbate the risks of longer-term climate change.

The Paris Agreement* on climate change includes an explicit commitment to limiting global warming to well below 2°C, and genuinely working to limit the temperature increase to 1.5°C above pre-industrial levels, recognising that this would significantly reduce the risks and impacts of climate change. Recent evidence suggests that to meet either of these commitments, all countries will need to reduce GHG emissions at a much faster rate than they currently are.^{5,6}

As a signatory to the Paris Agreement, Australia has a nationally determined contribution (NDC)** to reduce emissions by 26-28 per cent by 2030, compared with 2005 figures.⁷ Australia's total emissions in 2020 were 499 Megatonnes (Mt).¹ While this is the lowest emissions recorded since before 1995, the 12 per cent reduction in emissions from the transport sector attributed to COVID-19 travel restrictions is largely responsible for this shift.¹ Non-COVID affected projections indicate Australia's emissions reductions are likely to be insufficient to meet commitments under the Paris Agreement.⁸

Many developed countries have already committed to reaching net zero emissions by 2050.⁹ All of Australia's states and territories have also made this commitment, as have the agriculture sector¹⁰ and many large and significant Australian and international businesses,¹¹ signalling strong support for a net zero emissions economy.^{12,13}

Australia must propose a new NDC at COP26 in November 2021, and ATSE urges the Australian Government to use the opportunity to outline a roadmap to net zero emissions by 2050, including clear and ambitious targets for emissions reduction in 2030 and 2040, policies and programs to facilitate the transition, and transparent accountability measures to measure progress.¹⁴

For example, a 50 per cent emissions reduction by 2030 would set a clear course for net zero emissions by 2050.¹⁵ This target is realistically achievable with resolve, based on technologies that are available today.

* The Paris Agreement is a legally binding international treaty on climate change that commits to limit global warming to well below 2 degrees, preferably at 1.5 degrees Celsius. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016.

** Nationally Determined Contributions (NDCs) are the emissions reduction efforts each country commits to in order to reduce their national emissions. The Paris Agreement (Article 4, paragraph 2) requires each country to update their NDCs every 5 years (i.e. 2021, 2025, 2030).

ATSE POSITION 2

Australia should prioritise the immediate deployment of existing mature, low-carbon technologies which can make deep cuts to high-emitting sectors before 2030.

To achieve net zero emissions by 2050 and deep cuts to emissions this decade, Australia must prioritise rapid deployment of mature low emissions technologies now to decarbonise high-emitting sectors like electricity, stationary energy* and transport (see Figure 1) as soon as possible.

Solar, wind and energy storage (batteries and pumped hydro)¹⁶, electrification of land transport¹⁷ and construction of energy efficient homes and buildings¹⁸ can play an important role in rapidly reducing emissions from high-emitting sectors this decade.¹⁹ There is also an opportunity to decarbonise the use of natural gas (to be used for firming to support renewable energy during the transition) through technologies such as carbon capture, utilisation and storage technology, or by blending hydrogen with natural gas, in the short to medium term this decade.¹⁸

* Stationary energy emissions are those arising from the consumption of fuels in the manufacturing, construction and commercial sectors, and in other sources like domestic heating.

ATSE POSITION 3

Australia should develop a national net zero policy and implementation framework

Australia has the potential to be amongst the world's leading nations in renewable energy generation, low-emission, and negative emission technologies.* Australia's industrial, research and innovation communities can leverage Australia's abundant renewable resources, critical mineral resources, and basic infrastructure as opportunities to develop, build and deploy low-emissions technologies as fast, or faster, than international competitors.¹⁶ Accordingly, Australia can achieve net zero emissions by 2050 while also creating new and sustainable industries, opportunities for skilled employment,^{20,21} and export growth.

While technology readiness, availability and emerging capability is not a limiting factor on Australia's ability to achieve a net zero emissions transition, such a rapid large-scale technology deployment will require very significant financial investment from government and industry. Financial mechanisms to support this investment are currently absent but are crucial to both secure industry investment and coordinate technology deployment across the country.

The Australian Government's Low Emissions Technology Investment Roadmap aims to coordinate investment in research and development and deployment of emerging low-emissions technology. However, support for the deployment of mature energy technologies is currently out of scope in the Roadmap, instead, it looks to industry to lead investment in deployment of these technologies.²²

Without Federal funding for mature technology deployment, or a national framework to guide industry-funded deployment of technology, it will be much more difficult to realise the full potential of both mature and emerging renewable energy and low-emissions technologies.

The International Energy Agency's (IEA) recent report on global pathways to net zero emissions by 2050 calls for governments to provide credible plans to reach their net zero goals.¹⁸ These plans help to build confidence in investors, industry, citizens, and nations to work together to avoid a global temperature rise above 2°C. A national net zero policy and implementation framework will provide certainty for industry and research organisations and guide this technology-led transition, and outline how industry and communities will be supported to make the transition.

Australia's transition to net zero emissions will impact all sectors of the economy, communities and individuals. It will disrupt some existing industries and have implications for elements of Australia's workforce. However, increasing investment in low-emissions technologies will also create new industries and generate a substantial social, health, economic and workforce opportunities.²³

Planning and coordinating the transition to net zero should include in-depth engagement, consultation, and outreach to ensure community understanding and support. All sectors should also be included when creating national frameworks to reduce their emissions. Engagement should be open, transparent, and two-way, to allow individuals, sectors, and communities to contribute and ensure that Australia's more vulnerable citizens are not left behind.²³

ATSE will continue to work with government, industry, research organisations and other Academies to support Australia's transition to net zero emissions.

* Negative emissions technologies are decarbonisation technologies that permanently remove GHGs from the atmosphere.

1. Department of Industry, Science, Energy and Resources (2020). Quarterly Update of Australia's National Greenhouse Gas Inventory: December 2020, Australian Government Department of Industry, Science, Energy and Resources. <https://www.industry.gov.au/sites/default/files/2021-05/nggi-quarterly-update-december-2020.pdf>
2. International Panel on Climate Change (IPCC) (2021): Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. In Press. <https://www.ipcc.ch/report/ar6/wg1/#FullReport>
3. Australian Academy of Science (2021). The risks to Australia of a 3°C warmer world. <https://www.science.org.au/warmerworld>
4. Loeb NG, Johnson GC, Thorson TJ, Lyman JM, Rose FG, & Kato S. (2021). Satellite and Ocean Data Reveal Marked Increase in Earth's Heating Rate. *Geo Phys Let.* DOI: 10.1029/2021GL093047.
5. Climate Targets Panel (2021). Shifting the burden: Australia's emissions reduction tasks over the coming decades. <https://www.climatecollege.unimelb.edu.au/australias-paris-agreement-pathways>
6. Sachs J, Traub-Schmit G, Kroll C, Lafortune G, and Fuller, G. (2021). The Decade of Action for the Sustainable Development Goals. Sustainable Development Report 2021. Cambridge: Cambridge University Press. DOI: 10.1017/9781009106559
7. United Nations Framework Convention on Climate Change (2015). The Paris Agreement. https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf
8. Australian Academy of Technology and Engineering (2020). Australia's Emissions Targets – Are we on track? <https://www.atse.org.au/research-and-policy/publications/publication/australias-emissions-targets-are-we-on-track/>
9. UN Climate Action (Accessed 4th June 2021). Net Zero Coalition. <https://www.un.org/en/climatechange/net-zero-coalition>
10. National Farmers Federation (2020). Climate Change Policy. <https://nff.org.au/key-issue/climate-change/>
11. United Nations Framework Convention on Climate Change. Press release (21 September 2020). Commitments to net zero double in less than a year. <https://unfccc.int/news/commitments-to-net-zero-double-in-less-than-a-year>
12. Net Zero Managers Initiative (Accessed 4th June 2021). <https://www.netzeroassetmanagers.org>
13. Council of Small Business Organisations Australia (2021). Earth Day 2021: COSBOA releases climate change policy. <https://www.cosboa.org.au/post/earth-day-2021-cosboa-releases-climate-change-policy>
14. European Council (13 June, 2021), 2021 G7 Leaders' communique: Our shared agenda for global action to build back better. <https://www.consilium.europa.eu/en/press/press-releases/2021/06/13/2021-g7-leaders-communique/>
15. Climate Targets Panel (2021). Shifting the burden: Australia's emissions reduction tasks over coming decades. <https://www.climatecollege.unimelb.edu.au/australias-paris-agreement-pathways>
16. Lu B, Blakers A, Stocks M, Cheng C, & Nadolny A. (2020). A zero-carbon, reliable and affordable energy future in Australia, *Energy*, Volume 220. <https://doi.org/10.1016/j.energy.2020.119678>
17. AEMO on behalf of the DEIP EV Data Availability Taskforce (2021). Distributed Energy Integration Program – Electric Vehicles Grid Integration, https://aemo.com.au/-/media/files/stakeholder_consultation/working_groups/der-program/deip-ev/2021/deip-ev-data-availability-taskforce-report.pdf?la=en&hash=94970D539F74BE8D46AE24F46D4F2479
18. International Energy Agency (2021). Net Zero by 2050: A roadmap for the global energy sector. <https://www.iea.org/reports/net-zero-by-2050>
19. Campey T, Bruce S, Yankos T, Hayward J, Graham P, Reedman L, Brinsmead T, & Deverell J. (2017). Low Emissions Technology Roadmap, CSIRO. <https://www.csiro.au/en/work-with-us/services/consultancy-strategic-advice-services/csiro-futures/futures-reports/low-emissions-technology-roadmap>
20. Alphabet (2020). Clean Jobs Plan, https://www.climatecouncil.org.au/wp-content/uploads/2020/07/Climate-Council_AlphaBeta-Clean-Jobs-Plan-200720.pdf
21. Deloitte Access Economics (November 2020). A New Choice, Australia's Climate for Growth, <https://www2.deloitte.com/content/dam/Deloitte/au/Documents/Economics/deloitte-au-dae-new-choice-climate-growth-051120.pdf?nc=1>
22. Department of Industry, Science, Energy and Resources (2020). Technology Investment Roadmap: First Low Emissions Technology Statement, <https://www.industry.gov.au/sites/default/files/September%202020/document/first-low-emissions-technology-statement-2020.pdf>
23. Australian Academy of Social Science (2021). Australian action needed to address climate change. <https://socialsciences.org.au/publications/statement-on-australian-action-needed-to-address-climate-change/>

The Australian Academy of Technology and Engineering is a Learned Academy of independent experts helping Australians understand and use technology to solve complex problems.

Bringing together Australia's leading thinkers in applied science, technology and engineering, the Academy provides impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.