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# Australia

# Biofuels Annual

# November 2018

**Approved By:**
Rey Santella, Agricultural Counselor

**Prepared By:**
Roger Farrell, Agricultural Specialist

**Report Highlights:**
Australia's biofuels industry situation has not experienced any drastic changes and essentially remains the same as last year. Biofuel mandates do not cover the entire country and are modest compared to other countries with biofuels support programs and initiatives. With minimum mandate support, biodiesel production and imports have sharply decreased, due to lower world crude oil prices and high feedstock prices. Total biofuel production for 2019 is forecast to be stable at 290 million liters (ML), comprised of 250 ML of fuel ethanol and 40 ML of biodiesel. Fuel ethanol accounts for only 2 percent of total petrol sales across Australia. Second-generation biofuels, such as energy crops and algae-based fuels are not yet commercially viable. An advanced biofuels plant is being built in Queensland to produce fuel for military, aviation, and marine applications, but it is not yet operational.

**Commodities**: Biofuels, Wheat, Sugar, Sorghum, Trade Policy

**Post**: Canberra

## I. EXECUTIVE SUMMARY

Australia is a major importer of crude oil and refined products for transport fuels; although overall it is a leading international exporter of energy. Biofuels account for only 0.5 percent of energy use and 2 percent of petrol sales. There has been a continued decline in domestic refining capacity for transport fuels and a significant rise in import dependence, with 85 percent of refinery feedstock and 45 percent of refined production consumption now met from imports. The biofuel industry has significantly contracted in recent years due to lower world crude oil prices, high feedstock prices and a changing policy framework. Total biofuel production for 2019 is forecast to be stable at 290 ML, comprised of 250 million ML of ethanol and 40 million ML of biodiesel.

Biofuel production has been stable since 2017, after peaking in 2014 at 400 ML, with consumption approaching 800 ML, including biofuel imports. Production of ethanol is supported by a 6 percent mandate in New South Wales (NSW), while a 3 percent mandate in Queensland took force in 2017. The largest ethanol producer in Australia is Manildra, which manufactures ethanol from wheat waste and supplies the NSW market. Two smaller producers in Queensland manufacture ethanol from sorghum grain and sugar respectively. Imports of bioethanol from all sources appear uncompetitive with standard fuels under the current excise tax regime.

By contrast, production of biodiesel has collapsed due to high costs for feedstock (such as tallow) and low world oil prices. A surge in biodiesel imports occurred in 2013-15, building up stocks and keeping consumption higher than it would have been otherwise before the excise rebate scheme closed partly due to higher crude oil prices, which fell from mid-2014. Imports of biodiesel from all sources are subject to the full excise and re uncompetitive with standard diesel imports.

These developments reduced the scale of the biodiesel market and the B2 mandate in NSW and related tax relief was insufficient to prevent firms leaving the industry. The largest biodiesel producer, Australian Renewable Fuels (ARF), closed in early 2016. Exports of tallow to Singapore for the manufacture of renewable diesel have increased significantly in recent years, reflecting reduced demand from biofuel refineries in Australia. Europe is the main destination for exports of Australian canola for use in the production of biofuels.

Second-generation biofuels such as energy crops and algae-based fuels have been successfully demonstrated, but there is no commercial production and no subsidy scheme to support commercial sales. A significant research effort has been initiated by a number of research agencies in the development of first generation and second generation biofuels. The Queensland government has introduced a number of programs aimed at making the state a center of bio-manufacturing and biofuels production. It also hopes to develop the commercial production of biofuels for military, maritime and aviation uses. Since launching a 10-year roadmap in 2017, the Queensland government has directly supported proposals for nine new or expanded bio-refineries, but none have reached commercialization.

There are no comprehensive statistical series provided by the biofuels industry or the Australian government that shows the complete picture of biofuels sector. This report builds annual supply/demand balances using available sources such as excise tax rebate statistics, industry statistics on plant capacity, and greenhouse gas emissions estimates by the Australian government. Most biofuel plants have excess capacity and many have closed in recent years.

## II. POLICY AND PROGRAMS

### International

Australia is a member of the Asia-Pacific Economic Cooperation (APEC) Energy Working Group which includes a biofuels task force. This is an international grouping of countries seeking to make biofuels a more viable and sustainable transport fuel. Other members of the taskforce include Brazil, Canada, Japan, New Zealand, Malaysia, Mexico, Singapore, Taiwan, Thailand, the United States, and Vietnam. Bioenergy Australia is active in the International Energy Agency's Bioenergy group and Australia is participating in the development of ISO sustainability criteria for bioenergy.

## Fuel Taxes – Excise and Import Duties

Biofuels are taxed at lower rates than their fossil fuel equivalents, but this support is scheduled to decline over the period to 2030. Imported fuel ethanol and biodiesel are taxed at the higher rates thus, disadvantaged compared to domestic biofuels. Imports of petroleum products, such as petrol and diesel attract a customs duty equivalent to the excise on domestically refined products. Domestic fuel ethanol and biodiesel are subject to lower rates, but the excise tax rates on these fuels are gradually increasing. The fuel excise tax is indexed to movements of the Consumer Price Index and is administered by the Australian Taxation Office. As of October 2018, the following excise rates apply (see table 1 below).

*Table 1: Excise rates for fuel in Australia, 2018 (A$/liter)*

| Tariff item | Description | Excise rate |
|---|---|---|
| 10.1 | Petroleum fuel | 0.412 |
| 10.6 | Diesel fuel | 0.412 |
| 10.2 | Fuel ethanol | 0.081 |
| 10.2 | Biodiesel | 0.041 |

*Source*: Australian Taxation Office.

Under current arrangements, the excise duty on locally produced fuel ethanol will gradually increase to one-third the excise rate for petrol by 2030. Imported ethanol is subject to the full excise rate applying to petrol. The excise duty on locally produced biodiesel will gradually increase to one half of the excise rate for diesel by 2030. Since mid-2015, imported biodiesel has been subject to the full rate of excise tax applied to domestically produced diesel.

## Australian Fuel Standard for Biofuels

Federal government regulations apply to the quality of petrol and diesel fuel in Australia. The Fuel Quality Standards Act 2000 provides a legislative framework for setting national fuel quality and fuel quality information standards. Fuel quality standards apply to petrol, diesel, biodiesel, autogas and ethanol E85. The standards aim to reduce the amount of toxic pollutants in vehicle emissions. A fuel quality information labelling standard covers Ethanol (in petrol) and Ethanol E85.

Under the E10 fuel standard, suppliers who supply petrol containing ethanol must comply with the Fuel Quality Information Standard (Ethanol) Determination 2003 (labelling standard). This labeling standard is in place to inform consumers that the fuel they are purchasing contains ethanol. The Australian Government capped the level of ethanol that can be added to petrol at 10 percent in July 2003. This followed vehicle testing that suggested that petrol containing ethanol blends of 20 percent or more could cause engine problems in some older vehicles. A requirement to label ethanol blend petrol was introduced in March 1, 2004 and amended in January 2006 to simplify the labelling standard.

Under the Fuel Quality for Ethanol-e85 (a fuel blend of 70–85 percent ethanol with the remainder petrol), the fuel may only be used in cars that have been specifically built or modified to use E85. These include flexible-fuel vehicles and V8 racing supercars. The Fuel Quality Standard for Biodiesel defines biodiesel as "a diesel fuel

obtained by esterification of oil derived from plants or animals."

### NSW Government Biofuels Policy

NSW introduced an ethanol biofuels mandate in 2017 to encourage broader use of ethanol and other biofuels in the State. Most cars in NSW that use unleaded petroleum (ULP) can use 10 percent ethanol-blended fuel. The NSW government has a legislated ethanol supply mandate of E6 for wholesale companies and a requirement for retailers with 20 or more outlets to offer ethanol product for sale. Under the NSW *Biofuels Act 2007*, a certain percentage of the total volume of petrol sold in NSW is required to be ethanol and a certain percentage is required to be biodiesel.

The main objective of the policy is to support the development of a sustainable biofuels industry in NSW. The Act has a number of secondary objectives, including (a) improving air quality; (b) addressing climate change by reducing greenhouse gas emissions; (c) providing consumers with cheaper fuel options; (d) reducing the reliance of NSW on imported petroleum products; and (e) supporting regional development. The *Biofuels Act* is administered by the NSW Office of Fair Trading.

The NSW E6 mandate (with exemptions) requires that ethanol must represent six percent of the total volume of petrol sold in NSW. A B2 mandate also exists, which requires two percent of the total volume of diesel sold to be biodiesel. A range of exemptions are provided to petrol retailers, which effectively lowers their ethanol requirements below the E6 mandate. The NSW government has sought to reduce the number of exemptions to the Biofuels Act to encourage greater use of fuel ethanol. Under an amendment to the Biofuels Act, all fuel retailers that sell three or more types of petrol and diesel and have sales above a certain threshold will need to comply with the ethanol mandate.

### Queensland Government Biofuels Policy

The Queensland State government has introduced biofuel mandates to boost the biofuel and bio-manufacturing industry sector. In 2015, Queensland passed legislation that requires the fuel industry to meet targets for the sale of bio-based fuels, such as E10 and bio-based diesel. The mandate also sets minimum requirements for the sale of ethanol-blended regular unleaded petrol and bio-based diesel. The bio-based petrol mandate applies separately to the bio-based diesel mandate. Both schemes began in January 2017. Details of these requirements for fuel sellers are given here. The mandate requirements were increased to 4 percent in July 2018.

### Queensland Biofutures Roadmap

The Queensland State government is aiming to develop a competitive industrial biotechnology and bio products sector in its Biofutures Roadmap. It identified this sector as a priority industry to develop new markets for technology developers and agricultural producers. The state government has established an A$5 million Biofutures Industry Development Fund, an A$5 million Commercialisation Fund, and an A$4 million Biofutures Acceleration Program. Potential feedstocks have been broadly defined, but the main sources are likely to be sugarcane and sorghum. Since launching a 10-year roadmap in 2017, the Queensland government has directly supported proposals for nine new or expanded bio-refineries, see link: https://www.statedevelopment.qld.gov.au/industry-development/biofutures.html

## III. FOSSIL FUELS, RENEWABLE ENERGY AND TRANSPORT FUELS

### Overview

In 2017, fossil fuels (coal, oil and gas) accounted for 94 percent of Australia's primary energy mix. Oil, including crude oil, liquefied petroleum gas (LPG) and refined products, accounted for the largest share of energy consumption at 38 percent, slightly higher than the previous year (table 2). This total includes domestic and imported crude used by Australian refineries, and imported refined products used by industry and households.

*Table 2: Australian energy consumption, 2017, by fuel type (petajoules and share)*

| Energy type | Petajoules (PJ) | Share (%) | Change on 2016 (%) | Change over decade (%) |
|---|---|---|---|---|
| Coal | 1,937 | 31.5 | -1.0 | -1.9 |
| Oil | 2,315 | 37.7 | 2.1 | 1.7 |
| Gas | 1,515 | 24.7 | 1.1 | 2.9 |
| Renewables | 379 | 6.2 | 5.3 | 3.2 |
| Total | 6,146 | 100 | 1.1 | 0.8 |

*Source*: Australian Energy Update 2018

Coal remained the second largest fuel consumed in 2017, accounting for 32 percent of energy consumption (table 2). Coal consumption fell by 1 percent in 2017, reversing the growth of the previous two years and returning to the declining trend observed over the past decade. The decline in 2017 was caused by a large decline in brown coal consumption after the closure of the Hazelwood and Northern power stations, which more than offset an increase in black coal used for electricity generation.

*Table 3: Australian energy production, 2017, by fuel type (petajoules and share)*

| Energy type | Petajoules (PJ) | Share (%) | Change on 2016 (%) | Change over decade (%) |
|---|---|---|---|---|
| Black coal | 12,154 | 67.7 | 0 | 3.9 |
| Brown coal | 584.2 | 3.3 | -8.0 | -2.5 |
| Natural gas | 4,155 | 23.1 | 22.7 | 9.4 |
| Oil and NGL | 597 | 3.3 | -12.3 | -5.1 |
| LPG | 88 | 0.5 | 2.4 | -2.2 |
| Renewables | 379 | 2.1 | 5.3 | 3.2 |
| Total | 17,957 | 100.0 | 3.7 | 4.0 |

*Source*: Australian Energy Update 2018

Overall Australian energy production in 2017, by type of fuel, is shown in Table 3. Coal accounted for 71 percent of overall energy production, followed by 23 percent for natural gas and 3.3 percent for oil and natural gas liquid (NGL).

## Electricity Generation

Coal remained the major source for electricity generation in 2017, with its share in the fuel mix remaining at 63 percent, compared to more than 80 percent at the beginning of the century (see table 4). Natural gas-fired generation decreased by 0.2 percent in 2017, and continued to account for about 20 percent of Australia's electricity generation. Gas-fired generation fell in some states and territories, but rose in Victoria, Western Australia, and South Australia. Oil-fired generation decreased significantly in 2017 and represents 2 percent of Australia's electricity generation. Renewable energy accounted for 16 percent of Australia's electricity generation in 2016/17. Renewable generation increased by 6 percent in 2017, driven by increases in solar, hydro, and wind, which increased by 18 percent, 6 percent, and 3 percent respectively. Hydro continues to be the largest contributor to renewable generation, with a 40 percent share of renewable generation in 2017.

*Table 4: Australian electricity generation by fuel type, 2017*

| Energy type | GWh (a) | Share (%) | Change on 2016 (%) | Change over decade (%) |
|---|---|---|---|---|
| Fossil fuels | 217,562 | 84.3 | -0.8 | -0.3 |
| Black coal | 118,272 | 45.8 | 3.5 | -1.0 |
| Brown coal | 43,558 | 16.9 | -10.7 | -2.5 |
| Gas | 50,460 | 19.6 | -0.2 | 4.2 |
| Oil | 5,273 | 2.0 | -6.8 | 3.0 |
| Renewables | 40,455 | 15.7 | 6.1 | 8.2 |
| Hydro | 16,285 | 6.3 | 6.3 | 3.4 |
| Wind | 12,597 | 4.9 | 3.3 | 16.9 |
| Bioenergy | 3,501 | 1.4 | -7.6 | -3.0 |
| Bagasse | 1,435 | 0.6 | -20.7 | na |
| Wood, wood waste | 355 | 0.1 | 42.7 | na |
| Municipal, industrial waste | 76 | 0.0 | 76.9 | na |
| Sulphite lyes, biofuel | 442 | 0.2 | 6.2 | na |
| Landfill biomass | 970 | 0.4 | -8.6 | na |
| Sludge biogas | 223 | 0.1 | 5.6 | na |
| Solar PV | 8,072 | 3.1 | 18.0 | 59.2 |
| Small scale | 7,399 | 2.9 | 16.0 | 57.7 |
| Large scale | 672 | 0.3 | 47.1 | na |
| Geothermal | 1 | 0.0 | 133.3 | na |
| Total | 258,017 | 100 | 0.2 | 0.7 |

*Note: (a)* GWh is Gigawatt hours
*Source*: Australian Energy Update 2018

Renewable energy sources accounted for 6 percent of Australian energy consumption in 2017, comprising mainly biomass, hydro, and wind energy (see Table 5). This includes renewable energy use for electricity generation, as well as direct use of renewables such as firewood for residential heating, bagasse use in manufacturing, and solar generated hot water. In 2017, renewable energy consumption rose by 5 percent, mainly underpinned by growth in bagasse, solar, and hydro energy. Consumption of bagasse, the remnant sugar cane pulp left after crushing, rose to 29 percent of total renewable energy use in 2017, reflecting increased tonnage in sugar cane production.

Use of hydro rose by 6 percent and wind by 3 percent in 2017. Hydro energy has been a feature of Australia's electricity mix for decades, and production fluctuates from year to year according to market and weather conditions. Wind and solar energy have exhibited rapid growth in the past decade. Wind power has increased an average of 17 percent per year since 2008 to 45 petajoules in 2017.

Solar PV has grown from less than 0.5 petajoules a decade ago to 29 petajoules in 2017, including growth of 18 percent in 2017 alone. Municipal and industrial waste used to generate electricity provided nearly 3 petajoules of energy in 2017, up from 0.4 petajoules five years ago. Landfill biogas provided a further 12 petajoules of energy in 2017. Table 4 shows renewable energy consumption by fuel type for 2017.

*Table 5: Australian renewable energy consumption by fuel type, 2017*

| Energy type | Petajoules (PJ) | Share (%) | Change on 2016 (%) | Change over decade (%) |
|---|---|---|---|---|
| Biomass | 205 | 54.2 | 5.0 | -0.2 |
| Wood, wood waste | 95.1 | 25.1 | 1.9 | -0.4 |
| Bagasse | 110.3 | 29.1 | 7.9 | -0.1 |
| Municipal and industrial waste | 2.6 | 0.7 | 0.3 | na |
| Biogas | 15 | 4.0 | -4.1 | 3.7 |
| Landfill gas | 12.2 | 3.2 | -6.5 | na |
| Other biogas | 2.8 | 0.7 | 8.0 | na |
| Biofuels | 7.1 | 1.9 | -5.3 | 5.3 |
| Ethanol | 6.4 | 1.7 | 3.4 | na |
| Biodiesel | 0.6 | 0.2 | -48.7 | na |
| Hydro | 58.6 | 15.5 | 6.3 | 3.4 |
| Wind | 45.3 | 12.0 | 3.3 | 16.9 |
| Solar PV | 29.1 | 7.7 | 18.0 | 59.2 |
| Solar hot water | 15.7 | 4.2 | 5.7 | 10.0 |
| Total | 378.7 | 100.0 | 5.3 | 3.2 |

*Source*: Australian Energy Update 2018

## Transport Fuel in Australia

Oil consumption increased by 2 percent in 2017, with the increased consumption of refined products, mostly for transport. The higher oil consumption partially offset a reduction of crude consumption by refineries. Since 2010, the number of domestic oil refineries declined from seven to four. Refineries, which are no longer in operation are generally converted into fuel import terminals. The share of imports in total consumption of crude and refined oil products has steadily increased to 73 percent in 2017. The share of imports in total consumption of refined oil products reached 54 percent in 2017 (chart 1).

Australia does not have either government-owned reserves or mandated industry minimums for fuel stocks. National liquid fuel reserves are reportedly established at a 22 days for crude oil, 59 days for liquid petroleum gas (LPG), and 20 days for petrol, 19 days for aviation fuel, and 21 days for diesel. In early 2018, the Energy Minister announced a review of liquid fuel security, which is due to report by the end of the year.

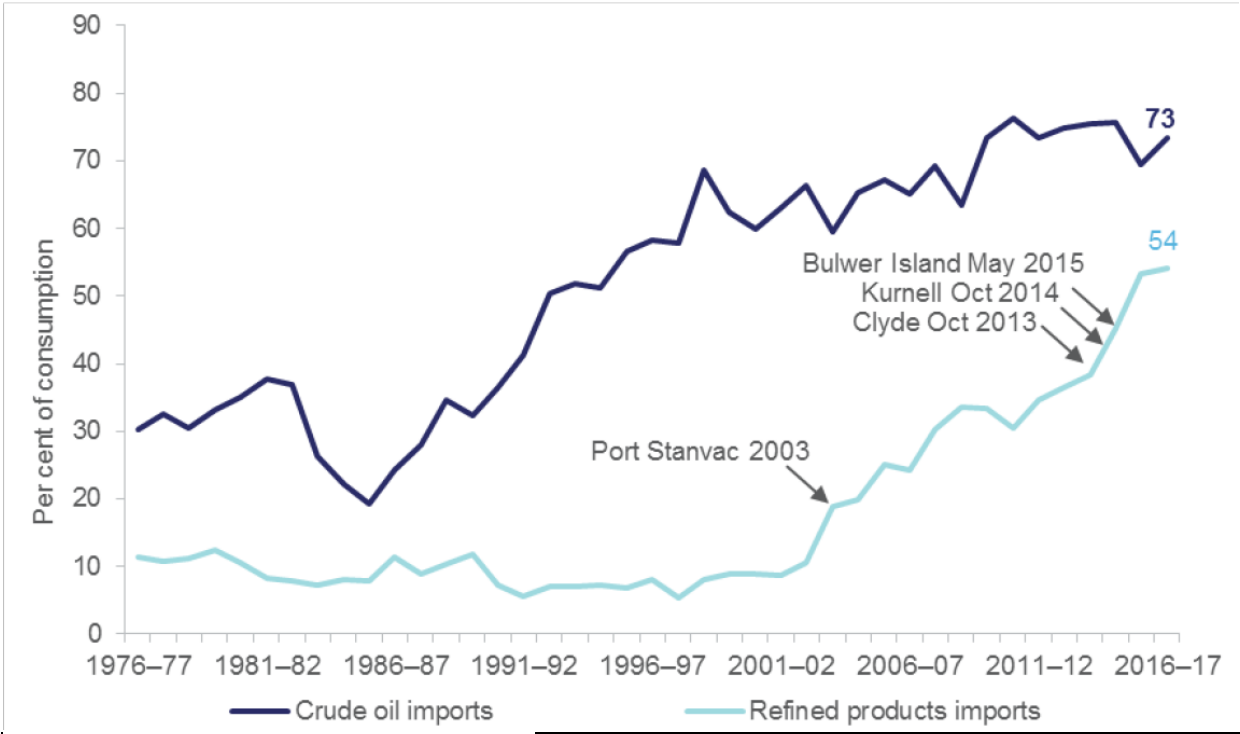
Demand for petroleum in Australia has been static over the last 15 years as vehicle fuel efficiency has improved. Use of regular unleaded petrol (ULP) has declined by more than 40 percent as consumers chose new vehicles that recommend the use of higher octane fuels or have moved to ethanol blend petrol. Other reasons include a decline in tariff and other barriers to motor vehicle imports into Australia, changing fuel efficiency regulations, modified lifestyle and consumption patterns, and better car fuel efficiency.

Australian demand for ethanol blend petrol reached a peak of 16 percent of petrol use in 2011, largely as a consumer response to the ethanol fuel mandate in NSW. Consumer enthusiasm has recently declined to less than 11 percent of total petrol use in 2017. A major reason appears to be consumer concerns over possible engine damage from the use of ethanol blended fuels. Some car dealerships have voided vehicle warranties on new cars if E10 fuel is used.

The Australian road transport fleet is generally reliant on petroleum based fuels such as petrol and diesel. Petrol is the dominant fuel in the light vehicle sector, although the share of diesel has increased. Diesel is the dominant fuel in the heavy vehicle sector. Petrol, diesel, and aviation fuel are the dominant transport fuels, accounting for over 90 percent of transport energy use in 2017. The share of petrol in the transport fuel mix has decreased

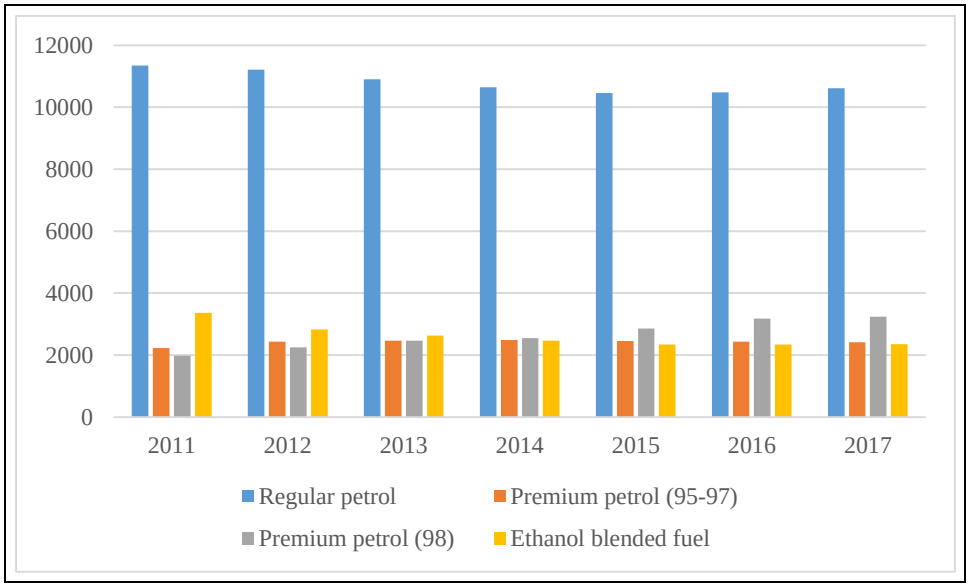
slowly over recent decades, outstripped by growth in diesel and aviation fuel. This reflects increased demand for diesel from mining activities and increased air transport activity. (Australian transport energy consumption, by major fuel type is shown in Chart 3).

*Chart 1: Share of imports in total consumption of crude and refined oil products, 1976-2017 (%)*



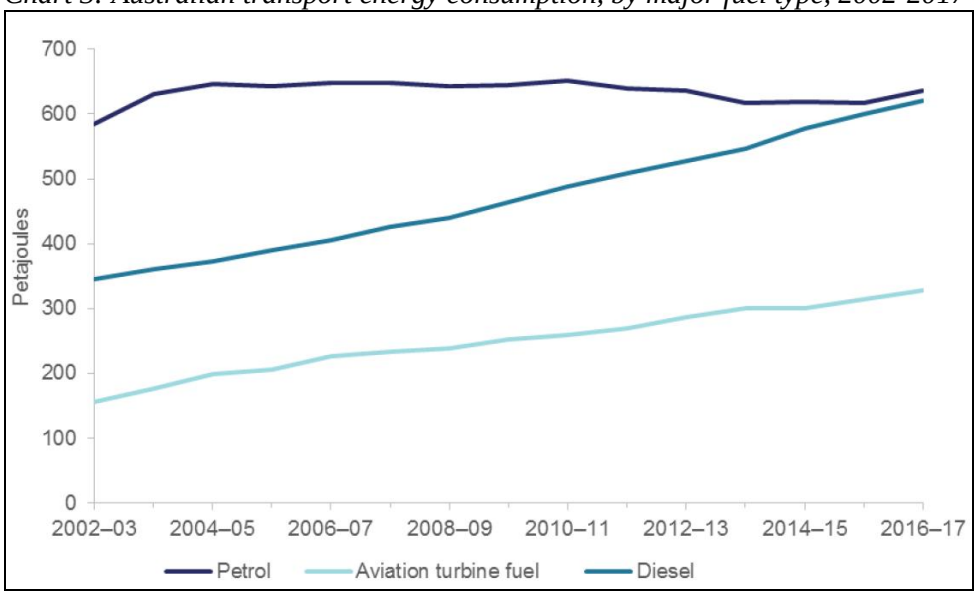

*Note:* Arrows refer to the closure of oil refineries.
*Source*: Australian Energy Statistics 2018

*Chart 2: Australian automotive fuel sales by type, 2011-2017 (ML)*




*Source:* Department of the Environment and Energy (2018), Petroleum Statistics 2018

*Chart 3: Australian transport energy consumption, by major fuel type, 2002-2017*




*Source:* Department of the Environment and Energy (2018), Australian Energy Update

## Fuel Efficiency and Emissions

Australia has a range of policy measures to increase fuel efficiency in the vehicle fleet. The Australian government has mandated fuel consumption labelling of all new vehicles up to 3.5 metric tons (MT), to provide consumer information on the relative performance of individual models. There are a range of voluntary measures in place to reduce vehicle CO2 emissions and improve fuel efficiency. The Australian government and the Federal Chamber of Automotive Industries (FCAI) agreed to a voluntary national average fuel consumption (NAFC) target for new petrol fueled passenger cars of 6.8 liter/100 kilometers. The Green Vehicle Guide (GVG) website provides model specific information to consumers on the emissions performance of all light vehicles.

### The Agricultural Sector

Agriculture is the fourth most energy-intensive industry in Australia, behind manufacturing, transport and mining, and accounts for nearly four percent of industry energy usage. On farms, energy is consumed as general electricity for lighting and appliances, fuel for machinery, vehicles, and freight. Energy is also used for heating and cooling, especially in the dairy, horticulture, piggeries, and poultry sectors. In 2016/17, energy use by the agriculture sector increased nearly 6 percent due to a record winter harvest, which increased diesel demand for cropping, as winter crop production was 50 percent higher in 2016/17.

The Clean Energy Finance Agency (CEFC) has provided co-financing for agribusinesses for a range of bioenergy projects from on-site generation using biogas, solar PV, cogeneration, new refrigeration units, and other equipment upgrades. These investments allow farmers and food producers to generate energy on-site and reduce their energy bills.

Renewable energy generation is increasing in the Australian agriculture industry. For example, Queensland-based Tully Sugar produces its own power by operating its steam boilers with renewable biomass generated from the fiber that remains after juice is extracted from sugar cane. The company then exports unused green power into the Queensland electricity grid. Similarly, Mackay Sugar has an US$90 million co-generation plant that processes waste from its sugar milling operations and sells surplus renewable energy back into the national electricity grid. At full capacity, the company can produce enough renewable energy to power about 30 percent of the needs of the Queensland town of Mackay.

The poultry and pig industries in Australia also feature a range of biomass power generation schemes. Chicken farms have installed anaerobic digesters and generators to meet non-peak power requirements using chicken manure and other waste. A number of pig farms use biogas capture and heat generation to generate energy for on-farm operations.

## IV. FUEL ETHANOL

### Overview

Fuel ethanol is used as a renewable transport fuel produced by fermenting starch and sugars from a range of feedstocks such as wheat, sorghum, and molasses. The most commonly available ethanol blend in Australia is E10, a 10-percent blend of ethanol with unleaded petrol (ULP). Ethanol blend fuels are also available using premium unleaded petrol (PULP). Sales of gasoline and ethanol fuel for motor vehicle use in 2017 are shown in Table 6.

*Table 6: Sales of gasoline and ethanol fuel for motor vehicle use in Australia, 2017 (million liters (ML)*

| State | Premium | Proprietary | Regular | Ethanol | Total |
|---|---|---|---|---|---|

| | unleaded | brand | unleaded | blended | |
|---|---|---|---|---|---|
| NSW | 1,079 | 1,360 | 1,756 | 1,576 | 5,771 |
| Victoria | 417 | 761 | 3,261 | 204 | 4,643 |
| Queensland | 455 | 658 | 2,529 | 565 | 4,207 |
| South Australia | 97 | 170 | 1,035 | 0 | 1,302 |
| Western Australia | 296 | 282 | 1,690 | 0 | 2,265 |
| Tasmania | 50 | 2 | 257 | 0 | 310 |
| Northern Territory | 22 | 0 | 87 | 0 | 110 |
| Australia | 2,415 | 3,236 | 10,612 | 2,348 | 18,612 |
| Share (%) | 13.0 | 17.4 | 57.0 | 12.6 | 100.0 |

*Source*: Department of the Environment and Energy, *Australian Petroleum Statistics 2018*.

Ethanol is blended with petrol to make commercial products by the major petroleum companies using a range of methods including "splash" or sequential blending, in tank blending and gantry side stream blending. The process of storing and blending ethanol with petroleum to make E10 (10 percent ethanol; 90 percent petroleum) has involved additional investment in infrastructure at terminals and storage facilities of around US$30 million by the refinery sector which handles retail distribution of ethanol fuels in Australia. This investment was facilitated by the Biofuels Capital Grants Program to support new or expanded biofuel production capacity, which ended in 2010.

## Production

In 2019, Australian ethanol production is forecast at 250 ML, the same as in the previous year. The ethanol industry in Australia has three established producers in NSW and Queensland, with an estimated installed production capacity of 440 ML. The largest ethanol producer in NSW is Manildra, which has the capacity to manufacture over 300 ML of ethanol. Manildra processes wheat starch through an integrated process which separates the gluten and processes the remaining starch into a range of food and industrial-grade starches, glucose syrups, and ethanol products. Waste from this process is then used to make stockfeed products.

Queensland has two ethanol plants, one operated by United Petroleum at Dalby and a smaller facility operated by Wilmar at Sarina. The Dalby bio-refinery is located in the sorghum growing region in the Darling Downs and normally buys around 0.2 million MT of sorghum grain a year from local growers, which can produce 80 ML of fuel-grade ethanol (one MT of sorghum grain can produce around 400 liters of ethanol). At full capacity, the biorefinery also produces 830,000 MT of wet distillers' grain, which is used for animal feed supplements, mainly in the dairy and cattle feedlot industries. In 2017, the Dalby ethanol bio refinery announced a US$20 million investment to boost production capacity to 100 ML. However, the high price of sorghum the current drought in southern Queensland and northern NSW may constrain overall ethanol production using this grain.

The Sarina biorefinery is operated by the Singapore-based company, Wilmar International, and generates fuel ethanol from sugar. It has the capacity to manufacture around 60 ML of ethanol annually. The Queensland plants have been operating below capacity. The Queensland State government expects that demand for fuel grade ethanol will increase by 100 ML by 2018. The *Liquid Fuel Supply Act 1984* requires the Queensland fuel industry to meet targets for the sale of bio-based fuels.

A number of domestic fuel-grade ethanol plants are proposed. These include:

- A North Queensland Bio-Energy (NQBE) proposal envisages the construction of a US$400 million sugar ethanol and power generation facility in Ingham, North Queensland to produce over 90 ML of ethanol annually.

- A NSW proposal for an ethanol plant at Deniliquin, NSW to produce up to 115 ML of fuel grade ethanol annually using low grade wheat.

- A bioenergy plant to produce ethanol from a variety of sources. The Australian Renewable Energy Agency (ARENA) has provided funding for Renewable Developments Australia to develop a plant for a US$600 million renewable bio-energy plant to produce 350 ML of fuel grade ethanol from sugar cane and sorghum; and

- A Queensland Austcane Energy proposal is for a US$180 million sugar cane ethanol plant to produce 100 ML per year of fuel-grade ethanol annually.

## Consumption

In 2018, fuel ethanol produced in two states supplied around one percent of the total road transport fuel market in Australia. The predominant petrol-ethanol blend (E10) is sold in NSW and Queensland. Ethanol use has been declining in recent years in Australia due partly to the lower availability of E10 pumps and a consumer preference for regular unleaded over E10. The lack of a significant price differential between E10 and regular petrol has reportedly contributed to the decline in ethanol sales.

There has been some consumer resistance to biofuels and there is a trend for NSW motorists to prefer premium unleaded petrol (PULP) use instead of E10 blended fuel at a rate well above the national average. Premium fuels in NSW represent almost 45 percent of total petrol demand. NSW ethanol use reached a peak in 2010/11 largely due to the forced removal of ULP at many sites, but since then average blending has fallen as consumers find new ways to buy PULP.

In Queensland, the bio-based petrol mandate requires retailers to sell 3 percent of their total volume of regular unleaded petrol sales and ethanol blended fuel sales as bio-based petrol (ethanol). If three out of every ten liters of regular petrol sold by a petrol station is E10, then that station would meet the mandate. The ethanol mandate increased to 4 percent in July 2018. The Queensland government has produced a campaign to support the biofuels mandate on its *E10 OK* website. The Queensland government vehicle fleet is giving priority to using E10 where it is practical, as outlined in its *retail fuel purchases policy*.

The Australian Institute of Petroleum (AIP) estimated that 11 percent of the vehicles in NSW were unsuitable for fuel ethanol. It noted that some applications such as marine and small engines are reportedly not able to use ethanol blends. However, the share of vehicles for which biofuel is reportedly an unsuitable fuel is likely to decline over time as the national vehicle fleet is replaced and the average age of vehicles falls. The NSW and Queensland governments have undertaken a number of marketing campaigns to improve consumer understanding of fuel ethanol use in vehicles. A key problem for the biofuels industry is that most vehicles that can use ethanol blended fuel are only warrantied for blends up to 10 percent, while some warranties can be voided if ethanol is used.

A further source of demand could come from the aviation industry in Australia. The global airline industry is under pressure to take voluntary initiatives to lower carbon emissions or eventually face government regulations. Virtually all jet fuel is currently imported. The industry has sought expressions of interest for supplies of locally produced, aviation bio-based, drop-in jet fuel. This aims to reduce emissions and lower the industries vulnerability to volatile oil prices. The major airlines Virgin Airlines and Air New Zealand have also developed a clear strategy to use biofuels for aviation fuel in the future.

## Trade

Fuel ethanol imports are subject to a general tariff of 5 percent and a customs tax of A$0.401 per liter. These measures have made fuel ethanol imports generally uncompetitive with domestically produced ethanol.

## Production, Supply and Distribution

*Table 7: The Australian Ethanol Industry (ML)*

| Ethanol Used as Fuel and Other Industrial Chemicals (Million Liters) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Calendar Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| **Beginning Stocks** | | | | | | | | | | | |
| Fuel Begin Stocks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Production** | | | | | | | | | | | |
| Fuel Production | 203 | 275 | 319 | 347 | 306 | 260 | 250 | 250 | 250 | 250 | 250 |
| **Imports** | | | | | | | | | | | |
| Fuel Imports | 21 | 38 | 40 | 14 | 8 | 6 | 6 | 5 | 5 | 5 | 5 |
| **Exports** | | | | | | | | | | | |
| Fuel Exports | 8 | 6 | 3 | 31 | 37 | 5 | 5 | 5 | 5 | 5 | 5 |
| **Consumption** | | | | | | | | | | | |
| Fuel Consumption | 216 | 307 | 356 | 330 | 277 | 261 | 251 | 250 | 250 | 250 | 250 |
| **Ending Stocks** | | | | | | | | | | | |
| Fuel Ending Stocks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total BalanceCheck | | | | | | | | | | | |
| Fuel BalanceCheck | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Production Capacity (Million Liters)** | | | | | | | | | | | |
| Number of Refineries | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Nameplate Capacity | 456 | 440 | 440 | 440 | 440 | 440 | 440 | 440 | 440 | 440 | 440 |
| Capacity Use (%) | 45 | 63 | 73 | 79 | 70 | 59 | 57 | 57 | 57 | 57 | 57 |
| **Co-product Production (1,000 MT)** | | | | | | | | | | | |
| Bagasse | 30 | 50 | 60 | 65 | 60 | 50 | 50 | 50 | 50 | 50 | 50 |
| DDG | 40 | 60 | 70 | 80 | 70 | 60 | 60 | 60 | 60 | 50 | 60 |
| **Feedstock Use for Fuel (1,000 MT)** | | | | | | | | | | | |
| Wheat | 306 | 486 | 564 | 540 | 512 | 468 | 460 | 460 | 460 | 460 | 460 |
| Sorghum | 122 | 130 | 148 | 143 | 135 | 130 | 120 | 120 | 120 | 120 | 120 |
| Molasses | 96 | 99 | 117 | 112 | 106 | 91 | 90 | 90 | 90 | 90 | 90 |
| | | | | | | | | | | | |
| **Market Penetration (Million Liters)** | | | | | | | | | | | |
| Fuel Ethanol | 216 | 307 | 356 | 330 | 277 | 261 | 251 | 250 | 250 | 250 | 250 |
| Gasoline | 19,503 | 18,198 | 18,725 | 18,762 | 18,659 | 18,120 | 18,070 | 18,178 | 18,000 | 18,200 | 18,200 |
| Blend Rate (%) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 |

*Note (a):* Estimates for DDG co-production assume that DDGs from both wheat and sorghum and using the same yield as DDGs from corn (1 MT of corn = 0.313 MT of DDG). *Source*: Department of Industry, BREE and Post estimates.

## V. BIODIESEL AND RENEWABLE DIESEL

### Overview

Biodiesel is produced from renewable plant or animal lipids (fats and oils) through a process called transesterification. The feedstocks used in Australia are animal fats (namely tallow) or used cooking oil (recycled yellow grease). Renewable diesel is a product derived from the same feedstock used in biodiesel, but is chemically equivalent to and fully substitutable with petroleum-derived diesel. The only type of renewable diesel currently commercially available at large scale is typically called hydrotreated or hydrogenated vegetable oil (HVO). There is no commercial production of this biofuel in Australia. Australia has imported and consumed small volumes from a plant in Singapore in 2013, but no harmonized code has been generated for this product. Australia exports tallow to Singapore, where it is used to produce HVO.

The B5 biodiesel fuel is the most common blend used in Australia, and is considered under fuel standards to be identical with fossil diesel fuel and is sold unlabeled. The B20 biodiesel blend is generally sold for commercial operations and is labeled. Biodiesel has slightly lower energy content than conventional diesel although this is not significant when operating vehicles on biodiesel blends up to B20. There is an Australian fuel standard for unblended biodiesel (B100).

Most diesel fuel in Australia is sold in bulk to commercial/industrial customers such as mining and transport companies on long-term contracts. Only a quarter of the diesel fuel used in Australia is sold through retail outlets. Of this, 80 percent is bought by the long-haul trucking industry with only a small proportion sold to private customers. Diesel engine manufacturer warranties for engines typically allow biodiesel blends up to 5 percent with conventional diesel (B5) provided that the resultant blend meets the diesel standard. Some manufacturers have engines which are certified for fuels above B5, but there are only a limited number of such engines in Australia. Biodiesel blends up to B100 are typically used in fleet operations, such as local council trucks.

### Production

Post estimates Australian biodiesel production to be stable at 40 ML in 2019, the same as the previous year, but significantly below the average of the last five years. Over this period, most of biodiesel companies have shut down their operations due to limited mandate support, low international oil prices, high feedstock prices, and insufficient tax relief to offset high feedstock prices. Biodiesel production facilities in Australia are shown in Table 8, although most have closed or they have severely reduced operations. In early 2016 the largest biodiesel producer, Australian Renewable Fuels, closed. Post maintains current biodiesel capacity at 400 ML, primarily because the Australian Renewable Fuels plant could be reopened under a new buyer and receive more favorable government support and economic conditions could improve. Australia does not produce renewable diesel.

### Trade

Biodiesel exports, which were always minimal, have ceased in line with the sharp decline in production. Imported biodiesel is uncompetitive with regular diesel under the new excise and import duty arrangements (see policy section), and have dropped significantly from recent years. Australia is a significant exporter of tallow to Singapore where it is used in the production of renewable diesel.

In 2011, Australia imposed anti-dumping and countervailing duties on imports of biodiesel from the United States. The duties were imposed mainly due to the U.S. federal tax credit of US$1/gallon. In April 2016, the Australian government announced the termination of its antidumping measure applying to biodiesel imported from the United States (see link), however, U.S. shipments have not resumed. Australian imports of biodiesel by country are shown in Table 9.

*Table 8: Selected biodiesel production facilities in Australia (ML), 2017*

| Biodiesel plant | Location | Capacity | Feedstock | Production start |
|---|---|---|---|---|
| Australian Renewable Fuels (ARF) Largs Bay | South Australia | 45 | Tallow, used cooking oil | 2006 (closed 2016) |
| Australian Renewable Fuels (ARF) Picton | Western Australia | 45 | Tallow, used cooking oil | 2006 (closed 2016) |
| Biodiesel Industries Australia (BIA) | New South Wales | 20 | Used cooking oil, vegetable oil | 2003 |
| Australian Renewable Fuels (ARF) Barnawartha | Victoria | 60 | Tallow, used cooking oil | 2006 (closed 2016) |
| Ecotech Biodiesel | Queensland | 30 | Tallow, used cooking oil | 2006 |
| Smorgon Fuels Biomax Plant | Victoria | 100 | Tallow, Canola oil and Juncea oil | 2005 (now closed) |
| Macquarie Oil | Tasmania | 15 | Poppy oil, waste vegetable oil | 2008 |
| Territory Biofuels | Northern Territory | 140 | Palm oil, Tallow, used cooking oil | closed in 2009 |

*Note:* Details of production by plant are not available.
*Source*: Biofuels Association of Australia and Post estimates.

*Table 9: Australian imports of biodiesel by country, 2010-2016 ('000 liters)*

| Country | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Singapore* | 858 | 39,741 | 209,583 | 139,355 | 0 |
| Argentina | 0 | 28,604 | 32,189 | 4,748 | 0 |
| Indonesia | 15,488 | 28,339 | 116,956 | 6,084 | 686 |
| United States | 0 | 11,352 | 0 | 1,105 | 1 |
| Canada | 5,018 | 5,482 | 1,057 | 0 | 0 |
| Other | 46 | 4,185 | 10,980 | 8,128 | 82 |
| Total | 21,410 | 117,703 | 370,765 | 159,420 | 769 |

*Note*: (a) Biodiesel and mixtures thereof, not containing less than 70 percent by weight of petroleum oils or oils obtained from bituminous materials (Tariff code: 382600). *Includes 21.4 ML of renewable diesel in 2013, and possibly some in following years.
*Source*: Global Trade Atlas.

## Production, Supply and Distribution

*Table 10: The Australian Biodiesel Industry, 2009-2019*

| Biodiesel (Million Liters) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Calendar Year | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** |
| **Beginning Stocks** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Production** | 85 | 85 | 90 | 114 | 114 | 150 | 130 | 100 | 40 | 40 | 40 |
| **Imports*** | 11 | 9 | 25 | 21 | 118 | 371 | 159 | 1 | 0 | 0 | 0 |
| **Exports** | 0 | 0 | 0 | 10 | 20 | 20 | 10 | 0 | 0 | 0 | 0 |
| **Consumption*** | 96 | 94 | 115 | 125 | 212 | 501 | 279 | 101 | 40 | 40 | 40 |
| **Ending Stocks** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Production Capacity (Million Liters)** | | | | | | | | | | | |
| Number of Biorefineries | 8 | 6 | 6 | 7 | 7 | 8 | 8 | 5 | 3 | 3 | 3 |
| Nameplate Capacity | 380 | 380 | 380 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Capacity Use (%) | 22.4% | 22.4% | 23.7% | 28.5% | 28.5% | 37.5% | 32.5% | 25.0% | 10.0% | 10.0% | 10.0% |
| **Feedstock Use for Fuel (1,000 MT)** | | | | | | | | | | | |
| Tallow | 42 | 42 | 40 | 65 | 65 | 60 | 50 | 46 | 16 | 16 | 16 |
| Used cooking oil | 39 | 39 | 45 | 45 | 45 | 85 | 75 | 50 | 22 | 22 | 22 |
| **Market Penetration (Million Liters)** | | | | | | | | | | | |
| Biodiesel | 96 | 94 | 115 | 125 | 212 | 501 | 279 | 101 | 40 | 40 | 40 |
| Diesel | 19,500 | 20,000 | 20,061 | 21,643 | 22,631 | 23,081 | 23,619 | 23,866 | 24,000 | 24,000 | 24,000 |
| Blend Rate (%) | 0.5% | 0.5% | 0.6% | 0.6% | 0.9% | 2.2% | 1.2% | 0.4% | 0.2% | 0.2% | 0.2% |
| | | | | | | | | | | | |

*Note*: (a) Production statistics for biodiesel were revised using National Greenhouse and Energy Reporting Scheme data which captures more production than the Production Grants Scheme (excise rebates); (b): A small volume of renewable diesel (HVO type) was reportedly imported and consumed in 2013; (c) Nameplate capacity refers to the intended full load production output of all facilities after accounting for repairs and maintenance, and includes all facilities in full operation as well as partially idled or shutdown but not dismantled.
*Source*: Post estimates based on information from industry and government contacts.

## VI. ADVANCED BIOFUELS

### Overview

There is no commonly agreed upon set of criteria used to define advanced biofuels. In this report, second generation or advanced biofuels include cellulosic ethanol, butanol, methanol, and dimethyl ether (DME), Fischer-Tropsch diesel or hydro-treated lipids (HVO), other drop-in fuels, and biofuels made from algae. Second generation biofuels are commonly agreed to be biofuels not made using the traditional, long-standing processes of sugar and starch fermentation (ethanol) and esterification whereby glycerin is separated from plant and animal lipids (biodiesel).

There have been a number of research and trial projects in Australia on second generation and advanced biofuels using non-traditional feedstocks including lignocellulosic feedstocks. The Oil Mallee project for example used Mallee eucalypts to produce eucalyptus oil, activated carbon (biochar), and bioenergy in a one kW integrated wood processing demonstration plant. Other feedstocks under development have included Indian mustard seeds (Western Australia), *Pongamia pinnata* trees (Queensland, Western Australia), *Moring oleifera* (Western Australia) and algae (Queensland, South Australia, Victoria). The Australian Renewable Energy Agency provided funding to projects developing advanced biofuel technologies.

### Biofuel and Sustainable Aviation Fuel (SAF)

Traditional aviation fuel accounts for around 30 percent of the operating costs of the major airlines in Australia and this share has increased significantly over the last decade. The airline industry has encouraged the development and use of biofuel as a sustainable aviation fuel (SAF) to reduce greenhouse gas emissions and lower dependence on volatile oil prices and build supply of competitively-priced biofuels. A 2011 study by the Commonwealth Scientific and Industrial Organisation (CSIRO), supported by Boeing, Airbus, Qantas and Virgin, found that a sustainable aviation fuels industry could be developed and would decrease greenhouse gases by almost 20 percent in the aviation sector. In 2012, Qantas operated Australia's first commercial SAF flight from Sydney to Adelaide with a 50 percent blend of SAF with traditional jet fuel in one engine.

The Roadmap Report found that by year 2020, a 5 percent bio-derived jet fuel share could be possible in Australia and New Zealand, expanding to 40 percent by 2050. Ongoing research aims to develop competitive "drop-in" advanced bio-jet fuels compatible with existing engines, infrastructure and existing supply chains. The industry has recognized that biofuels represent an important opportunity to reduce aviation emissions, but the price of aviation biofuels has not yet become commercially viable, especially in a period of low international oil prices.

### Advanced Biofuel Plant in Queensland

In March 2016, Southern Oil Refining company, an oil recycling company, committed to build an A$16 million biofuel pilot plant in Australia. The facility, called the Northern Oil Advanced Biofuels Pilot Plant, has now been built in Gladstone, Queensland and produces biodiesel derived from sugarcane bagasse. The pilot plant is expected to be operational later in 2018 and will aim to produce fuel within three years for use in field trials by the U.S. and Australian navies. There are plans to eventually expand the plant into an A$150 million commercial-scale refinery with a capacity of 200 ML of advanced biofuel a year. The Queensland State government has provided a grant to cover part of the cost of the plant.

### U.S.-Australia Cooperation on Biofuels

Under a 2012 U.S.-Australia *Statement of Cooperation for the Research and Use of Alternative Fuels*, Australia and the United States agreed to exchange information about policies, programs, projects, research results and publications, and to conduct joint studies in areas such as fuel sources and environmental impacts.

The Great Green Fleet initiative of the U.S. Department of the Navy and the U.S. Department of Agriculture aims to make alternative fuel blends a regular part of the military's bulk operational fuel supply. In 2012, the Secretary of the U.S. Navy established a goal that by 2020, half of the Department of Navy's energy would come from alternative energy sources. One goal of this policy is to demonstrate the viability of advanced alternative fuels as a substitute for petroleum and to increase energy security.

In May 2014, the Royal Australian Navy (RAN) confirmed plans to transform its existing fleet of naval vessels and aircraft into bio-fuel capable by 2020. This decision is in line with the U.S. Navy's plans to convert its own fleet using at least a 50-50 fuel blend. Australia has also been offered access to the alternative fuel technology, which is currently being developed by the U.S. military. In total, the RAN is planning to make fifty vessels and aircraft compatible with alternative fuels. In June 2017, discussions were held in Queensland with the procurement branch of the U.S. Navy and management of the Gladstone biofuels pilot plant to see if fuel produced by the plant would be compatible with needs of the U.S. naval fleet and navy ships visiting the port. Over 2018, further discussions have continued to further U.S.-Australia cooperation on biofuels.

## VII. BIOMASS FOR HEAT AND POWER

Bioenergy is derived from biomass to generate electricity and heat or to produce liquid fuels for transport. Biomass is any organic matter of recently living plant or animal origin. It is available in many forms such as agricultural products, forestry products, municipal and other waste. Traditionally, woody biomass has been used for bioenergy; however more recent technologies have expanded the potential resources to include agricultural residues, oil seeds, and algae. In 2017, bioenergy accounted for 1.4 percent of Australia's electricity production, and 8.9 percent of renewable electricity production.

While overall energy generation and fuel use is dominated by fossil fuels, especially coal, petroleum and gas, bioenergy is one of the largest contributors to Australia's renewable energy production. Energy from biomass is derived from five separate energy sources: garbage, wood, waste, landfill gases, and alcohol fuels. Most biomass uses incineration to generate power. Biomass generally includes plant or animal matter used for the production of fiber or chemicals, and may also include biodegradable wastes that can be burnt as fuel. Biomass can be converted to energy in many different ways, including direct combustion, gasification, combined heat and power (CHP), anaerobic digestion and aerobic digestion.

In 2017, biofuels accounted for around one half of one percent of Australia's fuel consumption. The bioenergy industry uses a range of biomass resources including: bagasse, which remains after sugar has been extracted from sugarcane; landfill gas, wood waste and black liquor, energy crops, agricultural products and municipal solid waste. In 2017, there were around 400 accredited renewable energy power stations with over 100 accredited bioenergy power stations.

Australia's sugar industry produces considerable renewable energy (electricity and steam) from bagasse, which is the leading source of renewable electricity generation. A number of agencies in Australia are currently researching whether sugarcane trash and bagasse can be converted to biogas and upgraded to biomethane for use in sugarcane farming and transportation. Solids from biogas production could then be converted via hydrothermal

liquefaction to biofuels and chemicals.

Wood energy is derived both from the direct use of harvested wood as a fuel and from wood waste streams. The largest source of energy from wood is pulping liquor or "black liquor," which is a waste product from the industrial processes of the pulp, paper, and paperboard industry. Australia burns an estimated five million MT of firewood per year. A range of woody biomass is currently commercially used to generate power. These are typically densely planted, high yielding varieties of poplar, willow, and eucalyptus that regenerate quickly after harvesting via coppicing (shoots from the stumps of trees).

The heat component of industrial cogeneration (such as alongside sugar mills) and dedicated industrial thermal energy are not supported by a specific mandatory target or Renewable Energy Certificates (RECs) in Australia. Residues from forests and wood processing and organic waste streams are relatively untapped resources for heat and power generation in Australia. Wood residues include primary waste from forestry such as cleared bark and sawn branches as well as pulp logs. Secondary residues from sawmills include chips, sawdust and shavings. These residues are generally abundant in the southern and eastern coasts, and in south western WA, with supply being available year round. There have been a number of proposals to use wood waste for biofuels, although none are yet commercially viable.

## VIII. NOTES ON STATISTICAL DATA

Post notes that there are no comprehensive statistical series provided by industry or government that organize the picture on country-wide biofuel production, consumption, trade, and stocks. This report builds annual supply/demand balances using available sources such as excise rebate statistics, industry statistics on plant capacity and greenhouse gas emissions estimates by the Department of the Environment. Details of Australian government policies on renewable energy and biofuels were sourced from the Department of Industry, the Australian Taxation Office and the Australian Renewable Energy Agency (ARENA). Australian Budget papers and explanatory memoranda provided details of actual legislation that affects the biofuel industry and expected changes to this legislative and regulatory framework.

Data on the production of biofuels in Australia was estimated by Post based on information from a range of sources, including from the Department of Industry and the Australian Taxation Office. Until 2014, the excise rebate provided an estimate of production which has been since supplemented by data from the Australian National Greenhouse and Energy Reporting Scheme and the Biofuels Association of Australia. There are a number of reports on possible production of advanced biofuels in Australia including the recent Qantas/Shell (2013) report and the CSIRO (2011) and LEK Advanced Biofuels Study (2011).

Trade statistics were sourced from the Australian Bureau of Statistics through the online Global Trade Atlas, a product of IHS Markit. Statistics on energy use in Australia were sourced from a variety of sources including the Bureau of Resources and Energy Economics (BREE)'s 2015 report on Australian energy statistics. Reports by the NSW and Queensland governments on biofuels and by the Australian Competition and Consumer Commission on its monitoring of the Australian petroleum industry were also reviewed.

In 2018, this report utilized publications by the Australian Department of Energy and the Environment and its related agencies, such as the Australian Energy Market Commission (AEMC), the Australian Energy Regulator (AER), the Australian Renewable Energy Agency (ARENA), the Clean Energy Finance Corporation (CEFC), and the Clean Energy Regulator (CER). It also reviewed publications of the NSW and Queensland governments in relation to the state's biofuels policies. Statistical publications from the Australian Department of Energy were also used. The September 2018 Resources and Energy Update of the Department of Industry contains the Office of the Chief Economist's forecasts for the value, volume and price of Australia's major resources and energy commodity exports.