SUBMISSION

Submission to the Climate Change Authority

# Submission to Setting, tracking and achieving Australia's emissions reduction targets

30 June 2023

**The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology and engineering, ATSE provides impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.**

Australia has committed to reducing greenhouse gas emissions to 43% below 2005 levels by 2030 and achieving net zero by 2050. Current commitments are still incompatible with limiting global warming to 1.5 degrees Celsius this century and should be considered a minimum cut to meet our Paris Agreement obligations with deeper cuts in emissions urgently needed.

To surpass current commitments, Australia must embrace technology-led decarbonisation targeting our highest-emitting sectors. This will require concerted efforts across Federal and state governments to make deep cuts in the highest emitting sectors of the Australian economy. ATSE recommends the following to the Climate Change Authority to inform its advice on setting, tracking and achieving emissions reductions targets:

**Recommendation 1**: Set a more ambitious emission reduction target for 2035 in line with limiting global warming to 1.5 degrees, with yearly transparent public reports on progress to this target.

**Recommendation 2:** Support and boost funding for targeted research development and demonstration of low and negative-emission technologies.

**Recommendation 3:** Create and apply a regulatory framework for appropriate emissions monitoring and verification requirements.

**Recommendation 4:** Identify and assist in the execution of initiatives to minimise sectoral emissions.

**Recommendation 5:** Prioritise inclusive stakeholder engagement and public participation when developing climate policy to identify and address adverse social impacts.

**Recommendation 6:** Embrace the use of open data, and sophisticated analytics tools, in planning for, tracking and assessing emissions reduction.

**Recommendation 7:** Establish a national skills taxonomy to facilitate consistent communication regarding workforce needs required by the clean energy sector.

## Deploying technological solutions to reducing emissions

Climate change due to human activity is causing extreme weather patterns which will continue to exacerbate and become less predictable. Extreme and volatile weather patterns cause events that result in infrastructure and societal upheaval, uninhabitable conditions and economic loss. According to a cost-benefit analysis conducted by the University of Melbourne, the potential cost of climate change damage to Australia, based on current global emissions patterns, could reach $762 billion by 2050 (Kompas et al. 2019). If temperatures rise above 1.5°C for an extended period of time, Australia's vital ecosystems, such as the Great Barrier Reef, will be severely harmed (Climate Council 2021). Every fraction of a degree of temperature rise is significant and we must reduce emissions deeply and swiftly.

Australia possesses strong research capacity in the technologies required to achieve net zero. ATSE has released an explainer on the state of low-emissions technology in Australia which recommended a portfolio of low-emissions technologies that act in concert, supported by a clear research agenda and policy framework to provide an environment for industry to act with confidence (Australian Academy of Technological Sciences and Engineering 2022a). A recent analysis also found that deploying negative emissions technologies (NETs) such as those that involve absorption of carbon emission at low concentrations from the atmosphere could be a cost-effective and less disruptive supplement while working to reduce hard-to-abate emissions, especially in the agricultural and land-use sectors, as well as some aspects of the transportation sector (National Academies of Sciences 2019).

Australia's research and development capacity in low-emission technologies and NETs has developed in spite of modest public investment. Australia's public funding for energy-related research, development &

demonstration per gross domestic product (GDP), as collected by the International Energy Agency (IEA), was 0.019% of GDP in 2021. This is below the IEA average of 0.039% (International Energy Agency 2023).

Demonstrating that a particular climate technology can function effectively is one of the crucial factors that can facilitate scaling up. Currently, the financial investment needed for demonstrating and supporting mature climate technologies at early stages is substantial. For example, the production cost of green hydrogen remains approximately three times higher than that of grey hydrogen, which is derived from natural gas through steam reforming (International Energy Agency 2023). To achieve significant cost reductions and encourage rapid deployment, it is imperative to focus on substantial improvements through research and development initiatives and financially support large-scale demonstration projects.

**Recommendation 1**: Set a more ambitious emission reduction target for 2035 in line with limiting global warming to 1.5 degrees, with yearly transparent public reports on progress to this target.

**Recommendation 2:** Support and boost funding for targeted research development and demonstration of low and negative-emission technologies.

## Accounting and regulating greenhouse gas (GHG) emissions

According to the leading GHG Protocol corporate standard, a company's greenhouse gas emissions are classified into three scopes. Scope 1 covers emissions from sources that an organisation owns or controls directly while Scope 2 are emissions that a company causes indirectly and come from where the energy it purchases and uses is produced. Scope 3 emissions are voluntary and the hardest to monitor while Scope 1 and 2 are mandatory to report (Greenhouse Gas Protocol 2019).

Scope 3 emissions are the result of activities from assets not owned or controlled by the reporting organisation, but that the organisation indirectly affects in its value chain. The Rocky Mountain Institute reported that globally the average company's supply-chain greenhouse gas emissions are 5.5 times higher than the direct emissions from its own assets and operations (Cannon et al. 2020). Any effective system of GHG accounting, therefore, needs to accurately measure each company's supply-chain carbon impacts, providing visibility and incentives for it to make more climate-friendly product-specification and purchasing decisions. Measuring these emissions needs to be supplemented by a regulatory framework that disincentivises bad actors.

The successful implementation of the Safeguard Mechanism Reforms[1] and the implementation of the national renewable electricity target along with the announced funding and policies, such as the Powering the Regions Fund, the National Electric Vehicle Strategy and the National Reconstruction Fund are essential steps for Australia to achieve its emission reduction goals and the broader climate goals. ATSE advocates that a whole-of-life greenhouse gas budget and an accounting framework should be developed and required for all infrastructure projects. This will provide a mechanism to accurately account for and limit emissions, driving innovation including in materials to reduce embodied emissions.

**Recommendation 3:** Create and apply a regulatory framework for appropriate emissions monitoring and verification requirements.

## Taking a sectoral approach to reduce emissions

Fossil fuels, the agricultural sector, and the production of cement are currently some of the most dominant anthropogenic sources of carbon dioxide in the atmosphere (Australian Academy of Technological Sciences and Engineering 2023a). Opportunities to support sectors to reduce emissions include shifting to renewable

[1] ATSE made a submission to the Department of Climate Change, Energy, the Environment and Water's consultation on reforms to the Safeguard Mechanism to assist industry to reduce greenhouse gas emissions, to meet Australia's commitment to net zero emissions by 2050 .

energy, improving energy efficiency, and using technologies that support carbon capture and storage. Specific opportunities include:

- The ***Energy*** sector's commitment to clean energy has resulted in the considerable efforts currently underway to transition to renewable energy and cut emissions from the energy sector. To reduce emissions from energy even further, research and development and investment are required in deploying renewable energy infrastructure including batteries and other forms of storage.
- The ***Healthcare*** sector can be supported by procurement, waste processing, and preventative healthcare (to reduce demand for healthcare for complicated problems). The Government could establish tax incentives for the procurement of environmentally friendly products and create procurement guidelines for the public healthcare sector.
- The ***Agriculture*** sector can reduce its total emissions by implementing promising feed additives to reduce methane emissions. Agriculture also presents opportunities to offset carbon emission, including through soil carbon sequestration[2] (Australian Academy of Technological Sciences and Engineering 2021).
- The ***Transportation*** sector has the potential to rapidly reduced emissions in passenger transport, public transport, and possibly freight transport by shifting to electric-powered vehicles. The National Electric Vehicle Strategy provides initial steps to reduce emissions. In the future, the Government should also build regulatory support for the second-hand electric vehicle market, improve charging infrastructure and optimise its usage to ensure a reliable electricity supply (Australian Academy of Technological Sciences and Engineering 2022b).
- The ***Minerals*** industry is critical to Australia's future renewable energy industry. Further research is needed to overcome engineering challenges and increase the capability for using electricity in the mining process and the development of alternative hydrometallurgical processes across a range of carbon-intensive metals currently produced using pyrometallurgy.
- ***Water and the Environment*** is another important sector for the transition into a sustainable economy. Implementing circular economy approaches would be crucial to reduce stresses caused to water resources[3] (Australian Academy of Technological Sciences and Engineering 2020).

Given the scale of the sectoral transformation required to address climate and environmental challenges, the Government must engage in extensive stakeholder dialogue and prioritise citizen participation. Building and maintaining public support for climate policies is essential for ensuring the resilience of the net zero transition. The Federal Government should specifically address inequalities and transitory potential economic hardships that may arise from the implementation of any policies.

**Recommendation 4:** Identify and assist in the execution of initiatives to minimise sectoral emissions.

**Recommendation 5:** Prioritise inclusive stakeholder engagement and public participation when developing climate policy to identify and address adverse social impacts.

## Harnessing digital technologies to reduce emissions

Digital technologies like artificial intelligence will play a critical role in reducing emissions. The strength of AI lies in its ability to learn by experience, collecting massive amounts of data from its environment, intuiting connections that humans fail to notice, and recommending appropriate actions on the basis of its conclusions. AI can analyse vast amounts of data from sensors, weather forecasts, and other sources to optimise the performance of renewable energy systems. For example, it can predict wind patterns and adjust the pitch of wind turbine blades to maximize energy production. AI technologies can also be used by companies to optimise their supply chain operations and emission intensity by forecasting their demand or supply patterns and identifying potential supply chain disruptions. This would help them optimise their

[2] *ATSE has published an explainer on Australia's soil carbon opportunities and risks. The report can be read here.*

[3] *In 2020, the ATSE examined Australia's potential to create a circular economy, or an economic system aimed at eliminating waste and the continual use of resources. The report can be read here.*

energy consumption as well and identify opportunities for efficiency improvements. However, it is important to note and take into account that AI itself emits carbon due to the energy and hardware it requires.

Open data can also improve carbon emission transparency in the supply chain. By providing insights into the carbon emission of different suppliers, open data can help businesses make more informed decisions and identify the most environmentally friendly suppliers. This information is essential to calculate the carbon footprint of a product and create its carbon profile. Ultimately, carbon profiling and the use of open data, combined with sophisticated analytics, can support businesses develop more accurate carbon reduction strategies.

**Recommendation 6:** Embrace the use of open data, and sophisticated analytics tools, in planning for, tracking and assessing emissions reduction.

## Achieving a skilled workforce to help achieve emission reduction targets

Australia's transition to a net zero economy will require the development of renewable energy infrastructure and the corresponding workforce to construct and operate it. It is crucial for Australia to ensure it has the necessary skilled workforce in the appropriate locations to facilitate the construction and utilisation of this energy infrastructure, along with the adoption of new energy technologies.

Currently, the Australian clean energy sector employs approximately 30,000 individuals engaged in large-scale renewable energy construction, operation, and maintenance (Clean Energy Council 2022). ATSE in its pre-budget submission urged a focus on building the Science, Technology, Engineering and Mathematics (STEM) sector of the future (Australian Academy of Technological Sciences and Engineering 2023b). For Australian innovation to thrive over the coming generations, we need to ensure that we have enough high-skilled workers who can rise to meet our future challenges. This must start early, in classrooms, to ensure our young people have access to the highest quality education possible. We must ensure that they are engaged and motivated to continue to learn and develop the skills necessary for success in our changing world.

There are already engineering and electrician workforce shortages, which threatens the progress of short- and medium-term projects to bring down emissions. To address these gaps and establish a pathway into the clean energy workforce, collaboration and coordination among governments, the education sector, and industry are paramount. In ATSE's Our STEM Skilled Future report, the importance of establishing a National Skills Taxonomy was highlighted (Australian Academy of Technological Sciences and Engineering 2022c). This taxonomy would facilitate consistent communication regarding workforce needs and pathways among various organizations and individuals in Australia, enabling better utilisation of our current skilled workforce.

**Recommendation 7:** Establish a national skills taxonomy to facilitate consistent communication regarding workforce needs required by the clean energy sector.

*ATSE thanks the Climate Change Authority for the opportunity to respond to the Issues Paper. For further information, please contact academypolicyteam@atse.org.au.*

Level 2, 28 National Circuit
Forrest ACT 2603
Australia

PO Box 4776
Kingston ACT 2604
Australia

+61 2 6185 3240
info@atse.org.au
atse.org.au

ABN 58 008 520 394
ACN 008 520 394

Australian Academy of Technological Sciences & Engineering

## References

Australian Academy of Technological Sciences and Engineering (2020) *Towards a Waste Free Future*, https://www.atse.org.au/research-and-policy/policy-priorities/helping-australia-get-technology-ready/waste-and-resource-recovery-report/#:~:text=In%202020%2C%20the%20Australian%20Academy,the%20continual%20use%20of%20resources., accessed 21 October 2022.

Australian Academy of Technological Sciences and Engineering (2021) *Australia's soil carbon opportunities and risks*, https://www.atse.org.au/research-and-policy/publications/publication/australias-soil-carbon-opportunities-and-risks/, accessed 26 June 2023.

Australian Academy of Technological Sciences and Engineering (2022a) *Here and now: The state of low emissions technology in Australia*, https://www.atse.org.au/news-and-events/article/here-and-now-the-state-of-low-emissions-technology-in-australia/, accessed 21 June 2023.

Australian Academy of Technological Sciences and Engineering (2022b) *ATSE Submission on National Electric Vehicle Strategy*, https://www.atse.org.au/research-and-policy/publications/publication/atse-submission-on-national-electric-vehicle-strategy/, accessed 26 June 2023.

Australian Academy of Technological Sciences and Engineering (2022c) *Our STEM skilled future — An education roadmap for an innovative workforce*, https://www.atse.org.au/research-and-policy/publications/publication/our-stem-skilled-future-an-education-roadmap-for-an-innovative-workforce/, accessed 16 February 2023.

Australian Academy of Technological Sciences and Engineering (2023a) *Submission to the Safeguard Mechanism Reform consultation on proposed design*, https://www.atse.org.au/research-and-policy/publications/publication/submission-to-the-safeguard-mechanism-reform-consultation-on-proposed-design/, accessed 24 June 2023.

Australian Academy of Technological Sciences and Engineering (2023b) *Pre-Budget Submission to the Treasury*, https://www.atse.org.au/wp-content/uploads/2023/01/ATSE-SUB-230127-Pre-budget-submission.pdf, accessed 26 June 2023.

Cannon C, Greene S, Blank TK, Lee J and Natali P (2020) *The Next Frontier of Carbon Accounting*, https://rmi.org/insight/the-next-frontier-of-carbon-accounting/, accessed 21 June 2023.

Clean Energy Council (2022) *Clean energy Australia report 2022*, https://apo.org.au/sites/default/files/resource-files/2022-04/apo-nid317318.pdf, accessed 2 December 2022.

Climate Council (2021) *Aim High, Go Fast: Why Emissions Need to Plummet this Decade*, https://www.climatecouncil.org.au/resources/net-zero-emissions-plummet-decade/, accessed 27 June 2023.

Greenhouse Gas Protocol (2019) *GHG Protocol Corporate Standard*, https://ghgprotocol.org/sites/default/files/standards_supporting/FAQ.pdf, accessed 21 June 2023.

International Energy Agency (2023) *Australia 2023 Energy Policy Review*, https://iea.blob.core.windows.net/assets/02a7a120-564b-4057-ac6d-cf21587a30d9/Australia2023EnergyPolicyReview.pdf, accessed 21 June 2023.

Kompas T, Witte E and Keegan M (2019) *Australia's Clean Energy Future: Costs and Benefits*, https://sustainable.unimelb.edu.au/__data/assets/pdf_file/0012/3087786/Australias_Clean_Economy_MSSI_Issues_Paper12.pdf, accessed 21 June 2023.

National Academies of Sciences E and M (2019) *Negative Emissions Technologies and Reliable Sequestration*, National Academies Press, Washington, D.C., doi:10.17226/25259.

Level 2, 28 National Circuit
Forrest ACT 2603
Australia

PO Box 4776
Kingston ACT 2604
Australia

+61 2 6185 3240
info@atse.org.au
atse.org.au

ABN 58 008 520 394
ACN 008 520 394

Australian Academy of Technological Sciences & Engineering