

## ENERGY TRANSITION

Development of Australia's biofuels and bioenergy sector has been hampered by the COVID-19 pandemic. There has also been some diversion of effort into research and development of green hydrogen from renewable sources. However, this could be about to change with the Australian government set to launch a Bioenergy Roadmap, which will identify key biofuel sectors targeted for support.

The biofuels industry is still in its relative infancy in Australia. Only two states have mandated the sale of ethanol-blended fuels and biodiesel – New South Wales in 2007, with Queensland following suit 10 years later. Australian national rules allow petrol sold on the general market to contain up to 10% ethanol (E10). E85 petrol containing up to 85% ethanol is also authorised, but is generally only suitable for purpose-built vehicles, such as Holden's flex-fuel VE Series II Commodore, Saab's 9-3 and 9-5 Biopower models, Chrysler's Sebring sedan and certain models from Dodge. Meanwhile, nationally authorised biodiesel blends are either 5% or 20% fatty acids from vegetable or animal tallow – B5 or B20.

Biodiesel is manufactured using feedstock from used cooking oil and other biofuel feedstocks include agricultural byproducts from Australia's large agricultural and forestry sectors, such as pulp, wood, manure and crop residue. Sugarcane, corn and wheat are also used to produce conventional biofuels, although there is pressure on the government to encourage the production of second-generation 'advanced' biofuels using non-food feedstocks. Commercial and household waste is also being used as a biofuels feedstock.

### Significant potential

According to Shahana McKenzie, CEO of Bioenergy Australia: 'Bioenergy and bio-industries present a unique opportunity to support Australia's recovery from the economic devastation caused by COVID-19, by providing rich grounds for regional job development and increasing Australia's self-sufficiency and resilience.' In a pre-budget submission to the Australian Treasury for 2021–2022, she proposed that biofuels could support a substantial decrease in carbon emissions.



# Backing bio-energy

**Although Australia has been slow to adopt renewable energy, new innovation and changes in domestic energy policy could see Australia become a serious player in the sustainable bio-energy sector, writes Barbara Barkhausen.**

Meanwhile, although George Varma and Toby Evans from international law firm Pinsent Masons note that the hype around hydrogen has recently overshadowed the potential of the biofuel industry, they agree with McKenzie in general. 'We see significant potential for Australia to become a world leader in this space,' they say. Both cite strong agricultural, forestry and waste management sectors as capable of supplying feedstocks to support a much larger biofuel sector than currently exists, as well as leveraging strong public research capabilities.

One example of such cooperation is the Melbourne-based La Trobe University, which has partnered with renewable energy company AgBioEn, to work on an A\$2bn (\$1.46bn) project to turn agricultural waste such as cereal straw into electricity, renewable diesel, jet fuel and fertiliser, at a multi-biofuel facility in Katunga, Victoria.

According to the Australian Renewable Energy Agency (ARENA) there is plenty of demand for biofuel as this vast country is reliant on air travel, long-distance road freight, rail and marine freight. 'The aviation industry in particular is driving this space,' notes Bioenergy Australia's McKenzie.

The national airline Qantas has been utilising sustainable aviation fuel (SAF) as it moves towards a goal of net zero emissions by 2050, using bio-jet fuel made from cooking oil, municipal waste, plant oils and agricultural residues. In 2012, Qantas flew Australia's first commercial domestic biofuel flights, and in January 2018 it operated the first biofuel flight between the US and Australia – from Los Angeles to Melbourne.

Pre-COVID-19, Qantas operated more than 1,500 flights, using around 14mn l/d of aviation fuel (of all kinds). According to the airline, SAF has the potential to reduce lifecycle CO<sub>2</sub> emissions

Manildra Group's state-of-the-art ethanol distillery in Nowra, New South Wales, is the largest of its kind in Australasia and south-east Asia, producing ethanol for the food and beverage, personal care, pharmaceutical and industrial sectors

Photo: Dean Holland

by up to 80% compared to conventional jet fuel. In 2019, Qantas committed A\$50mn (\$36.5mn) over the next 10 years towards the development of an Australian SAF industry. In January 2021, it announced a strategic partnership with BP to help develop this further.

Meanwhile, Virgin Australia is also engaged in the sector. In 2018, the airline completed a trial delivery of SAF through Brisbane Airport's general fuel supply system. Other industry sectors, such as the construction and mining sectors, are also exploring biofuel potential. According to McKenzie: 'We are seeing a significant increase in interest from the construction sector and expect announcements from significant players in the construction industry before the year end,' she notes.

Looking ahead, there is plenty of potential as the current SAF market share accounts for just 0.4% of total liquid fuel use in Australia, according to Pinsent Masons' Varma and Evans. There are fewer than 10 commercial-scale biofuel facilities in the country, producing conventional biodiesel and bioethanol, mainly using feedstock from the sugar industry.

Varma and Evans say the slow growth of transport biofuels so far can be explained by the higher cost relative to fossil petrol and diesel and a lack of compatibility with existing infrastructure and vehicles. However, Varma notes: It is generally accepted that as more "advanced" forms of biofuels develop, barriers to uptake may be resolved.' ARENA modelling, for example, suggests that advanced biofuels may become cost competitive with petrol over time given more plentiful supplies of feedstock, while being fully compatible with existing vehicles and infrastructure.

According to McKenzie, a more robust biofuels sector would also add to Australia's fuel security. 'In Australia, we have seen a significant decline in domestic refining capability. With

an additional two fossil-based refineries closing in the past 12 months. This leaves Australia with only two domestic oil refineries in operation [the Ampol refinery at Lytton, near Brisbane, and the Viva refinery in Geelong, Victoria],' she notes.

Given the nascent state of the industry, significant investment will be required to make biofuels a competitive, mainstream fuel option in Australia. 'Like any renewable energy it requires government support to get to scale,' comments McKenzie. ARENA believes that A\$25–30bn (\$18.5–22.2bn) will need to be invested in production facilities alone.

As mentioned, the Australian Department of Industry, Science, Energy and Resources is consulting on a new Future Fuels Strategy, while ARENA is developing a Bioenergy Roadmap. These policy papers will indicate how biofuels fit into Australia's holistic energy policies.

At present, the Australian government has earmarked the use of natural gas as a first step towards a low-emissions economy. The country also burns a lot of coal for its electricity and pointedly made no commitment to phase that out at the recent United Nation's COP26 climate change meeting in Glasgow (see p14). However, the Australian government is enthusiastic about hydrogen, with the Department of Industry, Science, Energy and Resources noting that producing clean hydrogen under A\$2/kg is a 'priority stretch goal' under the government's 2020 Low Emissions Technology Statement.

'In many ways, biofuels and renewable hydrogen are competing technologies in the same space, notes Varma. 'Whether one will supersede the other, or whether there is room for co-existence, will largely depend upon how each technology develops.' However, many officials and politicians view biofuels as a 'stepping-stone' towards a 100% hydrogen-powered transport sector in Australia, he adds.

### A bright future

Australian innovation has had a strong record over the years. ARENA claims that Australian research has played a key role in developing catalytic hydrothermal processing, the glycell process, hydrothermal liquefaction technology and cellulosic ethanol technology.

In the bio-energy sector, a Sydney start-up recently claimed it has invented new yeast strains to turn crops into fuel, and is eyeing an initial public offering (IPO) to leverage the growing biofuels market. Technology developed by MicroBioGen, led by former investment banking analyst Geoff Bell, can turn non-food products such as agricultural waste and timber offcuts into a low-carbon bioethanol and high-protein food products.

Another hopeful is Sydney-based Licella, which is working with Finland's biofuel major Neste and UK-based chemical recycling company ReNew ELP to explore the potential of using mixed waste plastic as a raw material for fuels, chemicals and new plastics. Licella has also formed a joint venture with Australian recycler iQ Renew to construct an end-of-life waste-to-fuels plant in Australia that will produce low sulphur fuels for shipping.

Meanwhile, Southern Oil Refining, Australia's leading producer of recycled fuels and owner of Australia's only biofuels testing refinery located at Yarwun, Queensland, has refined post-consumer waste feedstocks into 100% drop-in diesel. And construction company Boral Australia has conducted an ARENA-funded feasibility study into the use of technology to convert hardwood sawmill residues into renewable diesel. At the same time the Sydney-based company has also started to investigate novel technology to convert sawdust into electricity.

Another potential advance in Australian bioenergy could be producing biogas through anaerobic digestion, using co-located farms or milling operations. The electricity and gas may power these facilities 'behind the meter', with excess energy exported to the grid. This option is currently being considered by the Western Australia-based Delorean Corporation.

Although Australia has been a laggard in adopting renewable energy, the country's strengths in research and innovation may help it develop a strong and sustainable biofuels sector. ●

Qantas is one corporate that has invested in the biofuel industry at an early stage in Australia

Photo: Unsplash/Fidel Fernando

