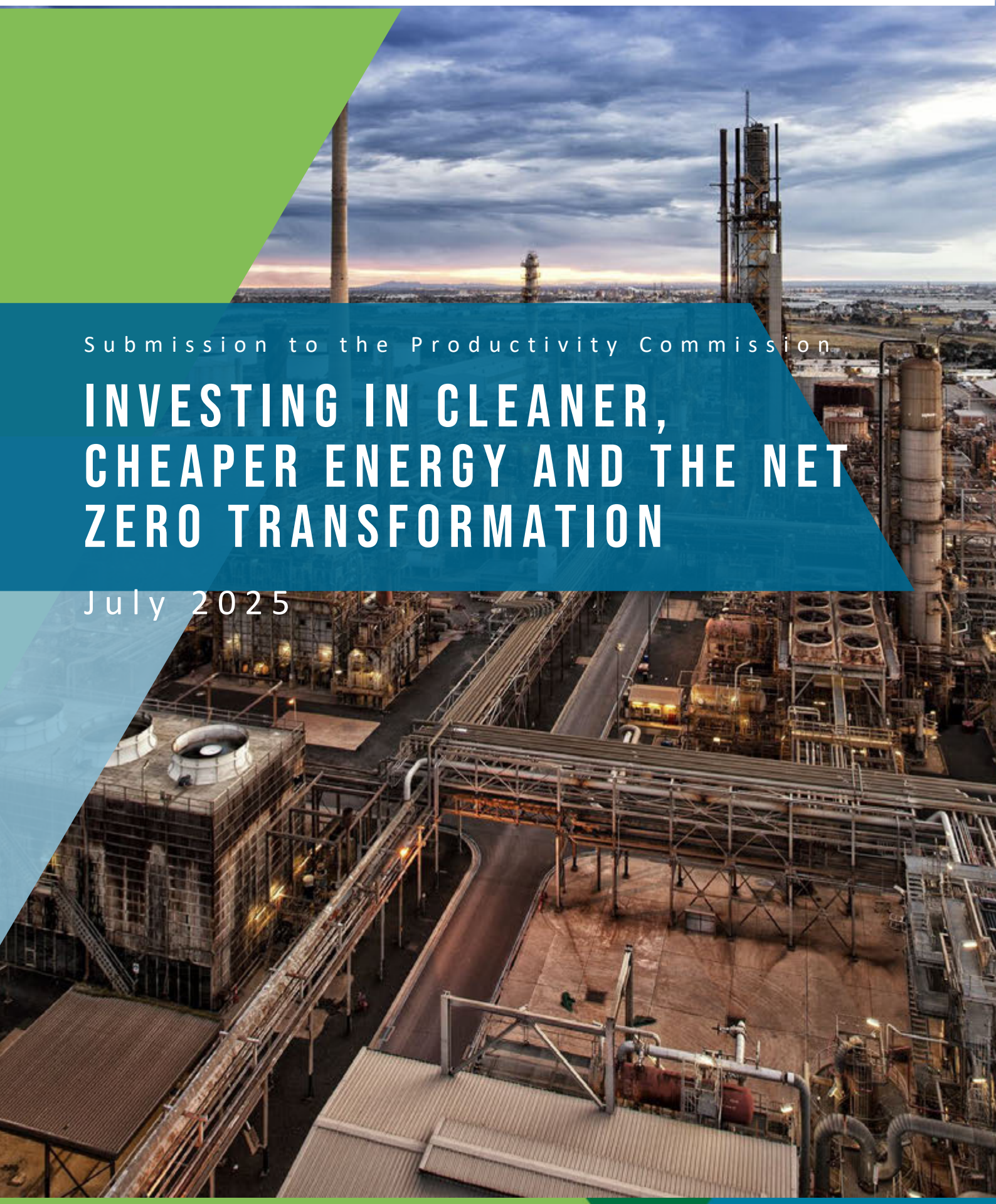
Australian Institute of Petroleum



Submission to the Productivity Commission

INVESTING IN CLEANER, CHEAPER ENERGY AND THE NET ZERO TRANSFORMATION

July 2025

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EXECUTIVE SUMMARY

AIP members supply almost 90 per cent of the 60 billion litres of liquid fuels (petrol, diesel, jet fuel) used in Australia.

Liquid fuels provide more than half of Australia's final energy needs. It is not surprising then that these fuels are also a major source of greenhouse gas emissions, accounting for 31 per cent of Australia's emissions in 2024. By 2030, emissions from liquid fuels are expected to be even higher (41 per cent of Australia's emissions).

Liquid fuels are used mostly in the transport sector. Since 2005, transport emissions have increased by almost 22 per cent to be higher than in any other sector, except electricity. Emissions are still rising (up 1.9 per cent in 2024).

Reversing the steady growth of emissions from transport is essential to achieving Australia's 2030 target and to make a higher target for 2035 feasible.

To date, policy has been focused on spurring the uptake of electric passenger vehicles and developing hydrogen as an alternative (post-2030) fuel. These policies are expected to have a modest impact on emissions over the next five to ten years. The official assessment is that transport emissions will fall by 4 per cent by 2030 and by 13 per cent by 2035 from 2025 levels.

On current policies, nearly all abatement in the transport sector before 2040 is expected to come from the National Vehicle Efficiency Standard (NVES) accelerating the uptake of new, lower emissions vehicles.

Since 2022, the number of hybrid and battery electric vehicles in Australia has more than doubled to over 900,000 vehicles. As impressive as that is, hybrid and battery electric vehicles represent only 4 per cent of the vehicle fleet and about 22 per cent of new vehicle sales.

Australia needs complementary policies to reduce emissions from the 96 per cent of vehicles which are *not* battery electric or hybrid vehicles. These vehicles – and the million or so new internal combustion engine vehicles added to the fleet every year - will be in use for at least another decade.

Despite substantial policy support, hydrogen has uncertain prospects as a commercial fuel in Australia. Investors in hydrogen projects, including AIP members, face daunting technology and market challenges. Government projections assume that hydrogen will not lower emissions before 2030 and will only account for 5 Mt of abatement in 2040.

Transport is only one of the 'hard to abate' sectors using liquid fuels. Around a third of emissions from liquid fuels occurs in other sectors such as mining and agriculture.

The most promising path to cut emissions from liquid fuels in all sectors is not replacing expensive, long-lived assets such as vehicles and engines. Changing to low carbon fuels is cheaper – and quicker - than changing engines.

Renewable fuels are produced from biogenic feedstocks (e.g. canola, used cooking oil, tallow, agricultural and forestry waste, bagasse) rather than crude oil. Emissions from renewable fuels can be as much as 80 per cent lower than from fossil fuels. Renewable fuels are 'drop-in' fuels which can be used safely in nearly all the vehicles, engines and equipment powered by fossil fuels today. Low carbon fuels can also be delivered through existing fuel infrastructure.

Australia has abundant feedstocks to produce renewable fuels. Australia is already a major feedstock exporter (Australia is the world's largest exporter of tallow).

AIP members are leading investors in renewable fuels. Ampol and Viva Energy are looking to use (via 'co-processing') biogenic feedstocks at their refineries to produce sustainable aviation fuel (SAF) and renewable diesel (RD). Ampol and bp are developing plans to establish new renewable fuels manufacturing plants at Lytton and Kwinana. These two greenfield projects could produce up to 1 billion litres of renewable fuels a year. AIP members are also importing relatively small volumes of renewable fuels to support their customers test and develop the local market.

Unfortunately, there is muted demand for low carbon fuels in Australia. At this stage, the higher production costs of renewable diesel and sustainable aviation fuel deter price-sensitive customers. In the 2024-25 Budget, the federal government recognised the need for policy to stimulate demand: a cost-benefit analysis of possible demand-side measures will commence in 2025.

A demand-side measure is essential to developing an Australian market for low carbon fuels. AIP believes that a low carbon fuel standard is an efficient and equitable way to increase the uptake of renewable fuels and support related initiatives (e.g. EV charging) to cut emissions. Such fuel standards operate in several US states (California has had a low carbon fuel standard since 2011), cutting the emissions-intensity of fuels used in those jurisdictions. The model is a proven success.

A fuel standard will take time to design and implement; Australia could start with a volumetric SAF mandate to support early projects and prevent the loss of feedstocks to export markets. A mandate could later be rolled into the fuel standard.

AIP notes that the Productivity Commission recommended in 2023 changing the Safeguard Mechanism to make wholesale fuel suppliers liable for the Scope 3 emissions of their products. This would be a major change to the Safeguard Mechanism with, presumably, implications, now or in the future, for all covered facilities. A stand-alone low carbon fuel standard is a simpler way to achieve the intended results than redesigning the Safeguard Mechanism.

The advantages of a low carbon fuel standard include:

- setting a price or penalty for more emissions-intensive fuels
- creating the assured market demand for renewable fuels which is essential for securing investment in local production and imported supply
- technology neutrality which allows fuel suppliers to innovate and respond to shifting market preferences
- stimulating least cost abatement through competition in the production and delivery of a diverse range of fuels.

A low carbon fuel standard requires enabling policies. The Guarantee of Origin scheme will need to set as soon as possible a methodology for lifecycle analysis and default emissions factors for feedstock/fuel combinations. A government decision on production incentives for low carbon fuels will help make the case for investment in local production.

RENEWABLE FUELS ARE AUSTRALIA'S BEST OPPORTUNITY FOR EARLY, LARGE SCALE, COST-EFFECTIVE ABATEMENT

BACKGROUND

AIP presents this submission on behalf of its core member companies:

- Ampol Limited
- BP Australia Pty Ltd
- Mobil Oil Australia Pty Ltd
- Viva Energy Australia Pty Ltd.

AIP member companies operate across the liquid fuels supply chain, including importing crude oil and petroleum products, refining, storing, distributing, marketing and retailing fuel. Underpinning this supply chain is major, ongoing industry investment in infrastructure. Over the last decade, AIP member companies have invested more than $10 billion to maintain reliable fuel supply for Australians.

AIP members are working to reduce greenhouse gas emissions from their operations and are offering their customers a range of lower carbon choices such as renewable diesel and sustainable aviation fuel. All AIP members are leading market trials of renewable diesel, with more than 3 million litres already sold to participating business customers. In February this year, Viva Energy imported the largest shipment of renewable diesel (10 million litres) into the country for use by Rio Tinto in their iron ore operations in the Pilbara. In May this year, Ampol imported the largest to date consignment (1.7 million litres) of sustainable aviation fuel (SAF) for use in Australia. Viva Energy is also trialling SAF with Virgin Australia for regional flights from Prosperine. bp and BHP have trialled trialling renewable diesel to cut emissions from iron ore operations in Western Australia.

Members are investigating the opportunities to produce low carbon fuels in Australia, including co-processing waste and biogenic feedstocks at established refineries as well as major new production facilities slated for Kwinana and Lytton. Early-stage co-processing at Geelong refinery could deliver 50 million litres of renewable diesel blend per annum. Bp's Kwinana Energy Hub project would produce 567 million litres of sustainable aviation fuel. Ampol's Lytton project would produce 476 million litres of renewable diesel and SAF.

AIP welcomes recent announcements from the Australian Government supporting renewable fuels, including:

- possible supply-side support under the *Future Made in Australia* program
- a cost-benefit assessment of possible demand-side measures, commencing in 2025
- $250 million through ARENA for pre-commercial innovation, demonstration and deployment of low carbon fuels
- the enactment of a Renewable Diesel Fuel Quality standard under the *Fuel Quality Standards Act 2000*
- development of a national feedstock strategy.

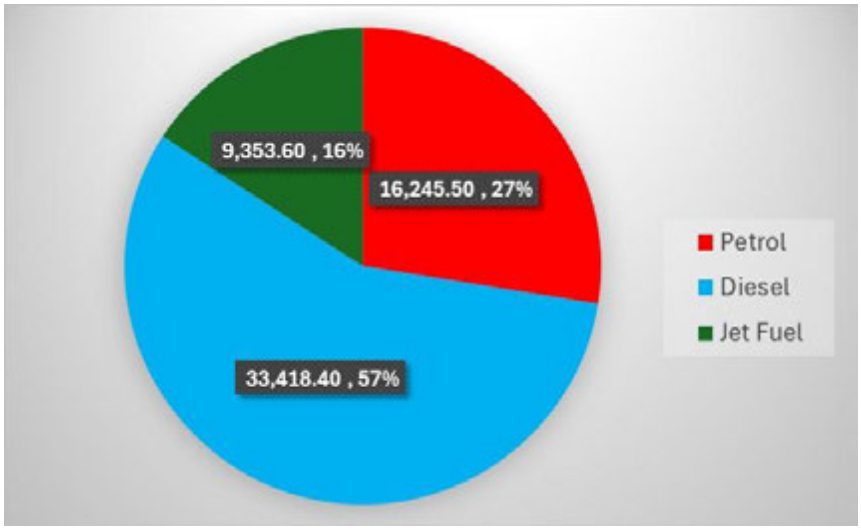
The federal government will soon decide Australia's 2035 emissions target. Any target – ambitious, modest or otherwise – will not be credible or feasible without cutting emissions from liquid fuels. Immediate action is needed in 2025 to establish the conditions for a growing, renewable fuels market in Australia. The initiatives announced in 2024 will need to be implemented as soon as possible to allow industry investment in production, products and supply chains.

THE CHALLENGE

While public and policy attention has usually focused on decarbonising electricity supply, Australia faces an even greater challenge reducing emissions from other 'hard-to-abate' sources of emissions. The most important of these sources is liquid fuels – petrol, diesel and jet fuel.

Liquid fuels account for about 55 per cent of final energy consumption in Australia (electricity accounts for just 22 per cent). Australia uses 60 billion litres of liquid fuels a year (figure one).

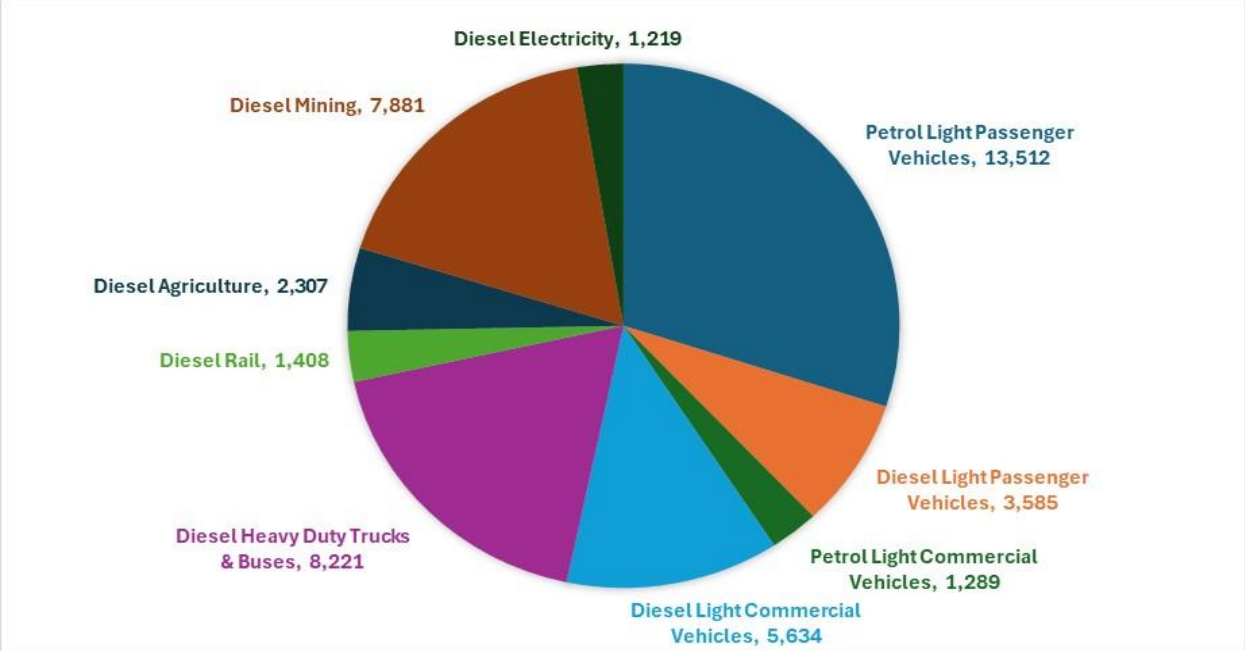
Figure one: Liquid Fuel Consumption 2024



Source: Australian Petroleum Statistics, Commonwealth of Australia 2025.

While fuel use is, naturally, concentrated in the transport sector, around a third of use occurs in other sectors, in particular mining and agriculture (figure two). Fuels – especially diesel - are used in many applications, from remote power generation to industrial equipment.

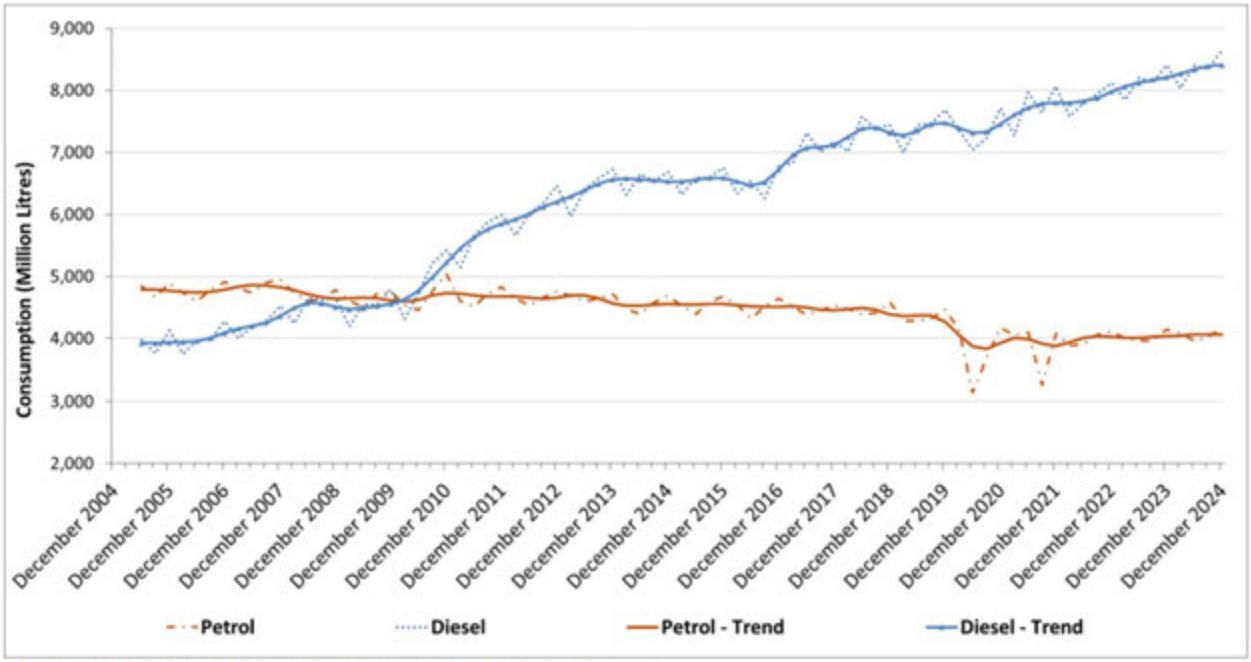
Figure two: Petrol and diesel use in 2022-23 (Million Litres)



Sources: *National* Greenhouse Accounts 2023: Activity Tables, Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW 2025; Department of Climate Change, Energy, the Environment and Water, Australian Energy Statistics, Table F, August 2024.

Diesel is used widely across the economy. Diesel sales have doubled over the last twenty years (figure three).

Figure three: Petrol and diesel use 2004-2024



Note: Data on petrol and diesel consumption is available from June 2005.
Source: Department of Climate Change, Energy, the Environment and Water

Australia's reliance on liquid fuels will not be changing quickly (figure four).

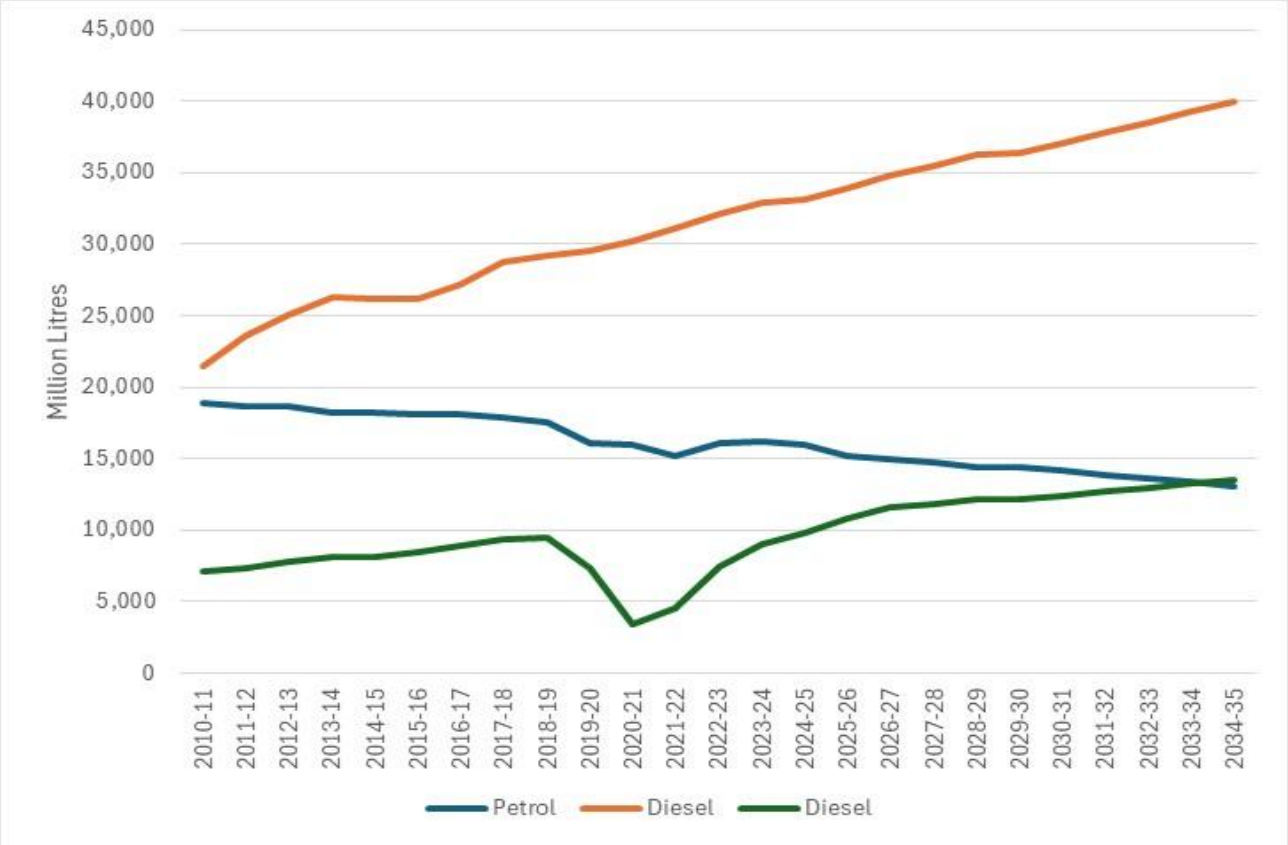
Petrol use appears to have peaked, due in part to improved energy efficiency, the increasing use of electric vehicles and the growing popularity of diesel light commercial vehicles. Nevertheless, road petrol use increased by 1.2 per cent in 2024.

Diesel and jet fuel are another matter. In 2024, consumption of road diesel and jet fuel set new records, up by 2.4 per cent and 4 per cent respectively.

The demand for diesel is expected to rise steadily over the next decade, driven by increasing business, freight and industrial uses. Diesel vehicles dominate the light commercial vehicle segment (76 per cent of light commercial vehicles are diesel). Australia's freight and logistics industry is powered by diesel (98 per cent of trucks use diesel). Australia has a truck fleet of more than 750,000 vehicles; fewer than 900 are battery electric or hybrid vehicles.

Demand for jet fuel, both for domestic and international aviation, is also expected to rise. The aviation industry has largely recovered from the COVID years, with international and domestic travel expected to return to 2019 levels by 2026 and then continuing to rise by returning to pre-COVID trend growth.

Figure four: AIP projections of fuel demand



Source: Australian Petroleum Statistics, Commonwealth of Australia 2025, and AIP analysis.

Our demand projections to 2030 are consistent with the 2025 forecasts from the Department of Industry, Science and Resources. They are also consistent with Wood Mackenzie (2024) which has forecast that demand for diesel will continue to grow until the mid-2030s, while demand for petrol stagnates. The projected increase in jet fuel is consistent with the Australian Government's projections published in May 2024 (Australian Government The Treasury, 2024).

As demand for diesel and jet fuel rises, so will emissions from the combustion of these fuels (figure five). Liquid fuels are energy dense – a gigajoule of energy can be extracted from just 29 litres of petrol or 26 litres of diesel. However, combusting a gigajoule of these fuels also releases about 68-70 kilograms of CO_2-e in greenhouse gases. Altogether, including emissions from producing and processing these fuels, diesel and jet fuel release about 85 to 88 kilograms of CO_2-e in greenhouse gases per gigajoule.

Figure five: Emissions from the combustion of liquid fuels

Source: AIP analysis based on AIP projections of fuel demand.

The expected drop in emissions from petrol use is, of course, positive. However, on current trends, that drop is overshadowed by growing emissions from diesel and jet fuel. Since 2005, the benchmark year for Australia's 2030 emissions target, emissions from the transport sector have increased by almost 22 per cent. In 2024, transport emissions increased by 1.9 per cent, eliminating any gains achieved in other sectors (economy-wide emissions rose, slightly, during 2024).

Some of the forecast growth in fuel demand, and therefore emissions, may not occur as new policies take effect. The federal government will soon release its six Net Zero plans for various sectors of the economy, including transport, agriculture and land, and resources.

To date, the main policy change has been the introduction of the New Vehicle Efficiency Standard (NVES) which the government expects will reduce emissions from new passenger vehicles by more than 60 per cent and halve emissions from new light commercial vehicles by 2030.

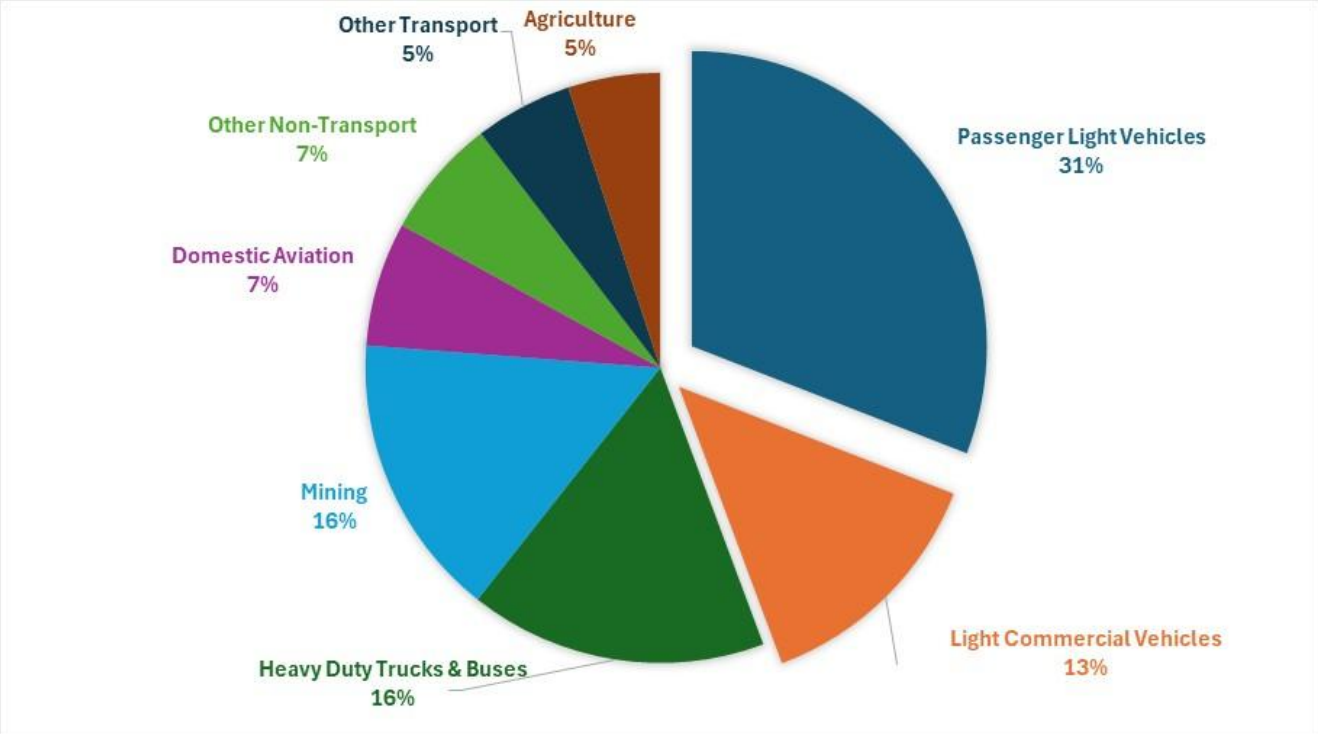
However, as the government recognises, improving the performance of new passenger and light commercial vehicles will not suddenly reduce emissions from the transport sector. The NVES is estimated to reduce emissions by 20 million tonnes by 2030 and 80 million tonnes by 2035; to put those estimates into perspective, the latest emissions projections indicate the transport sector will produce about 585 million tonnes of emissions (2025 to 2030) and about 530 million tonnes of

emissions (2030 to 2035). Put another way, the anticipated effect of current policies is 100 million tonnes of abatement over fifteen years, leaving cumulative emissions of about 1 billion tonnes.

As these estimates show, changing emissions by changing vehicles takes time. The vehicle fleet turns over slowly (the average working life of a passenger car is eleven years). For the foreseeable future, most new sales of passenger and light commercial vehicles will continue to be internal combustion engine models (78 per cent of new vehicle sales in 2024).

Accelerating the uptake of lower emissions passenger and light commercial vehicles will cut emissions from two segments of the market which produce about 44 per cent of emissions from the main liquid fuels (figure six) but will not affect the remaining 56 per cent.

Figure six: Percentage of CO_2-e emissions from the main liquid fuels by sector – 2022-23



Sources: *National Greenhouse Accounts 2023: Activity Tables, Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW 2025; Department of Climate Change, Energy, the Environment and Water, Australian Energy Statistics, Table F, August 2024*

As already noted, the expected abatement from the National Hydrogen Strategy, released September 2024, is modest and long-term. It is expected that, after 2030, hydrogen will slowly replace some use of fossil fuels in facilities covered under the Safeguard Mechanism, and in the passenger vehicle and road freight segments (the source of about 60 per cent of transport emissions). Abatement is projected to reach just 5 million tonnes in 2040.

In summary, while the latest projections forecast that emissions from the transport sector will decline gradually after 2025, these falls are small, slow and depend heavily on two new, untested policies – the NVES and the national hydrogen strategy. It is possible that emissions from the transport sector will prove more difficult to abate than forecast, given the strong, underlying demand for diesel and jet fuel. Assuming current policies achieve all the forecast abatement, liquid fuel use in the transport sector will account for an *increasing* share of Australia's emissions in the 2030s (an estimated 28 per cent of total emissions, up from almost 22 per cent today).

THE RENEWABLE FUELS OPPORTUNITY

As explained above, Australia's demand for liquid fuels is continuing to rise. Some Australians replacing their passenger cars with electric vehicles has not reversed this trend. Policy changes such as the NVES will put downward pressure on emissions growth in parts of the transport sector but much more is needed to achieve the scale of abatement to make a substantial 2035 emissions reduction target feasible and Net Zero in 2050.

Australia needs a broader range of complementary policies to reduce emissions from liquid fuels, not just in the transport sector but across the economy. The impending Net Zero sectoral plans will, hopefully, propose new policies to address this need.

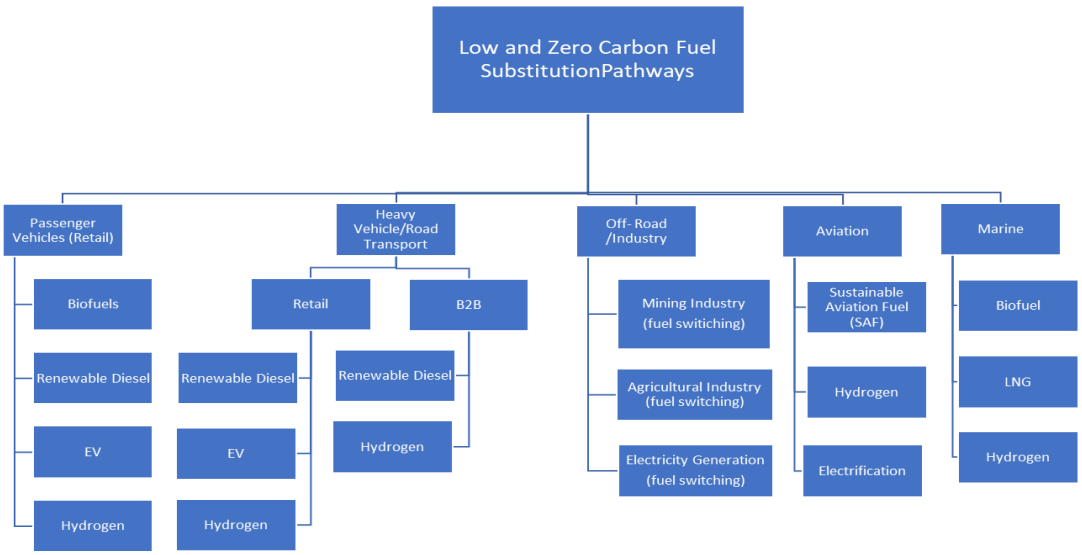
To date, policy has been focused on accelerating the switch to electric vehicles, with governments stimulating demand and funding charging infrastructure. These policies target less than half of the emissions from liquid fuels. The 'hard-to-abate' activities, such as heavy road freight, aviation, industrial uses and maritime transport, remain 'hard to abate'.

The next tranche of policies must tackle these major sources of emissions.

Australia can continue to use liquid fuels, continue to use the vehicles, plant and equipment powered by these fuels AND cut emissions from liquid fuels.

Australia can change the emissions-intensity of liquid fuels, using neat and blended renewable fuels instead of conventional fossil fuels. Renewable fuels can reduce emissions wherever liquid fossil fuels are used (figure seven). In many cases, renewable fuels are the only proven, at scale alternative to continuing use of fossil fuels. Substituting renewable fuels avoids the costs, delays and risks of replacing the huge investment Australia has made in liquid fuels infrastructure and supply chains.

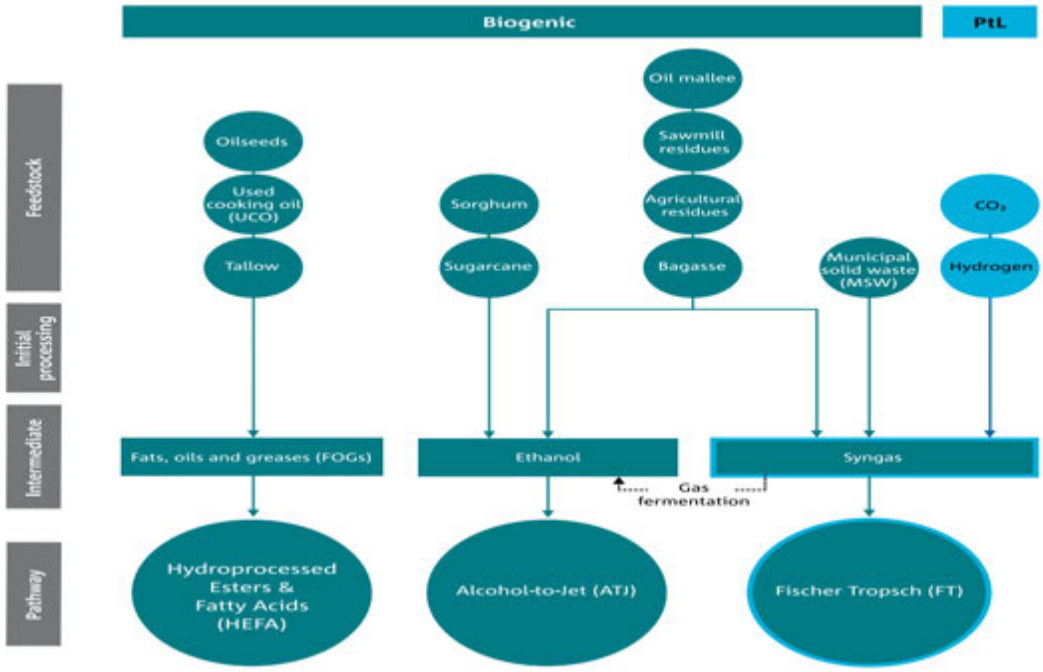
Figure seven: Opportunities for Fuel Substitution



Renewable fuels are typically produced from biogenic feedstocks through the hydro processed esters and fatty acids (HEFA) production process (figure eight), with other feedstocks and production pathways less developed as commercial options. The other production pathways will, undoubtedly,

mature and become more attractive in time. A wider range of commercial technologies will be essential in the medium-term to alleviate pressures on the supply of biogenic feedstocks.

Figure eight: feedstocks and fuels



Source: CSIRO (2023a, p. 15).

On a lifecycle basis, renewable fuels produce fewer emissions than fossil fuels (indicative values are shown in figure nine). The environmental benefit of using biogenic feedstocks rather than crude oil is that most of the emissions released by combustion can be 'zero-rated'. The crops and waste products used as feedstocks grow by absorbing carbon from the atmosphere, through photosynthesis; most of the carbon released on fuel combustion was 'captured' during the growth of the feedstock and can be netted out.

Figure nine: Emissions intensity of conventional and renewable fuels

Conventional fuel	Emissions intensity (kg CO_2-e/Gj)	Low carbon fuel alternative	Emissions intensity (kg CO_2-e/Gj)
Petrol	85.3	**E-10**	81
Diesel	88.1	**Renewable Diesel**	19.5
Jet fuel	88.3	**Sustainable Aviation Fuel**	19.5

Source: AIP analysis based on likely feedstocks used to produce low carbon fuels for sale in Australia and DCCEEW (2024) with the inclusion of scope 2 emissions for refined products. Note that international standards cap the renewable component of SAF to 50%; a 50% SAF blend would have an emissions-intensity of c.55 kg CO_2-e/Gj.

The precise emissions-intensity value of various feedstock/fuel combinations varies according to the international accounting model used. Some overseas carbon accounting schemes (e.g. the Greenhouse Gases, Regulated Emissions and Energy Use in Technologies or GREET) focus on direct emissions from the production, use and disposal of a product. Other schemes, such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), add indirect emissions from changes in land use. These schemes recognise that expanding renewable fuel production can lead to

land-clearing for feedstocks or replacement food crops, releasing stored carbon. Emissions from these induced land use changes should be calculated for a comprehensive estimate of all emissions – direct and indirect – released by production of the fuel.

The federal government has announced that the Guarantee of Origin Scheme originally intended for hydrogen and renewable electricity will be extended to low carbon fuels. It is possible that Australia will have a set of default emissions factors for renewable fuels produced from local feedstocks by 2026.

Renewable diesel and sustainable aviation fuel are 'drop-in' fuels which can replace conventional diesel and jet fuel in nearly all applications. Renewable diesel has its own fuel quality standard in Australia which is virtually identical to the conventional diesel standard (the main difference being a wider density range). It can be used neat but is usually blended with conventional diesel to provide a more affordable product for buyers. Sustainable aviation fuel is a blend of renewable and fossil fuels; international jet fuel standards limit the renewable fuel content to a maximum of 50 per cent.

Both fuels can be produced ('co-processed') in established refineries – around 40 refineries around the world are already co-processing lower carbon fuels - as well as produced at dedicated new facilities. Co-processing requires changes to the configuration of refineries and will usually reduce, slightly, production volumes. These costs can be more than offset by the advantage of avoiding the capital costs, delays and other risks involved in developing greenfield sites. As noted, AIP members are investigating both co-processing and the construction of new manufacturing facilities. Co-processing at Australia's two refineries could start with production up to about 100 million litres of RD and SAF a year.

The emissions benefit from substituting renewable diesel and sustainable aviation fuel for neat fossil fuels will depend on the feedstocks used and the blend rate of the final fuel. Renewable diesel has the advantage that it can be used neat while the SAF blend rate is capped at 50 per cent. Renewable diesel can be produced at slightly lower cost than SAF, all other things being equal, as SAF production involves additional processing steps.

The cost of abatement by renewable fuels

As with other, cleaner forms of energy, renewable fuels have higher production costs than fossil fuel equivalents. Feedstocks can account for up to 77 per cent of production costs. The costs of producing and processing biogenic feedstocks is significant, especially in the early days of industry development. Building a new supply chain takes time and investment. The result is a substantial price premium for renewable fuels.

Dependent on imported fuels and mainly imported crude oil for our liquid fuel needs, Australia is a price taker in the regional market for petrol, diesel and jet fuel. The same import parity pricing will apply to renewable fuels, whether locally produced or imported: Australian prices for renewable fuels will align with the prevailing regional prices – be that for the feedstocks or the end fuels. Like all fuels, these prices fluctuate, reflecting the supply-demand balance, the changing effects of public policy and, in the case of agricultural feedstocks, competing uses.

The same is true of prices for feedstocks. Spot prices for feedstocks vary widely, with used cooking oil from China recently at about US $1,000/tonne. Recent spot prices of SAF have fallen in a range of US $750 to $1,000/tonne (c.1250 litres) for 10 per cent and 30 per cent SAF blends. By comparison, the equivalent prices for diesel and jet fuel have been around US $600 to $620/tonne.

Figure 10 illustrates Singapore spot price premiums for renewable diesel and SAF blends compared to conventional equivalents. These numbers are just indicative. Spot prices are point-in-time numbers reflecting fluctuating factors including the supply-demand balance and prevailing feedstock prices. The estimated spot price premiums do not include all the cost components of the final retail price (e.g. shipping to Australia, wholesale and retail margins, and tax). These estimates are offered to impart a sense of the *possible* cost premiums for renewable fuels. Unfortunately, long-term contract prices are not readily available.

Figure 10: indicative Singapore spot price premiums on 5 June 2025

Blend Rate	RD (Class I (crops)) Price Premium (cpl)	RD (Class III (Tallow)) Price Premium (cpl)	SAF (Class II (used cooking oil)) Price Premium (cpl)
1%	1.4	1.7	1.6
2%	2.7	3.3	3.1
5%	6.8	8.3	7.8
10%	13.5	16.5	15.5

Sources: Argus Media, Reserve Bank of Australia and AIP analysis.

To estimate the marginal abatement cost for various feedstock and processing options, we have sourced Singapore product prices for diesel and jet fuel as well as low carbon fuels based on the most prospective Australian feedstocks (i.e. canola, used cooking oil and tallow). Details are provided in figure eleven below. Again, these estimates are just indicative, included to give a sense of possible abatement costs. The emissions-intensity estimates are taken from overseas data; Australian feedstocks, such as canola, are expected to have lower emissions-intensity.

Figure 11: estimated marginal cost of abatement for SAF and renewable diesel based on Singapore spot prices on 5 June 2025

Product	Feedstock	Price fob Singapore US$/tonne	Carbon Intensity of Feedstock g CO_2/MJ	Marginal Abatement Cost US$/tonne CO_2-e	Marginal Abatement Cost AUD$/tonne CO_2-e
Jet Fuel	Crude Oil	$617.79	88.8		
SAF (Class II)	Used Cooking Oil	$1881.78	18.4	$408.60	$629.89
Diesel (Gasoil 10 ppm)	Crude Oil	$599.78	88.3		
RD (Class I)	Canola	$1641.62	38.3	$480.33	$740.11
RD (Class II)	Used Cooking Oil	$1885.21	17.6	$419.12	$645.80
RD (Class III)	Tallow	$1872.39	16.8	$410.30	$632.20

Sources: Argus Media, Reserve Bank of Australia, DCCEEW (2024), and Yang & Yo (2025),

An Australian low carbon fuel standard would produce, over time, substantial abatement. Starting in 2027 with a baseline cut of 1 per cent and with additional 1 per cent reductions in each subsequent year, a low carbon fuel standard could yield almost 80 million tonnes of abatement over the eight years to 2034-35.

MARKET-ENABLING REFORMS

So far, this submission has outlined Australia's challenges in cutting emissions from liquid fuels and the untapped potential of renewable fuels to reduce emissions across the economy.

What is required to realise the abatement potential of renewable fuels?

Apart from modest sales of biodiesel and E-10, due largely to legacy state-based mandates and fuel excise discounts, the market for renewable fuels hardly exists in Australia. It is estimated that less than 14 million litres of renewable diesel and 2 million litres of sustainable aviation fuel have been sold in Australia.

In other countries, uptake of renewable fuels has been propelled by a mix of policies, including supply-side support (e.g. production subsidies, funding for R&D and early commercialisation) and demand-side programs (e.g. volumetric mandates for suppliers or retailers, regulated emissions-intensity obligations for suppliers). Supply-side measures have had various aims – stimulating an infant industry, attracting investment, de-risking projects and lowering production costs to improve the competitiveness of renewable fuels. Governments have also developed integrity systems to build market confidence in the environmental performance of fuels. All these measures have helped to develop feedstock and fuel production.

Countries have also used demand-side measures which, in various ways, require fuel suppliers and/or end-users to increase their sales/use of renewable fuels. The simplest approach has been volumetric mandates; for example, the European Union requires airlines to purchase modest volumes of sustainable aviation fuel.

In Australia, the federal government has foreshadowed a raft of supporting measures, including:

- possible production incentives under the *Future Made in Australia* program
- a cost-benefit assessment of possible demand-side measures, commencing in 2025
- $250 million through ARENA for pre-commercial innovation, demonstration and deployment of low carbon fuels
- the enactment of a Renewable Diesel standard under the *Fuel Quality Standards Act*
- development of a national food security strategy that, inter alia, will examine the potential to grow biofuel feedstocks

AIP believes the most important of these initiatives – implemented, proposed or possible – is the creation of an effective demand-side measure. Given the price premium between renewable and fossil fuels, renewable fuels will be, at best, a niche product unless policy creates demand.

A demand-side measure can take many forms:

- a volumetric target/mandate which require fuel suppliers/retailers to sell a set volume of renewable fuels.
- a public procurement target requiring government agencies (e.g. Defence) to purchase renewable fuels or require the use of renewable fuels in government contracts/projects
- a cap and trade scheme with an absolute emissions reduction target
- a cap and trade scheme with an emission-intensity target

Fuel mandates in Australia have had a chequered history, disappointing both would-be producers and governments seeking to reduce fuel prices and/or emissions.

As an abatement policy, mandates have been costly and delivered marginal benefits. The Australian Competition and Consumer Commission reported in November 2016 that the NSW ethanol mandate had reduced competition, reduced consumer choice and cost Sydney motorists about $75 million to $85 million in 2014-15. A 2016 study calculated that the New South Wales ethanol mandate produced abatement at a cost between $1,276 to $1,407 a tonne; put another way, the NSW mandate cost in the vicinity of $222 million to $245 million a year to reduce emissions by just 174,000 tonnes. In its Regulation of Australian Agriculture report (2016) the Productivity Commission recommended abolishing fuel mandates on the grounds "they deliver negligible environmental benefits and impose unnecessary costs on farmers and the community".

That said, there is a growing international consensus in favour of mandates requiring airlines to use sustainable aviation fuel. The International Civil Aviation Organization (ICAO) supports a 5 per cent reduction in emissions from international flights by 2030. The EU, the UK, Japan, Singapore, Indonesia, Malaysia and India are amongst the jurisdictions which have announced SAF mandates. The EU's ReFuelEU Aviation Regulation requires airlines to use 2 per cent SAF in 2025, rising to 6 per cent in 2030 and eventually 70 per cent in 2050. The UK's JetZero Strategy sets a 10 per cent SAF target for 2030. Japan has a 10 per cent SAF mandate for international flights.

While AIP agrees with the principle that the best way to achieve least-cost abatement is for countries to use a broad, whole-of-economy approach, there is a case for international aviation to be the exception. International aviation is, obviously, a global industry; a co-ordinated international approach will have efficiency benefits while different national regimes would risk distorting the market. Moreover, international aviation is also its own closed, accounting system. International flights do not count against nationally determined contributions. For these and other reasons, AIP sees merit in Australia adopting a SAF mandate aligned with emerging international practices.

Public procurement of renewable fuels could generate some early demand. To date, countries have tended to use public procurement to promote low and zero emission vehicles rather than fuel switching. In Australia, the Commonwealth Fleet Vehicle Selection Policy requires agencies to prefer low or zero emission vehicles, with a 2025 target of 75 per cent of new passenger vehicle orders being low and zero emission vehicles. The NSW Net Zero Government Operations Policy includes a target for purchasing electric vehicles. In the EU, the Green Public Procurement Guidelines (2023) include a voluntary set of criteria for agencies to consider when purchasing vehicles and related services, weighted in favour of hydrogen and fuel cell vehicles. The Biden administration's broader and more ambitious Federal Sustainability Plan (2021) set the goal of all federal vehicle purchases being zero emission vehicles by 2035. The plan included a general commitment to "buying products with a lower carbon footprint".

The third approach mentioned above is a 'cap and trade' scheme which limits (caps) the emissions which can be produced by participating entities, with penalties for parties which exceed their baseline and credits for parties which reduce their emissions below their baseline. Well-designed cap and trade schemes create effective carbon markets which can lead to least-coast abatement. The volume and cost of abatement from such schemes will depend on various factors, in particular the initial baselines set for entities, the availability or otherwise of lower-emissions technologies, and the trajectory for emissions reduction.

The fourth approach is a cap-and-trade scheme focused on reducing the emissions-intensity of liquid fuels. The obvious example in Australia is the Safeguard Mechanism which sets tailored emissions-

intensity benchmarks for all participating facilities and reduces those baselines each year by a fixed percentage (in most cases 4.9 per cent). Using an emissions-intensity benchmark allows businesses to expand their production without penalty if emissions-intensity remains under the benchmark or with penalties if the benchmark is exceeded.

A high-level comparison of the two different cap and trade schemas is provided in the figure below.

Figure 13: Cap & Trade Schemes Compared

Feature	Absolute Cap-and-Trade	Intensity-Based Cap-and-Trade
Key feature	Caps emissions from each participating firm.	Caps emissions per unit of output by each participating firm.
Environmental Impact	More likely to achieve a specific abatement target	May not reduce *total* emissions
Economic Impact	May constrain business growth, depending on how low the cap is, how quickly it is reduced, how ambitious is the trajectory, and the cost and availability of low emissions technology.	Less of a constraint on economic growth, if the cap declines at a rate which allows firms time to decarbonise their operations.
Risk of Carbon Leakage	Higher	Lower – firms can grow if they successfully reduce emissions-intensity
Administrative Complexity	Simpler to monitor and enforce	More complex – requires accurate output data and benchmarking
Market Signal	A strong price signal	Price signal can be diluted by output variability
Examples	EU ETS, California Cap-and-Trade	Australia's Safeguard Mechanism, Alberta's TIER

AIP's strong preference is a low carbon fuel standard targeting emissions-intensity, as operates in many overseas jurisdictions including California (2011), British Columbia (2008), Oregon (2009), Washington State (2021) and New Mexico (legislated in 2024 with introduction scheduled for 2026) (figure 11). In the US, a further eight states (Hawaii, Illinois, Massachusetts, Michigan, Minnesota, New Jersey, New York and Vermont) are considering introducing a low carbon fuel standard. There are reasonable prospects that New York, Massachusetts, Vermont and Hawaii will introduce schemes by 2027.

Figure 14: Low Carbon Fuel Standards

Jurisdiction	Target Reduction (%) 2030	Baseline Year	Status
California	20	2010	Implemented
Oregon	20	2010	Implemented
Washington	20 (2034)	2017	Implemented
New Mexico	20		Legislated with design to be settled
British Columbia	30	2010	Implemented

A low carbon fuel standard imposes an obligation on fuel suppliers to reduce the emissions-intensity of the fuel they sell.

Fuel suppliers can meet their obligations in a variety of ways. The most obvious is increasing the supply of renewable fuels into the market, replacing fossil fuels with neat renewable fuels and blended renewable/fossil fuels. This is a proven, quick and cost-effective way, using existing production and distribution channels, to cut emissions. A low carbon fuel standard can also promote abatement opportunities besides fuel switching, such as rolling out electric vehicle charging networks.

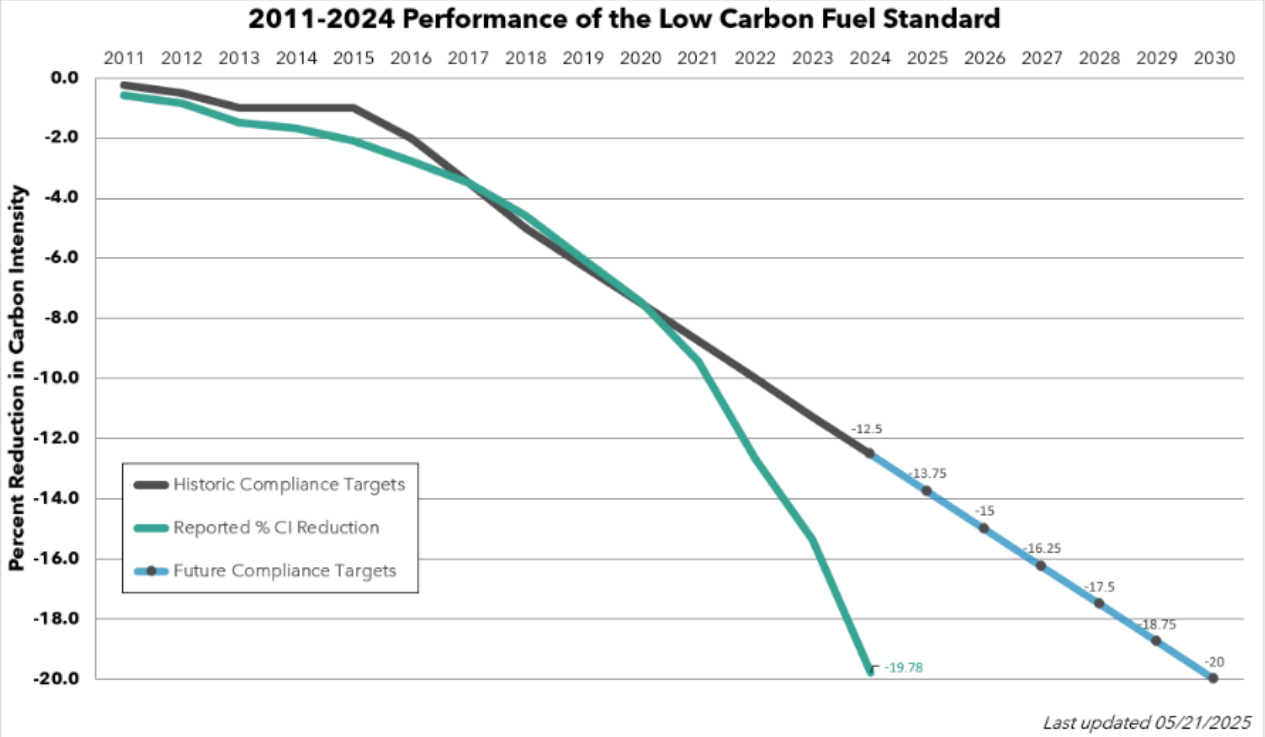
A low carbon fuel standard has many advantages:

- broad, cross-sectoral coverage capturing all uses of liquid fuels.
- flexibility, allowing suppliers to decide how to adjust their product mix to meet targets rather than being obliged to comply with prescriptive fuel mandates
- technology neutrality, with all fuels treated on a consistent basis (i.e. emissions-intensity)
- equity, allowing fuel suppliers to recover the costs of reducing emissions from all fuel users
- tailored trajectories which provide medium to long-term policy certainty and can be used to manage adjustment costs

The abatement potential of a low carbon fuel standard is evident in the case of California.

Since 2011, California has achieved a 20 per cent reduction in the emissions-intensity of the fuels used in the state, with most of that reduction occurring in the last five years. The original 2030 target of a 20 per cent reduction has now been lifted to a 30 per cent reduction. In Australia today, a 20 per cent reduction in the emissions-intensity of liquid fuels would mean annual abatement of almost 20 million tonnes.

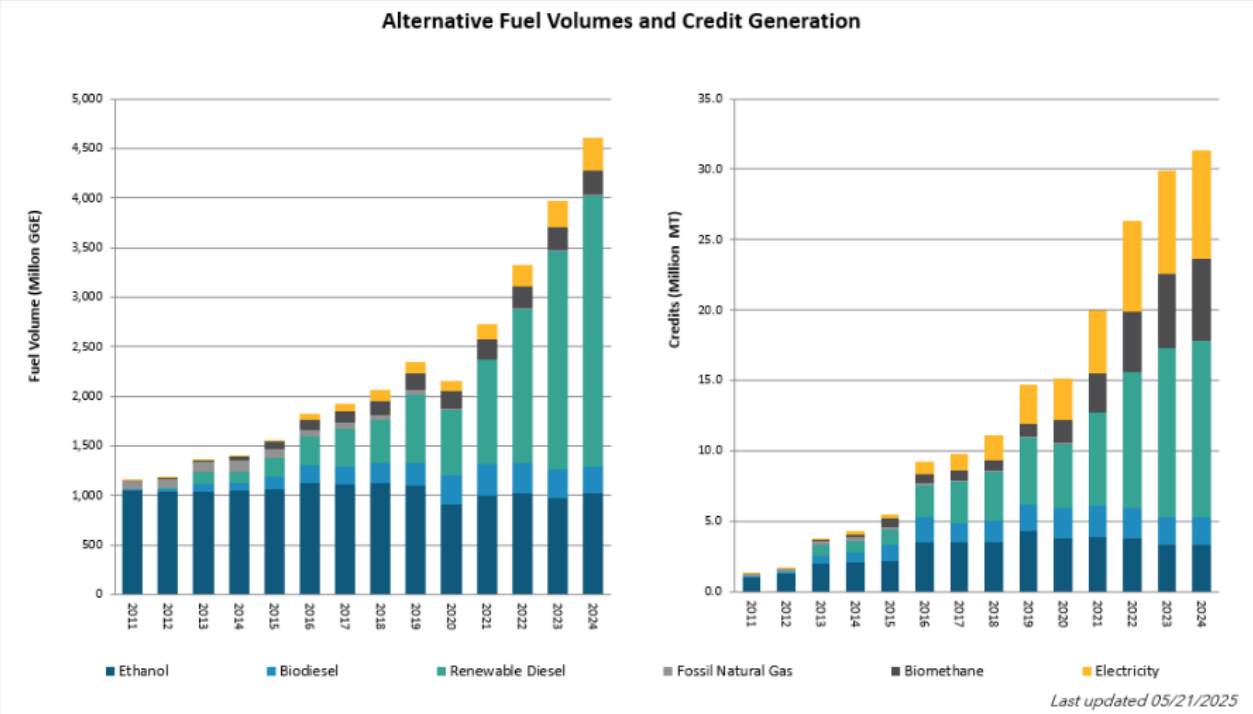
Figure 15: Emissions-intensity of fuel sales in California



Source: LCFS Data Dashboard | California Air Resources Board

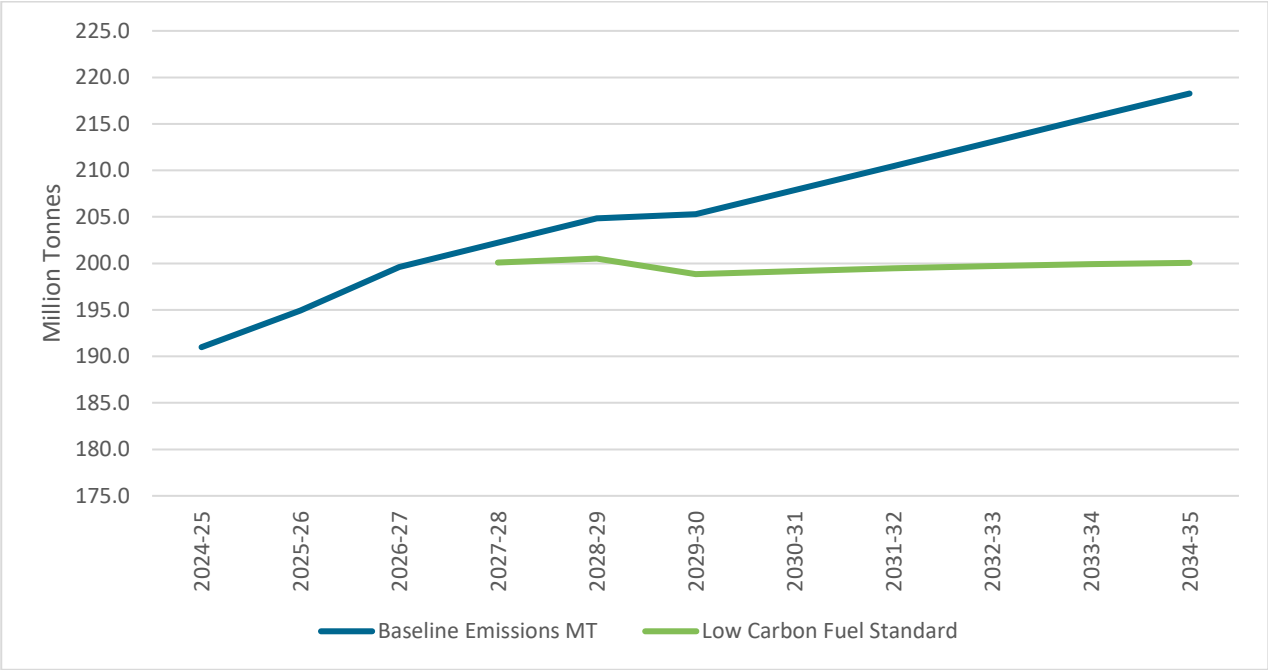
Over the life of the Californian standard, the mix of fuels has evolved in favour of cleaner fuels (figure 16). Ethanol dominated early sales but has been overtaken by renewable diesel which now easily accounts for the bulk of sales. As it offers much greater abatement than ethanol, renewable diesel receives a much larger share of the credits generated under the scheme.

Figure 16: Use of renewable fuels in California 2007-2024



An Australian low carbon fuel standard could produce, over time, similar, substantial reductions in emissions. Starting in 2027 with a baseline cut of 1 per cent and with additional 1 per cent reductions in each subsequent year, a low carbon fuel standard could yield almost 80 million tonnes of abatement over the eight years to 2034-35.

Figure 17: Scope 1, 2 and 3 emissions from the three main liquid fuels (CO2-e in Millions of Tonnes) under a baseline and a low carbon fuel scheme



Source: AIP analysis based on likely feedstocks used to produce low carbon fuels for sale in Australia and DCCEEW (2024) with the inclusion of scope 2 emissions for refined products.

An amended Safeguard Mechanism?

The Productivity Commission's 5-year productivity inquiry criticised sectoral policies, arguing in favour of "enduring, broad-based market mechanisms" which would create economy-wide incentives for abatement. AIP agrees in-principle that least-cost abatement is most likely to be achieved through such mechanisms, noting that a mechanism addressing liquid fuel use would cut across all sectors of the economy and capture about 31 per cent of Australia's emissions (the same as the Safeguard Mechanism today).

The Commission floated expanding the scope of the Safeguard Mechanism to cover more businesses, especially in the transport and electricity sectors. The Safeguard Mechanism captures about 31 per cent of Australia's emissions. Expanding the scope of the mechanism would compel more businesses to reduce the emissions-intensity of their production.

It was also proposed by the Commission that the Safeguard Mechanism should be changed to make wholesale fuel suppliers liable for their Scope 3 emissions. Over time, the Commission suggested, the Safeguard Mechanism should apply absolute emissions baselines (not emissions-intensity baselines) to these businesses.

The proposal to treat fuel suppliers differently from other covered facilities under the Safeguard Mechanism (i.e. making only those businesses liable for Scope 3 emissions and possibly applying absolute emissions benchmarks) was presumably inspired by the desire to avoid sectoral policies and use the Safeguard Mechanism as the leading "enduring, broad-based market mechanism", capturing suppliers of imported fuels as well as emissions from local fuel refining. However, this would seem to be more in appearance than in practice – in effect, two schemes would be created with a de facto sectoral scheme for some (fuel) businesses while most businesses continued under the existing arrangements.

Making fundamental changes to the Safeguard Mechanism for some but not all participating businesses seems inconsistent with the Commission's aspiration for broad-based, least-cost mechanisms. The suggested treatment of Scope 3 emissions is a contentious point, especially given the likely effects on Australian exporters (including wholesale fuel suppliers which export fuels to New Zealand and other regional markets). Another possible concern would be the impact on local refineries. The longstanding principle of carbon accounting is that businesses are responsible for their own Scope 1 emissions, not to make these emissions the liability of others. For these reasons, businesses under the Safeguard Mechanism are likely to be concerned by the precedents set by these proposals.

AIP understands the reasons why the Commission has floated these ideas. AIP believes that it would be simpler and more effective to adopt a demand-side measure for renewable fuels than complicating the operation of the Safeguard Mechanism.

AIP's preferred demand-side measure – a low carbon fuel standard – has obvious similarities with the amended Safeguard Mechanism proposed by the Commission:

- both proposals would be 'broad-based', capturing all liquid fuel sales which are a large, growing proportion of Australia's emissions
- both proposals would set a long-term trajectory to reduce emissions from liquid fuels, across the economy
- wholesale fuel suppliers would be liable for their Scope 3 emissions, albeit measured in emissions-intensity

The advantages of retaining emissions-intensity baselines, as opposed to absolute emissions, are:

- hard emissions caps for all participating entities are likely to constrain business growth, even for efficient businesses which are successfully decarbonising their operations.
- businesses may be compelled to pursue growth through carbon leakage, shifting activities offshore or to other domestic entities.
- policy makers and regulators cannot accurately forecast market developments, creating risks that hard caps will prove distortionary and/or punitive.

Next Steps

The PC intends that its advice to government will identify specific reforms, with quantified benefits, and include advice on how to implement the recommended reforms. AIP believes that the federal government has already identified the main, necessary reforms:

- a demand-side measure
- an integrity system (i.e. the Guarantee of Origin Scheme) which verifies the environmental claims of feedstock/fuel combinations (including imported fuels) and offers 'book and claim' certificates
- production incentives to attract investment in local production of renewable fuels
- a strategy to support the development of a local feedstock supply chain
- funding for industry innovation

Together, these measures are a coherent package of market-building reforms. All of these mooted measures should be developed and enacted as soon as possible.

An early commitment to introduce an effective demand-side measure, preferably modelled on the Californian Low Carbon Fuel Standard, is vital. Without this clear signal to the market, the other mooted reforms will be largely irrelevant. Major investment in local production of renewable fuels and in renewable fuel imports will not begin until there is assured market demand.

AIP also believes an early decision on incentives for local production of renewable fuels is needed. The federal government floated financial support in the 2024-25 Budget. Since that time, prospective local greenfield projects have been paused or cancelled while other countries continue to attract investment. In the interests of a timely decision, AIP recommends that the government offer support on the same terms as the Hydrogen Production Tax Incentive (HPTI), with some fine-tuning (e.g. assistance rates proportionate to the different abatement outcomes from different feedstock/fuel combinations).

Figure 18: A possible timetable

2025

- The federal government announces incentives for local production of renewable fuels under the *Future Made in Australia* program, commencing in 2026. Consultations, a regulation impact statement and legislation follow.
- ARENA launches its grant program.
- The federal government announces an in-principle decision to establish a demand-side measure, with a target commencement date of 1 January 2027.
- Third Quarter: draft local default emissions factors, including for renewable fuel blends co-processed at local refineries, are released for consultation. Associated amendments to the National Greenhouse Energy Reporting Scheme are also released. Consultations should cover the process for setting emissions factors for imported fuels and associated changes
- Fourth Quarter: the federal government announces its preferred model for the demand-side measure, including whether demand for SAF will be driven by a sub-target under the measure or a separate volumetric target.

2026

- Production incentives become available for local manufacturing projects.
- Second Quarter: default emissions factors for the leading local feedstock/fuel combinations are incorporated into the Guarantee of Origin Scheme. This will provide much-needed certainty for feedstock and fuel producers.

2027

- 1 January: the demand-side measure commences.

SELECTED REFERENCES

Australian Government Department of Industry, Science and Resources. (2025). *Commonwealth of Australia Resources and Energy Quarterly March 2025.* Canberra.

Australian Government The Treasury. (2024). *Future Made in Australia National Interest Framework: Supporting paper.* Canberra.

Australian Competition and Consumer Commission (2016). *Report on the Australian Petroleum Market September Quarter 2016*

CSIRO. (2023a). *Sustainable Aviation Fuel Roadmap.* Canberra: CSIRO.

DCCEEW. (2024). *Australian National Greenhouse Accounts Factors.* Canberra: Department of Climate Change, Energy, the Environment and Water.

Noel, Michael D. and Roach, Travis, Marginal Reductions in Vehicle Emissions Under a Dual-Blend Ethanol Mandate: Evidence from a Natural Experiment (February 11, 2016). *Energy Economics*, Vol. 64, No. 1, 2017, Available at SSRN: https://ssrn.com/abstract=3660012 or http://dx.doi.org/10.2139/ssrn.3660012

Productivity Commission. (2016). *Regulation of Australian Agriculture.* Report no. 79, Canberra.

Wood Mackenzie. (2024). *Australia retail fuels long-term outlook.*

Yang, F., & Yao, Y. (2025). Sustainable aviation fuel pathways: Emissions, costs and uncertainty. *Resources, Conservation & Recycling, 215*, 108124. doi:https://doi.org/10.1016/j.resconrec.2025.108124