



19 December 2025

Department of Infrastructure, Transport, Regional Development,
Communications, Sport and the Arts
111 Alinga Street
Canberra, ACT 2601

Subject: Submission to the Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts on the Cleaner Fuels Program Policy Design and Engagement

Dear Sir/Madam,

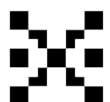
The NSW Decarbonisation Innovation Hub (NDIH), through the Powerfuels including Hydrogen Network (PFHN), is pleased to provide this submission to the Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts in response to the Cleaner Fuels Program Policy Design and Engagement Paper.

This submission has been prepared by the Network's lead contributors, with input and review from the PFHN Expert Panel. It reflects expert perspectives from New South Wales on how the Cleaner Fuels Program can most effectively support the development of a low-carbon liquid fuels industry, accelerate industrial decarbonisation, and strengthen Australia's clean manufacturing capability. The views presented are offered in good faith to inform evidence-based policy design and do not represent the formal position of any individual member, organisation, or the NSW Government.

The Expert Panel would welcome the opportunity to meet with the Program team to discuss this submission in more detail and to share insights and learnings from the NSW perspective.

Sincerely,

Scientia Professor Rose Amal AC
Network Lead
Powerfuels including Hydrogen Network
NSW Decarbonisation Innovation Hub





NSW Decarbonisation Innovation Hub Response: Cleaner Fuels Program Policy Design and Engagement Paper

From: The New South Wales (NSW) Decarbonisation Innovation Hub

Date: 19 December 2025

Contact

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Summary

The NSW Decarbonisation Innovation Hub supports a technology-neutral Cleaner Fuels Program that enables both biogenic and synthetic low-carbon liquid fuels (LCLF), with eligibility determined by verified lifecycle emissions and sustainability criteria. A broad type of LCLF should be supported, including bio-based drop-in fuels, advanced waste- and residue-derived fuels, and renewable fuels of non-biological origin (e-fuels), provided they meet minimum carbon-intensity thresholds and are produced domestically. Deployment should prioritise applications where liquid fuels remain indispensable, such as aviation and maritime transport, while being de-prioritised where electrification offers more efficient decarbonisation options. Prioritisation should also reflect regional feedstock availability and Australia's strong potential to scale e-fuels based on abundant renewable resources.

On financial design, the submission supports a competitive, value-for-money framework that assesses proposals through a balanced value matrix, including cost per litre or per tonne of CO₂ abated, lifecycle performance, economic and regional benefits, First Nations participation, environmental justice and fuel security. Market-linked mechanisms such as Contracts for Difference provide the greatest investment certainty and should form the basis of ongoing production support, complemented by fixed credits where appropriate in early markets. Capital grants and concessional finance through the Clean Energy Finance Corporation (CEFC) and National Reconstruction Fund (NRF) remain critical for first-of-a-kind projects, alongside targeted support for Front-End Engineering Design (FEED), pilots and higher-risk emerging technologies such as e-fuels.

The submission emphasises that production incentives must be embedded within a coherent wider policy architecture, including aligned decarbonisation strategies, fuel and vehicle standards, renewable electricity and hydrogen policy, waste and forestry frameworks, carbon markets and trade settings. Lessons from the other jurisdictions highlight the importance of stable multi-year incentives, integrated industrial planning and early supply-chain readiness. Domestically, recent experience with renewable and clean-energy projects demonstrates the need to manage system-level risks such as social licence, land-use constraints, lengthy approvals processes and support that is not scaled or timed to project needs. Anticipating and addressing these risks through coordinated approvals, predictable support mechanisms and strong community and environmental safeguards will be essential to build investor confidence and deliver a competitive, scalable LCLF industry for Australia.



Lead Contributors

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Q. 1.1: Which LCLF should be eligible under the program and why?

The NSW Decarbonisation Innovation Hub supports a technology-neutral definition of low carbon liquid fuels (LCLF) that includes both biogenic and synthetic fuels, with eligibility determined by lifecycle emissions performance and sustainability criteria rather than fuel type. This avoids prematurely favouring one pathway over another and recognises that both biogenic and synthetic fuels will be needed to achieve net zero, that biogenic fuels offering near-term commercial deployment and synthetic fuels providing long-term scalability as biomass constraints emerge. A technology-agnostic framework ensures the Program can support the broadest range of credible solutions, encourage innovation and mobilise investment across all pathways capable of delivering meaningful decarbonisation in hard-to-electrify sectors.

We recommend that all of the following LCLF categories be eligible, provided they meet agreed emissions-reduction and sustainability thresholds and are produced in Australia.

Bio-based drop-in fuels

- Sustainable aviation fuel (SAF) via recognised pathways (e.g. hydro-processed esters and fatty acid/HEFA, Fischer Tropsch, Alcohol to Jet, co-processing).
- Renewable diesel (RD) / hydrotreated vegetable oils (HVO) and associated renewable gasoline/naphtha cuts from the same hydrotreating or Fischer-Tropsch (FT) facilities.
- Renewable marine fuels (e.g. RD or renewable methanol for shipping applications).

Bio-based drop-in fuels provide an immediate and scalable decarbonisation pathway due to their compatibility with existing refining, storage and transport infrastructure. They enable rapid emissions reduction across aviation, heavy road transport, mining and maritime without necessitating downstream asset conversion. These fuels also create an essential early-market platform from which more advanced LCLF technologies can scale.



Advanced biofuels from waste and residues

- Fuels from waste oils and fats
- Fuels from forestry, agricultural and lignocellulosic residues
- Fuels from municipal solid waste via pyrolysis or gasification

Advanced biofuels maximise emissions reduction per unit of biomass by prioritising feedstocks that do not compete with food systems or drive land-use change. These pathways align strongly with sustainability principles and support new regional value chains for residues, waste materials and by-products. Enabling greater utilisation of under-used feedstocks also improves supply chain resilience, reduces reliance on globally constrained vegetable/waste oil markets and supports the commercial viability of integrated biorefineries across NSW and other jurisdictions.

Renewable fuels of non-biological origin (e-fuels)

- E-kerosene, e-diesel, e-gasoline, e-oxymethylene ethers (e-OME) and e-methanol produced using renewable hydrogen and captured CO₂.

e-fuels are fundamental to achieving deep, long-term decarbonisation in sectors such as aviation and maritime, where sustainable biomass availability limits the scale-up of bio-based fuels. By synthesising fuels from renewable hydrogen and captured CO₂, e-fuels pathways enable the production of genuinely carbon-neutral compatible fuels consistent with Australia's 2050 emissions targets and emerging international requirements. Their development aligns with global shifts toward carbon-circular fuel systems, where the carbon released during combustion has been previously captured and re-utilised, ensuring no net addition to atmospheric CO₂.

Australia's abundant renewable electricity resources provide a strong comparative advantage for large-scale renewable hydrogen production, which is the principal cost driver for e-fuels. Leveraging this advantage positions Australia to be competitive in both domestic and export markets as international mandates for synthetic and net-zero fuels accelerate.

Transitional and co-product fuels

Co-product fuels such as renewable naphtha and LPG-range co-products are generated as integral outputs of advanced biorefining and power-to-liquids processes. Whether derived from lipid hydrotreating, biomass gasification-FT synthesis, alcohol-to-hydrocarbon upgrading or synthetic e-fuel pathways, these processes yield a naturally distributed product that includes lighter hydrocarbons alongside SAF and renewable diesel. The naphtha and LPG cuts are chemically analogous to their fossil counterparts and can directly displace conventional feedstocks in petrochemical, industrial and remote-energy applications. Their inclusion within the



Program enhances overall carbon efficiency, strengthens project economics and supports early commercial deployment of integrated low-carbon liquid fuel facilities.

Q. 1.2: Should certain types of LCLF be prioritised over others?

a. Should LCLF suitable for particular sectors or uses be prioritised? For example, should sustainable aviation fuel be prioritised over renewable diesel?

LCLF should be prioritised for sectors where liquid fuels will remain essential and where few scalable alternatives exist, such as aviation, long-distance maritime transport and certain off-grid industrial operations. Prioritisation should be sector-based rather than fuel-based, ensuring support flows to applications where LCLF delivers the highest strategic value. Aviation and maritime may also progress more quickly because their fuel supply chains involve a small number of large, centralised stakeholders, enabling clearer offtake pathways compared with renewable diesel, which must engage thousands of dispersed end-users.

Geography also matters: some regions have limited access to sustainable biomass but strong renewable energy resources, making e-fuel pathways more viable than biofuels. Prioritisation should therefore recognise regional feedstock availability to ensure public funding supports technologies with a genuine commercial and resource advantage in each location.

For sectors likely to electrify or transition to hydrogen over time, LCLF can still provide near-term abatement, but long-term reliance is less certain. Overall, a sector- and region-based prioritisation approach supports efficient use of scarce feedstocks, accelerates deployment where it is most feasible, and aligns Program incentives with Australia's long-term decarbonisation objectives.

b. Should LCLF for certain sectors or uses be de-prioritised due to other viable decarbonisation pathways?

Yes, LCLF should be de-prioritised in applications where mature, scalable or lower-cost decarbonisation alternatives already exist or are expected to become commercially viable within the Program's investment horizon. For example, in road transport, battery-electric vehicles or hydrogen fuel-cell vehicles are increasingly viable for light vehicles and urban freight, while heavy long-haul transport remains structurally harder to electrify and may require LCLF for longer. Similarly, many stationary energy and industrial heat applications can be decarbonised more efficiently through direct electrification or renewable hydrogen rather than converting renewable energy into liquid fuels.



Directing scarce sustainable feedstocks and concessional capital toward applications with credible alternatives would deliver lower marginal abatement value and could impede the scale-up of technologies better suited to those uses. This is particularly important given long-run feedstock constraints and rising biomass prices, which will intensify as global demand for sustainable bio-based fuels grows. Prioritising LCLF only where liquid fuels remain structurally necessary ensures sustainable feedstocks are preserved for the applications that truly require them, maximises emissions reduction per dollar of public investment, and maintains alignment with Australia's broader net zero strategy.

c. What market impacts are anticipated by influencing prioritisation of particular fuel types?

Prioritising certain LCLF types will shape how the market develops by directing capital, feedstocks and supply-chain investment toward preferred pathways. Clear prioritisation can accelerate deployment in sectors with limited alternatives, such as aviation, but may also create feedstock competition, raising input costs or reducing availability for other fuel types.

Prioritisation can influence the technology mix, potentially favouring mature pathways at the expense of emerging options needed for long-term scalability. It also affects regional development, as different fuels anchor production in different locations depending on feedstock and infrastructure needs. Overall, prioritisation can drive early market formation but must be calibrated to avoid distorting feedstock markets or crowding out future innovation.

Q. 2.1: Should the production credit be a fixed amount per litre of production, or a variable amount that depends on the market price of LCLF?

a. Are there any potential benefits, risks or constraints considering the two different production credit options?

Fixed Production Credits

Benefits

- Provide investment certainty in early-stage markets. Produces a predictable revenue stream that can materially de-risk financing for first-of-a-kind facilities and accelerate project deployment.
- Provide administrative simplicity. Straightforward to tender, monitor and audit, minimising transaction costs for both proponents and government.



- Provide budget predictability for the Government can more accurately forecast expenditure, supporting clear program caps and fiscal planning.

Risks

- Risk of over-subsidisation as the market matures as fixed credits do not adjust as production costs fall or market prices increase. Over time, this may lock government into a subsidy level that exceeds what producers require, increasing fiscal exposure.
- Limited responsiveness to cost volatility. In contrast to over-subsidisation during maturity, fixed credits may fail to cover costs when feedstock prices and renewable utility costs increase, or LCLF prices decrease, leaving producers exposed to volatility and potentially undermining project viability.

Constraints

- Most suitable for early-stage pathways or smaller projects where market-price benchmarks are limited and a simple, investment-friendly mechanism is necessary.

Variable, Market-Linked Credits (e.g., Contract for Difference)

Benefits

- Dynamic, cost-efficient public expenditure: Payments fall automatically as market prices rise or production costs decrease, ensuring government support remains aligned with actual market conditions.
- Revenue stability for producers: A strike-price mechanism provides long-term price certainty, lowering the cost of capital.
- Risk-sharing: When market prices exceed the strike price, producers return the difference to government, reducing net public cost and aligning incentives.

Risks

- Higher administrative complexity. Requires ongoing price monitoring, reconciliation and credible benchmarking against international LCLF indices.
- Challenging for early-stage proponents. Smaller or less-experienced developers may find CfD-style mechanisms harder to manage, potentially limiting participation.
- Dependence on market price quality. Some LCLF types do not yet have deep, transparent markets, making index-based calculations more difficult.



Constraints

- More suitable for mature pathways, large-scale facilities and projects where reliable market price references exist.

b. What outcomes do you think can be delivered with the available funding?

With targeted program design and competitive allocation, the available funding can play a catalytic role in establishing Australia's early LCLF industry. While the funding envelope alone will not deliver full sectoral transformation, it can enable several first-of-a-kind and early commercial facilities to reach financial close by reducing the cost gap between conventional fuels and emerging LCLF pathways.

This early wave of development is critical for de-risking technologies, generating operational evidence, and demonstrating commercial viability to private investors. The Program can also stimulate the creation of new regional and industrial value chains by supporting feedstock aggregation, hydrogen supply development, renewable electricity integration, and carbon capture utilisation, which will underpin the scaling of future LCLF production.

By enabling domestic production for sectors with limited decarbonisation alternatives, the Program contributes to Australia's near-term abatement objectives while positioning industries such as aviation, heavy transport and maritime to meet emerging global fuel standards. Furthermore, early production volumes will generate market intelligence on costs, carbon intensity performance and supply-chain logistics, helping refine future policy settings and reducing the level of subsidy required as the market matures. Ultimately, while the Program's funding will not eliminate all investment risks, it will create the enabling conditions necessary for industry growth, accelerate cost reductions through learning and scale, and position Australia to build a competitive, self-sustaining LCLF industry aligned with long-term decarbonisation trajectories and international market expectations.

c. What type of mechanism provides the greatest investment certainty or level of bankability to projects?

From an investment and financing perspective, mechanisms that provide long-term, predictable revenue streams offer the highest level of bankability for LCLF projects, particularly those that are capital-intensive or reliant on emerging supply chains. In practice, a variable, market-linked mechanism such as a Contract for Difference (CfD) provides the strongest investment certainty because it stabilises revenues over the life of the project, insulating producers from fluctuations in international fuel prices, feedstock markets, renewable electricity costs and carbon markets.



By guaranteeing a strike price and compensating producers when market prices fall below this threshold, CfDs materially reduce revenue volatility, lower risk premiums demanded by lenders, and improve the economics of securing long-term project finance. This structure is particularly valuable for pathways exposed to commodity price movements, such as SAF, e-fuels and hydrogen-enabled production.

Fixed production credits can support early investment decisions by offering simplicity and clear upfront incentives, but they do not protect producers against cost increases or market downturns, nor do they adjust as costs fall. As a result, fixed credits provide shorter-term confidence but limited bankability beyond initial project formation. By contrast, a variable, market-linked mechanism delivers contractual revenue certainty over multiple years, enabling developers to raise debt at lower cost of capital, structure long-term off-take agreements, and progress toward financial close with greater confidence. Accordingly, while fixed credits have a role in early policy deployment, market-linked CfD-style mechanisms provide the highest degree of investment certainty and are most effective at unlocking large-scale private capital for LCLF projects.

d. How can this support be structured to prevent substantial upside to producers?

The production support mechanism should be designed so that public funding closes the genuine viability gap without creating windfall gains for producers. This can be achieved by using variable, market-linked mechanisms, such as a CfD that automatically taper support when market prices rise or production costs fall, and require producers to return value to government when prices exceed the strike price. For fixed production credits, upside can be limited through volume caps, declining credit levels over time, periodic recalibration, and clear transparency requirements on lifecycle costs and feedstock sourcing. These features ensure that support remains proportionate to actual market conditions, protects taxpayers from over-subsidisation, and directs funding toward producers that genuinely need assistance to reach commercial deployment.

e. How do you consider pricing for LCLF will be set over the short-medium term and longer term? Will pricing be matched to a premium on equivalent fossil fuel or price of imported LCLF or be on a carbon abatement basis?

In the short to medium term, LCLF prices will be largely cost-driven, reflecting early-stage production economics and limited supply, and will therefore sit at a premium to fossil fuels. Imported LCLF, particularly SAF, may act as a benchmark and influence domestic price expectations.



As the market matures, scales up and gains price transparency, LCLF pricing is expected to transition toward internationally referenced benchmarks. Over the longer term, pricing is likely to evolve into a carbon-adjusted market, where fuels with lower lifecycle emissions command higher value and pricing reflects both global market dynamics and compliance obligations in sectors such as aviation and maritime. In essence, pricing will move from cost-plus premiums today toward benchmark- and carbon-driven structures as the industry becomes more established.

Q. 2.2: To deliver the policy intent of the Program while maximising the value for taxpayers, do you agree that projects with the lowest cost should be prioritised under the Program, with the cost being measured either as per unit of LCLF produced or as per unit of carbon emissions abated?

Prioritising projects with the lowest cost, whether measured per unit of LCLF produced or per tonne of carbon abated, is an important principle for maximising value for taxpayers. However, cost alone should not determine project selection. A purely cost-based approach may unintentionally favour only the most mature or lowest-risk pathways and overlook emerging technologies, regional facilities or applications that lack alternative decarbonisation options but may deliver higher long-term value for Australia.

To deliver the Program's objectives, project assessment should be based on a broader value matrix that incorporates several dimensions of public benefit. This matrix should include cost performance, lifecycle emissions performance, economic benefits such as GDP contributions, new regional jobs and skills development, and environmental justice considerations, including community impacts and equitable access to benefits. Assessing proposals against this wider set of criteria ensures that public funding flows to projects that deliver the highest overall system value rather than the lowest immediate cost.

A value matrix approach supports efficient resource allocation, encourages investment in strategically important pathways and ensures that the Program contributes to a resilient and competitive domestic LCLF industry while protecting taxpayer value over the long term.



Q. 2.3: Should the production credit be linked to the quantum of LCLF produced, or the carbon emissions saving potential of the fuel?

While linking production credits to the quantity of LCLF produced provides administrative simplicity and can support early market formation, a structure that reflects the carbon emissions savings of the fuel aligns more directly with the purpose of a low carbon fuel program. A volume-based incentive treats all fuels equally regardless of lifecycle performance, which may unintentionally favour pathways with lower abatement outcomes. In contrast, an emissions-based approach ensures that public funding rewards fuels that deliver the greatest reductions in net carbon emissions per tonne consumed and encourages continued innovation, particularly in emerging low carbon pathways such as synthetic e-fuels.

From a practical perspective, an emissions-focused approach also helps lock in the carbon intensity performance of the industry from the start, which creates a strong foundation for scaling over time. To balance administrative simplicity with strategic impact, a hybrid model could be used. This would provide a baseline level of support linked to production volume while adjusting the final credit based on verified lifecycle emissions intensity. Such an approach maintains investment certainty while ensuring that most of the value flows to fuels that achieve the highest abatement outcomes, thereby maximising taxpayer benefit and maintaining alignment with Australia's net zero objectives.

Q. 2.4: What are your views on the cost to deploy LCLF domestically compared to internationally? Is there a local premium for domestic production?

Deploying LCLF domestically is expected to involve a local production premium in the short to medium term when compared with international supply, reflecting Australia's early stage of industry development and the capital intensity of first-of-a-kind facilities. Domestic producers face higher upfront infrastructure costs, limited economies of scale, and relatively immature supply chains for sustainable feedstocks (such as renewable hydrogen and biomass).¹ In contrast, several international jurisdictions, particularly the United States and parts of Europe, benefit from substantial subsidies, established refining capability, and deeper feedstock markets, which reduce their marginal cost of production. Logistical factors also influence comparative costs: while imported fuels may be cheaper on a production basis, transport, certification and supply-chain complexity can offset part of that advantage.

¹ IATA, [Net Zero Roadmaps](#)



Over the longer term, Australia's cost profile has strong potential to improve due to comparative advantages in renewable electricity for hydrogen production, abundant biomass residues, and access to CO₂ storage or utilisation pathways. With scale, learning and targeted policy support, domestic LCLF costs are expected to converge toward international benchmarks and, in some pathways such as synthetic e-fuels, may eventually become globally competitive. In this context, the short-term local premium should be viewed as a strategic investment that builds sovereign capability, reduces exposure to international supply constraints, supports regional economic development, and positions Australia to participate in emerging global LCLF markets.

Q. 2.5: Should the total value of production credits be capped for each project? If yes, what should the capped amount be and why?

Capping the total value of production credits per project can be an effective mechanism to maintain fiscal discipline and ensure equitable access to funding, but the cap must be set in a way that does not undermine project bankability or deter investment in capital-intensive pathways. A cap helps prevent disproportionate allocation of public funds to a small number of large facilities, supports a more diverse project portfolio, and limits government exposure to cost escalations or unexpectedly high production volumes. However, a cap that is too restrictive may leave projects with insufficient revenue certainty to secure financing, particularly for first-of-a-kind SAF, or power-to-liquids projects that require substantial upfront capital. The most effective approach is therefore a scaled or proportional cap, linked to project size, expected production volumes, and the level of abatement delivered. This allows government to manage overall program costs while still providing producers with a credible investment signal.

The cap should be set as a maximum value per tonne of CO₂ abated, rather than a fixed dollar amount per project. This ensures public funding is tied directly to emissions outcomes, provides a fair and technology-neutral benchmark across different LCLF pathways, and avoids over-subsidising fuels with lower abatement value. A CO₂-based cap can be calibrated to close the viability gap for early projects while maintaining fiscal discipline, and it can be reduced over time as costs fall and the industry matures. This approach delivers the strongest alignment with the Program's decarbonisation objectives and ensures transparent value for taxpayers.



Q. 2.6: Should production be focused on domestic supply only or should export also be permitted? What impact could restriction have for projects or the market?

While ensuring adequate domestic supply of LCLF is a central policy objective, restricting production exclusively to domestic markets may unintentionally limit project viability and impede the scale needed to create a competitive national industry. A balanced approach is required. For biogenic fuels, where Australia's feedstock availability is constrained and already under pressure from competing sectors, domestic supply should be prioritised to ensure that scarce biomass delivers maximum value for Australia's own decarbonisation needs.

By contrast, Australia has significant comparative advantages for producing synthetic e-fuels, including abundant renewable electricity, emerging hydrogen capability and access to suitable CO₂ sources. These characteristics position Australia strongly to participate in export markets for e-SAF, e-diesel and e-methanol, where global demand is expected to grow rapidly under international SAF and RFNBO mandates. Allowing export in these synthetic pathways supports economies of scale, improves investment attractiveness and strengthens Australia's role in global clean fuel supply chains.

To balance domestic priorities and export opportunities, the Program should permit exports while embedding mechanisms that safeguard local supply for priority sectors. This could include minimum domestic supply commitments or export caps linked to verified feedstock availability. Such an approach preserves commercial flexibility, leverages Australia's competitive strengths and ensures domestic decarbonisation goals are not compromised.

Q. 2.7: Is there a role for combined production support with capital grants for first-of-a-kind facilities?

Yes, there is a strong rationale for combining production-linked support with targeted capital grants for first-of-a-kind LCLF facilities. First-of-a-kind projects face disproportionately high upfront capital costs, technology integration risks, and financing challenges that cannot be fully mitigated through production credits alone. Capital grants help bridge the initial capital intensity, improve debt serviceability, and reduce the cost of capital, enabling projects to reach financial close. Production support then complements this by addressing ongoing operating cost gaps and providing long-term revenue certainty, which is essential for securing offtake agreements and maintaining investor confidence. This combined approach mirrors international best practice, where early capital support accelerates market entry and subsequent production incentives sustain operations as the industry scales. Importantly, a blended mechanism ensures that public



funding is deployed efficiently over the project lifecycle, capital grants reduce early-stage barriers, while production credits ensure that subsidies are tied to actual output, protecting taxpayer value. Together, these instruments create a balanced framework that catalyses first-of-a-kind facilities, accelerates learning and cost reduction, and positions Australia to build a competitive and self-sustaining LCLF sector.

Q. 2.8: What other types of funding or concessional finance could support LCLF projects (e.g. funding from CEFC and NRF)?

In addition to production credits, government can deploy a broader suite of concessional finance tools to accelerate LCLF project development. The Clean Energy Finance Corporation (CEFC) and the National Reconstruction Fund (NRF) already provide strong platforms for this, offering lower-cost or long-tenor debt, mezzanine or subordinated finance, loan guarantees, and targeted equity investments to improve project bankability, particularly for first-of-a-kind and capital-intensive facilities.

Government can complement these with capital grants or milestone-based funding to offset high upfront capital requirements, and with investment in enabling infrastructure such as renewable hydrogen supply, CO₂ capture and transport networks, and regional feedstock logistics. Further support could include credit enhancement for early offtake agreements, co-funding of feasibility and front-end engineering design (FEED), and streamlined planning, approvals and certification processes to shorten development timelines and reduce soft costs. Collectively, these tools can crowd in private capital, de-risk early projects, and create the foundational conditions needed for a competitive domestic LCLF industry.

Q. 2.9: Is any other support required across the supply chain to enable domestic production of LCLF?

Effective deployment of LCLF at scale will require coordinated support across the entire supply chain, not only at the point of fuel production. Early projects face structural constraints related to feedstock availability and logistics infrastructure, all of which influence cost, reliability and bankability. Government can play a critical role in addressing these bottlenecks by supporting the development of sustainable feedstock markets, including certification systems, aggregation hubs and long-term feedstock contracting frameworks that reduce volume and price risk for producers. In parallel, investment in renewable hydrogen production, electrolyser deployment,



and shared CO₂ capture and transport infrastructure will be essential to enable both bio-based and synthetic fuel pathways. For e-fuels specifically, it is important to recognise that the underlying science and process engineering are still evolving, with very high production costs and efficiency constraints at current technology maturity. Targeted support for research, development and pilot-scale demonstration is therefore necessary to improve conversion yields, reduce energy intensity and accelerate the progression of e-fuels toward commercial competitiveness.

Assistance to upgrade or repurpose port, pipeline, terminal and storage facilities can also reduce soft costs and improve market access. Further, skills development, workforce planning and streamlined regulatory processes, such as standardised sustainability certification, planning approvals and safety standards, can materially shorten project timelines. Together, these forms of supply chain support create the enabling conditions needed for domestic LCLF production to scale efficiently, reduce cost over time and ensure that early investments are not compromised by upstream or downstream constraints.

Q. 2.10: What lessons can Australia learn from other jurisdictions that have already implemented LCLF production support measures?

International experience demonstrates that successful LCLF deployment depends on long-term policy certainty, targeted financial support, and coordinated market development across the value chain. Jurisdictions such as the United States and the European Union have shown that predictable, multi-year production incentives. The United States has granted tax credits for SAF and clean fuel based on the US Inflation Reduction Act, while European Union have introduced Renewable Fuel of Non-Biological Origin mandates, which are critical for securing investment in first-of-a-kind facilities and enabling developers to raise low-cost capital. These jurisdictions also highlight the importance of stable sustainability and lifecycle carbon-intensity frameworks, which provide clarity for investors, enable transparent benchmarking, and reward fuels that deliver deeper emissions reductions.

Another key lesson is that support must extend beyond the production site: international programs have invested heavily in feedstock development, renewable hydrogen supply, and enabling logistics, recognising that production cannot scale without robust upstream and downstream conditions. China shows the value of integrated industrial planning, combining targeted capital support, waste-oil and residue mobilisation, and coordinated hydrogen and



carbon capture infrastructure to accelerate advanced biofuel and synthetic fuel deployment.² Their experience highlights that supply-chain readiness and feedstock aggregation are as critical as production incentives.³

The experience of NSW and Queensland with ethanol mandates offers valuable real-world lessons about how the mandates alone are insufficient, which ultimately lead to under-utilisation of production capacity. For a broader LCLF policy, combining mandates or offtake assurances with supply-side incentives, supply-chain infrastructure, and cross-sector support will be far more effective at delivering a competitive, scalable low-carbon fuel industry.

Competitive allocation mechanisms used in the UK and EU show that market-based instruments, such as contracts for difference, can both limit upside for producers and protect taxpayers while delivering high levels of investment certainty. Finally, mature jurisdictions demonstrate that policy should be flexible and adaptive, with periodic reviews that recalibrate support as markets evolve, costs decline and international standards shift. Collectively, these lessons suggest that Australia will benefit most from a stable, multi-year incentive regime, clear sustainability rules, coordinated infrastructure investment, and mechanisms that balance cost-effectiveness with long-term industry development.

Q. 3.1: Considering this objective, what production pathways should be focused on or prioritised?

a. Should priority be given to projects that use more-established production pathways (e.g. HEFA and HVO) than nascent production pathways that may present a higher level of technology risk?

To deliver meaningful LCLF volumes in the near term, it is reasonable for the Program to prioritise proven, commercial-ready pathways such as HEFA and HVO, which can move quickly to final investment decision and help establish early market confidence. Supporting these initial projects will create the foundational supply chains needed for industry growth.

However, Australia cannot rely solely on mature technologies. Long-term decarbonisation and global competitiveness will depend on higher-risk, high-potential pathways, including advanced residue-based and synthetic e-fuel production. These technologies are essential once

² Centre on Global Energy Policy, [China's Hydrogen Strategy: National vs. Regional Plans](#)

³ Foreign Agricultural Service of US Department of Agriculture, [Biofuels Annual](#)



sustainable biomass becomes constrained, but they will not reach commercial readiness without dedicated, early support to overcome higher capital intensity and technology risk.

A sequenced approach is therefore required: back proven pathways to establish the market, while investing in higher-risk emerging technologies to ensure a diverse and scalable LCLF industry aligned with Australia's net zero objectives.

b. How can nascent production pathways compete with more-established production pathways (e.g. HEFA and HVO)?

Nascent production pathways can compete with more-established technologies when policy settings recognise their strategic importance and provide targeted support to overcome early-stage technical and commercial barriers. To remain competitive, the nascent pathways require proportionate support across the technology development curve, including funding for pilot-scale and demonstration projects that validate technology performance, de-risk scale-up and build investor confidence. As these technologies move toward commercial readiness, government support may include concessional finance, capital grants for first-of-a-kind facilities, and tailored production credits that reward deeper lifecycle emissions reductions. Competitive processes should also evaluate projects not solely on current cost, but on strategic value, scalability, feedstock diversification, regional development benefits and long-term cost-reduction potential. By combining near-term deployment of mature technologies with structured, staged support for nascent pathways, the Program can deliver immediate emissions benefits while ensuring that next-generation fuels mature into commercially viable options aligned with Australia's net zero objectives.

c. What minimum stage of project development (and evidence) should be expected by projects under the program?

To ensure the Program delivers meaningful near-term production, projects should generally be at an advanced stage of development, with sufficient technical, commercial and financial maturity to progress to FID within the Program timeframe. This includes evidence of completed feasibility studies or FEED, validated technology performance at pilot or demonstration scale, clear site control, early permitting progress, credible feedstock and offtake strategies, and demonstrated financing pathways.

This Program can also operate in a complementary manner to existing state-based initiatives, such as the NSW Renewable Fuel Strategy, which provide targeted support for FEED and pre-FID activities. By recognising state-level FEED funding as an upstream enabler, the Program can focus its resources on projects closer to deployment while still allowing strategically important



earlier-stage pathways to mature through NSW or other state support. This coordination ensures a well-sequenced pipeline: state programs help advance projects from concept to FEED, while the Commonwealth Program supports those ready to move into construction and commercial production. This integrated approach maximises public value, accelerates project readiness, and ensures a robust flow of investment-ready projects capable of delivering meaningful volumes of LCLF to hard-to-electrify sectors.

Q. 3.2: Should there be a minimum facility size to be eligible?

A minimum facility size can help ensure the Program supports projects capable of delivering meaningful LCLF volumes and tangible emissions reductions. Without a size entry requirement, the Program risks attracting a large number of micro-projects that operate in isolation, lack integration into broader supply chains and carry higher commercial and technical risk. A minimum threshold therefore helps focus funding on facilities that are scalable, investable and able to contribute to a connected national LCLF network.

However, any threshold should remain flexible enough to avoid excluding strategically important smaller or modular first-of-a-kind projects, particularly those based on dispersed feedstocks or emerging pathways. A balanced approach would require proponents to demonstrate either a minimum commercial production capacity or a credible pathway to scale. For more mature technologies, it may be appropriate to set a higher minimum size requirement, reflecting their lower technology risk and greater ability to deliver commercial-scale volumes sooner. This tiered approach promotes efficient use of public funds, supports project viability and ensures the Program drives scalable industry development rather than fragmented small-scale experimentation.

Q. 3.3: Should LCLF be required to meet a carbon intensity threshold (% carbon intensity reduction compared to fossil equivalent) to be eligible for the program? If yes, what would be a reasonable threshold, and how should that threshold be calculated and verified? If not, why not?

Requiring LCLF to meet a lifecycle carbon-intensity threshold is an appropriate eligibility criterion, ensuring that public funding supports fuels that deliver genuine emissions reductions and align with Australia's net-zero commitments. A minimum 50% lifecycle emissions reduction compared to the fossil equivalent is a reasonable starting point, consistent with international practice, most



notably the European Union's Renewable Energy Directive (RED II and RED III), which apply similar minimum thresholds for sustainable fuels to qualify for policy support. However, given Australia's current feedstock base, a phased threshold, for example starting at 40–50% and tightening over time, would allow promising domestic pathways, including canola-based fuels, to participate while still incentivising continuous improvement. The threshold should be calculated using a transparent, internationally aligned lifecycle assessment (LCA) methodology, ideally embedded within the expanded GoO scheme, and verified through accredited certification and periodic review.

a. If the production incentive is based on carbon emissions reduced, rather than volume of LCLF produced (see Question 2.3), is a minimum carbon intensity threshold still needed as part of the eligibility criteria?

Yes. Even if incentives are awarded on a per-tonne CO₂ –e abated basis, a minimum carbon-intensity threshold remains essential to ensure that only fuels delivering meaningful and verifiable emissions reductions are eligible for support. A baseline threshold prevents low-impact or marginal pathways from entering the Program and preserves its environmental integrity by establishing a clear floor for performance. This approach is also consistent with international practice: jurisdictions such as the European Union, under the Renewable Energy Directive, require biofuels and renewable fuels of non-biological origin to meet minimum lifecycle emissions-reduction thresholds to qualify for market access or policy incentives. Maintaining a similar requirement reinforces alignment with global standards, supports export readiness, and simplifies administration by avoiding the need to individually assess pathways that do not meet core sustainability expectations.

b. Should Indirect Land Use Change be included in the method for determining carbon intensity, for the purpose of the Program?

Indirect land use change should be considered but applied pragmatically. Including indirect land use change in carbon-intensity calculations is consistent with global practice and reflects real emissions impacts associated with land conversion pressures. However, its modelling is inherently uncertain, and applying stringent penalties too early may disadvantage domestic feedstocks before more accurate data becomes available. A balanced approach would:

- incorporate indirect land use change using internationally consistent default values,
- allow producers to demonstrate lower indirect land use change through certified sustainable practices, and
- periodically review indirect land use change factors as better evidence emerges.



This provides environmental integrity without stifling early market development.

c. Should any feedstocks be prioritised or otherwise considered out of scope?

Feedstock eligibility should prioritise waste and residue streams, such as used cooking oil, tallow, agricultural residues, forestry residues and municipal solid waste, given their high lifecycle emissions reduction and low sustainability risk. Purpose-grown crops with high indirect land use change risk can be considered if the producers can demonstrate certified low indirect land use change performance.

The Program should also recognise CO₂-based feedstocks as a strategically important category, particularly for power-to-liquids and synthetic fuel pathways. Biogenic CO₂ and direct air capture CO₂ should be fully eligible, while unavoidable industrial process CO₂ may be allowed during a transition period. This approach ensures environmental integrity while enabling both near-term production and long-term scalability.

Q. 3.4: Other than carbon intensity, should any other sustainability criteria be included?

Yes. To maintain social licence and ensure that LCLF genuinely contributes to Australia's broader sustainability objectives, the Program should include a broader sustainability framework alongside carbon intensity. In addition to lifecycle emissions, eligibility should reflect:

- Land use and biodiversity outcomes, including avoidance of deforestation, high conservation value areas and unacceptable indirect land use change risk;
- Food and fibre security, ensuring that LCLF production does not materially displace food and fibre or drive significant price or land-use pressures
- Water use and local environmental impacts, including safeguards on water-stressed regions and protection of soil health and ecosystems; and
- Social and community outcomes, including respect for First Nations rights and interests, fair labour conditions and alignment with existing Australian workplace, environment and planning laws.

From a Program design perspective, these criteria should be risk-based and aligned with existing regulatory settings, so that certification does not duplicate domestic environmental approvals but instead provides an integrated, transparent assurance framework. This avoids creating unnecessary administrative burden while ensuring that public funding supports LCLF projects that are environmentally and socially responsible as well as low-carbon.



Q. 3.5: Which international and domestic sustainability schemes should be allowed to verify sustainability claims?

To verify sustainability claims efficiently and credibly, the Program should recognise a defined set of robust international and domestic schemes, rather than creating an entirely new system. Internationally, this could include well-established, third-party audited schemes such as ISCC, the Roundtable on Sustainable Biomaterials (RSB) and, where relevant for specific feedstocks, schemes such as Bonsucro (for sugar-based feedstocks) and recognised forestry certifications (e.g. FSC, PEFC) to demonstrate sustainable residue sourcing. These schemes already incorporate criteria on GHG emissions, land use, biodiversity, water and social safeguards, and supporting international alignment.

Domestically, sustainability verification should be anchored in, and interoperable with, the GoO scheme as it is expanded to cover LCLF, and should acknowledge compliance with relevant Australian environmental, planning, water and workplace legislation as a baseline. The Commonwealth could maintain an “approved schemes” list, with clear principles for recognition: transparent governance, independent third-party auditing, chain-of-custody/traceability, coverage of environmental and social criteria, and consistency with Australia’s international obligations. Proponents could demonstrate sustainability either through these recognised schemes or, where appropriate, through equivalent evidence assessed against the same principles. This approach provides flexibility, avoids duplication, and ensures that sustainability claims are both credible and administratively workable for projects pursuing domestic and export markets.

Q. 4.1: What are your views on the aforementioned factors affecting the merit of a proposal?

From the NSW Decarbonisation Innovation Hub perspective, the proposed merit factors are broadly appropriate and aligned with the Program’s intent, but they need to be applied in a structured, transparent way so they don’t collapse into “cheapest project wins”. Carbon emissions reduction potential should remain the primary anchor, with priority for projects that deliver substantial abatement in hard-to-electrify sectors (aviation, heavy freight, mining, maritime, remote operations), and that can scale over time. However, emissions alone are not sufficient: the Program should also explicitly value economic and regional development, including high-quality regional jobs, opportunities for First Nations participation, and diversified income for farmers and landholders through residue and waste markets.



Fuel security is a particularly important lens for liquid fuels. Proposals that materially improve sovereign capability, diversification away from single import pathways, and resilience to external shocks should rank more highly, even where their levelised cost is not the absolute lowest. Sustainability criteria should be treated as both a gate (minimum standards) and a differentiator (stronger performance scores higher), to avoid funding projects with weak long-term feedstock or environmental outcomes. Finally, “supporting an efficient market” is critical for a nascent sector: projects that help open up price discovery, create replicable models, secure bankable offtake, and commit to structured knowledge sharing will deliver outsized system value and should be recognised explicitly in the merit framework.

Q. 4.2: Recipients under the Program will need to deliver benefits according to the Community Benefit Principles under the Future Made in Australia Act (see Appendix D). How do you consider the Community Benefit Principles in relation to LCLF projects? Are there specific Community Benefit Principles that are more or less relevant?

LCLF projects are a natural fit with the Community Benefit Principles under the Future Made in Australia Act, but the relative importance of each principle differs slightly from other sectors.

Most relevant are:

- Regional and community economic benefits: LCLF projects are often anchored in regional areas (for feedstocks, ports, renewable resources). They can drive durable employment, skills, and co-benefits for farmers, forestry and waste sectors.
- First Nations participation: There is a strong opportunity to embed First Nations partnerships in land access, feedstock supply, equity participation, and cultural and environmental stewardship across project lifecycles.
- Capability and industry development: large LCLF projects build engineering, hydrogen, carbon management and advanced manufacturing capabilities that are transferable across the net-zero economy.
- Environmental integrity and long-term sustainability: Community benefit should explicitly include protection of biodiversity, water, soil health and food/fibre systems, not just near-term jobs.
- Energy and fuel security: LCLF projects can enhance Australia’s sovereign fuel capability by diversifying supply sources, reducing reliance on imported petroleum, and supporting domestic production of critical transport fuels for aviation, maritime and heavy industry. Strengthening national liquid fuel resilience should be recognised as a core community



benefit, particularly for regional and remote communities and sectors essential to economic continuity.

Q. 4.3: How will overseas policy developments interact with domestic policy settings to support projects reaching final investment decisions? For example, LCLF demand-side targets or mandates, and international frameworks such as the International Civil Aviation Organisation long-term global aspirational goal for international aviation (LTAG) of net-zero carbon emissions by 2050.

Overseas policy developments will be a major driver of investment decisions for LCLF projects located in Australia. International SAF mandates, US tax credits, and ICAO's LTAG for net-zero aviation by 2050 are rapidly creating strong demand pull and defining the standards that fuels must meet. For Australian projects, this has two key implications. First, overseas demand-side measures and price premia can improve project economics and underpin export offtake, but only if domestic settings (e.g. certification, carbon-intensity rules, sustainability criteria) are aligned with international frameworks such as CORSIA and EU RED. Second, attractive overseas subsidies and clearer long-term policies also create competition for capital: if domestic policy is weaker or more uncertain, projects and offtake may simply be directed to other jurisdictions. To support FID, Australia needs a coherent package: domestic production support, credible long-term signals (e.g. voluntary or mandated SAF/LCLF targets in aviation and other sectors), and full interoperability with international schemes. In practice, the most bankable projects will be those that can serve both domestic and export demand, with policy settings that reduce the risk of future misalignment between Australian and overseas rules.

Q. 4.4: In addition to production support, what other measures are considered critical to achieve final investment decisions for projects? What are their key features?

Beyond production support, several complementary measures are critical to getting projects to FID:

- Concessional and blended finance through bodies like CEFC and NRF: long-tenor debt, subordinated or mezzanine tranches, loan guarantees, and targeted equity positions that lower the overall cost of capital for first-of-a-kind and early commercial projects.
- Support for enabling infrastructure, such as investment in shared hydrogen production and storage, CO₂ capture and transport, export/import terminals, and feedstock



aggregation/logistics hubs which reduces project-specific capex and makes multiple projects viable in the same region.

- Public offtake and demand signals, such as long-term offtake commitments (or credit enhancement of offtake) from government or government-owned entities in aviation, defence, freight or remote operations which can anchor early projects and de-risk demand uncertainty.
- Planning, approvals and certification streamlining. Clear, time-bound, and coordinated regulatory pathways for environmental approvals, land access, safety, and sustainability certification materially shorten timelines and reduce soft costs.
- FEED and early-stage development support. Targeted funding for FEED, detailed engineering and bankable business case development (as seen in NSW Renewable Fuel Strategy) builds the pipeline of projects able to access Commonwealth production support.

Together, these measures address capital, revenue, infrastructure and regulatory risk – all of which must be managed to unlock private investment at scale.

Q. 4.5: What are the intersecting policies you expect need to be considered to unlock a domestic LCLF production industry?

The Program cannot operate in isolation; it needs to sit within a broader, integrated policy architecture. Key intersecting policies include:

- National and sectoral decarbonisation frameworks (e.g. aviation, maritime, heavy road and mining decarbonisation strategies) that clearly recognise LCLF's role and set expectations for demand over time. For aviation, Australia could adopt an approach similar to Japan that has adopted a coordinated national SAF strategy, including a 10% SAF target by 2030 and Public-Private SAF Councils that align airline demand with domestic production planning. Major carriers have set corporate SAF use targets and integrate SAF procurement into fleet and route planning, providing clear and predictable demand signals for industry.⁴
- Fuel and vehicle standards, such as fuel quality standards, engine certification and infrastructure regulations that ensure LCLF (including higher blends and synthetic fuels) can be used safely and efficiently in domestic fleets.

⁴ ICAO, [Japan's Efforts to Introduce SAF](#)



- Renewable electricity and hydrogen policy that expand low-cost renewables and hydrogen (e.g. capacity mechanisms, hydrogen hubs) are essential cost drivers for many LCLF pathways.
- Waste, agriculture, and forestry policy to unlock sustainable residues and waste streams while protecting food and fibre production, biodiversity and water resources; this includes circular economy strategies and residue mobilisation frameworks.
- Carbon markets and Safeguard Mechanism settings – rules that recognise and appropriately credit the emissions reductions achieved by LCLF use, including for liable entities, will influence demand and willingness to pay.
- Trade and export policy to ensure alignment with international sustainability and certification regimes and facilitation of LCLF export (e.g. customs, documentation, bilateral agreements).

Coherence and predictability across these domains will be critical: mixed signals or conflicting incentives would raise risk premiums and slow investment.

Q. 4.6: Is there any other feedback you would like to provide that isn't covered by questions above?

In addition to the considerations outlined in questions 1.1 to 4.5, it is important to recognise the broader lessons from recent stagnation across Australia's renewable energy and clean-fuel project pipeline. A consistent set of barriers has emerged that, if not proactively addressed, could also impede the successful roll-out of LCLF production under this Program.

First, social licence pressures and land-use constraints have delayed or reshaped major renewable, hydrogen and transmission projects across multiple states. Community concerns related to biodiversity, land management, regional amenity and industrial impacts have become a material source of project risk. In some cases, state Environmental Protection Authorities (EPAs) have applied stringent land-use or environmental conditions that, while essential for protecting ecosystems, can create uncertainty for proponents and significantly extend development timelines. LCLF projects will require early, structured community engagement and clear, transparent benefit-sharing frameworks, alongside coordinated federal-state engagement, to navigate these constraints while maintaining high environmental standards.

Second, slow and fragmented approvals processes remain a binding constraint on clean-energy investment nationally. Multi-year environmental assessments, overlapping federal and state regulatory requirements can significantly extend development timelines and erode project



economics. The Program will be more effective if it is complemented by streamlined, well-coordinated regulatory processes and planning clarity, enabling proponents to move from FEED to construction without avoidable delays.

Third, recent project cancellations and deferrals demonstrate that funding that is insufficiently scaled, poorly structured, or delivered too late can leave even well-designed projects unable to reach final investment decision. In several renewable and clean-fuel initiatives, the level or structure of available government support did not match the magnitude of viability gaps, especially as capital costs rose sharply and global competitors introduced far more generous incentives. For LCLF, production support must therefore be sized and structured to bridge real commercial gaps, offered on a multi-year and predictable basis, and coordinated with concessional finance and state-level supports.

Taken together, these lessons highlight that LCLF policy cannot focus solely on production incentives. It must also address the broader system conditions (i.e., social licence, regulatory certainty, permitting efficiency, and adequate, well-timed funding) that have constrained decarbonisation progress in other sectors. Incorporating these safeguards into Program design will materially improve bankability, accelerate deployment, and help ensure Australia avoids repeating the structural barriers that have slowed other clean-energy investments.

