GRATTAN Institute

Building a secure liquid fuel sector

Securing Australia's Cleaner Fuels Industry

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Overview

We welcome the opportunity to make a submission to the federal government's consultation on how to develop a low carbon liquid fuel (LCLF) industry. This submission makes three recommendations:

1. Frame the policy clearly:
    - Define the scheme as an industry policy.
    - The policy objective should be to develop domestic production of LCLFs.
2. Design for the policy objective:
    - Set a volumetric target, ensuring it encourages LCLF production from multiple pathways.
    - Exclude imported LCLFs.
    - Exclude petrol as an obligated fuel.
    - Exclude ethanol as a covered LCLF.
3. Learn the lessons of previous demand schemes:
    - Establish targets for at least 15 years.
    - Maximise transparency around future credit prices.
    - Ensure state-based policies don't skew policy outcomes.
    - Adjust the scheme as demand changes.

1 Building a new industry needs industry policy

A domestic low carbon liquid fuel industry could materially improve Australia's fuel security and unlock emissions-reduction pathways for hard-to-abate sectors. The federal government's proposed LCLF demand mechanism should be clearly framed as an industry development policy, with the objective of delivering scaled, diversified, and competitive domestic LCLF production capacity.

1.1 Why clean liquid fuels require industry policy

Australia has almost no capacity to produce meaningful amounts of clean liquid fuels at present. To build an industry capable of doing so, in a timeframe that makes a meaningful difference to fuel security, will require well-designed and comprehensive industry policy: a deliberate choice to alter the structure of the economy by encouraging resources to move into sectors that are perceived as desirable for future development.[1]

Australia has successfully used industry policy in the past. In the electricity sector, deliberate industry policy has successfully brought about technological transformation away from carbon-intensive production.[2] In Chapter 3, we set out the lessons from this and how they can be applied to developing a clean fuels industry.

The playbook for using industry policy to develop a new industry is well-established (for more, see Box 2 on page 6):

- Have a clear and measurable objective.
- Support increased supply, and tailor and change this support as the industry matures.
- Create demand 'pull' once initial supply is established. This must provide long-term (10 years or more) certainty of demand to underwrite investment.
- Be willing to remove support from companies and technologies that fail to meet objective success criteria.
- Focus on exports as well as local demand, to reduce risk and access economies of scale.

The government already provides supply-side support

Two existing schemes support the supply-side of an LCLF sector:

- The $250 million Future Made in Australia Innovation Fund, providing capital grants for pilot and demonstration LCLF plants.
- The $1.1 billion Cleaner Fuels Program, providing output-linked subsidies to LCLF producers over 10 years.

Both schemes will be delivered by ARENA (the Australian Renewable Energy Agency). The government should accelerate the deployment of this funding, ensuring ARENA withdraws funding from projects that fail.

1.2 The objective should be to grow an LCLF industry

The consultation paper proposes three goals for the LCLF demand scheme: least-cost emissions reduction, fuel security, and economic development. These goals are in tension; the government should be clear about what it is trying to achieve.

1. Aiginger and Rodrik (2019).
2. Noting that this transition has had issues and is not complete.

The policy should measurably improve sovereign fuel share

The government correctly identifies that 'continued dependence on imported fuels exposes Australia to fuel security risks and price volatility'.[3] The fundamental problem is that Australia does not make enough of our own fuel, so this is the problem the policy must solve.

At Grattan Institute, we call this 'sovereign fuel share' - the proportion of total fuel required to run the economy that is produced in Australia (see Box 1). Most current users of liquid fuel across the economy can improve their sovereign fuel share through electrification – electricity is the cheapest and easiest way to source domestic fuel for almost all cars, most trucks, and large parts parts of mining.

But many users will still need liquid fuels for decades. From a fuel security perspective, then, the goal of the LCLF demand-side policy should be to drive the development of a domestic LCLF industry capable of significantly improving the sovereign fuel share of sectors that depend on liquid fuels.

This should not primarily be an emissions-reduction scheme

Emissions reduction and domestic LCLF production are different goals. Least-cost emissions reduction could be achieved in much of the road transport and mining sectors through electrification. Of remaining demand for liquid fuels, short-term least-cost abatement is likely to be delivered by imports of LCLFs.

But neither electrification nor LCLF imports would result in an Australian LCLF industry capable of producing meaningful volumes of LCLF and therefore delivering a fuel security benefit for users of liquid fuels. These goals have trade-offs and so must be prioritised.

Box 1: Defining 'sovereign fuel share'

Sovereign fuel share is the proportion of total fuel required to run the economy that is produced in Australia.

Fuels can categorised into six types:

- Sovereign fuels:
  - Fuels refined domestically using Australian crude
  - Low carbon liquid fuels refined domestically
  - Electricity generated domestically
- Imported fuels:
  - Fuels refined domestically using imported crude
  - Imported refined petroleum fuels
  - Imported low carbon liquid fuels

Substituting an imported fuel for a sovereign one improves sovereign fuel share.

Instead of looking solely at the import share of liquid fuel demand, sovereign fuel share gives a fuller picture of fuel security, because it enables comparison of electrification with liquid fuels.

3. DCCEEW (2026a).

The government should frame this scheme primarily as an industry development policy, not an emissions-reduction policy.

Building a viable industry will require a market larger than Australia

Demand for petrol and diesel in Australia is likely to shrink over coming decades, as cars, much of trucking and a portion of mining and agriculture electrify, even as demand for jet fuel rises. It is difficult to access economies of scale for a market that is shrinking; and in a shrinking market, calibrating a target to a level that supports industry growth without pushing up prices also harder.

The solution to these challenges is to calibrate policy to an export-scale industry. Exports allow for growth, even while fuel use here shrinks. Overseas markets act as a hedge on domestic demand risk. Provided that the link between international and domestic prices is managed (as lesson from the gas export industry) Australian users can enjoy the cheaper prices that come with economies of scale.

1.3 Design an effective target

Set a volumetric target

A volumetric target is more likely to drive industry development better than a carbon intensity target, for two reasons.

First, an intensity target would deliver lower volumes of domestic LCLF production because it would allow non-LCLF compliance pathways (such as electrification). Second, an intensity target would make it harder for project developers to secure finance, because demand for their specific product would be less certain.

A carbon intensity target might make sense if the goal of this policy was to accelerate the electrification of current users of liquid fuels. But if this policy drives electrification, it will deliver less LCLF production.

These targets should be set as fixed volumes, not as a share of demand. Fixed volumes give a clearer investment signal than a demand-linked target. The biggest risk of a fixed volume target is that if demand for liquid fuel declines rapidly, a given volume becomes a larger share of total demand. This scenario is implausible before 2035 (the start of the proposed phase 2) so this risk is immaterial.

Fix targets to at least 2040

One lesson from the Renewable Energy Target is that growing a new industry requires a clear target with a predictable ramp over a timespan at least as long as standard commercial loan terms, and for an emerging industry, slightly longer.

Given the first domestic LCLF production is unlikely to occur much before 2030, fixing a target to 2035 is unlikely to provide sufficient certainty to project developers. The timeline should be extended to at least 2040, even if the targets transition to intensity-based targets.

Support multiple pathways

In the long term, an industry capable of producing LCLFs at scale at least cost will need a diversity of conversion pathways and feedstocks.

The most advanced and cheapest conversion pathways today (such as (Hydroprocessed Esters and Fatty Acids (HEFA), which converts animal fats and and vegetable oils into sustainable aviation fuel) are constrained from reaching large scale by feedstock availability. If the LCLF demand tool unlocks a fleet of HEFA refineries only, it will not achieve its objective because it will not create a path to scale. To succeed, it must drive development of conversion technologies and feedstocks that are higher-cost today, but which offer pathways to scale.

This can be achieved with separate targets for each pathway, or caps total LCLF share that can be delivered by any one pathway.

Box 2: The case for industry policy

Markets do not generally provide adequate incentives for research and development of new technologies, because knowledge is often intangible, risky, and difficult to appropriate.

Technologies where demand is driven by government decisions to provide public goods are particularly affected by complexity and uncertainty. Fuel security and emissions-reduction targets are both examples: governments have decided that these issues are important for public-good reasons, and are seeking to bring them about by deliberately encouraging economic activity to provide them. Early investors face high costs, low returns, and the risk of competitors free-riding on their initiative, just as they do for any new technology, with the added risk that the overall demand for the technology is a function of policy, not the market.

Critics of broader industry policy focus on two arguments. The first is that governments do not have enough information to choose which industries or firms to support,[a] and so should not pick winners but should rely on market forces to determine the winners.

The second is that industry policy brings with it the risk of rent seeking – that well-connected firms may be able to use their financial power, connections, and influence to get money.[b]

These arguments do not undermine the case for industry policy. Rather, they create the imperative for *good* industry policy.

To address the first concern, government intervention should resemble a portfolio. This means selecting a direction the economy should head in and then choosing not the 'winners' but the 'willing' – companies that are willing to invest in, take risk on , and profit from the changed structure.[c] As in any investment portfolio, failure of some 'bets' is expected. The key is to stop supporting the losers.[d] There should be a clear set of guidelines or rules on when to 'pull the plug' and redirect support to more promising projects or firms.[e] Similarly, using a broad range of interventions such as recoupable grants, loans, underwriting, and equity allows governments to share in the upside from the 'winners'.[f]

The solution to the second concern – rent seeking – is better institutional design. Here, governance structures are critical.[g] Clear targets, milestones, and procedures of accountability and transparency are needed,[h] and funding should be administered at arms length from government to prevent political imperatives over-riding economic ones.

a. Aiginger and Rodrik (2019).
b. Rodrik (2014).
c. Mazzucato (2019).
d. Hallegatte et al (2013).
e. Tagliapietra and Veugelers (2020).
f. Rodrik (2014).
g. Aiginger and Rodrik (2019).
h. Tagliapietra and Veugelers (2020).

1.4 Do not allow imports

The consultation paper says the government's proposed design 'does not require [LCLFs] to be produced in Australia'.[4] Instead, the government is proposing to 'remain open to both domestically produced and imported fuels', on the basis that this would 'reduce compliance costs, support least-cost emissions reduction, and maintain competition'.[5]

This design decision should be reversed. Because the goal of the policy should be to develop a domestic industry, entities should not be able to meet their LCLF obligations by purchasing imports.

The paper says 'imported LCLF may be more cost-competitive than many Australian production pathways and could supply a substantial share of future demand'.[6] If imports are cheaper than domestic production, a scheme open to both is unlikely to drive domestic industry.

Accordingly, the LCLF targets should be based on the feasible capacity of the domestic market to scale up production.

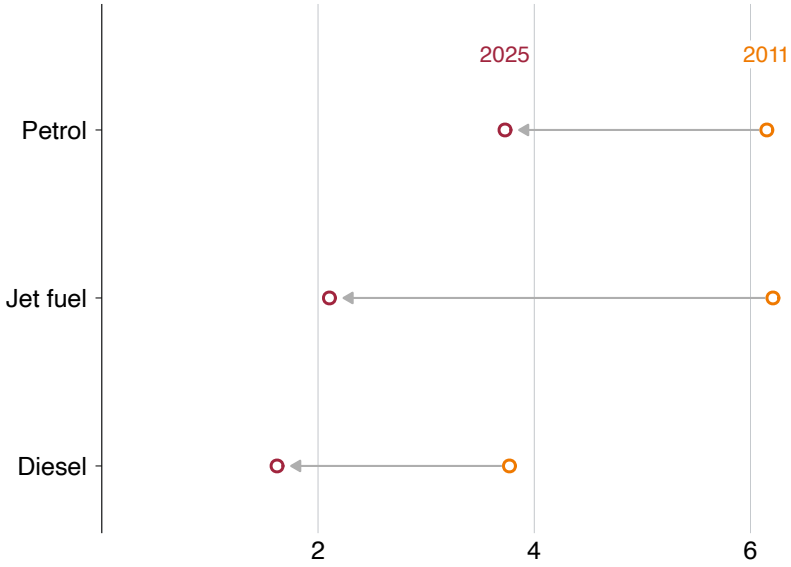
Given there are currently zero LCLF refineries in Australia, the government could open the scheme to imported LCLFs until 2030, to establish the demand-side of the industry while the supply-side is developed. Beyond that, the scheme should only support Australian industry.

1.5 Diversifying import suppliers is not a strong fuel security case for LCLF imports

The consultation paper defines the policy problem by saying that 'Australia's fuel supply is heavily reliant on imported fossil liquid'. But substituting one form of liquid fuel import for another does nothing to reduce Australia's reliance on imported fuels.[7]

Figure 1.1: The diversity of Australia's fuel import suppliers is much better than it was a decade ago

Diversity of fuel import supply using a modified Herfindahl-Hirschman Index, where a lower score means better diversity



Source: Grattan Institute analysis of DCCEEW (2026b).

4. DCCEEW (2026a).
5. Ibid.
6. Ibid.
7. Ibid.

The government suggests that 'diversifying fuel supply can strengthen resilience by reducing reliance on imported fossil fuels and increasing the range of fuel sources available to Australians'.[8] This is an argument for import diversification, not less import reliance.

Australia's liquid fuel import suppliers are already at near-record levels of diversity. For petrol, diesel, and jet fuel, the diversity of our refined fuel suppliers has substantially improved since 2011 (see Figure 1.1 on the previous page).

LCLF imports would still expose Australia to a largely identical set of supply risks – loss of access to global sea lanes, disruptions at Australian ports, and export controls in our trade partners.

Finally, the highly adaptable response of the global oil market to the Iran War indicates that suppliers are able to adjust production at short notice. After the prolonged closure of the Strait of Hormuz, Australia substantially increased imports from new and smaller suppliers.[9]

A diversity of suppliers reduces exposure to any one risk. But Australia already has good diversity in our fuel suppliers, and we have shown that we can diversify them even more at short notice. Pursuing supplier diversity at the expense of sovereign fuel supply would be a missed opportunity to address the root cause of our fuel insecurity.

8. Ibid.
9. For example, Argentina (275 ML total imports in 2025, 954 ML to date in 2026), the UK (6 ML imports in 2025, 168 ML to date in 2026), and the Netherlands (4 ML total imports in 2025, 194 ML to date in 2026). See: DCCEEW (2026b)

2 Exclude petrol and ethanol

From a fuel security perspective, the government's goal should be to increase sovereign (domestic) production of fuels for users who currently use liquid fuels. In many cases, the easiest and cheapest way to secure sovereign supply is through electrification. The goal of the LCLF policy should be to produce the fuels for those users who will still need liquid fuels.

Almost all petrol in Australia is used in cars and light commercial vehicles – two segments which can easily electrify. In fact, they already are. Petrol demand is on the decline, and is forecast to collapse.[10] Even with no further policy action, cars and light commercial vehicles will reach extremely high levels of sovereign fuel share from electrification alone. Given LCLFs will not be needed to replace petrol, petrol users should not pay for LCLF production. Petrol should be excluded as an obligated fuel.

For the same reasons, ethanol should not be included as a covered LCLF. Australia does not need it. As a direct fuel source, ethanol is primarily used for mixing into petrol to reduce emissions and improve fuel security.[11] But in a world where electric vehicles are now on an inexorable rise, both the emissions-reduction and fuel security case for ethanol mixing has collapsed.

Australia's capacity to produced LCLF is limited. Scarce resources should be directed to producing sustainable aviation fuel and renewable diesel, the fuels required for sectors which have few or no alternatives, not ethanol for cars, where electrification has already won.

10. Grattan Institute analysis.
11. Ethanol is also an important intermediate feedstock for synthesising other LCLFs, which would still be permitted even if it was not an eligible final LCLF itself.

2.1 Electric vehicles will cause petrol demand to collapse

Electric vehicles have now taken off in Australia. Last year, battery EVs were just 8 per cent of new car sales.[12] In August 2026, they hit a quarter of sales, eclipsing petrol cars for the first time.[13]

This trend is almost certain to continue, because the cost gap is closing fast. An electric car costs half as much to fuel as a petrol equivalent, and about 40 per cent less to service. Purchase prices have converged too: the cheapest electric car sold in Australia now undercuts a mild-hybrid Suzuki Swift.[14]

Higher petrol prices from the Iran War have accelerated this trend. Studies have consistently found that petrol price rises move buyers towards electric vehicles: in one study of the Nordics, a 1 per cent increase in the petrol price raised EV sales by 0.85 per cent.[15] Australian fuel prices jumped 32 per cent in March 2026 alone.[16]

Grattan Institute's modeling projects that, even without further policy intervention, battery EVs will make up 60 per cent of new passenger car sales by 2035, and 92 per cent by 2045.[17]

12. Federal Chamber of Automotive Industries (2026a). EVs were 13.1 per cent of total sales. Thai (2026).
13. Federal Chamber of Automotive Industries (2026b) and Electric Vehicle Council (2026).
14. Baker (2025). On the NRMA's assessment, small electric cars and small petrol cars now cost about the same to own over five years: Schmidt (2026).
15. Zhang et al (2026); Fei et al (2025).
16. https://www.abs.gov.au/articles/history-automotive-fuel-prices.
17. For light commercial vehicles the shift is slower: 12 per cent by 2035, rising to 66 per cent by 2045.

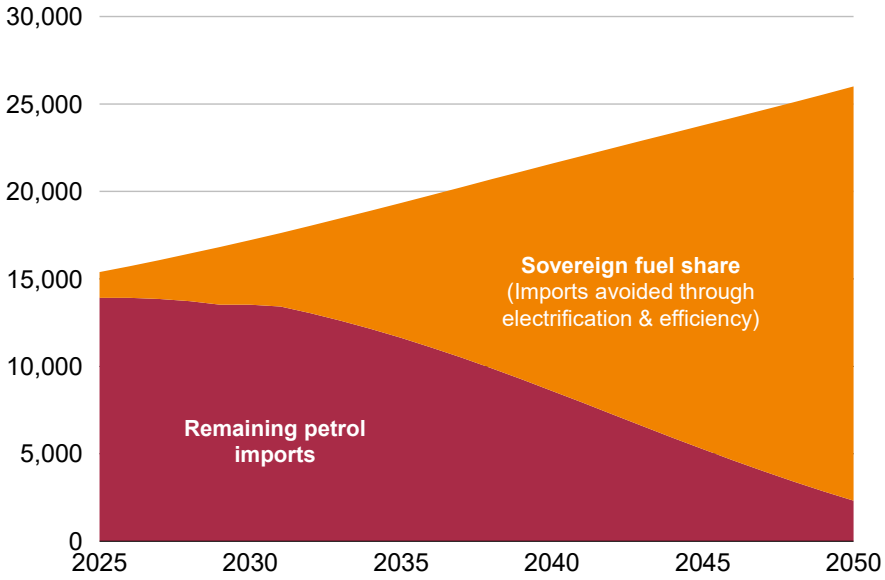
The fleet turns over slowly, but it does turn over

New sales and cars on the road are different things. In 2025, EVs were still only about 1 per cent of the 20 million light vehicles on Australian roads, and the average passenger vehicle is more than 11 years old.[18] A petrol car sold in Australia today will still be on the road in the 2040s.

Even allowing for this lag, the fleet changes. We project that battery EVs will make up 37 per cent of all passenger cars on the road by 2040.[19] And while we project that the total number of vehicles on Australian roads will keep growing to 28.9 million in 2040, the number of petrol-burning cars and utes peaks around 2030 at 15 million and then declines steadily through the 2030s, to 12.7 million by 2040.

More EVs and hybrids means less petrol. Under our modeling, petrol demand will fall by 66 per cent by 2050, even under current policy settings (see Figure 2.1). The scheduled review of the New Vehicle Efficiency Standard (which regulates car emissions) will probably lead to tighter emissions standards, meaning more EVs and more efficient petrol cars on the roads, pushing petrol consumption down even faster than we project today.[20]

Figure 2.1: Petrol demand is forecast to collapse because of the rise of electric vehicles and more efficient petrol cars
Projected petrol consumption and petrol consumption avoided, to 2050 (Megalitres)



Sources: Grattan Institute analysis.

2.2 Cars don't need LCLF to secure their fuel supply

As petrol demand declines, and more cars and light commercial vehicles switch to electricity, the sovereign fuel share of these segments will increase (see Figure 2.2 on page 12).

Today, Australia's car and light commercial vehicle fleet sits at just 8 per cent sovereign fuel share - in other words, 92 per cent of the fuel

18. Bureau of Infrastructure and Transport Research Economics (2025).
19. We project that 81.5 per cent of new cars sold that year will be electric and 37 per cent of cars on the road will be electric. The difference is a fleet that takes 20 years to turn over.
20. Parliament of Australia (2024).

used by these segments is imported. But that increases to 52 per cent by 2035 and more than 80 per cent by 2050. All of this increase is the result of electrification.

2.3 Including petrol will hit the poor

Petrol is about 90 per cent of household fuel consumption; diesel is much less important.[21] Obligating diesel and jet fuel therefore reaches households mostly indirectly, through freight and airfares. A policy that includes petrol reaches them directly, at the pump. And fuel prices pass quickly into headline inflation.[22]

The households still buying petrol into the 2030s will disproportionately be those that found it harder to upgrade to an EV: renters, apartment-dwellers, and those who cannot afford a new car. This means there will be a shrinking base across which to spread an increasing cost, comprised of the households least able to pay.

2.4 Ethanol should be excluded – we don't need it

Australians do not need domestic supplies of ethanol to reach high levels of fuel security or to hit emissions-reduction targets. And including ethanol would divert resources from the LCLFs they do need.

Ethanol would make little difference to fuel security

As an LCLF, ethanol is mixed with petrol for use in vehicles. But the sovereign fuel share of these segments is set to reach extremely high levels through electrification alone (see Figure 2.2 on the next page).

While electrification replaces petrol with sovereign electricity across the whole fleet, blending ethanol replaces a fraction of each litre. Australia's entire ethanol output could displace only a little over 1 per cent of national petrol consumption by volume, and less again by energy.[23] This is the same sovereign fuel share as just six months' worth of electrification.

The government should prioritise fuels that have no alternative

Every litre of ethanol produced is a litre less of other important LCLFs for sectors with no substitutes. Producing LCLFs for cars that can be electrified instead of planes that cannot would be a waste of resources.

Australia's current pipeline of LCLF refineries already needs to grow quickly. The Clean Energy Finance Corporation has identified 16 potential projects with combined output of about 2,000 megalitres, none of which has reached a final investment decision.

Against that, the consultation paper proposes targets rising from 750-to-1,900 megalitres in 2030 to 3,450-to-8,900 megalitres in 2035.[24] At the upper bound, the scheme would require more than four times the entire current project pipeline within a decade. One of the most advanced LCLF projects, Ampol's Brisbane Renewable Fuels Project, is set to produce 750 megalitres at full capacity. At the upper end of the government's target range, Australia would need 12 new green refineries of equivalent size to be built over the next nine years.

The capacity should go where it is needed most. That is aviation fuel and renewable diesel - not ethanol.

21. Reserve Bank of Australia (2026).
22. ibid. A 10 per cent increase in domestic fuel prices adds a bit over 0.3 percentage points to headline inflation over one-to-two quarters.
23. Arup Australia (2025); DCCEEW and DITRDSCA (2026). About 175 megalitres of ethanol production against more than 15,000 megalitres of petrol consumed in the 12 months to March 2026. Ethanol carries roughly two-thirds the energy of petrol per litre.
24. ibid.

Ethanol should be used to make other LCLFs

Ethanol is not only a possible LCLF itself for cars, it is also a critical input into producing other higher-value LCLFs.

On the figures for Australia's two announced alcohol-to-jet projects, producing a litre of sustainable aviation fuel takes about two litres of ethanol. Together, those projects would need about 400 megalitres of ethanol; more than double Australia's entire annual ethanol production.[25] Using ethanol for cars means less ethanol for projects like these.

This trade-off is already visible internationally. SkyNRG, based in the Netherlands, has revised down its forecast of 2030 alcohol-to-jet capacity by about 1.3 million tonnes, citing increased competition for ethanol from road fuels as a reason.[26] Closer to home, Ampol assessed the alcohol-to-jet pathway for its Brisbane Renewable Fuels Project and rejected it: the pathway had 'improved technical maturity but lack of available domestic feedstock led to over-reliance on imported feedstock'.[27]

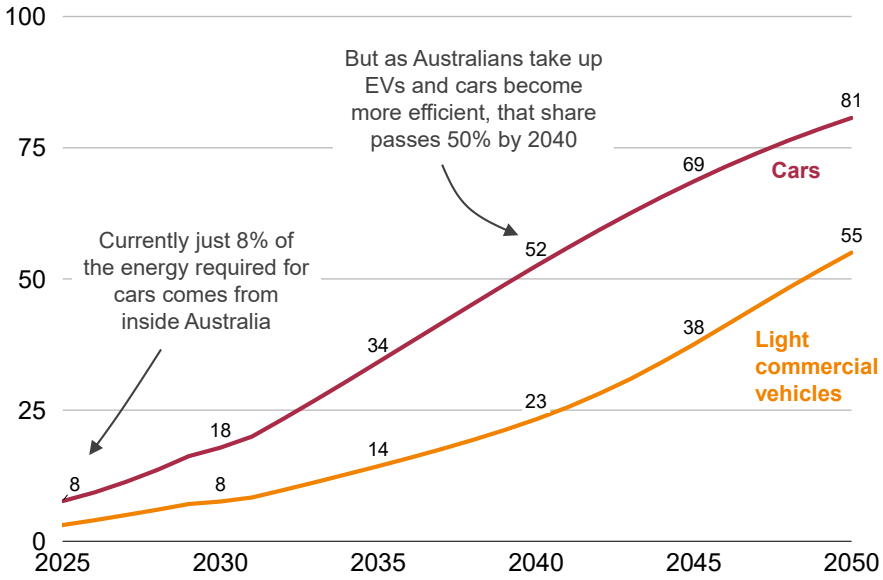
Making ethanol eligible under an obligation that covers petrol would create in Australia the competition that is already constraining the pathway elsewhere.

Another ethanol mandate is unlikely to work anyway

Two Australian states have existing ethanol mandates, but neither have worked, and a new federal obligation would be likely to face similar obstacles.

NSW requires ethanol to be at least 6 per cent of the petrol sold by large retailers. Because petrol may legally contain no more than 10

Figure 2.2: The sovereign fuel share of cars and light commerical vehicles is set to reach very high levels without LCLFs
Share of total fuels coming from sovereign (domestic) sources, (% sovereign fuel share)



Note: As vehicles electrify, the sovereign fuel share methodology calculates the volume of avoided liquid fuel consumption to determine the increased sovereign fuel share.

Source: Grattan Institute analysis.

25. Arup Australia (2025). Project Ulysses would require 204 megalitres of ethanol for 102 megalitres of fuel; the Charters Towers project 192 megalitres for 96.
26. SkyNRG and ICF (2026).
27. Ampol Australia Petroleum (2025).

per cent ethanol,[28] meeting that mandate requires around 60 per cent of the petrol sold to be E10. E10 is about 22 per cent of sales, down from 25 per cent in 2019, and as at May 2024 every retailer subject to the Act had obtained an exemption from the mandate.[29]

Queensland requires 4 per cent, which on its own department's arithmetic needs 4 in 10 motorists to choose E10. About 3 in 10 do, and the five-year average is 2.9 per cent.[30]

Neither mandate has been met. And the failure is not in enforcement, it's because motorists don't buy it.

About 69 per cent of the NSW exemptions were granted because the retailer had taken every prescribed step to comply (i.e. installing the infrastructure, securing supply, marketing E10 at a displayed price) and still could not meet the mandate.[31] As the Queensland government puts it, the legislation 'does not force motorists to buy' E10.[32]

This is not an enforcement problem that a federal scheme would solve. It is a demand problem. E10 is the cheapest fuel on the forecourt, but it contains about 3 per cent less energy than regular unleaded and sells at a discount of only 1.1 per cent; so it is cheaper by the litre and dearer by the kilometre.[33] Motorists appear to have worked this out. E10 has held at around 22 per cent of NSW fuel sales since 2020, and the Independent Pricing and Regulatory Tribunal expects sales to keep falling as hybrid and electric vehicles take over.[34]

28. *Fuel Quality Standards (Petrol) Determination 2024* (Cth), s 5, item 6.
29. Independent Pricing and Regulatory Tribunal (2024).
30. Queensland Government (2025).
31. Independent Pricing and Regulatory Tribunal (2024).
32. Queensland Government (2025).
33. Independent Pricing and Regulatory Tribunal (2024). An average discount of 2.1 c/L to U91 in 2023, down from 1.7 per cent to 1.1 per cent of the U91 price since 2020.
34. ibid.

3 Lessons from other demand mechanisms

In this section, we focus on lessons for scheme designers from the Renewable Energy Target, Australia's largest and most successful demand mechanism.

When introduced in 2000, the federal Renewable Energy Target aimed to achieve an additional 2 per cent of electricity coming from renewables by 2008, by making it mandatory for electricity retailers to purchase a percentage of renewable electricity each year. At the time, this represented a doubling of post-1997 renewable electricity production.[35]

Additional state-based targets were introduced in 2007, and the national target was expanded in 2008 to 20 per cent of electricity by 2020 – a goal that was achieved in 2019.

3.1 Why the RET worked

Four main factors contributed to the RET being a successful policy to underwrite development of an industry capable of supplying a large amount of Australia's electricity: it was a long-term policy; it used a market-driven approach; international cost reductions; and the unique nature of electricity compared to other energy sources.[36]

The original RET was legislated to run for 12 years (2000 to 2012). In 2008 this was extended to 2020. This length of time guaranteed that new generators would have markets for their certificates. This certainty crowded in private sector investment.

Much of the scheme architecture has remained for 25 years. However, it is notable that periods of uncertainty about the scheme's future (for example, reviews of the scheme in 2006-07 and 2014) led to downturns in investment.

An obvious strength of the RET was the use of markets to drive a least-cost outcome. This contrasts to approaches taken in other countries, such as feed-in tariffs, which may have delivered similar industry growth, but at higher cost to those economies.

Australia rode the wave of cost reductions driven by larger countries' moves towards renewables, particularly the growth of wind energy in Denmark and the UK, and the growth of solar deployment in Germany and solar manufacturing in China. And Australian households enthusiastically adopted rooftop solar, well beyond the levels that modelling predicted.

The electricity market has some unique characteristics that helped the RET to succeed. Firstly, even if prices rise, it is almost impossible for electricity users to move away from using electricity. This means that the base over which costs of the RET were spread remained stable over time. And second, there was little need for new infrastructure to support new generation to achieve the RET target of 20 per cent renewable energy.[37]

35. Renewable Energy Target Act (2000).
36. Other policy measures, as shown in Box 2, also supported its success.
37. This is partly because demand did not grow (so existing transmission was adequate for demand), and partly because renewable resources were close to existing transmission, or were so good that new transmission could be justified (for example, on the Eyre Peninsula in South Australia). Because the share of renewables has risen beyond the RET target, this no longer holds true, hence the current need to build new transmission.

3.1.1 Unforeseen outcomes and adverse consequences

The RET experience shows it is not easy to forecast how market-based policies will play out.

Present technology costs may be poor indicators of future costs

Modelling in 1999 predicted that most of the new renewable electricity capacity would draw on bioenergy and waste, with nothing from solar and very little from wind, because the former were lower cost. In the end, wind and solar took nearly 100 per cent of the target.[38]

This happened for two reasons. Firstly, wind and solar, while high-cost when the RET was established, fell dramatically in price, driven by policy overseas. Bioenergy didn't experience the same cost reductions and was subject to feedstock risk; and waste (as an established technology) did not have further scope to reduce its costs.

Secondly, energy retailers were willing to sign long-term power purchase agreements, to reduce the risk that they wouldn't be able to get sufficient renewable electricity supply to comply with the target. This suited wind projects very well, because it meant they could more easily secure finance with a long-term contract to buy their output at a fixed cost.

Demand is uncertain

The 1999 modelling was premised on a forecast that demand for electricity would grow, such that renewables would be used to meet new demand. This did not happen. Instead, demand flat-lined, and pushing in new renewable supply began to undercut market share for coal and gas generators.[39]

State polices can distort federal policies

Poor co-ordination between state and federal policy led to state policies distorting investment signals, so that the RET was no longer achieving least-cost outcomes.

For instance, generous feed-in tariffs for rooftop solar skewed renewables development away from (cheaper) large-scale solar and wind, necessitating splitting the RET into the Small-scale Renewable Energy Scheme (the SRES) and the Large-scale Renewable Energy Target (the LRET) in 2011. And state renewables targets meant renewables developed in some states and not others, rather than letting it happen in the places with the best resources.

Small and large producers should be treated differently

The RET distinguishes between small and large generators. Small generators (almost entirely rooftop solar) have always been eligible to claim all their credits upfront, in return for accepting a 'deemed' amount of credits that reflect an average amount of generation over the lifetime of the system. This does two things: it reflects that small generators are usually private purchases, made with cash upfront, and so aligns the subsidy from the credits with the capital outlay (compared to large generators funded with debt, which creates an ongoing outlay). It also vastly simplifies scheme administration, because the regulator only has to interact with the small generator once.

3.2 Where clean fuels differ from renewable electricity

There are a number of factors that affect liquid fuels differently to electricity, which will affect how these lessons from the RET can be applied.

38. McLennan Magasanik Associates (1999) and Clean Energy Regulator (2022).
39. This was a good outcome from an emissions-reduction perspective, but a poor outcome for electricity system reliability because there was (and still is) no policy for dispatchable capacity to supply the other services provided by coal and gas generators.

Most obviously, electricity is already a serious competitor for petrol in transport, and will become a serious competitor for diesel in mining and road transport. This means a reduced user base over which to spread the costs of a demand mechanism. Hence, the costs to fuel users may grow over time, even if the cost of producing clean fuels falls.

The second difference is the equipment that uses liquid fuels. Appliances and equipment that use electricity are not affected by where the electricity comes from, because an electron is an electron. A renewable electricity target had no effect on the technical performance of electrical equipment. However, one liquid fuel is not directly substitutable for another: you cannot put petrol in a diesel truck, or diesel in an aircraft. This means that a demand mechanism cannot have a single target: it must have sub-targets for each fuel, even though the same architecture can be used for all.

3.3 Our design recommendations

To avoid some of the missteps of the RET while delivering similar industry development benefits, we recommend any demand mechanism for clean fuels accommodate the following features:

- Establish annual targets for at least 15 years, ramping up from the commencement date to 2035, and then holding at that level for the remaining years.
- Maximise transparency around credit prices, so that a forward price helps underwrite investment.
- Build in a mechanism to prevent state-based policies from skewing activity towards higher-cost activities.
- Be prepared to adjust the scheme if demand for liquid fuels changes significantly, and set out in legislation or regulations how this process would play out.
- If smaller, distributed production facilities are likely to take up a large share of production, provide different compliance and crediting arrangements for these facilities.

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