Refined Ambitions:
Exploring Australia's Low Carbon Liquid Fuel Potential

CEFC Investment Insight: July 2025

Unlocking Australia's Low Carbon Liquid Fuel Future

This CEFC investment insight highlights key findings from the report:
Refined Ambitions – Exploring Australia's Low Carbon Liquid Fuel Potential
Commissioned by the CEFC and prepared by Deloitte.

As a specialist investor in Australia's race to net zero, the CEFC recognises the vital contribution that Low Carbon Liquid Fuels (LCLFs) can make in our transition to a net zero economy. Given that liquid fuels are essential for major industries such as aviation, freight and mining and contribute approximately 32 per cent of national emissions, there is an urgent need for alternative solutions.

LCLFs present a viable and scalable option for sectors of the economy that are hard-to-electrify, while also enhancing national fuel security. This report delivers a timely and strategic evaluation of how LCLFs can bolster economic resilience, facilitate emissions reduction, and promote energy independence in a decarbonising world.

→ Read the full report at **www.cefc.com.au/insights/LCLF**

Fuelling the transition

Low Carbon Liquid Fuels have a critical role to play in maintaining the competitiveness of Australian liquid fuel users in a decarbonising world.

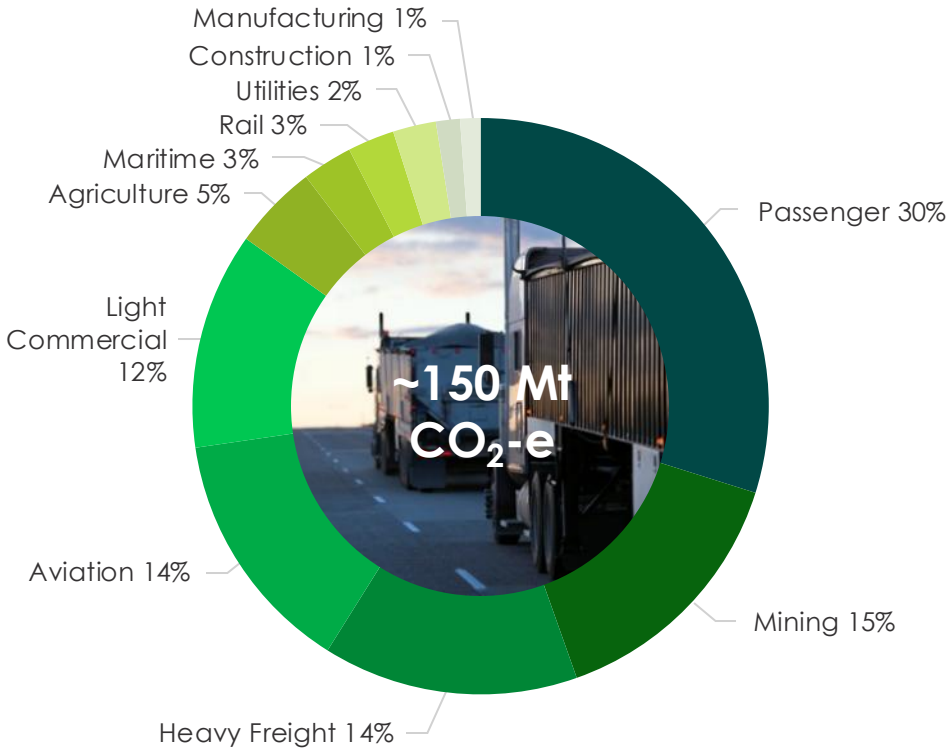
Australia consumes more than 56 billion litres of liquid fuel each year, covering transport, mining, construction, power generation (utilities), manufacturing and agriculture.

Liquid fuels account for ~32 per cent of Australia's total emissions, making decarbonisation in this space vital for net zero.

Key economic sectors - especially aviation, heavy freight, and mining - face challenges in electrification.

More than 80 per cent of our refined liquid fuels come from imports, making us vulnerable to global disruptions.

Emissions from liquid fuel use by sector



Sources: 1. 2022-23 Liquid fuel demand and emissions calculated using liquid fuel demand by sector in accordance with Australian Government (DCCEEW), applying scope 1 emission intensity values from Table 8 of the Australian National Greenhouse Accounts Factors. 2. Bioenergy Australia, 2025 3. CSIRO, 2025

What are Low Carbon Liquid Fuels?

LCLFs are renewable substitutes for conventional fossil-based liquid fuels.

Derived from (non-exhaustive list of all sources):

- **Biogenic sources:** Fats, oils and greases, sugars and starches, lignocellulosic biomass, waste-based feedstock
- **Synthetic sources:** captured CO_2 + green hydrogen (Power-to-Liquids)

Common LCLFs:

- Sustainable Aviation Fuel (SAF)
- Renewable Diesel (RD)
- Synthetic e-fuels

Designed to be drop-in compatible, avoiding disruption to engines or supply chain infrastructure.

The LCLF opportunity – headline outcomes

The production of LCLFs can boost Australia's economic prosperity, with benefits flowing directly to regional communities.

A mature domestic LCLF industry in Australia could deliver:

$36b*

fuels market opportunity of LCLF sold in 2050

~230m

tonnes CO_2-e in cumulative emissions reduction by 2050

Provide co-benefits across fuel security, industry diversification, and Australia's export potential.

*Based on 2025 dollar values (i.e. not inflation adjusted) based on Deloitte modelling.

The electrification gap

While electrification across some sectors is expected to displace 57 per cent of fuel demand at 2050, LCLFs offer an alternative pathway to abatement for hard-to-electrify sectors.

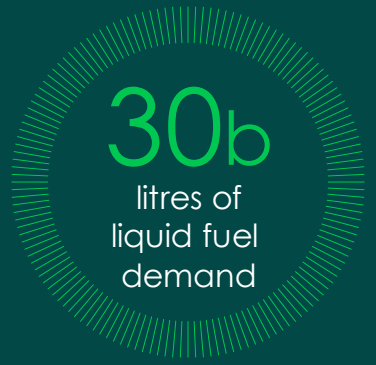
Passenger vehicles and city fleets are forecast to electrify rapidly.

But key hard-to-electrify sectors face challenges with:

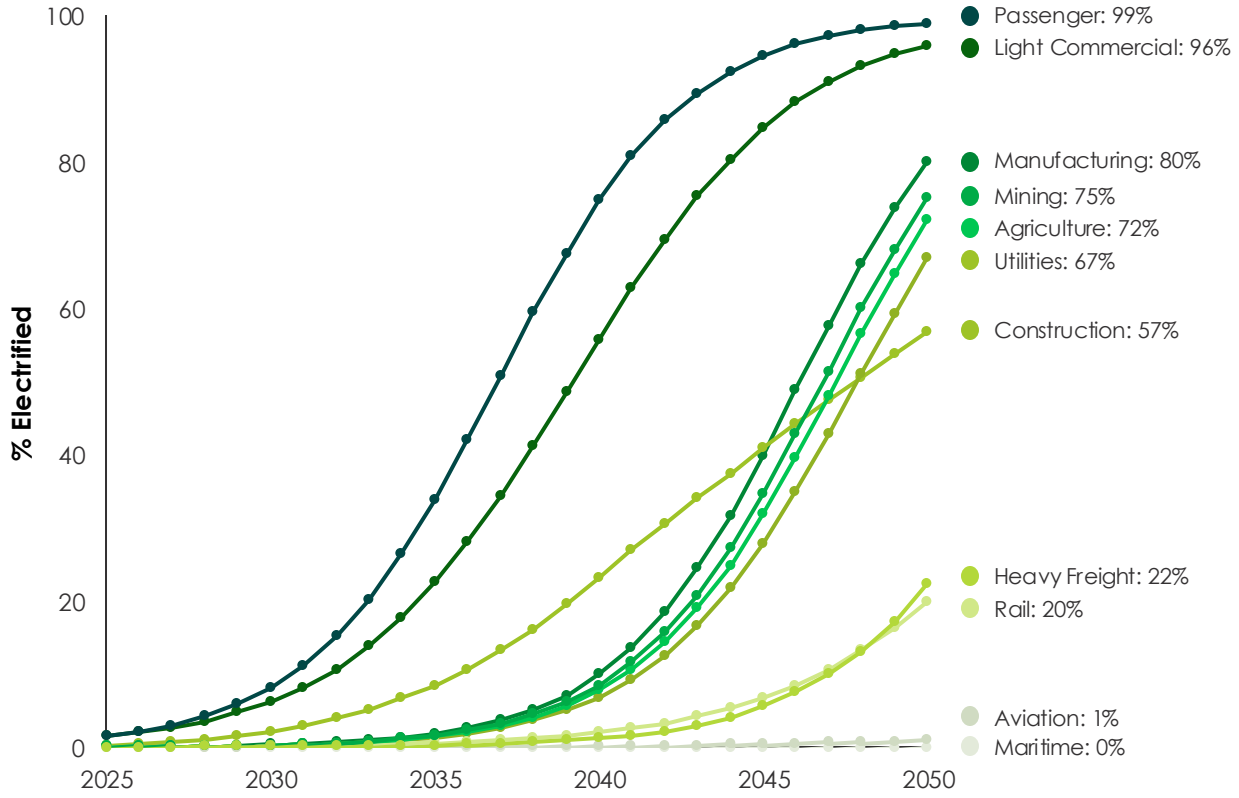
- Limited battery range and payload efficiency
- Lack of grid access in remote regions
- Slow turnover of large capital assets (e.g. aircraft, locomotives, mining trucks)

By 2050, Australia may still require 30 billion litres of liquid fuels.

Without LCLFs, Australia's net zero goals are unlikely to be met.



Deloitte Analysis: Fuel sector electrification fitted to simple adoption curves



Source: Deloitte analysis. See inputs and assumptions in *Refined Ambitions – Australia's Low Carbon Liquid Fuel Potential Report Appendix*

Strong opportunities for LCLFs in hard-to-electrify sectors

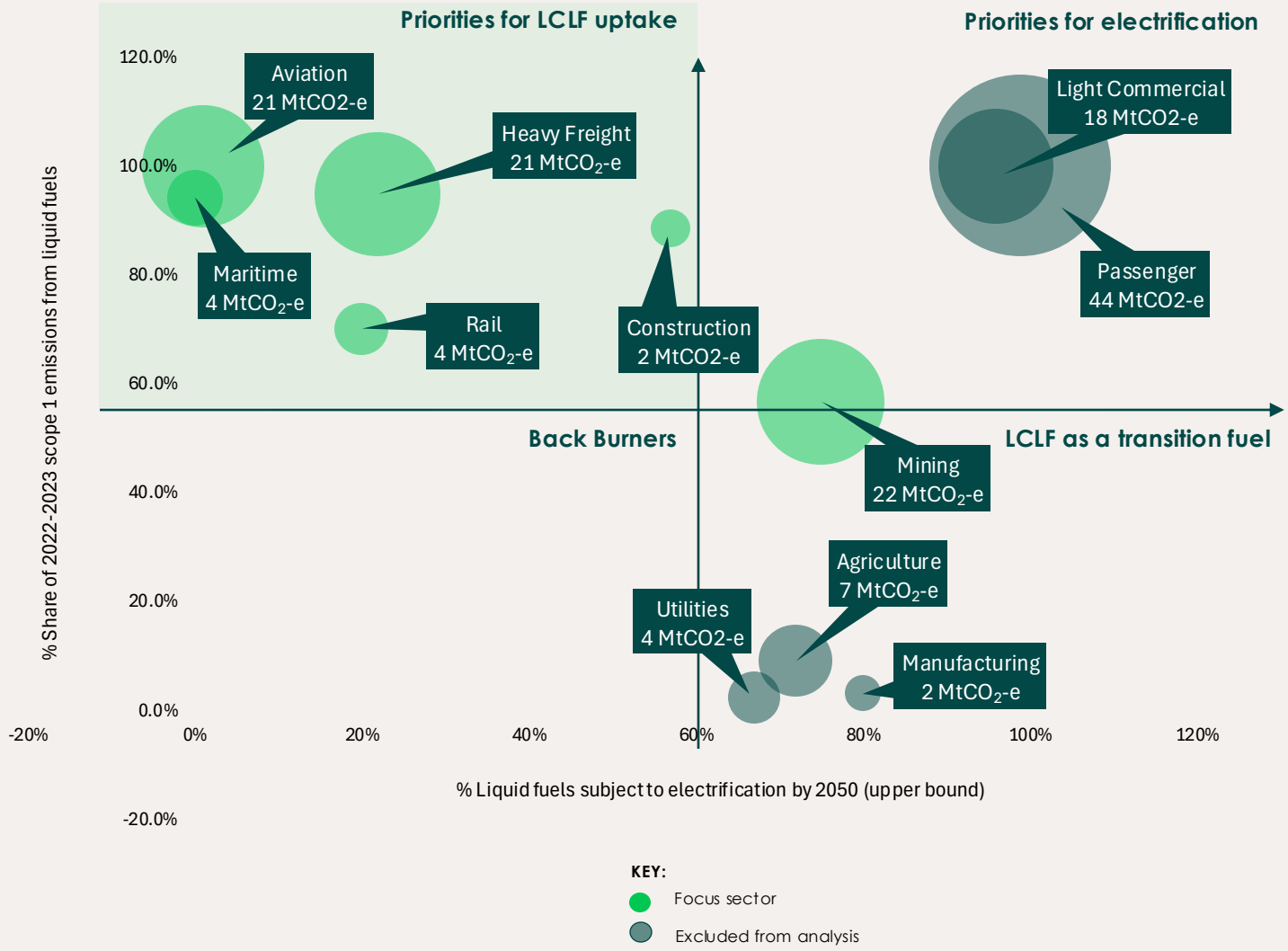
Australian liquid fuel users in hard-to-electrify sectors have consistently emphasised the role LCLFs can play within Australia's decarbonisation journey.

Key sectors that rely on liquid fuels that are hard-to-electrify include:

These six sectors account for over 80 per cent of projected liquid fuel use in a net zero aligned 2050 economy. The development of an Australian LCLF sector will accelerate the decarbonisation of these sectors, which are vital to Australia's economic interests and key to Australian decarbonisation goals.

Unpacking electrification potential by 2050 of current liquid fuel use cases

LCLF uptake is likely to be prioritised in sectors where electrification is not possible or commercially mature, and where liquid fuel use represents an outsized share of total scope 1 emissions.



Sources: Bubble size represents the total liquid fuel emissions (Scope 1) in 2022–23. Refer to Refined Ambitions: Australia's Low Carbon Liquid Fuel Potential Report Appendix A for the percentages of liquid fuels subject to electrification by 2050 for each sector.

Fuel security risk

Australia's defence, mining and freight sectors are critically exposed to global supply chain shocks.

75% ↓~20%

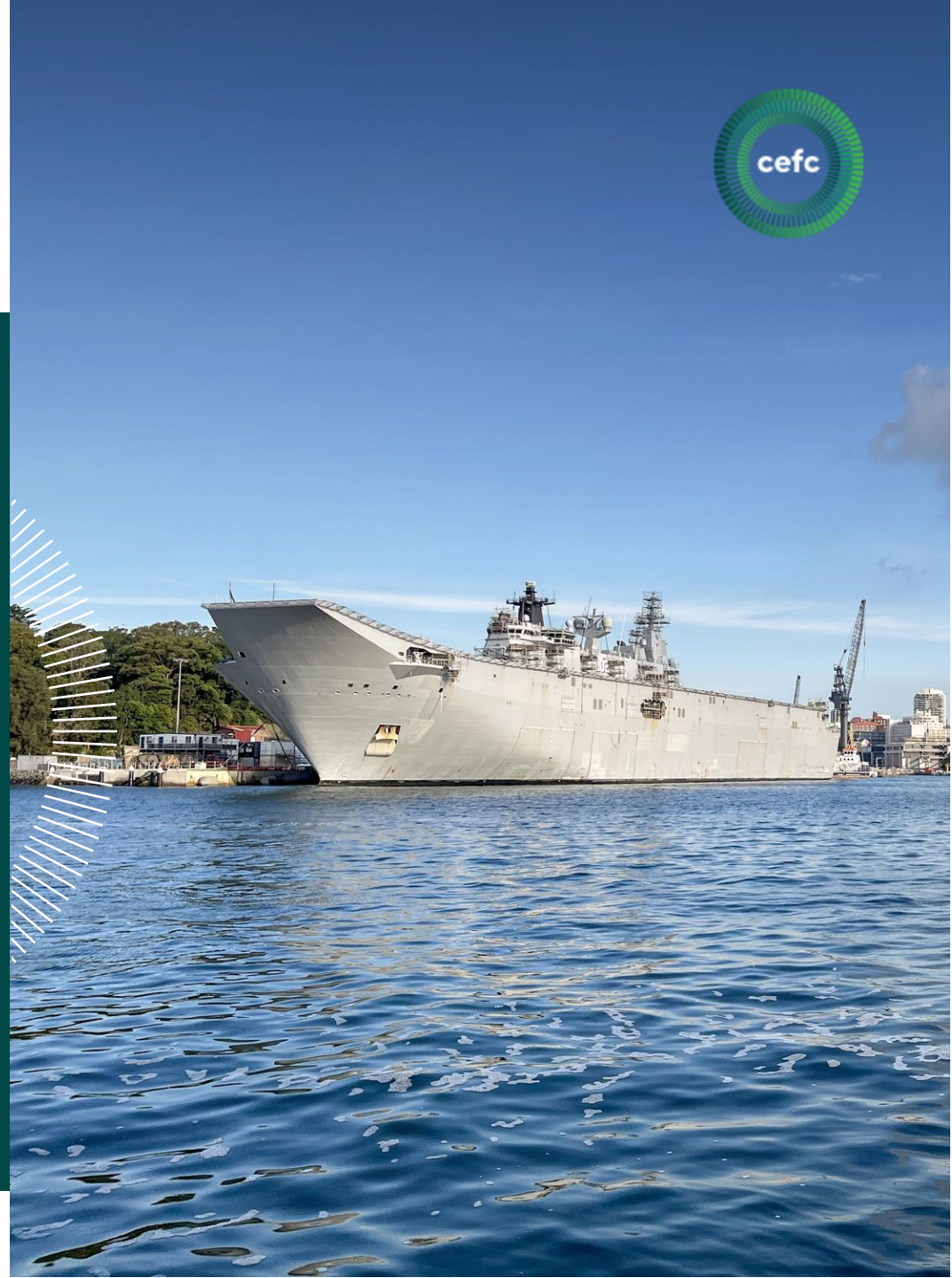
Domestic refining has fallen from 75% to ~20% of national needs in just over a decade.

~90% of imports from Asia

Fuel imports topped $50.7 billion in 2023, with over 90% sourced from Asia.

A sovereign LCLF industry can:

- Reduce import reliance
- Support local resilience
- Create energy security for high-value sectors



Feedstock advantage

With advancing economies embracing LCLFs, the Australian agriculture sector has a competitive advantage, with abundant feedstock resources to supply the global market.

Australia is a net exporter of raw feedstocks suitable for LCLFs:
Canola, sawmill residues, bagasse, sorghum, tallow, used cooking oil and other oilseeds

CSIRO estimates:

12.8BL

Australia could produce up to 12.8 billion litres of biogenic LCLFs domestically by 2050.

Current export value:

~$3.9b/yr

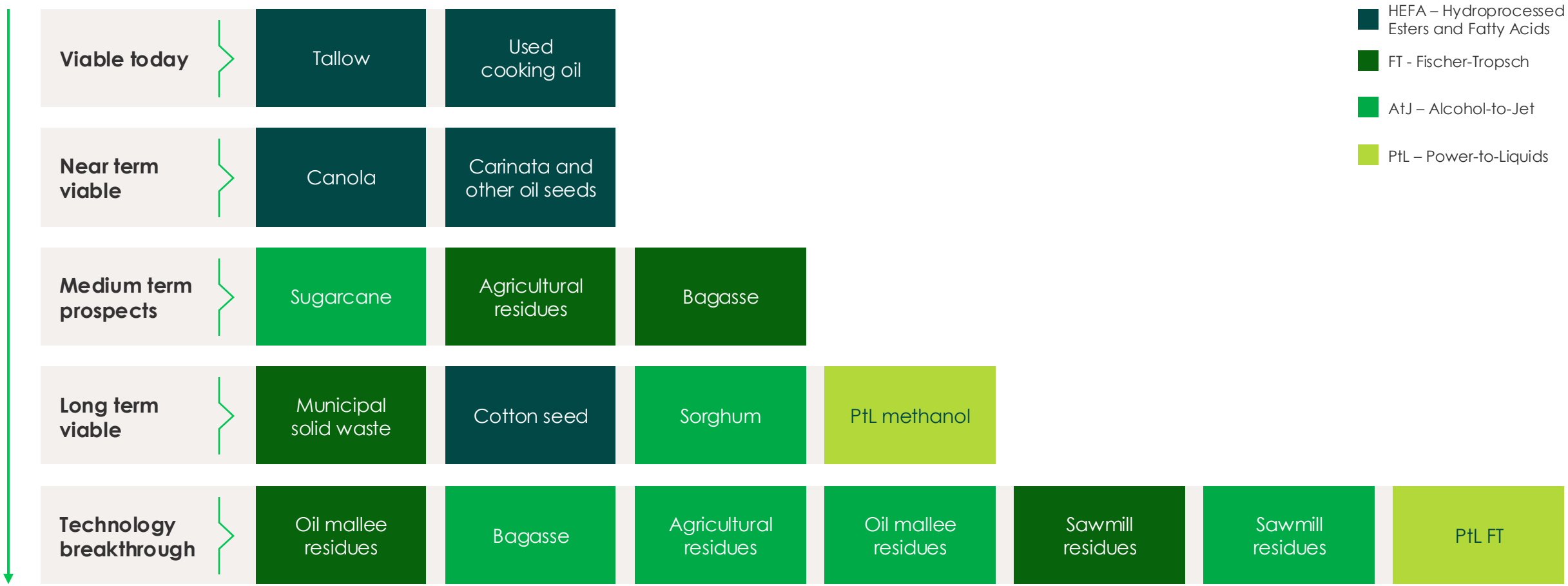
of feedstock for biofuel production processed offshore

Australia has the opportunity to:

- Capture more value locally
- Create new revenue streams for farmers
- Power a new generation of regional industries

2025 LCLF Feedstock Ladder

Australia's feedstock supply ladder, reflecting the competitiveness of different feedstock–fuel combinations.



The investment landscape

Australia has an investment pipeline of 12 biogenic and four e-fuels projects proposed, totalling ~2,000 ML capacity.

~2,000ML
capacity

Pipeline scale comparable to Japan and South Korea

Investor sentiment is cautiously optimistic – but capital is constrained by:

- Lack of policy certainty
- Technology uncertainty (e.g. commercial viability of LCLF production pathways)
- Cost gaps vs fossil fuels

Pathways to scale

Three hypothetical scenarios developed to illustrate the development of an LCLF market in the Australia context:

Base scenario (market-led)

Demand remains niche and fragmented. No real scale.

Central scenario (offset constrained)

Firms prioritise on-site decarbonisation. Demand builds across mining, aviation.

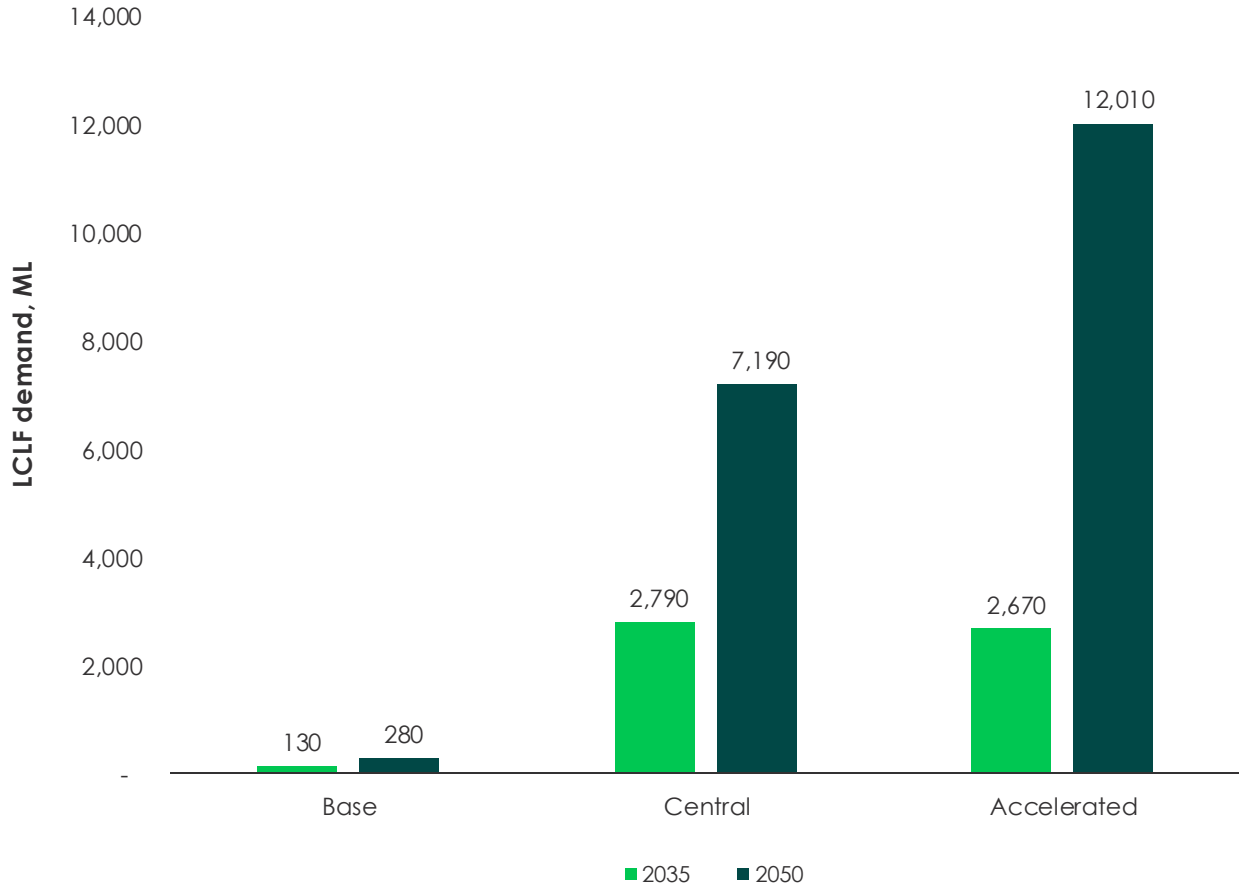
Accelerated scenario (highly regulated demand)

ReFuelEU-style regulation triggers >5,500 ML by 2040. Abatement cost rises over time as PtL comes online.

Key insight:

Delay increases cost. Early investment yields cheaper abatement and achieves net zero ambition.

LCLF demand scenarios for 2035 and 2050



Barriers to scale

Investors recognise Australia's LCLF production potential and the growing pipeline of projects. But five interrelated investment risks currently make capital allocation challenging in the Australian market.

1

Demand uncertainty

A functional market requires the cost gap between LCLFs and traditional fossil-based liquid fuels to be bridged.

2

Price risk

Revenue uncertainty limits financing options for LCLF projects.

3

Feedstock risk

The variability of feedstock volumes and price and the mismatch with fuel supply contracts requires mitigation.

4

Technology risk

Newer production pathways lack standard risk mitigants raising financing complexity.

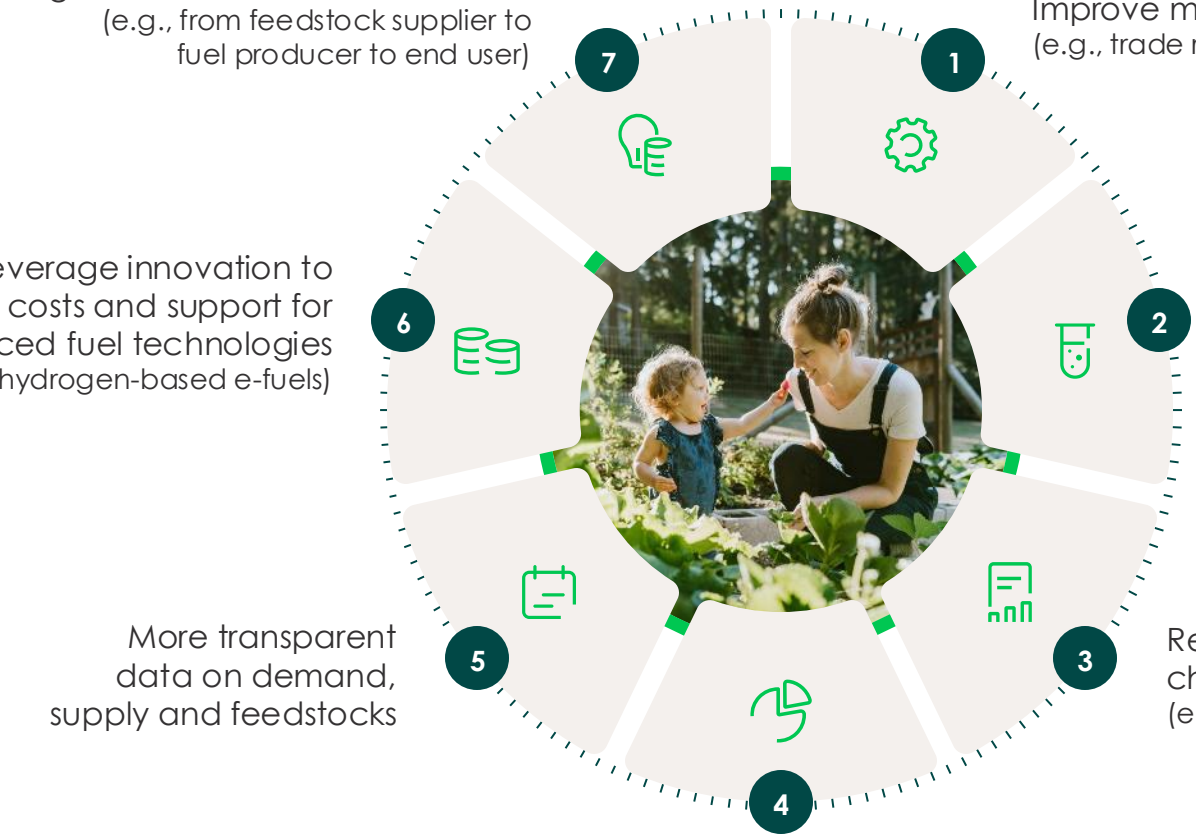
5

Policy uncertainty

Policy certainty will be a decisive factor in determining the pace of market development and competitiveness.

Scaling the market – Seven market enablers

With the correct settings in place, Australia can unlock a globally competitive and sovereign clean fuels sector.



1. Improve market access
(e.g., trade relationships)

2. De-risk investments
(e.g., concessional finance to de-risk private capital)

3. Reduce transaction challenges
(e.g., standardised contract terms)

4. Consider credible demand signals
(e.g., SAF and freight fuel blending mandates)

5. More transparent data on demand, supply and feedstocks

6. Leverage innovation to reduce costs and support for advanced fuel technologies
(e.g., hydrogen-based e-fuels)

7. Better coordination and alignment across the value chain
(e.g., from feedstock supplier to fuel producer to end user)

Australia's call-to-action

Coordinated near-term action is needed to leverage Asian mandates to lay the foundation for a scaled Australian value chain.

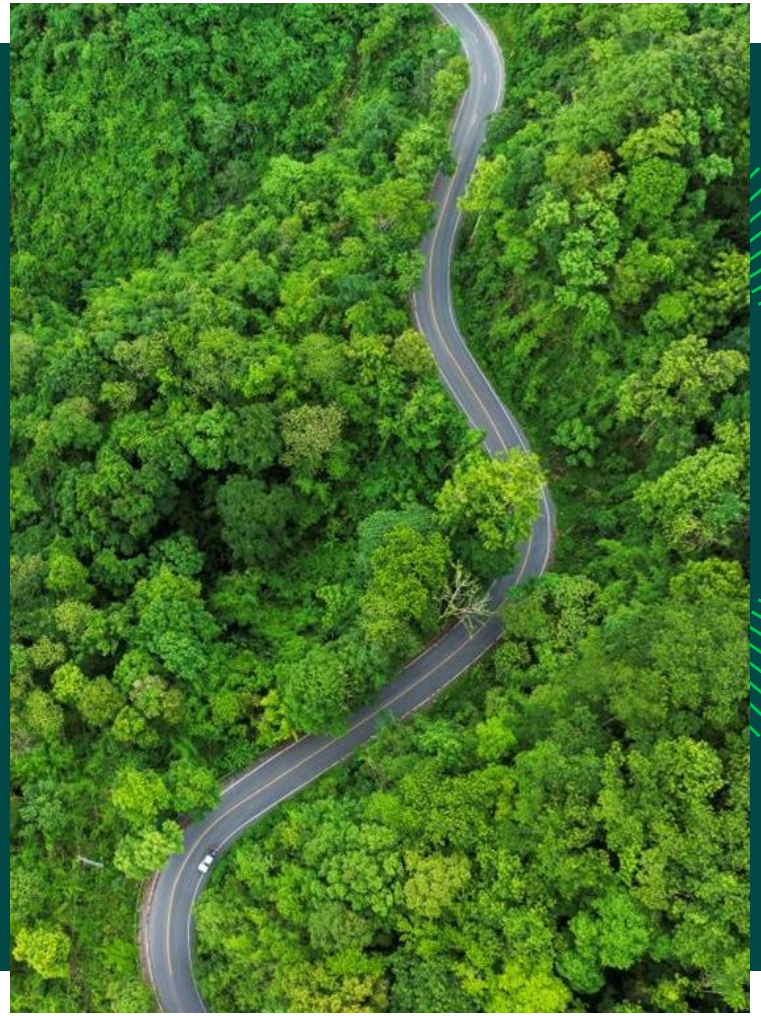
LCLFs are not optional – they are essential to closing the net zero gap.

Australia has:

- A comparative advantage in feedstocks
- Strong project pipeline
- Strategic sectors needing a solution
- A fuel security imperative to develop a LCLF production industry

With smart coordination, we can:

- Build a $36b industry in 2050*
- Abate 230 Mt CO_2-e by 2050
- Strengthen regional economies and fuel security



This is a once-in-a-generation opportunity.

*Based on 2025 dollar values (i.e. not inflation adjusted) based on Deloitte modelling.

Thank you

This CEFC Investment Insight - Refined Ambitions: Exploring Australia's Low Carbon Liquid Fuel Potential - draws from broader research commissioned by the CEFC and prepared by Deloitte.

Download the full report:
cefc.com.au/insights/LCLF

For more information, visit cefc.com.au

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About the CEFC

The CEFC is Australia's specialist climate investor, helping cut emissions in the race towards net zero by 2050.

We invest in the latest technologies to generate, store, manage and transmit clean energy.

Our discounted asset finance programs help put more Australians on the path to sustainability, in their homes and on the road. CEFC capital is also backing the net zero transformation of our natural capital, infrastructure, property and resources sectors, while providing critical capital for the emerging climate tech businesses of tomorrow. With access to more than $32 billion from the Australian Government, we invest to deliver a positive return for taxpayers.