Bio-energy Study: - Regulatory and Commercial Considerations for Expanded Cogeneration

Australian Sugar Milling Council

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1. Project Context

The sugar milling sector in regional Queensland has the potential to significantly enhance its cogeneration capacity, increasing from the current 405MW (~1TWh of energy)[1] to over 800 MW (~1.7TWh of energy). Realizing this potential depends on implementing effective commercial and policy frameworks, alongside the cost-efficient liberalization of bagasse utilization. While bagasse is often burned inefficiently in existing mill steam boilers, addressing these inefficiencies and enabling greater flexibility in its use could unlock substantial investment in sugar mills.

The sugar milling sector could contribute significantly to regional economic development, energy security, and the decarbonization of the electricity grid. These outcomes align with national and state policy goals for sustainable and renewable energy development.

This project is structured around four interconnected work streams designed to address the sector's challenges and opportunities – this report focuses on work streams 3 and 4 outlined below:

1. **Evaluation of Competitiveness Against Alternative Generation Sources**
   This analysis will assess how cogeneration compares with other energy generation sources in terms of economic feasibility, efficiency, and market competitiveness within the National Electricity Market (NEM).
2. **Economics of Bagasse Densification and Feedstock Supply**
   A detailed study will explore technological pathways to densify bagasse feedstock. Densification would enable storage and transportation, providing flexibility to dispatch electricity outside the harvesting season. This increased versatility would allow mills to capitalize on higher NEM spot prices, improving the financial viability of cogeneration.
3. **Policy and Commercial Mechanisms to Support Investment**
   This work stream will examine the policy and commercial tools required to support cogeneration expansion. This includes identifying mechanisms to generate sufficient revenues, managing market risks, and ensuring the sector remains competitive. Recommendations may include regulatory reforms and policies frameworks that recognize the unique value of cogeneration to the energy market.
4. **Risk Identification and Mitigation**
   An evaluation of regulatory, policy, and market risks to inform strategies to mitigate barriers to investment in cogeneration. Addressing these risks is essential to create a stable and attractive investment environment.

[1] ASMC Website – Sugar Fact / Electricity Cogeneration https://asmc.com.au/sugar-industry-overview/sugar-facts-electricity-co-generation/

2. Executive Summary

The Australian Sugar Milling Council's (ASMC) strategy to expand cogeneration from sugar mills presents a significant opportunity to both address challenges within the National Electricity Market (NEM) and contribute to Australia's ambitious energy transition goals. This strategy supports Australia's targets of reducing emissions by 43% by 2030 and achieving net-zero emissions by 2050 (refer to Appendix 7.1 for detailed targets).

As Australia works toward these goals, the rapid transformation of the energy grid has introduced several challenges that must be overcome to ensure a sustainable, reliable, and affordable energy future, including:

- **Grid Design Limitations:** The NEM was originally designed for centralized, fossil-fuel generation and struggles to accommodate the variability of renewable energy sources like wind and solar.
- **System Stability:** The increase in inverter-based renewable energy, such as solar and wind, complicates grid stability, particularly in maintaining sufficient system strength.
- **Market Signals:** Current market structures fail to provide the necessary incentives for investment in energy storage and firming services, both of which are essential to balance intermittent renewable generation.
- **Aging Infrastructure:** With many coal-fired plants nearing the end of their operational life or closing earlier than expected, the NEM faces a critical gap in dispatchable generation.
- **Growth of Distributed Energy Resources (DERs):** The growing prevalence of rooftop solar and home batteries increases the complexity of grid management and stability.
- **Rising Demand:** The ongoing electrification of transport, industry, and heating adds additional strain to the grid, creating an urgent need for flexible, reliable energy solutions.

Cogeneration from sugar mills offers a practical, dispatchable, and renewable energy source that can help stabilize the grid, reduce reliance on fossil fuels, and address several of the challenges facing the NEM. By leveraging biomass and other renewable resources, sugar mills can provide essential support in managing grid variability and maintaining energy security.

To successfully implement an expanded cogeneration strategy, sugar mills will need to address three critical challenges to provide investment certainty:

- **Economic Feasibility:** A robust commercial strategy is essential to optimize spot market pricing, secure long-term Power Purchase Agreements (PPAs), and explore potential government support mechanisms. These measures will ensure that sugar mills contribute to regional development, stabilize the power system, and help reduce NEM wholesale prices.
- **Regulatory Issues:** The scale of the cogeneration expansion may risk sugar mills losing their non-market, non-scheduled status in the NEM. Future regulatory engagement may be required to ensure cogeneration is appropriately recognised in NEM frameworks.
- **Operational Challenges:** Participating in the NEM requires additional market functions and compliance with energy trading processes, which may divert valuable resources from core milling operations. To minimize costs and operational complexity, sugar mills could outsource market activities to third-party providers who specialize in NEM trading and settlement services.

Expanding cogeneration presents a powerful opportunity for sugar mills to play a central role in addressing the NEM's challenges while advancing Australia's clean energy goals. By leveraging investment mechanisms such as capital grants, bespoke CIS structures, or targeted derogations, sugar mills could secure the necessary financial, regulatory, and operational support to ensure the success of expanded cogeneration projects. These measures will not only contribute to regional economic development and job creation but also help build a more resilient, sustainable energy future for Australia.

3. Market Reforms

Chapter Key Points

- **Market Reform and Evolving Obligations**: Ongoing policy and operational reforms in the NEM aim to integrate renewable energy and improve system reliability. Sugar mills should prepare for potential regulatory changes, including stricter compliance requirements and the phasing out of current non-scheduled generator exemptions.
- **Cogeneration and Compliance Risks**: Expanding cogeneration capacity may trigger additional obligations, such as Generation Performance Standards (GPS) and reclassification as scheduled generators, due to increased visibility, grid impact, and regulatory scrutiny.
- **Opportunities in Policy Reviews**: The NEM Wholesale Market Settings Review presents opportunities for ASMC members to advocate for recognizing cogeneration's dispatchable capabilities, though risks exist if definitions favour other technologies like batteries or gas.
- **Operational Rule Changes**: Proposed changes, including lowering the non-scheduled generation threshold and enhancing access standards, could increase compliance obligations for sugar mills and influence their market participation requirements.
- **Proactive Engagement Strategy**: ASMC members must engage with stakeholders, document cogeneration benefits, and align policy submissions with business goals to safeguard exemptions, shape policy outcomes, and explore new long term market opportunities.

Market reform in the NEM occurs at a policy and operational level. Policy driven market reform involves fundamental changes to the NEM's design such as the concept of a capacity market to address long term structural issues in the NEM. However, such concepts may not consider technical and operational matters which may occur to varying degrees no matter what the long-term market design might be.

The NEM has evolved gradually, primarily through operational rule changes, with ongoing consultation processes continuing to shape its design. Operational rule changes have progressively shifted how participants engage with the market and introduced new concepts such as five minutes settlements. Ongoing rule changes are generally more technical in nature ranging from engineering matters, information gathering, connection standards to clarification of processes or market guidelines. Rule changes tend to create new obligations or modify existing market obligations of market participants and in some instances, broader policy reforms may have addressed issues more holistically than incremental rule changes.

In recent years, operational rule changes have become critical in addressing challenges associated with integrating variable renewable energy resources into the NEM focussing on three core elements:

- **Essential System Services:** Ensuring the grid has the necessary services, such as frequency control and inertia, to maintain reliability and stability.
- **Resource Adequacy and Capacity:** Ensuring there is sufficient capacity to meet demand, especially during periods of low renewable generation output.
- **Integration of Consumer Energy Resources (CER):** Facilitating the effective participation of distributed energy resources, such as rooftop solar, batteries, and demand response, in the NEM.

This section outlines current NEM reviews and ongoing rules changes that may impact on sugar mills.

3.1. Emerging Policy and Regulatory Risks

Sugar mills' operational characteristics and current energy export levels lend strong support for ongoing exemptions and classifications already in place. However, despite these exemptions, plant upgrades will often trigger the need for compliance with Generation Performance Standards (GPS) or trigger enhanced data exchange and visibility requirements[2] with AEMO - processes have proven costly and time-consuming for sugar mills undergoing upgrades.

Although cogeneration is dispatchable and may have some limitations depending on processing and fuel source, the proposed increase in cogeneration will likely trigger the non-scheduled threshold for NEM registration. This will require GPS modelling of new plant and equipment to ensure compatibility with the power system dynamics and connection standards. It may however still be feasible for sugar mills to apply for NEM exemptions given plant characteristics (see Section 4.2.3); however, expanded cogeneration may increase the likelihood of reclassification, depending on AEMO's assessment of system visibility and performance requirements

In order to retain their exemption status sugar mills will require a strategy that recognises and deals to the factors driving AEMO and market participants to seek greater visibility of all resources that impact the system. These include:

- **Influence on Spot Prices:** Sudden changes in non-scheduled generation can significantly impact spot prices, particularly in regions with high penetration of renewable energy. Increased export volumes from sugar mills may exacerbate these fluctuations, drawing regulatory attention.
- **Forecasting and Dispatch Challenges:** The NEM relies on accurate demand and generation forecasts for its real-time dispatch model. Non-scheduled generators do not participate in the market's centralized dispatch process, which increases the risk of forecasting errors and complicates system planning.
- **Increased Reliance on Ancillary Services:** Variability in generation from non-scheduled sources impacts the market's ability to maintain a balanced system, leading to a greater dependence on Frequency Control Ancillary Services (FCAS) to stabilize the grid.
- **Lack of Visibility and Control**: The limited operational visibility of non-scheduled generation makes it more difficult for AEMO and network operators to predict system behaviour and respond to fluctuations effectively.

These factors will continue to drive the evolution of the role of non-scheduled generators in the NEM potentially leading to increased regulatory obligations. It is possible that future regulatory requirements, such as those applied to plant upgrades, could align more closely with those imposed on market participants. Consequently, sugar mills should proactively plan for the possibility that the current exemptions under which sugar mills operate may be phased out, regardless of whether an expanded cogeneration strategy is pursued or not.

3.2. NEM Policy Reviews

3.2.1. NEM Wholesale Market Settings Review

The NEM Wholesale Market Settings Review[3], announced in December 2024 is a comprehensive evaluation led by an expert panel to determine how the NEM can best evolve to support investment in firmed renewable generation and storage capacity following the conclusion of the Capacity Investment Scheme (CIS) in 2027. Recognizing the substantial reforms already underway in the energy market, the panel builds on prior work by the AEMC, AER, and AEMO. The review process emphasizes extensive stakeholder engagement to incorporate insights from governments, market bodies, investors, and electricity consumers, both within Australia and internationally.

Key aspects under review include:

- **Investment Incentives:** Exploring mechanisms to improve incentives for firmed renewable generation and storage capacity.
- **Wholesale Market Interactions:** Examining the interaction between electricity consumers and the wholesale market.

2 Based on stakeholder feedback

3 NEM Wholesale Market Settings Review: https://www.dcceew.gov.au/energy/markets/nem-wms-review#dcceew-main

- **Price Volatility Management:** Developing strategies to manage volatile electricity prices during the transition to renewable energy.
- **System Services and Competition:** Identifying ways to secure essential system services and enhance competition in a market increasingly characterized by smaller, decentralized generation units.

The panel is seeking input on several critical issues, such as the role of certificated schemes, the potential expansion of the Retailer Reliability Obligation (RRO), and the most efficient ways to incorporate new consumer energy resources (CER) like electric vehicles and batteries. A series of consultation processes will occur between December 2024 and mid-2025, with the final report and recommendations due by December 2025.

3.2.1.1. ASMC Takeaways

The review is currently in its early stages of engagement with industry stakeholders, market bodies, and regulators. While the terms of reference focus on specific market issues, some potential solutions build on earlier concepts that were previously considered but not implemented and may now be revisited with updated design elements. Some of these earlier concepts may be revisited and enhanced with updated design elements, alongside proposed amendments to the current NEM market rules. For sugar mills, the review presents an opportunity to establish new markets that recognise the value of dispatchable generation, particularly cogeneration, for the diverse services it provides the NEM.

The review is expected to span approximately 12 months, with active consultation occurring over a six-month period. The review timeline suggests draft recommendations are likely to be delivered prior to the conclusion of the process. This timeline is short and significant as it indicates a likely combination of targeted rule changes to reinforce existing market structures and the introduction of new design elements that will require further detailed design and consultation beyond the initial 12-month review period.

3.2.1.2. Next Steps / Actions

- Review terms of reference, submissions and further documents as they become available,
- Engage with the members of the review panel to discuss process and specific areas of market design such as the value of market services and dispatchable generation, and the role scheduled and non-scheduled generation in the provision of market services,
- Consider which services sugar mills are most likely to provide the market given operational limitations,

3.3. Operational Rule Changes

3.3.1. Non-scheduled Category Thresholds

AEMO has been evaluating potential changes to the non-scheduled generation threshold within the NEM. Under current arrangements, generating units with a nameplate capacity of less than 30 MW are classified as non-scheduled, exempting them from participation in the central dispatch process. However, proposals have been made to lower this threshold to 5 MW to improve market transparency and enhance system security. The intent behind this change is to classify generators above 5 MW as either scheduled or semi-scheduled by default, thereby increasing visibility of smaller generators and supporting more efficient pricing and system operations.

The AEMC reviewed these proposals and, in its draft determination, decided not to mandate scheduling for generators between 5 MW and 30 MW. Instead, it recommended measures to improve transparency in AEMO's registration, classification, and exemption processes. These measures include requiring AEMO to consult on updates to its registration information resources and guidelines. This involves providing clearer criteria for exemptions from generator registration, refining the classification of non-scheduled generating units, and standardizing the information required in energy conversion models.

As of now, the 30 MW threshold remains unchanged. However, as the energy system grows increasingly complex with the integration of smaller-scale generators, AEMO and other market participants may consider re-evaluating the threshold.

3.3.2. *Transitional Services Framework*

The Transitional Services Framework is a regulatory mechanism designed to ensure the secure operation of the NEM as it transitions to a low- or zero-emissions power system. This framework enables the AEMO to procure essential system services that are not adequately supplied through existing market mechanisms, addressing emerging challenges such as system strength, inertia, and voltage control.

This framework is part of a broader effort to adapt the NEM's regulatory and operational structures to the evolving energy landscape. The framework is designed to address.

- **Gaps in System Services:** The framework targets gaps arising from the retirement of traditional synchronous generators, which has reduced the availability of critical services like inertia, system strength, and voltage control.
- **Support Grid Stability:** With a growing penetration of variable renewable energy (VRE) sources, the framework helps ensure the power system remains stable and resilient despite challenges to traditional stability mechanisms.
- **Facilitate the Transition:** Acting as a bridge between current market arrangements and long-term, market-based solutions, the framework supports the energy transition by enabling interim measures.
- E**nable Proactive Management: The** framework allows AEMO to secure services in a planned and structured manner, reducing reliance on reactive interventions and minimizing risks to system security.
- **Encourage Innovation and Participation:** By opening opportunities for emerging technologies like battery storage and advanced grid-supporting devices, the framework fosters innovation in delivering essential system services.

The framework prioritises transitional arrangements for inertia, system strength and reactive power and voltage control.

3.3.3. *ASMC Takeaways:*

Sugar mills should monitor potential changes to the non-scheduled generation threshold, as ongoing discussions may impact generators between 5 MW and 30 MW.

Additionally, the Transitional Services Framework and NEM Access Standards reforms offer opportunities for mills with renewable energy projects, such as biomass or battery storage, to support grid stability. Adopting innovative technologies and leveraging these changes could streamline grid connections and unlock new revenue streams

3.4. Policy and Regulatory Engagement

ASMC and its individual members' engagement with policy and regulatory processes is necessary to safeguard current NEM exemptions and ensure that future long term business needs are not compromised through unintentional consequences from policy reforms or evolving rule changes. Participating actively in policy development and rule changes processes may also help identify new services or arrangements that sugar mills can participate in.

3.4.1. *High Level Engagement Strategy:*

- **Strategy Inputs:**
    - **Evaluate Capabilities:** Document potential sugar mill specific cogeneration services, value of dispatchability, market services, reliability, alignment with market objectives (reliability, system security, emissions reductions), and outline constraints,
    - **Assess Future Needs:** Identify operational, financial, and regulatory requirements for sugar mills competitiveness,
    - **Evaluate Expanded Roles:** Anticipate future needs as market-scheduled generators, including operational constraints unique to sugar mills (e.g., seasonal profiles, fuel supply limitations).
    - **Market classification:** Identify under what circumstances or conditions that sugar mills can or would operate as scheduled generators,

- **Define Proposition:** Document preferred short- and long-term position across, economic, regulatory and operational dimensions. Define strategy in terms of two worlds
  - Statas Quo
  - Market participation

- **Engagement Approach:**
  - **Identify key stakeholder groups:** ASMC stakeholders include governments, AEMO, the AEMC and the newly established review panel. Market participants and peak bodies can raise rule changes that impact sugar mills such as the Australian Energy Council (AEC) rule change to lower non-scheduled generation thresholds.
  - **Build Relationships:** Collaborate with policymakers to align cogeneration proposals with energy and climate policy,
  - **Integrate Long-Term Planning:** Align submissions with future business goals and market trends and ensure submissions align with the unique characteristics of sugar mills, avoiding obligations misaligned with their capabilities.

4. NEM Classifications and Operational Requirements

Chapter Key Points

- **Classification Transition Risks**: As sugar mills expand cogeneration, current classifications as non-market, non-scheduled generators may no longer apply, requiring reclassification as scheduled generators, with higher operational and compliance demands.
- **Differences in Generator Categories**: Scheduled, semi-scheduled, and non-scheduled classifications differ in terms of dispatch participation, forecasting, market settlement, and compliance obligations. Scheduled generators face greater complexity but offer opportunities in ancillary services and market revenues.
- **Benefits of Scheduled Generation**: Scheduled generators can provide firming capacity, frequency control, system strength, and participate in long-term hedge contracts and PPAs, supporting grid stability and creating new revenue streams.
- **Regulatory and Business Risks**: Scheduled classification exposes mills to market price volatility, stricter compliance obligations, and higher operational complexity, while non-scheduled generators face challenges in securing PPAs and adapting to narrowing exemptions.
- **Operational Complexity:** Scheduled generators require advanced systems (e.g., SCADA) and real-time market participation, while non-scheduled generators must navigate forecasting, contract negotiations, and compliance with grid standards.

Sugar Mills are currently classified as non-market, non-scheduled generators. In moving toward an expanded cogeneration strategy these exemptions may no longer apply in which case sugar mills would be classified as scheduled generators.

This section outlines the differences in operational requirements for market and non-market classifications, including scheduled and non-scheduled generators and the associated risks and opportunities the differing categories bring.

4.1. Comparison of Generation Classifications

4.1.1. Market Participant / Non-Market Participant

Market Participants actively engage with the NEM, buying or selling electricity and being exposed to spot market prices. They must register with AEMO under categories such as Market Generator, Market Customer, and their transactions are settled through AEMO's financial processes.

In contrast, Non-Market Participants are connected to the grid but do not engage in the spot market. Instead, they trade energy through bilateral contracts or power purchase agreements (PPAs) with Market Participants and settle transactions privately. They register with AEMO as Non-Market Generators or Non-Market Customers.

Table 1 below provides an overview of key characteristics differentiating Market Participants from Non-Market Participants. Note that a participant will also be registered in a particular category such as Market Generator or Market Customer carrying with it specific obligations under the NER and technical requirements to interact with AEMO and its market systems. The Market Generator category is discussed further below.

Table 1 Key Differences between Market and Non-Market Participant

Aspect	Market Participant	Non-Market Participant
Energy Trading	Buys or sells electricity in the NEM's spot market	Does not participate in the spot market; trades via contracts
Exposure to Spot Prices	Exposed to NEM spot market prices	Not exposed; uses fixed or private contractual prices
Settlement	Settled through AEMO's market processes	Settled privately between contractual parties
Registration	Registers as a Market Generator, Customer, or Aggregator	Registers as a Non-Market Generator or Customer
Examples	Large-scale generators, energy retailers, aggregators	Generators with PPAs, private industrial facilities

4.1.2. Scheduled Generation

Generators that actively participate in the NEM dispatch process by submitting bids for energy and being centrally dispatched by AEMO every 5 minutes. These generators:

- Are generally large-scale generators (e.g., coal, gas, hydro with controllable output).
- Have a capacity ≥ 30 MW.
- Must provide accurate forecasts of availability and comply with dispatch instructions.
- Required to offer energy into the market at different price bands and can be instructed to ramp up or down based on market demand.

4.1.3. Semi-Scheduled Generation

Generators that are subject to dispatch instructions from AEMO but only when there is network congestion or other system constraints. These generators:

- Are generally variable renewable energy sources like wind and solar farms.
- Have a capacity: ≥ 30 MW.
- Have output that depends on resource availability (e.g., sunlight or wind) but is still forecast and managed by AEMO.
- AEMO may limit their output during specific periods to ensure system reliability or manage network constraints.
- Must provide forecasts of their expected output using systems like the Australian Wind Energy Forecasting System (AWEFS) and Australian Solar Energy Forecasting System (ASEFS).

4.1.4. Non-Scheduled Generation

Generators that do not participate in the central dispatch process and operate independently of AEMO's dispatch instructions. These generators:

- Are generally small-scale generators or intermittent resources without material impact on the grid.
- Have a capacity < 30 MW, or generators without a significant influence on the network.

- Do not have to bid into the market and can generate electricity whenever available.
- Commonly used for localized or distributed generation purposes with minimal integration into the broader market.

Small solar farms, small hydroelectric plants, and distributed energy resources (DER) like rooftop solar systems.

Table 2 below provides a comparison of generation categories.

Table 2 Comparison of Generation Categories

Requirement	Scheduled Generation	Semi-Scheduled Generation	Non-Scheduled Generation
Capacity Threshold	≥ 30 MW	≥ 30 MW	< 30 MW
Dispatch Participation	Fully dispatched by AEMO every 5 minutes	Dispatched during network congestion or system constraints	Not dispatched by AEMO; operates independently
Bidding into the Market	Must submit bids into the NEM dispatch process	Must submit forecasts; AEMO may dispatch based on forecast and constraints	Not required to bid into the NEM dispatch process
Forecasting Requirements	Must provide accurate availability and generation forecasts	Must provide resource availability forecasts (e.g., wind/solar output)	Not required to provide forecasts
Control Over Output	Can be instructed to adjust output based on market conditions	Output is variable; AEMO may limit or curtail during constraints	Output is not controlled or forecasted centrally
AEMO Dispatch Instructions	Required to follow dispatch instructions	Must comply with dispatch instructions when necessary	Not subject to AEMO dispatch instructions
Compliance with System Security	Must comply with system security standards (e.g., frequency, voltage control)	Must comply with system security standards as applicable	Must comply with local network standards (if applicable)
Market Settlement	Settled based on market outcomes (energy prices)	Settled based on market outcomes (energy prices)	Settled based on local prices or not settled if below 30 MW
Connection to the NEM	Direct connection to the NEM grid	Direct connection to the NEM grid	Can be connected to the NEM grid or to a local network
Examples	Large coal, gas, hydro plants	Large-scale wind and solar farms	Small-scale solar, hydro plants, or distributed energy systems

4.2. Scheduled Generator:

Scheduled generators, typically defined as those with a capacity greater than 30 MW, have a critical role in the NEM. These generators can control and adjust their output in real-time based on dispatch instructions from the AEMO and play a significant role in grid stability, market participation, and the provision of ancillary services.

4.2.1. Benefits of Scheduled Generator Classification:

Scheduled generators will potentially benefit from the evolving energy market, particularly in terms of participation in the provision of firming and essential market services. The key benefits include:

- **Firming Services**: Scheduled generators can provide firming capacity to balance intermittent renewable energy sources, such as wind and solar. By offering firm capacity, they can help stabilize grid reliability and provide confidence to investors in renewable technologies.
- **Frequency Control**: Scheduled generators can offer frequency control ancillary services (FCAS), contributing to grid stability by responding to sudden changes in demand or generation. These services are critical as the grid becomes more reliant on variable renewable energy sources.
- **System Strength and Inertia**: Scheduled generators can provide system strength (the ability to resist voltage fluctuations) and inertia (the capacity to counter rapid changes in grid frequency), which are vital for maintaining grid stability, especially in systems with a high share of renewable generation.
- **Long-term Hedge Contracts**: Participation in firming and ancillary services enables scheduled generators to secure long-term hedge contracts, providing financial stability and a predictable revenue stream. This is particularly advantageous in a market that is becoming increasingly volatile with high renewable penetration.
- **Power Purchase Agreements (PPAs)**: Scheduled generators have opportunities to enter into PPAs to provide green energy. These agreements offer a reliable revenue stream, often at favourable terms, as governments and industry seek to meet renewable energy targets**.**

4.2.2. Technical Requirements

Equipped with advanced control and communication systems, including Supervisory Control and Data Acquisition (SCADA) and Energy Management Systems (EMS), scheduled generators enable real-time monitoring and coordination with AEMO and Network Service Providers (NSPs) for effective generation management. Accurate forecasting is essential, requiring scheduled generators to submit reliable generation forecasts to support efficient dispatch planning. Additionally, they engage with market systems to submit price bids, receive dispatch instructions, and optimize market participation.

In the event of a grid or generation outage, scheduled generators must provide real-time outage reporting and maintain direct communication channels. They also contribute to system security by providing ancillary services such as frequency control, voltage regulation, and ramping capabilities, which are increasingly critical with the growing penetration of renewable energy.

As scheduled generators are more responsive to market price signals than non-scheduled generators, they play a key role in optimizing generation output in line with market conditions. Compliance with rigorous reporting and operational requirements ensures AEMO has up-to-date information on capacity, generation forecasts, and operational status. See Appendix 7.2 for detailed scheduled generator requirements.

4.2.3. Exemptions

Under normal circumstances, large generators with a capacity exceeding 30 MW must comply with the NEM market participation rules. This includes submitting bids and adhering to dispatch instructions from the AEMO. However, exemptions from these requirements may be granted under specific conditions:

- **Generation Type and Operational Characteristics:** Large generators that are technically unable or unwilling to comply with central dispatch requirements may apply for an exemption. This could be due to challenges in forecasting output, an inability to control output in real-time, or operational constraints.
- **Variable Generation:** Generators that rely on variable renewable energy sources (e.g., wind or solar) and face inherent difficulties in output forecasting may qualify as non-scheduled generators. Non-scheduled status allows them to operate independently of AEMO’s central dispatch process.

Defining the contribution of cogeneration to the NEM, alongside operational constraints, will be important in future discussions with market bodies

4.3. Non-scheduled generation:

Non-scheduled generators play a significant role in the energy mix, offering both opportunities and challenges as the NEM evolves. Unlike scheduled generators, they have limited influence on short-term market prices as they cannot directly control their output to capitalise on high price signals or stabilize market conditions. This limits their ability to optimize revenue from price fluctuations. While non-scheduled generators do not participate in the central dispatch process, AEMO incorporates their expected output into its operational planning. These forecasts are important for managing grid reliability and preparing for the intermittent nature of renewable energy generation. Although AEMO does not control the output of non-scheduled generators, their forecasted generation is integrated into the broader system balancing process, helping to maintain grid stability despite the inherent unpredictability of these generators.

Cogeneration, particularly at the proposed scale does not readily fit the traditional view of non-scheduled generation, however with further definition of operational constraints, sugar mills may be able to explore tailored exemptions or derogations that more readily suit the unique characteristics of cogeneration.

4.4. Market Participation Risks

The classification of sugar mills as scheduled or non-scheduled generators presents distinct risks that must be carefully weighed. Scheduled classification provides opportunities to participate actively in the market but involves significant exposure to price volatility, regulatory compliance, and operational complexity. The Non-scheduled classification mitigates some of these challenges but may limit revenue opportunities and introduce risks tied to contract negotiations and forecasting accuracy. There is also the possibility that the non-scheduled is further narrowed exposing sugar mills to greater costs and compliance obligations.

4.4.1. Price Volatility Risks

- **Scheduled Generators:** Sugar mills classified as scheduled generators are directly exposed to NEM spot market price volatility. They must submit dispatch offers and are subject to AEMO's five-minute dispatch instructions, which means their revenue is tied to fluctuating market prices. While this offers opportunities during high-price periods, it also exposes them to significant downside risks during low-price or negative pricing events. Additionally, compliance with real-time bidding and dispatch can be challenging for sugar mills with variable generation profiles.
- **Non-Scheduled Generators:** Non-scheduled sugar mills are less exposed to short-term price volatility because they typically sell energy through bilateral contracts or power purchase agreements (PPAs) rather than directly participating in the spot market.

4.4.2. Regulatory Risks

- **Scheduled Generators**: Regulatory requirements for scheduled generators are stricter, with obligations to comply with dispatch instructions, real-time reporting, and participation in ancillary services markets. Non-compliance can result in penalties, increased costs, and reputational risks. Regulatory changes, such as updates to market rules or grid connection standards, can further increase compliance costs or operational constraints.
- **Non-Scheduled Generators**: Non-scheduled sugar mills face lower regulatory obligations but may still need to comply with grid connection and performance standards set by AEMO. Regulatory risks arise if changes in the NEM framework impose additional reporting, forecasting, or operational requirements on non-scheduled generators.

4.4.3. Business Risks

- **Scheduled Generators**: The requirement to invest in sophisticated systems (e.g., SCADA/EMS, AGC) and maintain compliance with AEMO's operational standards adds significant capital and operational expenses. Sugar mills, which may not traditionally focus on energy generation as a core business, could face financial and operational strain if market participation diverts resources from their primary milling operations. Additionally, exposure to market price fluctuations may create uncertainty in revenue streams, impacting long-term business planning.

- **Non-Scheduled Generators**: Non-scheduled sugar mills face risks in securing favourable PPAs or bilateral contracts. Poor contract terms or counterparty risks (e.g., default by buyers) could undermine profitability. Furthermore, their inability to directly influence market outcomes or capitalise on price spikes may limit revenue potential compared to scheduled generators.

4.4.4. Complexity

- **Scheduled Generators**: Operating as a scheduled generator requires significant operational complexity, including real-time market participation, accurate forecasting, compliance with dispatch instruction, and managing ancillary services. Sugar mills may need to build or procure expertise in energy markets, which could be resource-intensive and require specialized staff and systems.
- **Non-Scheduled Generators**: While less complex than scheduled operations, non-scheduled sugar mills still face challenges in forecasting generation output accurately for AEMO and managing integration with grid operators. They must also navigate contract negotiations and ensure compliance with performance standards, which require technical and legal expertise.

4.4.5. Connection and Registration Process

Navigating the NEM connection and registration process can be complex, particularly for first-time proponents. While regulatory documentation is available, processes evolve and are not always clear. The process involves multiple steps, including securing a new connection agreement, negotiating and agreed generator performance standard, and completing registration requirements with both AEMO and the Network Service Provider (NSP).

Although each proponent will have a different experience to reflect their own project and engagement with the process. Below is a list of practical learnings accrued in recent years by multiple participants:

- **Engage experienced GPS modelling experts** – A thorough understanding of NSP and AEMO requirements, as well as their modelling approach is essential for a smooth approval process.
- **Choose OEM providers with suitable GPS models** – Where possible, select Original Equipment Manufacturers (OEMs) that have pre-developed or can create GPS models that meet AEMO and NEM standards. Developing new models or calibrating existing network models with new equipment specifications can be time-consuming.
- **Allow ample time for approvals** – While both NSPs and AEMO have set response timelines, these do not always align. Efficient queue management depends on submitting information in the correct format; incorrect or incomplete submissions may require resubmission, potentially causing delays and losing queue position.
- **Be prepared for uncertain costs** – The full cost of the process is not always clear at the outset. From the initial inquiry to the final report, additional remediation measures may be required to achieve an optimal connection, adding unforeseen expenses.

4.4.6. 5.4.6. Dispute Processes and Other Considerations

Under the National Electricity Rules (NER), dispute resolution follows a structured approach designed to address conflicts between parties, particularly concerning network connections. The NER provides a structured process for resolving network connection issues. Participants should seek their own technical and legal advice on the appropriate steps.

In the context of network connections, disputes may sometimes arise that extend timelines beyond what proponents had initially anticipated. Challenges may include:

- **Assessing Sufficiency of Models**: Determining whether a submitted model meets the necessary standards or if additional scrutiny by the Network Service Provider (NSP) or the Australian Energy Market Operator (AEMO).

- **Process Delays:** Requests for additional modelling can reset timelines in the application process, leading to uncertainties and potential delays. The transparency of decision-making in these scenarios is crucial for maintaining trust and efficiency**.**

Addressing these concerns requires ongoing collaboration among AEMO, NSPs, and proponents to enhance the clarity, efficiency, and fairness of the connection process, thereby reducing the likelihood of disputes.

5. Commercial Opportunities and Operating Models

Chapter Key Points

- **Power Purchase Agreements (PPAs):** PPAs provide long-term price stability and support renewable energy adoption, appealing to retailers, industries, and communities seeking ESG alignment and cost certainty.
- **Virtual Power Plants (VPPs):** Integrating cogeneration, batteries, and solar into VPPs optimizes grid participation, reduces risks, and creates new revenue streams for ASMC members.
- **Third-Party Service Providers (TPSPs):** Outsourcing NEM operations to TPSPs lowers costs, ensures compliance, and offers expert market management with 24/7 capabilities.
- **Risk Mitigation:** PPAs and TPSPs help manage market volatility and operational complexities, ensuring stable energy pricing and compliance with regulatory requirements.

This section outlines potential pathways for sugar mills to expand their participation in the NEM through commercial arrangements and operational models that can help mitigate the risks of operating in the NEM. Key focus areas include Power Purchase Agreements (PPAs), integration with Virtual Power Plants (VPPs), and the use of Third-Party Service Providers (TPSPs).

5.1. Power Purchase Agreements (PPA's)

The corporate Power Purchase Agreement (PPA) market has seen substantial growth, with 2024 surpassing previous years in contracted volumes. Major corporations are increasingly entering long-term renewable energy PPAs to align with their decarbonization strategies and strengthen their social license. This trend is further driven by broader corporate ESG commitments and regulatory mechanisms, such as the Safeguard Mechanism, which emphasise the importance of renewable energy adoption.

Renewable PPAs are viewed as a long-term hedge, offering partially fixed prices over a typical 10-year horizon. Compared to traditional short-term hedging through forward contracts limited to 2–3 years in the NEM and characterised by volatility and illiquidity, PPAs provide a more stable and predictable energy cost structure. Due to these challenges, energy retailers are often hesitant to offer long-term pricing, as they cannot mitigate the associated pricing risks in the wholesale market.

5.1.1. Potential PPA Customers:

Several customer segments stand to benefit from long-term Power Purchase Agreements (PPAs), with each group seeking stability, sustainability, and long-term energy cost predictability. Key potential PPA customers include:

- **Energy Retailers**: Retailers can leverage PPAs to create more predictable pricing offers for their customers, facilitating long-term contracts that reduce exposure to market volatility. By pairing PPAs with Guarantees of Origin (GO), retailers can also market certified green energy products, potentially commanding a premium and attracting environmentally conscious customers.
- **Industrial and Commercial Businesses**: For businesses seeking long-term price certainty and a reliable renewable energy supply, PPAs offer a valuable tool to decarbonize operations while

fulfilling Environmental, Social, and Governance (ESG) obligations. Such agreements enable these companies to meet their sustainability goals, reduce exposure to fluctuating energy prices, and align with regulatory requirements, particularly as pressure increases to adopt renewable energy solutions. Major corporations across sectors such as resources, retail, and telecommunications have adopted PPAs as part of their decarbonisation strategies.

- **Regional Industries and Grower Communities**: These groups, which often face energy cost unpredictability, can secure long-term energy price certainty through PPAs. This offers significant value, providing stability for energy costs and supporting social license objectives while advancing sustainable operations. PPAs can also be crucial for securing funding or government backing for projects that benefit local economies and communities.
- **Government Entities**: Government bodies at all levels are increasingly entering into PPAs to fulfill their own decarbonization mandates and energy security goals. These PPAs can provide long-term price certainty, enable alignment with national renewable energy targets, and foster the social license to operate within communities. Governments can use PPAs to stimulate investment in renewable projects while mitigating the financial risks associated with energy price fluctuations.

5.1.2. PPA structure considerations:

PPA structures can vary significantly in the energy sector and are in large part dependent on what the proponent requires to get the project commercialised. Broadly PPA's can be structured in three ways depending on the specific customer circumstances:

- **Direct grid supply:** If the PPA involves direct grid supply through the NEM, the customer must either be a Market Customer or purchase from a registered retailer.
- **Behind-the-meter or private network supply:** No market registration is needed, though exemptions may be needed.
- **Corporate PPAs:** Can be structured to avoid the need for direct market registration, with a retailer managing the transaction.

The broad terms and structure of the PPA will determine its overall success in the long run - key considerations include:

- **Feasibility and Tenure:** Establishing what the project needs to succeed - project hurdle rates, revenue targets, and the preferred contract duration**,** sharing of upside and downside revenue fluctuations,
- **Output Allocation:** Balancing merchant risk with contracted commitments, such as capping PPA sales at 80% of capacity to manage production variability and maintain some flexibility to offer capacity into the market to capture high price events**.**
- **Government Support:** Consider whether government support is required and what form best compliments the market strategy and output allocation to underwrite a PPA. Explore which mechanisms enhance project viability and reduce financial risk.
- **Operational Control:** Can the PPA embed bidding rights for the offtake party during specified hours and seasons to increase the value of the PPA. Consider the complexity of the PPA and operational bidding by a retailer is feasible or adds complexity.
- **Green Certification:** Utilizing Guarantees of Origin (GO) certificates to secure a price premium for certified renewable energy.

5.2. Behind the Meter options (Virtual Power Plants)

Virtual Power Plants (VPPs) aggregate decentralized energy resources such as solar panels, batteries, wind turbines, and cogeneration units to operate as a single entity in the energy market. VPPs optimize electricity generation, storage, and dispatch, providing reliable, flexible, and cost-effective power to the grid. By pooling resources, VPPs enable distributed energy systems to compete effectively in energy markets and offer a range of services such as frequency regulation and demand response.

Cogeneration systems can integrate seamlessly into VPPs when they meet technical compatibility standards, such as rapid response capabilities. When paired with complementary technologies like battery storage and solar PV systems, cogeneration units enhance the flexibility and reliability of VPPs. Batteries enable energy storage for dispatch during peak-price periods, while solar installations on nearby rooftops can add renewable energy to the mix, maximizing efficiency and market responsiveness.

For sugar mills, integrating cogeneration into a VPP offers several advantages. Batteries mitigate operational risks by ensuring a continuous energy supply during plant disruptions, such as processing delays. They also allow mills to store excess energy and capitalize on high-price market events. Additionally, cogeneration-battery hybrids can access ancillary services, such as frequency regulation and demand response, creating diversified revenue streams.

Strategically, sugar mills can strengthen their energy operations by pairing cogeneration with battery storage and solar PV systems. This approach reduces reliance on grid power, may enhance financial returns, and support sustainability goals.

5.3. Third Party Service Providers (TPSP)

ASMC members have the option of outsourcing NEM operations such plant bidding and settlement services to TPSP's. Utilisation of TPSP services has increased in recent years as smaller generators (wind, solar, BESS plants) and retailers with some generation capacity seek to minimise NEM participation costs and the additional regulatory risks associated with NEM operations.

TPSP's offer a range of services from a minimal compliance service level to a high plant control service level. The level of service required for ASMC members will vary depending on the preferred operating model including plant operations and capability, business requirements for NEM related activities (trading, settlements, IT infrastructure costs).

Under a TPSP operating model, ASMC members are responsible for technical plant compliance, NSP agreements and AEMO registration requirements. This includes relevant generator performance standards modelling, commissioning and testing, and connection agreements. The TPSP will alongside the customer to ensure all other non-technical registration requirements and processes are completed – NSP, enquiries, system interfaces, 24x7x365 coverage, primary 24/7 contact information, trading expertise.

5.3.1. ASMC Takeaways

Outsourcing NEM operations to TPSP's has a number of benefits for ASMC members:

- TPSPs manage the complex requirements of NEM participation, including bidding, settlements, and compliance,
- Offers a way to reduce operational costs and mitigate regulatory risks associated with direct NEM involvement,
- TPSPs offer a range of service options to customer needs,
- Access to expertise in managing market operations, including trading, IT infrastructure, and dispatch strategy.
- 24/7 operational capabilities, redundancy, and compliance management to ensure seamless integration with NEM requirements.
- Enhanced ability to adapt to a rapidly evolving energy market, including automated systems for re-bidding and dispatch.

5.3.2. Next Steps/ Actions

- Engage with potential TPSPs[4] to understand their offerings, costs, and expertise.
- Co-develop a tailored operating strategy that aligns with the specific requirements of ASMC members' future cogeneration assets.

[4] CQ Partners: https://www.cqpartners.com.au
Overwatch Energy: https://overwatchenergy.com.au/about/

6. Business Case and Investment Support Mechanisms

The regulatory landscape surrounding Australia's energy transition is evolving rapidly, with several mechanisms designed to foster investment in renewable energy and address grid reliability concerns. This section delves into key policy frameworks, including the Capacity Investment Scheme (CIS), which targets the development of renewable energy and storage projects, and the Guarantee of Origin (GO) scheme, which will support the certification of low-emission products and renewable electricity generation. These frameworks, along with the Australian Carbon Credit Units (ACCUs) and the Safeguard Mechanism, offer a range of opportunities and obligations for ASMC members involved in cogeneration and renewable energy projects. This section also highlights potential investment support options, including capital grants and tailored mechanisms under the CIS, which can help mitigate reduce investment risk for ASMC members. Through strategic engagement with these initiatives, ASMC members can align with national sustainability targets, access valuable funding, and enhance their market competitiveness.

6.1. Regulatory Incentive Mechanisms

Australia's energy transition requires robust policy and market mechanisms to address the challenges of decarbonization, grid stability, and investment in renewable energy and storage technologies.

The Capacity Investment Scheme (CIS) is a central initiative designed to incentivise investment in renewable energy and storage projects to meet jurisdictional reliability needs between 2026 and 2030. By targeting 32 GW of new capacity by 2030, the CIS aims to support Australia's target of 82% renewable energy generation. The scheme's focus on grid reliability and revenue certainty makes it a potential mechanism for cogeneration projects, though operational complexities and contractual requirements may pose challenges for ASMC members.

As Australia phases out the Renewable Energy Target (RET) by 2031, the emerging Guarantee of Origin (GO) scheme will play a critical role in certifying renewable electricity and low-emission products. This framework offers ASMC members opportunities to leverage renewable electricity generation for brand value, ESG commitments, and market differentiation.

In addition, Australian Carbon Credit Units (ACCUs) and the Safeguard Mechanism present opportunities and obligations for emissions reduction and offsetting. While most sugar mills fall below the Safeguard Mechanism threshold, expanded cogeneration may increase emissions to a level that triggers compliance, requiring strategic management of liabilities.

The evolving policy and regulatory environment in which ASMC operates, highlights opportunities for alignment with national targets and investment in sustainable energy solutions. The subsequent sections detail each mechanism, their relevance to ASMC, and actionable next steps for participation.

6.1.1. Capacity Investment Scheme (CIS)

6.1.1.1. Scheme Overview

The Capacity Investment Scheme (CIS), introduced in December 2022, is a policy framework designed to incentivise private investment in renewable energy and storage projects. The CIS will operate from 2023 to 2027, aiming to address jurisdictional reliability needs between 2026 and 2030.

Key objectives include:

- Establishing a national framework to support new investments in renewable capacity (e.g., wind, solar) and clean dispatchable capacity (e.g. battery storage, pumped hydro).
- Deliver 32 GW of capacity by 2030 to achieve the Australian Government's target of 82% renewable electricity generation by 2030, comprising: 23 GW of renewable capacity (investment estimated at $52 billion) and 9 GW of clean dispatchable capacity (investment estimated at $9 billion).

The CIS will allocate 18 GW of capacity via Renewable Energy Transformation Agreements (RETAs) to State and Territory Governments with the remaining capacity to be allocated through merit-based tenders across the National Electricity Market (NEM).

Queensland has not yet signed onto the CIS program due to unresolved negotiations under the previous state government and its focus on the Queensland Energy and Jobs Plan (QEJP). Queensland jurisdictional projects are therefore ineligible for jurisdictional funding under the scheme.

Future Queensland governments could explore options to renegotiate access to the CIS, depending on state policy priorities

The CIS targets renewable energy and storage investments and excludes the following under the CIS framework:

- Fossil Fuel Projects: Traditional coal and gas plants.
- Non-Dispatchable Renewables Without Storage: Projects lacking storage solutions or other capacity support.
- Unproven or High-Risk Technologies: Technologies without a track record of reliability or regulatory compliance.
- Non-Energy Investments: Broader infrastructure projects, such as transmission and distribution networks, which may be funded through alternative mechanisms.

6.1.1.2. Contractual Framework

The CIS will utilise long-term contracts (10–15 years) to provide revenue certainty through a cap-and-floor mechanism, requiring participants to propose revenue-sharing structures tailored to project needs during the tender process. AEMO Services will conduct tenders and recommend projects, whilst the Commonwealth will make the final contract decisions.

Eligible projects must:

- Meet bespoke reliability targets set for the relevant jurisdiction based on modelling from the AEMO ISP and ESOO (initial targets will expressed in terms of medium storage 4-hour capacity in MW but may allow for 2-hour storage depending on project). Participants must provide rebates if availability thresholds are not met,
- Provide at least 30 MW of capacity,
- Be grid-charging capable,
- Exclude thermal generation, and
- Demonstrate secured land access, planning approvals, and registration with AEMO.

6.1.1.3. Initial Tender Results

Tender results (excluding costs) are provided in Table 4 and 5 below. All projects announced to date have a battery storage component.

Tender selection generally focuses on:

- Technical and commercial viability.
- Proponent capability.
- Social license and community benefits.
- Contribution to grid reliability.
- Project costs, including potential payments to maintain competitiveness.

Table 4 Tender 1 Results

Project Name	Capacity	Proponent
Woreen Energy Storage System	350MW / 1400MWh 4 hour project	Energy Australia
Springvale Energy Hub	115MW / 230MWh 2 hour project	Progress Power
Hallet BESS	50MW / 200MWh 4 hour	Energy Australia
Solar River	170MW / 653MWh 3.8 hour 230MW solar farm	Zen Energy
Limestone Coast West	250MW / 1000MWh 4 hour	Pacific Green
Clements Gap Bess	60MW / 143MWh 2 hour	Pacific Blue

Table 5 Tender 2 Results

Project Name	Capacity	Proponent
Orana REZ	415MW / 1640MWh 4 hour	Akaysha Energy
Liddell Battery	500MW / 1000MWh 2 hour	AGL
Smithfield Battery	65MW / 130MWh 2 hour	Iberdrola
3 x Virtual Power Plants	95MW 2 hour	Enel X

6.1.1.4. Current Open Tenders

There are currently two open tenders - CIS Tender #3, expected to deliver 4 GW of dispatchable capacity for the NEM and CIS Tender #4 expected to deliver 6 GW of renewable generation for the NEM.

6.1.1.5. Scheme Applicability to ASMC

The CIS mechanism offers benefits to investors, government and the power system more broadly. Elements of the CIS framework may provide insights into how cogeneration projects could be supported within broader investment mechanisms

- The CIS offers revenue certainty by balancing investor protection with government support whilst potentially offsetting downside risk for the government with the revenue sharing mechanism,
- The scheme focuses on grid reliability aligns with cogeneration being dispatchable and having the ability to provide essential system services to the power system, and firming services to the market.
- Flexibility in pricing structure tailored to individual projects.

However, ASMC will need to consider whether the CIS framework:

- Is contractually onerous for the scale of investment required,
- Would create operational difficulties given the physical plant profiles of cogeneration plants compared to relatively simple, solar and battery operations,
- The pricing structure that could be applied to sugar mills and cogeneration.

6.1.1.6. Actions / Next Steps

- Determine the level of government support required to meet investment criteria to set framing for a bespoke structure to support long term sugar mill operations,
- Evaluate operational constraints and these can be aligned reliability requirement within a bespoke CIS,
- Explore whether a cap-and-floor mechanism, contracts for difference or other contract type is best suited to cogeneration investments,
- Determine whether other funding options (e.g., one-off grants), are preferable to long term CIS contract arrangements,
- Assess whether cogeneration investment is feasible during CIS timeframe (ends 2027),

6.1.2. Renewable Energy Target (LRET)

The Renewable Energy Target (RET) was established to deliver an additional 33,000 gigawatt-hours (GWh) of electricity from renewable sources annually between 2020 and 2030. The target was successfully achieved by 2020, with significant renewable energy capacity added to the system under the Large-scale Renewable Energy Target (LRET) since then.

From January 1, 2031, Large-scale Generation Certificates (LGCs) will no longer be issued under the RET, marking a transition in the approach to renewable energy certification. As the LRET phases out, there will be an increased reliance on voluntary schemes, corporate commitments, and new certification frameworks, such as the Guarantee of Origin (GO) scheme.

Market demand for renewable electricity certification remains strong, driven by voluntary Environmental, Social, and Governance (ESG) commitments. New mechanisms like the GO scheme will play a critical role in ensuring the continuity of renewable electricity tracking and verification post-LRET, providing the transparency and accountability needed to support ongoing investment in sustainable energy practices.

6.1.3. Guarantee of Origin

6.1.3.1. Scheme Overview

The *Future Made in Australia (Guarantee of Origin) Bill 2024* establishes the voluntary Guarantee of Origin (GO) scheme to certify and track the emissions intensity and renewable attributes of low-emissions products and renewable electricity generation. The GO scheme is intended to support Australia's climate commitments under the *Climate Change Act 2022* to reduce emissions by 43% below 2005 levels by 2030 and achieve net-zero emissions by 2050. In this way the GO scheme will replace Large-scale Generation Certificates (LGCs) under the RET, which ends in 2031.

Initially focused on hydrogen, the scheme can expand to include green metals, low-carbon fuels, and other products.

Key features of the GO scheme include:

- A certification framework and a public register to ensure transparency and accountability,
- Tradeable digital certificates that are expected to facilitate the evolution of secondary markets,
- Alignment with international emissions accounting frameworks and domestic schemes such as the Renewable Energy Target (RET) and the National Greenhouse and Energy Reporting (NGER) scheme.

Table 6 below highlights the transition from the LRET to GO scheme.

Table 6 Key differences between LRET and GO

Aspect	LRET (LGCs)	GO Framework
Purpose	Mandates the generation of renewable electricity to meet Australia's energy targets.	Certifies and tracks the origin, emissions, and carbon intensity of renewable products.
Scope	Limited to renewable electricity generation (e.g., wind, solar, hydro).	Broader scope, including renewable electricity, hydrogen, low-emission fuels, and metals.
Certificate Unit	1 megawatt-hour (MWh) of renewable electricity.	Tracks energy or products with emissions data across their lifecycle.
Mandatory/Voluntary	Mandatory for electricity retailers under the Renewable Energy Target (RET).	Voluntary for producers, aimed at market transparency and trade facilitation.
Market Application	Used in compliance markets to meet RET obligations.	Primarily used in voluntary markets, with potential for international trade.
Emission Data	Does not provide detailed lifecycle emissions data.	Includes lifecycle emissions and carbon intensity of the product.
Trading	Traded among energy generators and electricity retailers for compliance.	Can be traded domestically or internationally to verify sustainability claims.
Regulator	Administered by the Clean Energy Regulator.	Developed by the Clean Energy Regulator with the Department of Climate Change.
Alignment with Standards	Aligned with Australia's RET framework.	Internationally aligned for compatibility with global sustainability markets.

6.1.3.2. Scheme Applicability to ASMC

The GO framework offers several benefits to ASMC members:

- Potential to unlock greater value from electricity generation and sugar production,
- Support corporate ESG targets, either domestically or across global business structure,
- Set to become operational in 2025 allowing ASMC members to implement branding or marketing initiatives,
- Designed to operate alongside LRET scheme and can be utilised in PPA negotiations or government funding proposals.

6.1.3.3. Actions / Next Steps

- Register for the Guarantee of Origin (GO) Scheme
- Actively participate in the trading of GO certificates.

6.1.4. ACCU

6.1.4.1. Scheme Overview

Australian Carbon Credit Units (ACCUs) are tradable units issued under Australia's Emissions Reduction Fund (ERF). Each ACCU represents one tonne of carbon dioxide equivalent (tCO_2-e) either avoided or removed from the atmosphere through approved emissions reduction or carbon sequestration projects. These projects can involve various activities, such as reforestation, soil carbon improvements, energy efficiency upgrades, or reducing emissions from industrial processes.

ACCU prices averaged $33.50/tCO2e[5] in 2024 with market analysts suggesting a significant increase in ACCU prices in 2025. Projections suggest a rise from A$45 per tonne in September 2024 to A$70 per tonne by September 2025[6], driven by strong demand signals from compliance with the Safeguard Mechanism to offset emissions.

Though the scheme has had some challenges authenticating the credibility of some projects, the Federal Government is enhancing the ACCU framework to ensure its alignment with international standards and support Australia's net-zero emissions target by 2050. This includes:

[5] Energy Action – Oct 2024

[6] S&P Global – Sept 2024

- Strengthening the integrity and transparency of ACCUs to maintain market confidence.
- Expanding methodologies to include more activities that reduce or sequester emissions.
- Encouraging greater participation from landholders, businesses, and communities.

6.1.4.2. Scheme Applicability to ASMC

ASMC members may be able to make use of the ACCU program through plant efficiency upgrades or process improvements which reduce emissions. This could be as simple as replacing all energy intensive lighting with energy efficient lighting or more costly capital programs that may occur under the cogeneration expansion program.

6.1.4.3. Actions / Next Steps

- Evaluate the Potential of Australian Carbon Credit Units (ACCUs):
  - Consider ACCUs as a strategy to offset emissions, especially given their potential for higher market value in the future.
  - Identify and participate in programs or initiatives that may qualify for ACCUs.
- Quantify Emissions Reductions:
  - Estimate the emissions reduction achievable through improved plant operations or expanded cogeneration capacity.
- Engage with the Emissions Reduction Fund (ERF):
  - Develop and submit a proposal to the ERF or Clean Energy Regulator (CER) to secure recognition and potential financial incentives for emissions reductions.

6.1.5. Safeguard Mechanism

6.1.5.1. Scheme Overview

The Safeguard Mechanism is aimed at managing and reducing the emissions of the country's largest industrial facilities. It operates under the Climate Change Act 2022, which supports Australia's targets to reduce greenhouse gas emissions and achieve net-zero emissions by 2050.

The Safeguard Mechanism applies to Australia's largest emitters—typically those facilities emitting more than 100,000 tonnes of CO2-e per year. It covers industries such as mining, energy, manufacturing, and other high-emission sectors. Facilities that exceed their baseline emissions must offset the excess emissions by purchasing carbon credits from eligible schemes like the Australian Carbon Credit Units (ACCUs).

6.1.5.2. Scheme Applicability to ASMC

The Safeguard Mechanism applies to large industrial facilities that emit more than 100,000 tonnes of CO2 equivalent (CO2-e) per year. Most sugar mills do not meet this threshold for emissions. However, under an expanded cogeneration scenario it may be possible that some larger sugar mills produce significant emissions due to energy-intensive processes (such as burning bagasse for power generation) breach the threshold emissions level.

6.1.5.3. Actions / Next Steps

- Consider increased emission levels under an expanded cogeneration scenario and how liability may be best managed.

6.2. Investment Mechanisms

This section focuses on the various options available to ASMC members to facilitate investment in expanded cogeneration capability. These options are tailored to provide financial backing, risk mitigation, and strategic flexibility for projects at different stages of development. Projects requiring further funding assistance to meet required hurdle rates capital grants, either non-repayable or repayable can be a valuable resource to cover upfront costs and enable a final investment decision. Capital grants from government which would take into the broader regional, community and market benefits of expanding cogeneration capability may be available to sugar mills.

This section also discusses the importance of derogations, which provide flexibility for sugar mills participating in the NEM, ensuring that smaller or non-commercial generators are not burdened by overly complex regulatory requirements. Together, these support options offer a range of pathways for ASMC members to secure the necessary resources and align with Australia's broader energy and sustainability goals.

6.2.1. No Additional Funding Required

If the project demonstrates financial feasibility through structured PPAs and the potential from merchant generation or market services (e.g., selling into the NEM or ancillary services markets), no additional support mechanisms may be required.

6.2.2. Capital Grant

A capital grant offers a direct financial injection into a project, particularly during its early stages, to mitigate initial cost barriers and facilitate a final investment decision (FID). This funding mechanism can provide the necessary resources to bridge funding gaps, ensuring that projects can proceed without undue delay or financial constraint.

6.2.2.1. Non-Repayable Cash Grant

- **Description:** A one-time financial grant designed to support initial capital expenditures and bridge funding gaps.
- **Potential Requirements:**
  - The project must be nearing FID, with comprehensive documentation including detailed project plans, environmental approvals, modelling, registration with AEMO, and evidence of company commitment.
  - The grant application must demonstrate how the funding will ensure the project's viability and align with broader governmental or industry goals, such as decarbonization or renewable energy targets.
- **Advantages:**
  - Reduces the financing burden on the project and accelerates timelines without creating repayment obligations, making it an attractive option for developers needing upfront financial support.

6.2.2.2. Repayable Capital Grant

- **Description:** A repayable grant that functions similarly to a low-interest or zero-interest loan, where the funds are to be repaid over a defined operational period.
- **Requirements:**
  - Similar to the non-repayable grant, the project must demonstrate its nearing FID status. In addition, there will be agreements specifying the repayment terms and operational milestones (e.g., repayment after 5-10 years of operation).
- **Advantages:**
  - Provides upfront financial support while ensuring that returns are realized by the granting authority.
  - Reduces the financial risk for sugar mills and establishes a clear repayment structure, helping secure the project's financial future while maintaining developer liquidity.

A capital grant can provide a direct injection of funds to support the project, especially during the early stages, mitigating upfront cost barriers and enabling a final investment decision (FID).

6.2.3. Capacity Investment Scheme – bespoke mechanism for Sugar Mills

A tailored mechanism like the CIS could be developed specifically for sugar millers to support expanded cogeneration projects. The potential structure could include:

- A "cap and floor" mechanism offers' a balanced approach to risk-sharing, where the cap ensures that sugar mills can benefit from favourable market conditions, but the floor protects them from significant revenue shortfalls in times of market instability.
- This bespoke mechanism could also include a performance bonus for exceeding certain operational or environmental targets, incentivizing higher performance standards that align with broader industry goals.
- The mechanism could integrate climate resilience components, ensuring that the infrastructure and operations of the cogeneration project are designed with the long-term sustainability of the local environment and community in mind.

The benefits of a bespoke CIS include:

- Minimizes financial risk, providing assurance to sugar mills by capping losses while enabling upside opportunities.
- Encourages private-sector investment in cogeneration by reducing uncertainty tied to market volatility.
- Supports broader policy objectives, such as decarbonization and regional energy security.

This approach would require negotiation with state or federal governments to develop a framework aligned with existing policies (e.g., renewable energy targets or industrial decarbonization efforts) but specifically tailored to one industry sector. This may require substantial development input and legal input to ensure that contracts are not overly onerous on sugar mill operations. A bespoke CIS mechanism may involve additional obligations on participants, for example integration with storage or alignment with broader CIS projects such as:

- Provisions for integrating additional technologies (e.g., energy storage) to enhance operational flexibility and market participation,
- Or require alignment with the already established CIS projects to avoid competitive disadvantages to other developers.

6.2.4. Derogations

Sugar mills typically generate power as part of their broader industrial operations (e.g., processing sugar cane into sugar and bioenergy), and their primary purpose is not to generate and sell electricity into the NEM. The derogations help ensure that these mills are not burdened with the extensive regulatory and operational requirements that are designed for large-scale commercial electricity generators.

Sugar mills could seek specific derogations to accommodate their unique operational and financial constraints. Table 7 below outlines possible derogations:

Table 7 Potential Derogations

Derogation	Description
Generator Performance Standards (GPS)	Relaxed reactive power, frequency response, and voltage control requirements.
Flexible Registration Requirements	Allow semi-scheduled or non-scheduled classification to reduce compliance burdens.
Ancillary Services Participation	Enable participation in FCAS and system services with modified conditions.
Metering & Settlement Obligations	Simplified metering and extended settlement periods to accommodate seasonal operations.
Network Connection & Charges	Reduced network connection charges and flexible export rules.
Capacity & Reliability Contributions	Adjusted reliability requirements to reflect seasonal generation patterns.

7. Appendices

7.1. Australian Emissions Targets

Jurisdiction	2030 Target	2050 Target
Australia (Federal)	43% below 2005 levels	Net zero emissions
New South Wales	50% below 2005 levels	Net zero emissions
Victoria	50% below 2005 levels	Net zero emissions
Queensland	30% below 2005 levels	Net zero emissions
South Australia	At least 50% below 2005 levels	Net zero emissions
Western Australia	80% below 2020 levels	Net zero emissions
Tasmania	Already net zero (achieved in 2015)	Maintain net zero
Australian Capital Territory	65–75% below 1990 levels	Net zero by 2045
Northern Territory	50% renewable energy by 2030	Net zero emissions