Sugarcane Bioenergy Inquiry 2025

Submission No:	12
Submitted by:	Mackay Sugar LTD
Publication:	Making the submission and your name public
Attachments:	See attachment
Submitter Comments:	

Mackay Sugar
Member of Nordzucker Group

Sustainable production

September 2025

Authorised by: Carl Morton
CEO Mackay Sugar LTD
[redacted]
PO Box 5720
Mackay Mail Centre
QLD 4741 Australia

Mackay Sugar
Member of Nordzucker Group

www.mkysugar.com.au

Submission Primary Industries and Resources Committee Inquiry into Sugarcane Bioenergy Opportunities

This submission is made on behalf of Mackay Sugar LTD

Mackay Sugar Limited (MSL) is home to almost one third of Australia's raw sugar exports and provides 45% of the raw sugar used by Sugar Australia for their refined sugar products stock on Australian supermarket shelves. We also produce other sugar-related products like molasses and mill mud that is used locally in Mackay by our growers.

Our three factories, commonly known as Mill's within our region and industry, collectively produce approximately 700,000 tonnes of raw sugar and 180,000 tonnes of molasses every year through the sugar milling process. To do this, the factories "crush" greater than five million tonnes of sugar cane.

Located at Racecourse Mill, our Cogeneration Plant utilises sugarcane fibre to produce both steam and electricity, supplying energy to the factory, the adjacent raw sugar refinery, and approximately one-third of the Mackay region's annual electricity demand. This equates to enough renewable power to supply around 20,000 households, generating approximately 115,000 MWh each year.

Bagasse, the fibrous by-product of the sugar milling process, serves as a renewable biofuel for the Cogeneration Plant's steam boiler. Sourced directly from cane fields, this fibre provides a sustainable energy source. The carbon dioxide emissions released during combustion are offset by the absorption of new season crops, supporting a closed-loop carbon cycle.

Each crushing season (June to December), around 220,000 tonnes of surplus bagasse from Mackay Sugar mills are stockpiled for use during the non-crush period. This ensures a reliable year-round energy supply for both our factories and Sugar Australia's co-located refinery. Through careful management and the efficient utilisation of bagasse, Mackay Sugar's Cogeneration Plant delivers electricity that is virtually carbon-neutral, making it one of the region's most efficient sources of renewable biomass energy.

1. The role and benefits of sugar cogeneration in Queensland's electricity generation mix, including existing capacity and potential for expansion.
   1.1. MSL contributed to the Australian Sugar Manufacturers Bioenergy Study through the consultant group LEK. The study provided analysis on the potential of cogeneration expansion across the sugar industry, and its impacts and implications for wholesale generation markets.
      1.1.1. MSL's contribution was not limited only to financial support but also included the time of key people and resources through the ASM Bioenergy Industry Committee.
      1.1.2. This study showed:
         1.1.2.1. Cogeneration is a true green, firm power source with some existing generation infrastructure spread across Queensland sugar mills.
         1.1.2.2. The existing generation infrastructure in sugar mills is not set up to maximise generation, however this infrastructure can be augmented to export up to an additional 800 MW of energy each year.
         1.1.2.3. Modelling suggests that wholesale electricity prices may reduce by up to 20% in the late 2020's and early 2030's if the augmented capacity of cogeneration was made available to the Queensland energy market.
      1.1.3. Raw sugar factories power generation is not weather dependent and allows for all day generation into the national power grid.
      1.1.4. Raw sugar factories power generation is produced from rotating mass, synchronous turbo-alternators providing inertial base load for network frequency stability.
   1.2. MSL has been committed to the utilisation of cogeneration, given its broad economic and sustainability benefits. In 2012 MSL invested over $130 Million implementing a renewable Cogeneration facility to produce up to 36MWh using Bagasse (sugar cane fibre) as a renewable fuel source delivering base load supply to the network.

1.2.1. This project was justified on market conditions with a much more stable and predictable electricity prices as well as Large-Scale Generation Certificates (LGC's).

1.2.2. Bagasse is the feedstock for cogeneration. Bagasse is one of the only truly renewable crops for energy as it sequesters more carbon from the atmosphere than it emits from burning its fibre as the Sugar produced in the process takes a large portion of the carbon.

1.2.2.1. Since the change of ownership to a majority shareholding by Nordzucker in 2019, MSL has spent $480 Million in capital and maintenance (with a further $110M planned in the Financial Year Ending February 2026 (YEF26)) to increase plant reliability and steam efficiencies. This has led to additional bagasse availability and ultimately a vast reduction of coal usage as shown in the table below.

Coal Burnt (t)	2019	2020	2021	2022	2023	2024
	40,598	24,793	9,755	4,833	6,671	5,415

2. Market regulatory, and infrastructure barriers to increased bioenergy production from sugar.

2.1. The MSL Cogen facility was justified on a much more stable price profile from electricity generation markets that recognised the renewable nature of cogeneration. The declining price of LGCs is diminishing the value attributed to baseload synchronous renewable power. Without a suitable alternative mechanism in place, existing investments may risk becoming unprofitable.

2.1.1. The falling price for LGC's, combined with highly volatile (and often negative) prices in the wholesale market, has severely challenged the viability of cogeneration. Frustratingly, despite the significant benefits of cogeneration in providing base load synchronous renewable power. There are no market incentives or payments for this, making current investments potentially no longer profitable.

2.1.1.1. Unlike variable renewable sources such as solar and wind, renewable biomass generation carries unavoidable input costs (e.g. transport and handling of fuel) which must still be met even during periods of negative pricing. At these times, the contribution of synchronous rotational generation is even more critical. Biomass generation provides inherent synchronous inertia, which is essential for maintaining network frequency stability and ensuring fault recovery capability in a grid increasingly dominated by asynchronous generation such as solar and wind. Without this synchronous inertia, the system is more vulnerable to instability, cascading faults, and blackouts.

2.1.1.2. The existing infrastructure was developed with an off-grid operational requirement to support both our facility and our customers. This design means that generation cannot simply be curtailed during periods of negative pricing. As a result, profitability is directly impacted, discouraging further investment in generation capacity. Instead, operators are forced to consider export-limiting measures such as steam dump condensing units, which bypass the turbo alternator and reduce the amount of synchronous inertia available to the grid.

2.1.1.3. To address these issues, policy should formally recognise synchronous inertia as a critical system service in its own right, distinct from energy generation. Government could consider mechanisms such as:

- Inertia or system strength markets that remunerate generators providing synchronous inertia, like how frequency control services are currently procured.

- Capacity payments or reliability support payments that value the availability of synchronous generators during times of low system strength or high asynchronous generation.
- Targeted grants or investment incentives to encourage biomass and other synchronous providers to maintain or expand generation through their turbo alternators, rather than investing in export-reduction technologies that diminish grid stability. Such measures would ensure that biomass generators remain economically viable while continuing to deliver the synchronous inertia and fault-stabilising capability essential for a secure and resilient energy system.

2.2. The tightening of network power quality compliance requirements has significantly increased the complexity of operating and upgrading our generation assets. New and existing infrastructure now require far more detailed modelling and verification before connection approvals can be obtained. While these measures aim to ensure stability in a grid with a growing proportion of asynchronous generation, they have also made the process of upgrading and maintaining proven synchronous infrastructure substantially more resource intensive and costly.

2.2.1. As a result, our cogeneration operations have faced extended approval periods, in some cases exceeding two years, alongside additional costs of more than $1 million for the development of complex network models over the past four years. These protracted timeframes and high compliance costs place a disproportionate burden on synchronous renewable generators, despite their role in providing critical inertia and system strength. The current framework risks discouraging timely investment in infrastructure upgrades that are essential for both maintaining reliability and supporting the integration of higher levels of variable renewable energy.

2.2.2. To mitigate these impacts, policy reform should aim to:

- Reduce approval timeframes by streamlining assessment processes for proven synchronous generation technologies.
- Introduce cost recovery or co-funding arrangements for mandatory network modelling, recognising that these studies provide system-wide benefits.
- Ensure proportionality in compliance requirements, so that synchronous inertia providers are not inadvertently penalised relative to asynchronous generators.

By addressing these barriers, government policy can ensure that synchronous renewable generators remain active participants in the market, continuing to deliver essential fault resilience and frequency stability to support the broader renewable energy transition.

3. Opportunities to align sugar biofuel production with national security and defence liquid fuel needs.

3.1. Fuel Security

3.1.1. With the recent closing of oil refineries in Australia and the limited fuel storage nationally the risk of fuel security is significant (this is estimated to be 16 to 58 days which is well below the 90-day International Energy Agency (IEA) recommendation). Of concern is the fact that diesel would be the first fuel to be consumed (~ 16 days) and is the major fuel of large transport and with the size of Australia would effectively cripple infrastructure.

3.2. Ethanol (Petrol octane booster and Aviation fuel feed stock)

Note - MSL supplies the Wilmar BioEthanol plant molasses as a feedstock.

3.2.1. Submissions to date have largely focused on the technology of refining ethanol to jet / renewable diesel – what is of key importance, and often neglected, is ensuring that the physical supply chains exist for the aggregation, production, transportation and processing of feedstock., without careful consideration of establishing viable supply chains, there is the potential is for Australian government to help fund a refinery which ends up using cheap imported ethanol from countries like Brazil, Thailand and India which ultimately further subsidises those industries sugar production and makes Australian raw sugar production even less viable.

3.2.2. Ethanol can be successfully blended with petrol and whilst the energy density is only approximately 60% of petrol if blended at the right percentages (up to 10% by weight) it can increase the petrol octane rating significantly and help burn the base fuel more efficiently with the oxygen molecule still being present (ethanol C_2H_5OH).

3.2.3. Aviation fuel from ethanol is challenging due to the oxygen molecule being ~½ the molecular weight so for ~ two litres of ethanol only one litre of sustainable fuels would be produced. The cost of ethanol from molasses is approximately $0.70 to $1.20 per litre so the feed stock cost would be high. The coproduct of ethanol production is vinasse (dunder) which is 5 – 12 times the volume produced and needs to be used as fertiliser or stockfeed (the large volumes of this product produced means a suitable market must be located near the ethanol production).

3.2.4. Ethanol from sugar would need to attract a similar pricing to the ice 11 which would mean ethanol pricing would be estimated > $2.50 per litre. (1,000 kg of sugar theoretically yields 647 litres of ethanol) therefore at $550 T of sugar would be 85c per litre of ethanol and you would need ~2 litres just in raw material without processing costs) The price of producing Sustainable aviation fuel would be on top of this.

3.3. Sustainable Diesel or Aviation fuel from bagasse is in its infancy at this time but there are some technology providers who are developing smaller modular processes (starting at 50kT of Bagasse) which would make the logistics viable. The byproduct is high in lignin which is difficult to deal with and would likely need to be burnt in a biomass boiler however this could potentially be able to be consumed in new sugar industry boilers.

4. Develop policies and funding mechanisms that reduce investment risks for manufacturers and growers in cogeneration and biofuels, drawing on examples of successful policy implementation from international markets and other sectors.
    4.1. When policy or funding mechanisms are used to grow a market sector the investments need to be upheld for the investment periods which has not always been the case
        4.1.1. Biofuels enjoyed substantial excise relief until 2015 where it was significantly reduced, this was used to justify investment (example Dalby Ethanol and Bio Diesel processing) the excise relief was removed earlier than originally committed to which effectively made those plants no longer viable.
        4.1.2. Ethanol state mandates are not adequately enforced in QLD and NSW which means the volumes consumed are well below the current manufacturing capabilities (Manildra and Wilmar facilities).
        4.1.3. LGC are not providing financial support to underpin cogeneration, nor is there any market payment that recognises the benefits of cogeneration's base load synchronous generation.
        4.1.4. Electricity generators have restricted access to margins earned by retailers.
            4.1.4.1. Power options such as virtual microgrids could allow us to provide power to our other sites or growers avoiding huge transmission losses for coal fired power stations as the power would be generated very closely to the users. This discounted power would allow for additional irrigation and increase crop yields, helping farmers and manufacturers to be more viable. The additional sugar cane produced would then allow more power generations and raw materials for biofuel manufacturing (TRUE circular economy with agricultural

producers and the manufacturer). Additionally, a cheaper energy source for agriculture could drive innovation into non-fossil fuelled equipment on farms. This would result in an industry truly reducing its carbon footprint, not just greenwashing it. For this to happen there is no need for any additional infrastructure but rather a simple change of policy.

4.1.4.2. There is a need to develop a pricing policy to encourage green energy produced base load synchronous generation. One such model could be government owned enterprises offering offtake agreements that provide floor and cap process, removing negative pricing during the day. Based on MSL's interaction with wholesale markets, the suggested values at today's market could be a floor of $55MWh and cap of $350 MWh (note AEMO market data shows large coal fired power stations can reduce their loads in peak solar and wind generation). Governments can recoup the cost of the floor pricing, when prices exceed the cap.

4.1.4.3. The sustainable, synchronous baseload nature of biomass to energy is readily recognised in other developed energy markets. In Japan a long-term offtake agreement of ~$205MWh is being offered which is supporting conversion of coal powers stations to biomass alternatives – a similar process could be implemented in Australia making it viable for raw sugar producers to produce stable baseload synchronous energy themselves or alternatively to invest in "black pellet" manufacturing that is creating a renewable coal alternative from bagasse. Similarly, pellets can be used to make smelting operations in Australia truly green, replacing coal and also the need to install expensive electric blast furnaces (often at a significant cost to governments).

5. The R&D agenda to underpin a world leading sugar-led bioenergy industry.

5.1. Without government support into research, development and application of new technologies industry is in serious danger of missing a key opportunity to diversify its products from sugar.

5.2. The sugar manufacturers already pay $0.35 per T cane as a levy to Sugar Research Australia with almost no allocation coming back in sugar factory industry research.

5.3. MSL is currently taking <u>significant</u> technical risk putting in new technologies to make the factories more energy efficient such as;

5.3.1. $14.6 - Million falling film evaporator,

5.3.2. $ 4 Million - Pan utilising new dimple tubed calandria

5.3.3. $3 Million - 3 x honeycomb calandrias,

5.3.4. $3 Million - Flat belt mud filter,

5.3.5. $2.5 Million - Molasses massecuite mixer,

5.3.6. $13 Million - five hybrid locomotives and brake vans.

6. Strategic land use and regional development considerations affecting cane growing and sugar manufacturing capacity.

6.1. MSL has recently opposed battery storage facilities taking up good agricultural land (there was industrial zoned land only 500m away from the farm).

6.2. MSL is fundamentally opposed to the reduction of prime agricultural land when there are already large areas allocated in state development precincts as well as heavy industrial zoned land that are underutilised in the Mackay Region.

7. Benefits for growers in diversification opportunities. If growers get more returns or additional benefits from the sugar industry, they will plant more cane maximizing the capacity of our mills.

7.1. When Nordzucker elected to invest in Mackay Sugar Limited they were adamant that the growers maintain a significant shareholding >29%. This was so that when the business turnaround project was completed the growers at the time of purchase could enjoy the benefit of a profitable business in the form of share dividends. It was also envisioned that if MSL did invest in other technologies such as but not limited to Precision Fermentation, Sustainable Biofuels and additional Cogeneration that this would provide a good mechanism for sharing these potential earnings.

7.2. With sugar being a potential feed stock to these new products the domestic sales volumes should increase (traditionally higher premiums when compared to export markets).

Note: Queensland Commodity Services (QCS) is the marketing arm for MSL as well as many of its growers, QCS elects to share the domestic markets as part of our joint grower pools and as such our growers would enjoy access to these increased volume premiums.

8. Consideration of food versus fuel.

8.1. With using sugar cane bagasse, there is no effect on the amount sugar produced so there is no food vs fuel argument. In fact, the opposite is true, if the industry is able to continue to export truly renewable, base load synchronous power and our suppliers (i.e. growers) can benefit from that, then the industry will grow, increasing the amount of sugar available for food production.

The way forward – MSL recommendations for the Parliamentary Inquiry

1. **Advance Shovel-Ready Bioenergy Projects**
   MSL seeks $10 million in funding for the sugar industry from Queensland Government to support feasibility studies and final investment decisions for shovel-ready projects in sugar and bagasse-based biofuels, biogas, and bioenergy. This includes optimising existing infrastructure to accelerate deployment.

2. **Maximise Bagasse Cogeneration Potential**
   Cogeneration from bagasse offers a more efficient use of renewable biomass, which is otherwise incinerated in low-efficiency boilers. If Queensland adopts offtake agreements with sugar manufacturers—such as fixed or floor pricing to reduce exposure to midday market volatility—and explores international models for long-term incentives or microgrid policy reforms, the industry could unlock stable, synchronous rotational generation. This would strengthen baseload electricity supply while supporting agricultural and manufacturing growth.

3. **Secure Federal Investment in Low-Carbon Liquid Fuels**
   MSL recommends that the Queensland Government advocate for a significant share of Federal funding for low-carbon liquid fuel initiatives. This includes investing in sugar industry projects and conducting detailed assessments of logistics and feedstock supply chains. An initial $20 million commitment from Queensland is proposed, with ongoing support from both levels of government.

4. **Build R&D Capacity for Advanced Sugar Manufacturing**
   A $6 million investment from the Queensland Government is sought to co-invest with industry and the Federal Government in developing R&D capabilities. This includes adopting internationally proven technologies not yet used in Australia to modernise sugar manufacturing.

5. **Support Cane Rail Infrastructure for Disaster Recovery and Efficiency**
   Continued support from both governments is essential to maintain and upgrade cane rail networks, particularly in disaster recovery efforts. This infrastructure reduces road transport pressure and could enable efficient multi-feedstock collection.

6. **Deliver a Diversification Strategy for the Sugar Industry**
   These reforms should be implemented as part of a broader sugar industry diversification strategy. A successful diversification agenda needs to address issues around technology, physical supply chains, market regulations and payments, and government policy and incentives. An holistic government-industry strategy will ensure all these activities are undertaken in a coordinated synergistic manner that will maximise outcomes for the sugar industry and the Queensland economy.