

Submission to the Australian Government Department of
Industry, Science, Energy and Resources

ATSE submission to the Low Emissions Technology Statement 2022 consultation

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ATSE SUBMISSION TO THE LOW EMISSIONS TECHNOLOGY STATEMENT 2022 CONSULTATION

The Australian Academy of Technology and Engineering (ATSE) is a Learned Academy of around 900 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.

ATSE welcomes the opportunity to provide a submission to the 2022 Low Emissions Technology Statement (LETS), highlighting areas for Government prioritisation to enable Australia to reduce its carbon emissions.

ATSE welcomes the Government's commitment to net zero emissions by 2050 and believes that this transition must be technology-led. Based on the unequivocal scientific evidence for climate change, [ATSE also recommends setting a more ambitious interim emissions target by 2030](#) and prioritising the immediate deployment of existing low-carbon technologies to reduce emissions by that date¹. The LETS is an opportunity to lead Australia to a decarbonised economy using a combination of comparative advantages, private sector innovation and ongoing Government funding and policy and program support.

Key recommendations

1. Implement an additional filter for *likelihood of technology reaching maturity by 2030*
2. A rapid transition to renewable energy, with solar and wind leading the way.
4. Prioritise energy storage for additional investment
5. Continue to invest in curiosity-driven research
6. Ongoing investment in future skilled workforce via programs that develop STEM literacy and skills from school level through to careers
7. Shift the regulatory environment from incentivising fossil fuel usage to incentivising renewable energy uptake

Prioritising key technologies to reduce emissions

As previously noted by ATSE, a limitation of the Roadmap is that it does not include Government support for the deployment of mature technologies². With the recent commitment to net zero by 2050, an update to the LETS provides an opportunity to amend this. It is crucial to rapidly reduce emissions this decade from high-emitting industries by swiftly adopting mature technologies at a large scale. Key mature technologies for the 2022 LETS to prioritise include solar and wind electricity generation, energy storage, electric vehicles, while exploring the viability of emerging fields including clean hydrogen and carbon capture, utilisation, and storage (CCUS).

¹ ATSE 2021, 'Australia's technology-led transition to net zero emissions', accessed from <<https://www.atse.org.au/wp-content/uploads/2021/09/POS-NetZero-PS10-210823.pdf>>

² ATSE 2021, 'Australia's technology-led transition to net zero emissions', accessed from <<https://www.atse.org.au/wp-content/uploads/2021/09/POS-NetZero-PS10-210823.pdf>>

Currently, technology priorities are selected in LETS through four filters: abatement potential, economic benefit, comparative advantage, and responsiveness to Government investment. **ATSE recommends that an additional filter for likelihood of technology reaching maturity by 2030 be implemented.** That is, the technology should be commercially available and capable of being economically competitive. This additional filter will strengthen the Roadmap's approach to public investment being most impactful for technologies where Australia is, or can be, a world leader in development, manufacturing and/or exporting. It will also focus the roadmap on investment which will result in the necessary advances to substantially reduce emissions in the coming decades.

The approach must also consider international collaborations to progress technological development, as a coordinated global approach is necessary to achieve net zero emissions³. Such collaboration is critical for technologies to create a net global reduction in emissions – rather than creating lower domestic emissions with higher emissions for overseas trading partners.

Solar and wind electricity generation

In the 2021 LETS, solar was identified as a new priority with the Solar 30 30 30⁴ initiative designed to lower the cost of solar, providing cheap and renewable electricity to power other emerging low-carbon industries. **ATSE recommends a rapid transition to renewable energy, with solar and wind leading the way.** ATSE endorses the inclusion of solar in the 2021 LETS and recommends this focus be maintained in the 2022 LETS.

Green hydrogen

Hydrogen uptake needs public investment to become scalable and economical. If it is found to be viable, its uptake could potentially follow a similar trajectory to that of wind and solar electricity.

As highlighted by the National Hydrogen Strategy, Australia is well-placed to establish green hydrogen as a key export industry⁵. For hydrogen exports, the areas of focus include production, storage, and transport; with advances required to do each at scale and safely. **ATSE suggests that LETS 2022 considers each area separately and determines the likelihood of Australia becoming a global leader in each.** International collaborations, like those in place with Japan and Germany, will be required to lean on respective strengths and develop clean hydrogen into a scalable and economical solution.

Hydrogen can also be widely used in the domestic market, including for electricity generation, injection into natural gas, as a transport fuel, as heat production, and feedstock for chemicals and fertiliser. To facilitate these applications, improvements are required for at-scale production, storage, distribution and supply to customers. The establishment of hydrogen hubs, as outlined in the National Hydrogen Strategy, will co-locate production and storage with demand.

There is an opportunity to use planning of hubs as an additional mechanism to reduce emissions by modelling the impact of population and economic decentralisation.

Energy storage

Affordable and scalable energy storage (such as batteries and pumped hydro) is essential to efforts to rapidly reduce emissions before 2030 while maintaining reliable electricity supply. LETS 2021

³ Huang, WL, and Li, J 2021, 'Optimizing the Roadmap to Carbon Neutrality with a New Paradigm', Engineering, accessed from <<https://doi.org/10.1016/j.eng.2021.09.005>>

⁴ ARENA 2021, 'Investing in Australia's net zero future', accessed from <<https://arena.gov.au/blog/investing-in-australias-net-zero-future/>>

⁵ COAG Energy Council 2019, 'Australia's National Hydrogen Strategy', accessed from <<https://www.industry.gov.au/sites/default/files/2019-11/australias-national-hydrogen-strategy.pdf>>

identifies a cost reduction of energy storage to under \$100 per MWh as a stretch goal by 2025, and longer-duration ‘deep storage’ was earmarked for further exploration in the coming LETS 2022. As energy storage at a large scale is fundamental for reducing emissions, **ATSE recommends the prioritisation of energy storage as an area for additional investment in LETS 2022.**

Electric vehicles

Greater uptake of electric vehicles is key to reducing carbon emissions in the transport sector. There are opportunities for not only passenger vehicles but also public transport, logistics transportation, agricultural machinery such as tractors, construction machinery, and specialised mining vehicles.

As advocated in ATSE’s submission to the Roadmap⁶, the Government should **implement comprehensive policies to encourage rapid and widespread uptake of low-emission and zero-emission vehicles and investigate options to reduce emissions for aviation and shipping.**

Carbon capture, utilisation, and storage (CCUS)

In addition to preventing carbon emissions, CCUS can be employed to reduce emissions, particularly for industries where reductions are otherwise challenging. Scaling up CCUS is fundamental to the success of other priority technologies, for example to reduce emissions from brown hydrogen production. CCS is identified by LETS 2021 as a stretch goal, with expected deployment as early as 2025 – despite its economic viability presently being unclear. Due to the breadth of CCUS options, it is essential for the 2022 LETS to explore which areas to target, determining areas of investment priority based on the filters including Australia’s ability to be a global leader in this area.

Exploring nuclear energy

LETS 2021 identifies that small modular reactors (SMRs) could become an option in the future if there is bipartisan support to lift the legislative ban against nuclear energy.

ATSE’s view is that there should be a national dialogue about nuclear energy, rather than it being dismissed due to a legislative ban. ATSE recognises that nuclear energy can only be pursued with community consent⁷, and that any market activity should take place within clearly defined regulatory parameters, but it needs consideration as part of the energy mix. The risks of nuclear energy should be considered against the health and environmental costs of fossil fuels.

In LETS 2022, there is an opportunity to lay the groundwork for opening the discussion and educating Australians on nuclear power, particularly SMRs.

Enabling ongoing innovation with curiosity-driven research

Curiosity-driven research facilitates the future growth of technological advances, yet practical applications are rarely envisaged at the outset. Yet it is the outcomes of curiosity-driven research that will make the final 15% reduction in carbon emissions as outlined in the Government’s roadmap. To provide the preconditions for continued innovations to reach the 2050 net zero commitment, **ongoing and stable funding for curiosity-driven research is required, outside of the technology priorities.**

⁶ ATSE 2020, ‘Technology Investment Roadmap Discussion Paper’, accessed from <<https://www.atse.org.au/research-and-policy/publications/publication/technology-investment-roadmap-discussion-paper/>>

⁷ ATSE 2019, ‘Inquiry into prerequisites for nuclear energy in Australia’, accessed from <<https://www.atse.org.au/wp-content/uploads/2019/09/Inquiry-into-the-prerequisites-for-nuclear-energy.pdf>>

This strategy also plays to Australia's strengths with a highly trained research workforce and a breadth of industry and research institutes. Renewed public investment in curiosity-driven research would also provide an opportunity for the nation to benefit from any future profits of these developments.

Preparing the skilled STEM workforce

A highly skilled STEM workforce is critical to the technology development and deployment outcomes sought by the Roadmap. The 2021 LETS notes that skilled workers are one of Australia's strengths. In keeping with the Roadmap's ethos of leaning on Australia's existing advantages, there is an opportunity to leverage and build upon our strong education and training system to meet the human resource needs of a decarbonising economy. By upskilling Australians in STEM, the Government can attract co-investment from its own citizens as they form the workforce needed to support innovation and emerging low-emissions industries. Furthermore, targeted retraining programs should be developed for people currently working in coal production to support their transition into other jobs, preferably in emerging industries.

ATSE recommends ongoing investment in programs that develop STEM literacy and skills from school level through to specialised training at the tertiary level. This approach is exemplified by ATSE's flagship programs: CS in Schools, STELR and the Industry Mentoring Network in STEM (IMNIS) initiative.

A policy-led approach

The Roadmap seeks to drive down the cost of low-emissions alternatives to cost parity with existing high emissions technologies, so they become competitive options in the free market. However, in the absence of a true free market due to fossil fuel subsidies – priced at \$10.3 Billion in the 2020-21 financial year⁸ – a different, evidence-informed, policy-led approach is needed. When determining cost comparisons, future economic losses due to climate change must also be accounted for – Deloitte Access Economics determined that, if climate change is not addressed, the Australian economy will shrink by 6%, with 880,00 fewer jobs, by 2070⁹. **The regulatory environment must shift from incentivising fossil fuel usage to incentivising renewable energy uptake.**

⁸The Australia Institute 2021, 'Australian fossil fuel subsidies hit \$10.3 billion in 2020-21', accessed from <<https://australiainstitute.org.au/post/australian-fossil-fuel-subsidies-hit-10-3-billion-in-2020-21/>>

⁹Deloitte Access Economics 2020, 'A new choice: Australia's climate for growth', accessed from <<https://www2.deloitte.com/content/dam/Deloitte/au/Documents/Economics/deloitte-au-dae-new-choice-climate-growth-051120.pdf?nc=1>>