Renewable Diesel

Position Paper

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AUSTRALIAN CONSTRUCTORS ASSOCIATION

Brisbane: New Performing Arts Venue

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At a glance

- Australia's net zero ambitions cannot be achieved without decarbonising construction.
- Construction is a 'hard to abate' sector. Electrification is the preferred decarbonisation pathway, but technology constraints mean this will not be available in the short to medium term.
- We need to rapidly adopt low carbon liquid fuels to bridge the gap until electric options mature.
- Renewable diesel is a critical transition fuel for the construction industry as it enables necessary emission reductions in the short term without modifications to existing machinery.
- There is currently no domestic renewable diesel production in Australia. This reflects a policy vacuum that lags other countries significantly.
- Importing renewable diesel is cost prohibitive relative to mineral diesel, making adoption a competitive disadvantage. The lack of a cost-competitive domestic supply of renewable diesel is a significant constraint on the scope for decarbonising construction.
- Direct government policy intervention is needed to provide critical market signals to rapidly accelerate both the supply and demand for renewable diesel in Australia.
- A domestic renewable diesel industry would have a range of additional benefits beyond construction decarbonisation, including lower air pollutants and better air quality, energy security, local employment and economic growth from both feedstock and refining.
- ACA calls on the Australian Government to lead the development of a low carbon liquid fuel policy. This could take the form of a National Renewable Diesel Roadmap that charts a course for a sustainable domestic renewable diesel industry.

The burning platform

According to the latest stocktake from the international research alliance, Net Zero Tracker, most large economies and emitters now have some variation of a net zero target.[1] More than 70 countries have enshrined their targets in legislation or official policy.

While the world has largely accepted climate science, the much more difficult work of delivering on these commitments remains underdeveloped. A recent UN report finds a significant gap between countries' pledges and the actual trajectory of global emissions. It concludes that emissions must be cut by 43 per cent by 2030 and 60 per cent by 2035 to stop climate change at safe levels.[2]

The scale of this challenge for industries such as construction, mining, transport, agriculture and maritime cannot be underestimated.

Global emission reduction targets imply a widespread turnover of the capital stock. It is likely that fossil fueled internal combustion engine (ICE) equipment in some sectors will still be in operation and reach their end of life after 2050. This presents clear challenges for the achievement of net zero targets. A successful transition will require pathways that decarbonise existing fleets.

The construction industry sits at the very centre of this policy challenge.

The combustion of liquid fossil fuels in construction machinery and equipment is a significant contributor to the industry's carbon footprint, which represents 23 per cent of global emissions. In 2019-20, the Australian construction industry consumed 3,250 megalitres of mineral diesel, representing nearly eight megatonnes of carbon dioxide emissions.[3]

This heavy dependence on fossil fuels means global emission targets will simply be unachievable without substantial decarbonisation of the construction industry.

HVO deployment on Macintyre Wind Farm

Reviewing the options

There are relatively few pathways to decarbonising onsite construction activities and transitioning to fossil fuel free machinery and equipment.

Electrification

Electrification is the most likely pathway for many industries. It is achieved by replacing ICEs with either wired or battery powered electric motors. Wired machines are well-suited to applications where the plant is relatively fixed in location, such as tower cranes, while battery electric technology is better suited to mobile plant and equipment, such as excavators.

Electrification is one of the few pathways to achieving a truly zero emission construction site. These technologies do not produce any greenhouse gases. However, the full zero emission benefits of electrification are only realised where the electricity is supplied by renewable sources. The Federal Government's current policy intent is to achieve 82% renewable penetration in the national grid by 2030,[4] a significant increase from the current level of 18.96%[5] This reduction in the carbon intensity of the national grid will support the decarbonisation of industries that can electrify their equipment.

While electric machinery has obvious benefits, their adoption faces two key constraints: the state of technology and the capacity of the national electricity grid. The energy demands of some construction machinery, together with limitations in local electricity supply and battery technology, means that complete electrification is not currently feasible at scale. And while technology continues to evolve, some construction machinery is not expected to be electrified until after 2050, if at all.[6] Only 40 per cent of construction machinery (by energy use) is expected to be suitable for electrification by 2030, with 60 per cent electrification available by 2040.[7] The time constraints on the net zero transition mean the switchover of many assets will need to occur before the end of their useful lives.

The capacity of the national electricity grid is another key constraint on electrification. A typical tower crane consumes an estimated 10,140 kWh/year – a significant grid-loading that is already difficult for city infrastructure to supply.[8] An expansion of peak loads arising from widespread electrification means that temporary on-site energy storage is likely to be needed for construction projects as the national grid is expanded.

All things considered, electrification is the most promising long-term path to decarbonising construction equipment but complete penetration faces significant short-to-medium term barriers.

Hydrogen

Hydrogen technology, particularly of the 'green' and 'blue' varieties, is gaining interest as an alternative low-carbon fuel source.[9] There is the potential for hydrogen technology to be applied to construction equipment as both hydrogen-fueled ICEs and hydrogen fuel cells. Several equipment manufacturers have developed prototypes for hydrogen powered construction machinery, including hydrogen fuel cell generators to replace diesel generators.

Nevertheless, the cost effectiveness and practicalities of hydrogen-powered machinery for large-scale deployment remains speculative. The primary barrier to rapid adoption is the lack of infrastructure required for clean hydrogen generation, distribution and storage. The outlook for clean hydrogen availability is very limited in the short-to-medium term.

It is not possible to retrofit legacy diesel ICE machinery with hydrogen internal combustion engines, so this pathway is only suited to outright capital replacement. The need to replace existing fleets with all new equipment and install new infrastructure for refueling and storage represents a significant barrier to fast and widespread adoption.

Biodiesel

Biodiesel is a sustainable liquid fuel derived from vegetable oils including used cooking oil or animal fats. It has physical properties similar but not equivalent to mineral diesel. Biodiesel is fossil fuel free and represents high carbon emission savings over mineral diesel. It is currently available from three refineries on Australia's eastern seaboard, supplying into Victoria, NSW, ACT and South-East Queensland.

Biodiesel can be safely blended with mineral diesel at various concentrations, with Original Equipment Manufacturers generally limiting blends with mineral diesel to up to 20 per cent biodiesel. This blending constraint places a limit on the extent to which biodiesel can be relied upon to decarbonise construction without modification of existing machinery.

Renewable diesel

Renewable diesel is an advanced biofuel, refined from renewable resources such as vegetable oils including used cooking oil, animal fats and waste agricultural products. Renewable diesel reduces greenhouse gas (GHG) emissions by up to a 95 per cent over the life cycle of the fuel compared with mineral diesel and also improves air quality compared with mineral diesel.[10]

Unlike biodiesel, renewable diesel is chemically identical to mineral diesel and can be used as a 100 per cent substitute. This means diesel machinery and supply infrastructure can be immediately switched to renewable diesel without performance issues or any need modify engines. It is also readily supported by Original Equipment Manufacturers at full concentration.

Renewable diesel is becoming widely available overseas. In the US, the supply of renewable diesel is expected to more than double through to 2025 based on a significant pipeline of projects underpinned by a range of favourable policy settings.[11] In Australia, by contrast, there is currently no renewable diesel production and only very limited supply in the forward pipeline.

Renewable diesel use at New Performing Arts Venue, Brisbane

The way forward

Decarbonisation presents unique challenges for construction. As with most industries, electrification represents the most promising long-term solution for eliminating construction's emissions. Yet the likely path of technological change will see electric alternatives estimated to be available for only 40 per cent (by energy use) of construction equipment by 2030.[12] Firms also face significant economic disincentives to abandoning existing assets, particularly before the end of their useful life, which will further slow the rate of transition to electric.

Put simply, a strategy of waiting for electrification to reach maturity is incompatible with Australia's net zero commitments. We must pursue alternatives in the interim. ACA advocates for a tiered approach to decarbonising construction that embraces the long term ambition of electrification while pragmatically adopting other low carbon liquid fuels in the interim.

Renewable diesel stands out as the most cost effective, feasible and readily deployable transition fuel where electric options are unavailable. Renewable diesel enables equipment and machinery to live out its working life while zero emission technology matures. Renewable diesel is also the most promising option for applications where zero emission technology does not emerge.

Without a reliable and affordable supply of renewable diesel, it will not be possible to reduce construction's emissions to levels compatible with national emission reduction targets. This supply will not materialise by accident.

A domestic renewable diesel industry will provide a range of benefits beyond decarbonisation. It has the potential to generate significant employment in areas with abundant feedstocks, improving incomes, community resilience, and fuel security. Much of these gains will accrue to regional Australia.

Brisbane: Caboolture Hospital Redevelopment

What needs to happen?

A key barrier to the adoption of renewable diesel in Australia is the lack of availability – there is no domestic production. While readily available and used extensively in construction overseas, renewable diesel is only available in Australia through direct importation at a high-cost premium. While some refineries are in the early stages of development, the industry needs a catalyst. Domestic production must be urgently scaled if we are to meet our net zero ambition.

A reliable supply of renewable diesel does not only depend on refinery capacity. Just as petroleum supply is limited by access to oil reserves, renewable diesel supply can only grow as fast as the supply of its feedstock. A supply chain of suitable feedstocks needs to be developed to underpin a domestic renewable diesel industry.

The renewable diesel adoption gap between Australia and the rest of the world reflects a policy gap. While the proliferation of emissions standards and low carbon liquid fuel policies in the US and Europe are prompting overseas supply chains to decarbonise, Australian firms face fewer incentives to accelerate adoption. Some companies are actively boosting decarbonisation investments on their own initiative at cost premiums, but the majority are waiting for clear policy signals from government.

There are strong international precedents for such policies. Low carbon liquid fuel incentives are now commonplace in Europe and in an increasing number of US states. In the US, renewable diesel production is expected to more than double by the end of 2025 thanks to a string of federal and state-based policies.[13] These incentives are leading to significant investments into renewable diesel infrastructure overseas, including the conversion of existing petroleum refineries into renewable diesel refineries.

By contrast, proposed Australian renewable diesel refineries are operating in a policy vacuum which is impacting investment. A range of viable policy options are available that provide critical market signals, including financial mechanisms that support the cost-competitive consumption of renewable diesel and facilitate the transition of liquid fuel dependent industries. This could be supported by an integrated suite of tax incentives and capital grants aimed at rapidly increasing the viability of an Australian renewable diesel industry. A recent report from BioEnergy Australia and Deloitte outlines the key policy levers available to Australian governments to incentivise the transition to renewable fuels in Australia.[14]

Sydney: Sydney Metro Victoria Cross Station

Recommendation

ACA calls on the Australian Government to lead the development of a low carbon liquid fuel policy to accelerate the development of a domestic renewable diesel industry.

The policy should plot a clear course for scaling a sustainable renewable diesel industry in Australia using Australian feedstocks. Consideration should be given to the role of fuel carbon intensity standards, tax treatment, as well as capital grants and incentives. A key outcome should be to prescribe a holistic regulatory framework that builds investment confidence and empowers organisations to rapidly adopt renewable diesel.

London: Elephant Park

Endnotes

1 Net Zero Tracker (2023) Net Zero Stocktake 2023: NewClimate Institute, Oxford Net Zero, Energy and Climate Intelligence Unit and Data-Driven EnviroLab.

2 https://unfccc.int/documents/631600

3 Analysis of data provided in BioEnergy Australia and Deloitte, *Transitioning Australia's Liquid Fuel Sector: The Role of Renewable Fuels*, 2023

4 Australian Government Department of Climate Change, Energy, the Environment and Water, *Annual Climate Change Statement 2022*, 2022

5 Clean Energy Regulator, "The renewable power percentage," www.cleanenergyregulator.gov.au, Feb. 06, 2023. Available: https://www.cleanenergyregulator.gov.au/RET/Scheme-participants-and-industry/the-renewable-power-percentage

6 Adhikari Smith, Dia, Whitehead, Jake, and Hickman, Mark (2022). Planning a Transition to Low and Zero Emission Construction Machinery. Brisbane, QLD Australia: The University of Queensland. https://doi.org/10.14264/93110de

7 Ibid.

8 Cranes Today, *Are cranes electric?*, 14 February 2019.

9 There are several methods of producing hydrogen that generate varying levels of greenhouse gas emissions. 'Green' and 'blue' hydrogen are generally considered the 'cleanest' options. Further information is available at: https://www.csiro.au/en/news/all/articles/2021/may/green-blue-brown-hydrogen-explained.

10 https://www.neste.com/products/all-products/renewable-road-transport/reduced-emissions

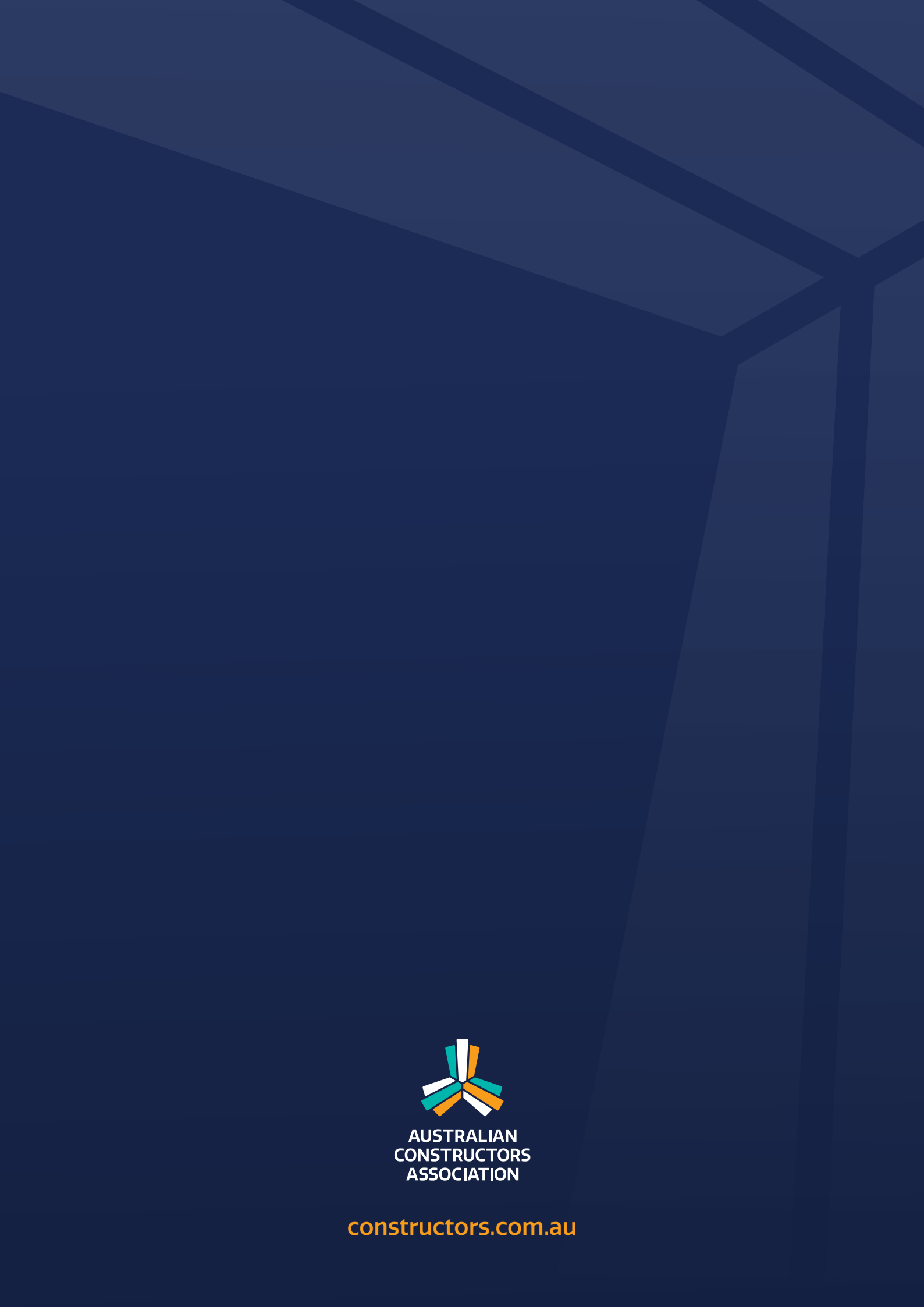
11 https://www.eia.gov/todayinenergy/detail.php?id=55399

12 Adhikari Smith, Dia, Whitehead, Jake, and Hickman, Mark (2022). Planning a Transition to Low and Zero Emission Construction Machinery. Brisbane, QLD Australia: The University of Queensland. https://doi.org/10.14264/93110de

13 https://www.eia.gov/todayinenergy/detail.php?id=55399

14 BioEnergy Australia and Deloitte, *Transitioning Australia's Liquid Fuel Sector: The Role of Renewable Fuels*, 2023

HVO deployment on Macintyre Wind Farm



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