Sugarcane Bioenergy Inquiry 2025

Submission No:	38
Submitted by:	Queensland Cane Growers Organisation
Publication:	Making the submission and your name public
Attachments:	See attachment
Submitter Comments:	

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27 October 2025

Mr Stephen Bennett MP
Chair of Primary Industries and Resources Committee
Parliament House
George Street
Brisbane QLD 4000
By email: pirc@parliament.qld.gov.au

Dear Mr Bennett

Inquiry into Sugarcane Bioenergy Opportunities in Queensland

Thank you for the opportunity to provide a submission on the Inquiry into Sugarcane Bioenergy Opportunities in Queensland following the announcement from the Primary Industries and Resources Committee on 01 July 2025.

Queensland Cane Growers Organisation Ltd (CANEGROWERS) is a not-for-profit public company with the sole purpose of promoting and protecting the interests of sugarcane growers since its inception in 1925.

CANEGROWERS is the peak body for the sugarcane industry. Our affiliations at the State, National and International level combined with 13 district offices in Queensland ensures that services and advocacy are provided in local communities as well as at the highest levels of industry and government decision-making.

Queensland's cane industry is a 160-year success story built on hard work of generations of growers and has evolved now to have a globally recognised sustainability platform though Smartcane BMP and world-class, low-cost production system that has positioned Australia as the 4th largest exporter of raw sugar in the world. But despite repeated efforts, large-scale revenue diversification has not been achieved because Australia has not kept up with the policy settings that we see developed, implemented and in force in most of our global competitors. This inquiry is the chance to change that. Queensland can build a bioenergy sector that complements our existing sugar supply chain, takes advantage of the many diversification opportunities to de-carbonise and stabilise our liquid fuel supply and finally build value across the supply chain and especially down to the growers that the industry is built upon.

Government policy has created the need to decarbonise liquid fuels; now it must share risk to establish domestic supply. That means supporting bankable demand, delivered via credible mandates and offtake agreements, complimented by practical supply-side enablement such as CapEx support, project-development grants and modernised energy network rules so sugar mills can sell power profitably back into the local electricity grid. Doing this unlocks cogeneration upgrades, new regional biofuels projects, and feedstock innovation backed by reliable and affordable water and electricity.

Executive Summary / Direct response to Terms of Reference

Role and benefits of sugar cogeneration in Queensland's generation mix (current & potential)

Queensland's sugar mills provide ~448 MW of installed capacity, supplying ~1.6% of state electricity - firm, synchronous renewable power concentrated during the cane crush from June to December. Bagasse power is dispatchable and controllable at the distribution level, better supporting regional reliability compared with variable renewables. Significant opportunity exists to increase this out. Modernising to high-pressure boilers, condensing turbines and enabling off-season operation with stored crop residues would materially lift exports with Australian Sugar Manufacturers reporting the potential to increase supply by an additional 800MW. This expansion needs bankable offtake with continued Large-scale Generation Certificates (LGCs). It could be further supported by enabling mill-to-irrigator tariffs/embedded networks under the Energy Innovation Toolkit. Cheaper, more reliable pumping power provides improved irrigation economics to produce more tonnes which further reinforces reliable cane supply for the mills and underwrites economic viability.

Barriers to increased bioenergy production from sugar (market, regulatory, infrastructure)

Market: There is a huge potential global market for low carbon liquid fuels such a Sustainable Aviation Fuel (SAF) and Biodiesel. Yet, the production of these fuels is significantly more expensive when compared to traditional fossil fuels. Meanwhile for cogeneration, mills are exposed to volatile wholesale electricity prices (including negative prices), which suppresses investment.

Regulatory: Barriers include a lack of standardised biofuel offtake terms as well as a lack of base level demand that can stimulate investment, which could be secured through regulatory means such as Biofuels and SAF mandates. For cogeneration, barriers include slow and complex grid-connection/technical requirements for mid-scale generators and limited mechanisms for peer-to-peer and local energy use pilots. For farmland expansion to increase feedstock supply, development of new agricultural lands is exceedingly difficult.

Infrastructure: Airports need storage and quality systems to receive SAF, and terminals require blending capacity. Noting that initial upgrades are occurring via funded trials[1]. For cogeneration, some infrastructure barriers exist for suitable grid connection and capacity constraints. The sugar industry has a significant logistical capacity to cut, transport and aggregate feedstock

Opportunities to align sugar biofuels with national security & defence needs

Australian Defence Force (ADF) demand is a potential cornerstone for SAF. Defence has commenced a 12-month SAF pilot at RAAF Base East Sale[2] as a net zero strategy as well as reducing dependence on imported fuel supply, which exemplifies an explicit fit for Queensland supply if developed. Australia remains highly import-dependent for liquid fuels, and domestic biofuels improve fuel security and reduce sovereign-risk exposure.

Policy & funding mechanisms to de-risk investment

Contracts-for-Difference (CfDs): This would set a long-term strike price for SAF/renewable diesel and/or cogen MWh. The mechanism pays the difference vs a reference price and is indexed to CPI. This can be further supported by and auditable Carbon Intensity (CI) accounting scheme aligned with international feedstock standards.

[1] https://arena.gov.au/assets/2025/07/Viva-Energy-SAF-Infrastructure-Solutions-for-the-Future-Market-context-and-opportunity-report.pdf

[2] https://www.defence.gov.au/news-events/releases/2025-02-09/sustainable-aviation-fuel-pilot-program-underway-raaf-base-east-sale

Mandates/targets with sustainability rules: Enforce Queensland's E10 and consider national ethanol targets, and adopt a modest, staged SAF target aligned to international norms (e.g., EU 2% in 2025 → 6% in 2030), with credible certification.

Standardised contracts: Publish model offtakes for SAF/ethanol and biomass PPAs to reduce transaction costs and improve bankability.

R&D agenda for a world-leading, sugar-led bioenergy industry

CSIRO SAF Roadmap frames national opportunities and priority gaps. Process intensification for AtJ SAF, residue logistics, and bagasse power modernisation. In the medium term, 2G/cellulosic ethanol (bagasse/trash), gasification/FT, Hydrothermal Liquefaction routes, as well as other novel approaches such as liquid phase catalytic (e.g. Mercurius REACH). QUT, UQ and ARENA programs provide platform capacity (Mackay pilots; sugarcane biogas studies).

Feedstock productivity: Advanced varieties and agronomy (incl. gene-edited traits for conversion and drought tolerance) to lift tonnes and lower CI. New varieties take several years to be ready for release. While some research has been carried out to investigate opportunities, renewed efforts should be initiated to develop appropriate varieties in parallel with SAF and ethanol initiatives.

Strategic land-use & regional development considerations

Prioritise brownfield mill precincts and transport/terminal nodes for biorefineries to minimise new land impacts and leverage existing infrastructure such as cane-rail. Single-window approvals for boiler/turbine upgrades, storage tanks and airport SAF logistics (learning from early QLD SAF trials).

For cogeneration, target grid upgrades where multiple mills can export firm renewable MWh; use the regulatory sandbox for local energy trials (e.g., mill-to-irrigator tariffs/microgrids) to turn under-used water into yield/biomass. Maximise existing productivity to support ethanol/SAF production by combining energy opportunities with water pricing discounts to underwrite productivity during CfD periods.

Benefits for growers from diversification

Most of the opportunities in diversification can sit ideally side by side and complimentary to our successful sugar industry supply chain. This should be the priority for any development. Domestic ethanol/SAF demand diversifies markets versus raw-sugar exports; cogeneration strengthens mill viability and regional power quality. Government should ensure public support is contingent on transparent pass-through - e.g., biofuel pool pricing, residue purchase schedules (e.g. for tops & trash), and LGC revenue-sharing where cogeneration expands. Access to reliable, affordable electricity for irrigation (via local energy trials) and BMP-linked CI premiums can increase tonnes and reward low-emissions farming.

Food versus fuel

Cane in Queensland primarily produces raw sugar, with major scope to use residues (bagasse, trash, molasses) and surplus (e.g. export) sugar for fuels without compromising domestic food security. CSIRO and IEA[3] show growing global demand for biofuels where sustainable feedstocks and certification mitigate food-fuel conflicts. Supporting use of residues and advance pathways for production, including CI-based incentives and establishing robust sustainability certification (CORSIA-aligned and leveraging Smartcane BMP) can provide safeguards and maintain integrity as supply scales.

[3] https://www.iea.org/energy-system/low-emission-fuels/biofuels

Background

Sugarcane and its by-products including molasses, bagasse, cane trash can be converted into multiple forms of renewable energy – from ethanol for vehicles, to SAF, renewable diesel for transport through to electricity via cogeneration of electricity from sugar mills. Few crops match cane's combined sugar content plus residue volume, enabling multi-product biorefinery models and year-round revenue when paired with modern boilers/turbines and residue logistics.

Queensland's cane belt delivers a large, consistent feedstock stream built on multi-year ratoon crops, mechanised harvest, and established mill logistics. The crop's perennial nature and staggered harvest provide predictable, season-long throughput for biorefineries and cogeneration, with bagasse available at scale as a co-product of crushing. With targeted actions there are significant opportunities to increase the productivity of the sector, with more timely irrigation, lower-cost electricity, variety development, clean seed, precision agronomy, utilisation of residue within the supply chain, and selective area expansion near existing infrastructure, even before looking at greenfield sites.

Sugar cane is intrinsically robust in hot, humid conditions, tolerates episodic flood and wind better than many other cops, and is incredibly resilient to climatic shocks. Close to 70% of the Australian crop is irrigated and where irrigation is available and affordable, this, combined with the implementation of best management practices, serves to further harden the system against seasonal variability.

Sugarcane is used to produce sugar, an ingredient rather than a stand-alone staple food and therefore working within the existing sugar cane supply chain does not divert cane to fuel and limits any risk to food security in Australia or globally. Diversion of surplus sugar or molasses to biofuels adds value, while bagasse, tops, and trash are co-products and residues, used primarily for cogeneration or potential biofuel feedstock. Finally strategic land use planning can ensure that cane energy expansion complements rather than competes with other agricultural uses.

Queensland doesn't need to "study the problem". Over a decade of rigorous work by governments, industry and researchers has mapped the pathway for biofuels. At the federal level, CEFC/ARENA-commissioned analysis shows Australia lacks commercial advanced biofuel capacity today and will need a ~40-fold scale-up over the next 30 years – alongside $25–$30 billion in production investment[4] – yet this analysis also notes Australia's strong feedstocks and capabilities to meet that demand.

CSIRO's 2023 Sustainable Aviation Fuel Roadmap[5] estimates a domestic SAF opportunity worth up to $19 billion per year by 2050, and the Queensland Government has already commissioned a biofuels feedstock-expansion study being delivered by Deloitte, CSIRO and the Rural Economies Centre of Excellence[6]; the state is also facilitating multiple first-wave projects totalling ~715 ML/y of SAF/renewable diesel[7].

Deloitte's 2025 Refined Ambitions report[8] for the CEFC finds Australia's agricultural sector can supply most of the ~$15 billion in domestic feedstocks needed by 2050 to underpin a >$36 billion Low Carbon Liquid Fuels (LCLF) market. It sets out practical enablers – concessional finance, revenue-certainty mechanisms, standardised contracting and credible demand signals – to unlock investment. Earlier Commonwealth-commissioned work (L.E.K.'s Advanced Biofuels Study, with CSIRO as technical advisor) prioritised viable conversion pathways and explained why policy support is needed while costs fall with scale.

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[4] https://arena.gov.au/knowledge-bank/biofuels-and-transport-an-australian-opportunity/

[5] https://www.csiro.au/en/work-with-us/services/consultancy-strategic-advice-services/csiro-futures/energy/sustainable-aviation-fuel-roadmap

[6] https://www.statedevelopment.qld.gov.au/strategic-industries/key-industries/biofuels

[7] https://documents.parliament.qld.gov.au/com/PIRC-1135/ISRES-82C3/submissions/00000005.pdf

[8] https://www.cefc.com.au/insights/market-reports/refined-ambitions-how-australia-can-become-a-low-carbon-liquid-fuel-powerhouse/

The evidence base is deep, current and largely convergent on what's needed: targeted, bankable demand signals and de-risking tools to funnel in private capital – so Queensland cane growers can translate proven feedstocks into investable, scalable domestic low carbon liquid fuel.

Bioenergy opportunities snapshot

Queensland already operates bagasse cogeneration plants (438 MW) at 18 mills, supplying about 1.6% of state electricity – most of it during, but with capacity to extend beyond the crush – and a 60 ML/yr ethanol plant at Sarina supported by biofuel mandates that lifted E10 outlets from 343 to ~900[7]. These assets prove capability and give investors something to build on, if policy translates intent into bankable demand and grid access.

CANEGROWERS see significant potential in five investable pillars for bioenergy:

1. **Ethanol (1G) that strengthens domestic fuel security.**
2. **SAF via ethanol-to-jet and utilisation of crop residues.**
3. **Firm renewable power from mills (cogeneration).**
4. **Cellulosic (2G) ethanol from bagasse/trash as a longer-term opportunity which requires R&D into commercialisation.**
5. **Opportunities are also present in precursor projects such as palletisation of cane trash as an energy product.**

Under the current cane payment (CCS) formula, growers are paid with reference to the raw sugar price – not ethanol or power. Bioenergy expansion will not, by itself, increase cane price per tonne. To ensure growers share in new value streams, CANEGROWERS proposes that any publicly supported bioenergy project adopt a transparent value-sharing mechanism – such as a biofuel pool price, residue payment schedule, or defined share of Large-scale Generation Certificates (LGC)/biopower netbacks to be, in the first instances negotiated within cane supply agreements.

1. Fuel Ethanol from Sugarcane (1G Ethanol)

Converting sugarcane juice or molasses to ethanol is a well-established pathway. Queensland already produces fuel ethanol from molasses – for example, Wilmar's Sarina distillery makes ~60 million litres per year. This ethanol supplies E10 petrol blends (10% ethanol gasoline), with about two-thirds of Sarina's output used in Australian E10/E85 fuel[7]. Queensland has had a 4% ethanol mandate since 2017, requiring larger fuel retailers to sell at least 4% biobased petrol (E10). This policy expanded the number of service stations offering E10 to about 900 statewide. However, actual ethanol blending has reached only ~2.9%[7] (about 3 in 10 motorists choose E10) – below the mandate – due to consumer choice and availability of regular unleaded.

Expanding ethanol production creates a domestic market that is insulated from sugar price swings. This could arise from stronger mandates, and/or demand for ethanol to produce SAF. Should this occur mills would seek more cane (for molasses) to produce ethanol and where the ethanol price is attractive relative to sugar, could also divert B and C stage syrup into the distilling process for greater ethanol yield (although growers acknowledge that this would require capital investment into mill infrastructure changes). A robust ethanol sector in Queensland could let growers and millers capture value from high oil prices when sugar prices are low. It can also help to reduce surplus sugar on the world market, indirectly supporting sugar prices. Co-products like molasses-based distiller's grain or vinasse from ethanol fermentation can be used as cattle feed or fertilizer, potentially creating local by-product markets that involve growers (e.g. as livestock producers or soil improvers).

Support needed: To make further ethanol investment attractive, the government may need to bolster demand and improve economics:

- Strengthen or extend blending mandates: Ensuring the existing E10 mandate is enforced and considering a higher blend target (e.g. E10 statewide average or optional E20 blend in future) would guarantee market volume for ethanol. For instance, India's government pushed from E10 to E20 by 2025, creating a huge assured market for cane ethanol. Queensland could gradually increase its mandate or set a national ethanol target to signal demand.

- Consumer uptake initiatives: Educating motorists and encouraging flex-fuel vehicles could raise E10 use above the current ~3% uptake. Government fleets and regional councils could lead by using E10/E85 vehicles.
- Infrastructure and investment support: Grants or low-interest loans for sugar mills to add distilleries would lower upfront costs. Funding fuel infrastructure (storage/blending at terminals, E10 pumps in rural areas) would also help. The state might consider contracts-for-difference to guarantee ethanol producers a stable price relative to petrol, though ethanol is closer to market-competitive than SAF.
- Regulatory clarity: Fuel quality standards should continue to allow up to 10% (or more) ethanol in petrol without voiding car warranties. Clear support from auto OEMs for E10/E20 compatibility in vehicles will boost consumer confidence.

Overall, first-generation ethanol is a proven opportunity ready to scale if demand is assured. With the incentives, it can stimulate growers to build cane supply and can be ramped up quickly with the enforced blend mandates and modest capital support.

Sustainable Aviation Fuel (SAF) via ethanol-to-jet and residues.
Sustainable Aviation Fuel (SAF) is a drop-in jet fuel made from renewable sources that can directly replace conventional jet kerosene. Sugarcane can contribute to SAF in two main ways: (1) converting sugar fermentation products (like ethanol or other intermediates) into jet fuel via processes such as Alcohol-to-Jet (AtJ), and (2) converting biomass (bagasse) into syncrude via gasification or hydrothermal liquefaction, then refining to jet fuel (e.g., Fischer-Tropsch). Both pathways are technically proven but not yet deployed at commercial scale in Australia.

Australia currently has no domestic SAF production – airlines have relied on small batches imported from abroad. For example, in 2025 Ampol imported 2 million litres of SAF for trials. Qantas and Brisbane Airport have run pilot flights on imported bio-jet fuel blends. The first commercial AtJ plant in the world (LanzaJet's Freedom Pines in the US) is only just coming online in 2025, highlighting the cutting-edge nature of this industry. Queensland has had strong rhetoric to position itself to be a leader in SAF: the state government is facilitating biorefinery projects aiming to produce ~715 million litres per year of SAF/renewable diesel across various regions, and a study is underway on converting sugar mill waste into jet fuel with federal funding (Licella backed by ARENA) at Isis Central Mill near Childers.

Developing SAF and related drop-in fuels (like renewable diesel) from sugarcane could create a *massive new market* for Queensland cane, with direct and indirect benefits to growers. Queensland alone uses ~8 billion litres of diesel annually, and jet fuel demand is growing long-term. Even a fraction of blending with biofuels represents hundreds of millions of litres of potential demand. If sugarcane-derived fuels capture part of this, it translates to significant cane throughput. Using data from a report prepared for the industry by Pottinger, Australia could produce approximately 2.3 billion litres of SAF from 30 million tonnes of cane (using fermentable sugars as well as bagasse for conversion). With 85% of sugar exported, almost 2 billion litres of SAF could be produced from sugarcane currently used to produce export sugar[9].

Growers would benefit from increased demand for cane supply while further negotiations would be required to see co-benefits shared where mills divert a portion of cane juice and molasses (and bagasse in the future) to biofuel production. This could help smooth out the boom-bust of sugar exports by guaranteeing a portion of cane-derived products has a domestic buyer each year. SAF and renewable diesel prices are tied to energy markets and carbon markets, which could yield better returns than sugar under certain conditions. For instance, the price of ethanol-to-jet SAF is higher than fossil jet fuel today – although they have a higher production cost, these fuels also carry

[9] Using data from a report prepared for the industry by Pottinger, using current technology and demonstrated efficiencies, one tonne of fermentable sugar produces 317 litres of SAF (1G sugar fermentation), and one tonne of bagasse could produce 110 litres of SAF via cellulosic (2G) pathway.

premium value for emissions reduction. With airlines willing to pay a green premium (especially under emissions reduction pressure), a portion of that value after investor reward, can flow back to feedstock suppliers to grow supplies and incentivise changes to crop characteristics (depending on constituents sought – e.g. higher biomass, other fermentable sugars, etc.).

SAF production from sugarcane could yield co-products that benefit the industry. For example, bagasse gasification for SAF might produce electricity or steam as by-products for the mill (further lowering energy costs), and fermentation routes could produce protein-rich yeast biomass usable as animal feed.

A local SAF industry improves fuel security (including reduced sovereign risk for fuel supply) and creates regional employment. While this benefits the broader community, growers specifically gain from having thriving regional industries and potentially by participating in equity or profit-sharing if grower cooperatives invest in biorefineries.

Support needed: Sugarcane-based SAF is promising but faces a significant viability gap without policy intervention. It requires multi-faceted support:

- Blending mandates or targets for SAF: Around the world, mandates are emerging to create guaranteed demand for aviation biofuel. The EU for example, is introducing a 2% SAF mandate by 2025 (ramping up thereafter, e.g. 6% by 2030), the US is targeting an annual domestic SAF usage of 11.3 billion litres by 2030, and Japan and others are moving to require SAF use in the coming decade. Australia currently has no SAF mandate. Implementing a modest mandate (e.g. 5% SAF by 2030 for domestic flights or for fuel suppliers) or a Green Fuel Standard would assure investors that a market will exist for their product. Even a public-sector commitment – such as the RAAF (Defence) pledging to use SAF for a portion of its jet fuel needs – could catalyse initial projects.
- Price support and risk-sharing: SAF is currently 2–5 times more expensive than fossil jet fuel. To bridge this gap in early years, government may provide production incentives. Options include: contracts-for-difference (CfD) that pay SAF producers the difference between their production cost and the market jet fuel price/carbon price; direct production credits per litre of SAF; or an intermediary like a blender's tax credit. Another approach is helping airlines with the cost premium – for instance, a government-supported fund or Carbon Offtake Agreements that subsidize the extra cost of SAF until economies of scale drive prices down.
- Capital and infrastructure investment: Building a commercial SAF biorefinery is capital intensive. Governments can offer loan guarantees, grants (e.g. ARENA's $8 million grant for a Queensland SAF feasibility study), or even take equity stakes in pioneer plants. Supporting infrastructure is also key: for example, upgrading Brisbane and regional airports to handle SAF logistics (storage, quality testing) – as seen with trials funded to test SAF fuelling at Brisbane Airport. Additional investments in feedstock supply chains are needed to untap the use of agricultural residues like tops and trash to support 2G pathways.
- Regulatory enablement: Streamlining approvals for new biorefineries and ensuring SAF meets fuel standards for Jet A-1 are crucial. Developing a sustainability certification scheme for biofuels will also help Queensland producers tap into global markets that demand proof of sustainability (e.g. CORSIA for aviation fuels). The government can facilitate these regulatory frameworks and assist the sugar cane industry to map out and respond to these international frameworks.
- Public-private partnerships: To get things started, Queensland could foster partnerships (as it is doing via the "Biofutures" initiative) that bring together growers, mills, airlines, and technology providers. For example, some airlines globally directly invest in biofuel producers or sign long-term offtake agreements at premium prices to ensure supply. Encouraging such models would reduce risk for all parties.

With these supports, Queensland could leverage its sugarcane as a feedstock for SAF and renewable diesel, tapping into a potentially huge domestic and export market as aviation strives for net-zero and

or serves to be the strategic opportunity afforded by the needs of the Australian and allied defence forces. The Australian Defence Force consumes over 400 million litres of liquid fuel each year[10], and a significant sovereign risk exists due to reliance on fuel imports. With ADF air bases in Queensland situated in sugarcane growing country, this could be a strategic opportunity to consider. Civilian demand is already emerging. Notably, Qantas has pledged 10% SAF use by 2030[11] – a local supply would help meet such commitments. In the long run, Queensland-grown fuel could even be exported to airlines in Asia-Pacific hubs, given the state's comparative advantage in feedstock and existing expertise in sugar chemistry.

2. Firm renewable power from mills (cogeneration).

Queensland's sugar mills have long used bagasse (the fibrous cane residue) as a fuel to generate steam and electricity for on-site use. This cogeneration ensures mills are largely energy self-sufficient and able to crush cane without substantially drawing from the electricity grid. Original boiler designs were aimed at using up bagasse and not optimised for maximum energy production. With upgraded boilers and turbines, many mills have the capacity to export additional power to the grid as renewable electricity. As of 2025, there are 18 bagasse power plants across Queensland mills with a total installed capacity around 438 MW[12]. These are relatively small units (5–69 MW each), but collectively they supply roughly 1.6% of Queensland's electricity[13]. Bagasse power generation is seasonal, peaking during the crush (July–December) when biomass is freshly available, and tapering off in the wet/off-season. Still, there is technical potential to significantly expand cogeneration output – through off-season use of stored biomass or cane trash, and through efficiency upgrades – turning sugar mills into bigger contributors of green power. It is estimated that a capacity of an additional 800 MW could be achieved[12].

While electricity sales occur at the mill level, they can indirectly and directly benefit growers. By producing their own power and steam, mills avoid purchasing electricity or fuel, thereby saving costs. This improves the mill's profitability and resilience. A financially healthy mill is more likely to remain viable and reinvest in plant and equipment infrastructure. If cogeneration is expanded to reliably export power, with the right commercial agreements, mills gain an extra revenue stream to buffer against low sugar prices.

Locally generated baseload synchronous power that can be provided by increased cogeneration can improve electricity reliability in regional communities (where mills feed into the grid). Growers, as part of those communities, benefit from improved power quality and potentially local job creation (running power plants provides technical jobs beyond the season). In some scenarios, growers could use biomass power more directly – for example, a mill could supply cheaper electricity to growers for increased irrigation and thereby further securing better cane supply through productivity gains. This type of green-energy-closed-loop is a largely untapped opportunity which would require regulatory reform to enable.

Alternatively, where there is scope to increase fibre/biomass production for cogeneration, growers could negotiate to share in cogeneration profits – this would require revisiting the cane payment formula (Queensland's current cane price formula doesn't account for non-sugar revenues). Successful global examples exist: in some countries, growers supply cane trash or agree to specific harvest practices and in return receive a share of the power revenue. Further, if mills start using cane tops/leaves (trash) as additional fuel (after cane is harvested), growers could be paid for that material. This improves farm income per hectare and incentivizes better residue management.

[10] https://www.anao.gov.au/work/performance-audit/defences-procurement-fuels-petroleum-oils-lubricants-and-card-services
[11] https://www.statedevelopment.qld.gov.au/strategic-industries/key-industries/biofuels/sustainable-aviation-fuel
[12] https://sugarmanufacturers.org/wp-content/uploads/2023/05/Milling-Sector-Bio-Energy-Agenda.pdf
[13] https://documents.parliament.qld.gov.au/com/PIRC-1135/ISRES-82C3/submissions/00000005.pdf

Support needed: Expanding cogeneration output and its returns to growers faces both technical and economic hurdles. Key policy and support measures needed:

- Power Purchase Agreements (PPAs) or feed-in tariffs: One major barrier is that bagasse power generally has higher cost than solar/wind, though they provide a benefit of firm, low-emission, distributed energy, and reduced grid strengthening requirements. Unstable power offtake prices make mills hesitant to invest without assured revenue. The government or energy utilities could offer long-term PPAs at a reasonable fixed price specifically for exported biomass electricity, guaranteeing income. For example, locking in a 10-15 year contract for power export would give mills confidence to invest in larger boilers or generators. A feed-in tariff specific to biomass (as some countries have used) could similarly ensure a premium price for renewable dispatchable power. These could also include the ability to reserve some of the generated power for supply to growers within the local network.
- Current electricity rules prevent cross-property export allocation, growers cannot offset irrigation load with rooftop exports on another farm, nor directly purchase mill cogeneration. Various electricity policy settings would be required to unlock this opportunity. At the local feeder levels where the mill and growers are only utilising local distribution networks (e.g., limited to a substation feeder or group of substation feeders), government supported trials should be established for Peer-to-Peer (P2P) trading. The trials could be established through a government sponsored AER Regulatory Sandbox. This would require the development of a Local Use of System (LUoS) tariff for the distribution component cost, and supported by a local trader retail construct, and other waivers to allow the Sandbox trial to function. These relate to rules waivers to allow cross-site allocation/netting within a defined locality (e.g., feeder) while preserving Global Settlement and Unaccounted-For Energy (UFE) integrity. In addition, PPAs should provide for a flexible allowance for mills to sell power directly to its supplying growers without penalty and maintain the ability to supply power to Ergon, as well as for growers to remain as Ergon customers while supplementing their usage through P2P. These opportunities arise only when there is surplus generation in the network thereby creating the opportunity for low priced power to growers and so should be compatible with provision of baseload power.
- Many sugar mills are in regional areas with limited grid infrastructure. Upgrading grid connections – e.g. funding new or improved substations, transmission lines, and simplifying technical grid requirements for mid-size plants – is important. Policies to exempt or ease compliance for smaller renewable generators (as currently, <5 MW units have lighter requirements) should continue, and thresholds could be adjusted to encourage larger exports without onerous burden. Streamlining the grid connection process and reducing upfront costs (perhaps via an infrastructure grant or a state-sponsored coordination of multiple mills' grid upgrades) would remove a big barrier.
- Upgrading old cogeneration systems to modern high-efficiency high-pressure boilers and turbines can greatly increase power output from the same volume of bagasse. Government can offer capital grants or accelerated depreciation for equipment that boosts exportable electricity. Support could also target year-round generation strategies – for instance, funding storage solutions for surplus bagasse or co-firing equipment to use other biomass in the off-season. By extending operation beyond the crush season, mills could supply power during peak demand further supporting grid stability.
- Ensuring bagasse power is fully recognized and rewarded in renewable energy schemes is important. Under Australia's renewable energy target, bagasse qualifies for Large-scale Generation Certificates, which provide extra income. Continued or expanded credit for biomass generation (especially since it provides dispatchable renewable energy, which is valuable for grid stability) will improve profitability.
- As Queensland pursues net-zero targets, the state might consider Contracts for Difference auctions for not just wind/solar but also renewable firming power. Bagasse cogeneration could bid into such a scheme, getting a guaranteed price per MWh that reflects its value as on-demand renewable energy. This kind of support would level the playing field with other renewables that currently outcompete biomass on cost alone.

- Finally, providing technical and business advice to mills on cogeneration expansion would help projects get off the ground. Supporting studies on how to efficiently collect and use additional cane trash as fuel, or improve boiler efficiencies, will facilitate informed investment.

With supportive policies, cogeneration can be a win-win: mills become energy hubs, the grid gains renewable baseload electricity and added reliability, and growers benefit through stronger mills, possible revenue sharing and access to additional low-cost energy directly from the mill. It leverages an existing asset – bagasse – that every grower already produces along with sugar. A key component of this opportunity is to ensure irrigation enablement which requires mill-to-irrigator power pilots (microgrids or tariff equivalents), and pump/VSD rebates to turn under-used water into yield and biomass.

3. Cellulosic (2G) Ethanol from bagasse/trash

Second-generation ethanol uses cellulosic biomass – in this case sugarcane bagasse (the fibrous cane residue after juice extraction) or even cane trash – to produce ethanol via advanced pretreatment and fermentation processes. This technology is emerging: globally, a few plants are in early commercial stages (e.g. Indian Oil's 2G ethanol plant started in 2022 using crop residues, and Praj Industries is deploying bagasse-to-ethanol technology[14]). In Queensland, 2G ethanol is not yet commercial, but it represents a way to turn abundant bagasse into liquid fuel. Australia's Clean Energy Finance Corp identified bagasse-based ethanol as a medium-term option that should be pursued once it becomes cost-effective. CSIRO suggests Australia could eventually supply billions of litres of advanced biofuels using agricultural residues[15].

Cellulosic ethanol could open new revenue streams for agricultural waste. Australian cane growers are not typically paid for bagasse – the mill uses it for steam/power. If bagasse or cane trash become valuable feedstocks for 2G ethanol, growers will likely look to negotiate new contract terms to position themselves to share in revenue and credits for delivering more biomass (e.g. cane tops, leaves) to the mill. In the long run, successful 2G ethanol can increase cane demand including energy-cane varieties with higher fibre/biomass which would mean more stable or increased cane demand from mills. This would benefit growers' income and potentially, bargaining power where practice change may be required. Further with the right market-based instrument in place, the use of crop residue for fuel improves the industry's sustainability profile, which could enhance market access and possibly provide access to climate-related incentives. In addition, since varieties would be bred for energy cane and not food, there is an opportunity to pursue and develop genetically modified varieties that can achieve desirable traits beyond what conventional breeding techniques could achieve. Such traits might include improved productivity, drought tolerance, fibre and sugar composition, and pest and weeds tolerance.

Support needed: Because 2G ethanol is still technologically and economically challenging, significant support is required to realize this opportunity:

- R&D and demonstration funding: Government grants (through ARENA or CEFC) for pilot and demonstration plants are critical. Public-private research to improve enzymes, yeasts and pretreatment for bagasse-to-ethanol will help bring down costs and increase yields (e.g., Queensland is already investing in sugarcane biorefinery research and feedstock studies).
- Capital incentives: First-of-a-kind 2G plants have high capital and operating costs. Time-limited subsidies, low-interest loans, or investment tax credits can de-risk these projects. The US, for example, uses production tax credits for cellulosic biofuel to offset cost premiums[13]. Queensland could offer similar support or co-invest in a flagship 2G ethanol plant at a sugar mill.
- Advanced biofuel mandate or credits: Creating a carve-out in fuel standards for advanced biofuels can ensure a market for 2G ethanol. For instance, requiring a small percentage of

[14] https://www.sciencedirect.com/science/article/pii/S2211338825002887
[15] https://www.csiro.au/en/news/All/Articles/2023/August/sustainable-aviation-industry-australia

petrol or diesel to come from advanced (non-food) biofuels would oblige fuel suppliers to buy cellulosic ethanol if available. Alternatively, a low-carbon fuel standard credit system could reward the superior greenhouse gas savings of bagasse ethanol, giving it a market premium.

- Feedstock logistics support: Using cane residues at scale may require new equipment for collection, transport and storage. Support for growers to procure trash balers or for mills to establish supply chains during the cane off-season would help secure feedstock for 2G plants.

With these measures, 2G ethanol could become investable in the future, turning Queensland's large biomass byproduct stream into ethanol without displacing food production. This would further boost grower incomes through payments for what is currently a low-value byproduct.

Cross-cutting enabling policies

The same handful of policy, infrastructure, and commercial settings could serve to further unlock all pathways. Together they can lift multiple projects, reduce cost of capital, and ensure that value flows back to farms.

1. Carbon-intensity (CI) measurement scheme to earn CI premiums for Smartcane BMP and best practice adoption. The industry would benefit from a simple, auditable carbon-intensity (CI) accounting scheme aligned with international feedstock standards. Such mechanisms are required now to realise the benefits of what is still an emerging industry. Existing industry resources are dedicated to business as usual and Government needs to play a role to build capacity, tools and insights to foster the develop of emerging industry to sufficient scale that they in turn build internal capacity to invest in these resources.

2. Development of standardised value-sharing clauses in publicly supported projects associated with feedstock price formulas and sharing of risks and rewards. Ensure that public support translates into visible farm-gate benefits by developing methods for value-sharing.

3. Improve price and reliability of inputs: affordable irrigation water and electricity to lift cane yields and biomass supply. Turn under-utilised entitlements into more cane tonnes and biomass through a reduction in price risk of pumping for irrigation. This could be achieved through mill-to-irrigator pilots for microgrids or tariff equivalents (with network impact tests). Other complementary measures could include on-farm water storage, scheduling tools, lined channels where leakage is high, clearer multi-year water allocation signals, rebates for CT metering, VSDs and soft-starts. Lower grid-emissions kWh and smarter irrigation help to reduce CI and could be tied to CI premiums above.

4. Streamlined planning/permitting for projects and agricultural land. Reduce time and risk from approvals for biorefineries, cogeneration and farm works. Establish single-window approvals – one lead agency to coordinate environment, safety, electricity connection and local planning. Develop code assessable tracks and precincts (with clear rules, fast assessment tracks with simplified approvals, dedicated advisory services).

5. Develop transparent offtake standards for both government and commercial agreements so that contracts are bankable, comparable and faster to negotiate.

Global Context, Current Trends and Risks

While our focus is Queensland and Australian demand, it's notable that global trends in biofuels are creating positive momentum and potential export opportunities for Queensland's sugarcane bioenergy sector:

1. India – the world's second-largest sugar producer – is rapidly scaling up ethanol blending to 20% (E20) by 2025/26. The government has removed restrictions on converting sugarcane juice and molasses to ethanol to achieve this goal and Indian mills have massively increased

ethanol capacity. This demonstrates how high-level mandates can stimulate a sugarcane ethanol industry, bolster grower incomes, and even tighten the global sugar market (as more cane goes to fuel). Queensland can draw lessons from India's success, even if domestic fuel demand growth is slower – strong policy can create a reliable ethanol market that supports growers.

2. Brazil has run its Proálcool program since 1975, using mandates and subsidies to build a huge sugarcane ethanol industry. Brazilian mills switch between sugar and ethanol based on market signals, and many produce bioelectricity from bagasse at scale. This integrated approach has made Brazil a top biofuel producer and given cane growers more market options. It underlines the value of scale and vertical integration.
3. From 2025 the European Union (and UK) require airlines to use a minimum share of SAF (2% by 2025, rising to ~6% by 2030)[16]. Japan, Singapore, and others are also planning SAF usage requirements or targets[13]. This is creating a global market for SAF that savvy producers can supply. If Queensland develops SAF capability, it could not only serve Qantas and Virgin, but also export SAF to airlines in Asia-Pacific or Europe (especially if our feedstock and production can meet stringent sustainability criteria). The Queensland government's own modelling showed global SAF demand could make it a $14 to 23 billion industry by 2030[11]. Getting in early could secure a slice of that market for Queensland growers' product.
4. Major aviation and energy companies are starting to invest in biofuels. For instance, Boeing invested in a Queensland SAF project (Wagner Sustainable Fuels)[17], and airlines globally are signing long-term offtake agreements. Oil companies like BP and Shell are also entering biofuel refining. This influx of capital and expertise means the technology is advancing and costs should fall – a trend that will benefit Queensland's nascent industry. Government support coupled with private investment can accelerate the commercialization timeline.
5. As more corporations and countries set net-zero targets, demand for low-carbon liquid fuels is rising. Sectors like aviation, marine, and heavy transport see biofuels as a key decarbonization tool. This global pressure supports domestic action – for example, the Australian Safeguard Mechanism now pushes large emitters to cut emissions[13], which could spur mining companies or airlines to seek biofuel alternatives. Queensland's growers stand to gain if their feedstock becomes part of these companies' decarbonisation strategies.

In summary, international trends are aligning to make sugarcane biofuels a timely opportunity. India and Brazil show how policy can unlock grower benefits at scale, and the worldwide push for SAF and renewable fuels indicates a growing market that Queensland can supply. These factors, while secondary to local demand, bolster the case for Queensland to invest in cane-based biofuels now – both to capitalize on export potential and to ensure the state isn't left behind as energy markets transform.

With the march towards a biofueled world there are also risks if Australia does nothing.

- Airlines, miners and logistics pay the "green premium" to foreign suppliers. With no domestic supply and no mandate, Australian fuel users keep trialling small volumes and then procure low-carbon fuels from mandated markets – sending the premium offshore and locking in short, tactical deals rather than local, long-dated contracts. Qantas has a 10% SAF target by 2030; without local product, that spend (and learning-by-doing) accrues to overseas producers.
- Fuel security and trade balance risks worsen. Australia's liquid-fuel import bill is already massive (>$50b in 2023), with >90% of petroleum products imported – concentrated in a

[16] https://www.reuters.com/sustainability/boards-policy-regulation/eu-susbsidise-high-volume-greener-aviation-fuel-boost-airline-demand-2025-06-11/
[17] https://www.reuters.com/sustainability/australia-funds-queensland-study-produce-aviation-fuel-sugarcane-waste-2025-02-26

handful of Asian refineries[8]. Doing nothing means remaining exposed to supply shocks and continuing to export value instead of substituting with local low-carbon fuels.

- It could become harder – and more expensive – to meet emissions goals. Other jurisdictions de-risk biofuels with mandates and tax credits. Australia lacking similar tools means slower scale, fewer options for heavy transport/aviation, and higher abatement costs for covered sectors. Policy gaps keep contract terms short and prices uncertain – exactly what raises the cost of capital and slows emissions progress.
- Regional energy and industry opportunities pass us by. Cogeneration upgrades (firm renewable MWh from bagasse) are less investable than wind/solar without tailored offtakes/CfDs; mills under-invest, so communities miss out on dispatchable renewable power and jobs (following from Australia's absence of investment-grade demand signals). Skills, supply-chain capability and IP cluster where mandates/credits exist (EU/US/Asia), widening the gap that Australia must close later.

Conclusion

Queensland's sugarcane growers are uniquely positioned to benefit from the transition to bio-based fuels and energy. Opportunities like ethanol, sustainable aviation fuel, advanced ethanol and cogeneration can diversify grower income, improve farm sustainability, support manufacturing viability to untap new capital investment and strengthen rural economies. Many of these pathways are technically viable today or within reach, but they will not become reality at scale without enabling policy.

By implementing smart mandates, providing targeted financial support, and investing in infrastructure, government can de-risk these industries for private investors. In return, growers could see direct gains – from feedstock payments for ethanol or SAF production, to profit-sharing in power sales (or cheaper energy for irrigation), to new markets for byproducts and biomass. All this can be done in parallel and complimentary to our existing successful sugar supply chain.

The biofuel future for Queensland sugarcane aligns with broader goals: regional job creation, fuel security and emissions reduction. The momentum globally – from India's ethanol surge to Europe's SAF requirements – reinforces that these are not speculative ideas but mainstream trends. With the right policy frameworks, Queensland can replicate and tailor these successes domestically. This will ensure that sugarcane, a crop that has been a mainstay to Queensland, continues to prosper in a low-carbon world by directly fuelling Australia's energy needs and rewarding the growers who cultivate it.

Please do not hesitate to contact me on dan_galligan@canegrowers.com.au if you require any further information in relation to this submission.

Yours Sincerely

[redacted]

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