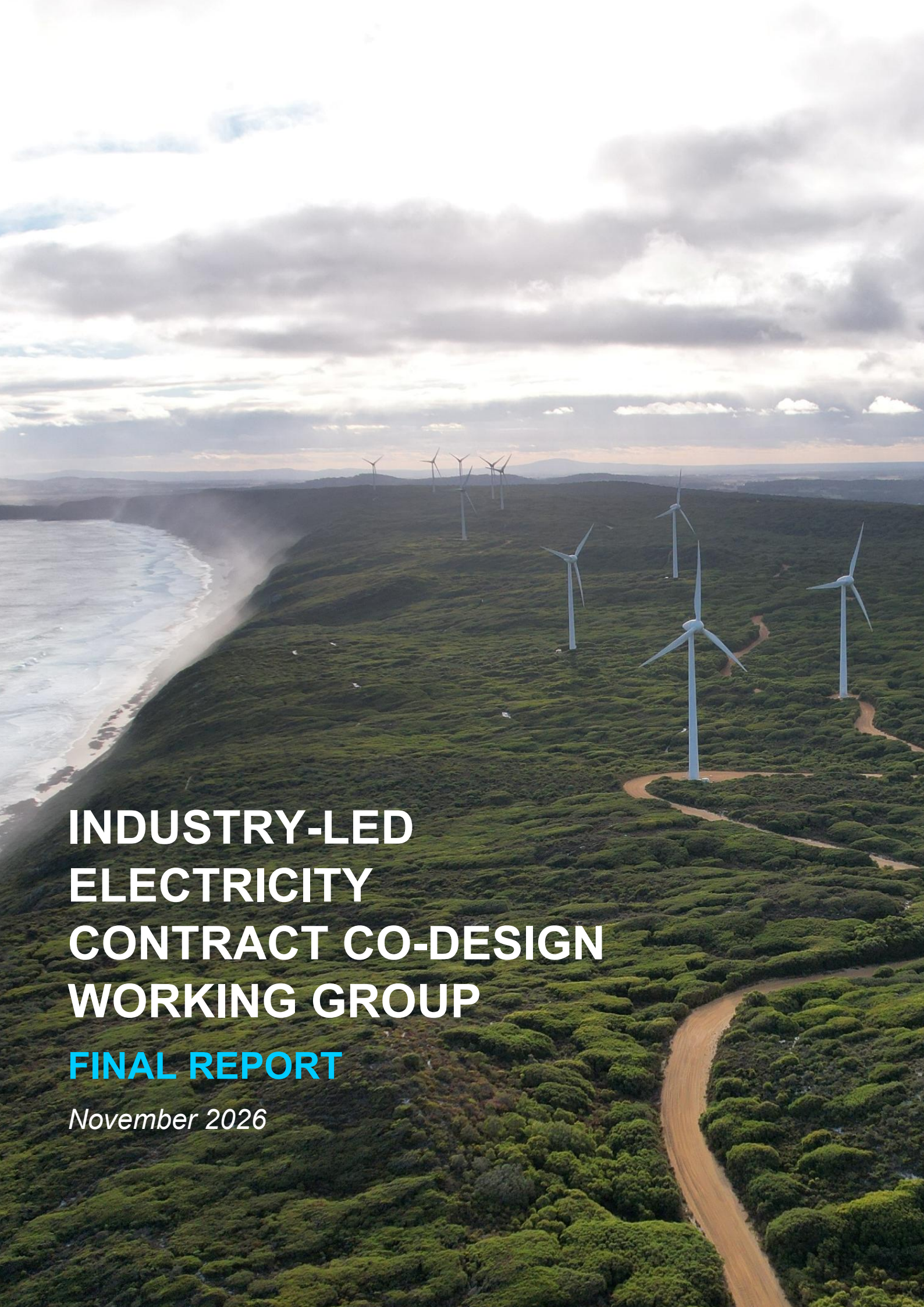

INDUSTRY-LED ELECTRICITY CONTRACT CO-DESIGN WORKING GROUP

FINAL REPORT

November 2026

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Executive Summary

The Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) and AusEnergy Services Limited (ASL), with the Australian Energy Regulator (AER) participating in an observing capacity, convened an industry-led Working Group to co-design an initial set of standardised electricity contracts for use in the first Electricity Services Entry Mechanism (ESEM) tender. The establishment of the ESEM was a key recommendation of the National Electricity Market Wholesale Market Settings Review (NEM Review), which was commissioned by the Energy and Climate Ministerial Council (ECMC) and delivered its final report in December 2025. The ESEM contracts are also intended to be capable of being subject to the Market Making Obligation (MMO) in future, which would require some market participants to make markets using these contracts or other contracts to support contract market liquidity.

The Working Group comprised eleven representatives from across the electricity sector, including generation, storage, retail, energy users and financiers. It was tasked with developing standardised contracts for bulk energy, shaping and firming services that support investment in new electricity services, improve buyer and seller risk management, and can be recycled into the market as fungible products. Through workshops, intersessional working forums, technical analysis and industry consultation, the Working Group assessed contract options against seven criteria. As a result of the co-design process, the Working Group developed three terms sheets – one each for bulk energy, shaping and firming:

- **Bulk energy:** Bulk energy contracts are intended to manage the price and volume risks associated with variable zero-emissions generation. The preferred structure is an ex-post Regional Reference PPA (RRPPA) swap, which provides sellers with a fixed price for volumes linked to the output of a Regional Reference Fleet, while giving buyers exposure to the fleet's performance. Settling against a regional, technology-specific fleet rather than an individual project keeps the contract fungible and shares volume risk between buyers and sellers, while sellers retain an incentive to outperform the fleet. Separate contracts will be developed for onshore wind and solar to reflect different generation profiles, but the terms sheet for the two product types is the same and the main difference between the products will be in the mix of assets comprising the Regional Reference Fleet for each.
- **Shaping:** Shaping contracts are intended to manage the financial risks created by differences in wholesale electricity prices across the day, including by supporting the movement of energy from lower-price to higher-price periods. The preferred structure is a Daily Dynamic Block Spread (DDBS) swap, which identifies up to two charge and two discharge blocks each day in advance using forecast residual demand and settles against the realised price difference between those blocks. Nominating blocks ex-ante, rather than settling ex-post, gives sellers the settlement certainty needed for bankability while tracking actual intraday price spreads more closely than fixed time blocks.
- **Firming:** Firming contracts are intended to manage the risks of high spot prices during sustained periods of scarcity. The preferred structure is a $600/MWh cap contract, under which the buyer pays a premium and receives payments when the spot price exceeds the $600/MWh strike price. The higher strike, compared with the conventional $300/MWh cap, reflects the rising cost of new peaking capacity and the need for a strike price that remains suitable over long contract tenors.

The recommended products are not intended to replace existing derivative contracts currently traded in the NEM. They will offer an alternative or complement to current products used by buyers, and it is expected that in some cases market intermediaries may combine or repackage products to meet buyers' specific risk management needs. Used together, the three contracts can hedge a large share of a typical load profile, although some residual exposure will remain for buyers to manage through existing contracts or intermediaries.

Further work will be required to finalise the contract designs. Aligning on the final design of the Regional Reference Index and Regional Reference Fleet for the bulk energy contract is the main outstanding item, including the index methodology, fleet composition and updates, the treatment of hybrid projects, and index behaviour during negative price periods. Other areas include confirming the Daily Shaping Period and nomination arrangements for the shaping contract, and the interaction between the $600/MWh cap strike and other regulatory settings.

Several of these involve interactions with other NEM Review workstreams or warrant more detailed market modelling and are called out in the report. Force majeure protections, contract recycling and market-making arrangements are being progressed in parallel and will be critical to implementation, though they are not referenced directly within the terms of the contract so will need to be addressed through complementary policy measures. In relation to force majeure, the Working Group has recommended that such protections be addressed under a separate bilateral arrangement between the seller and an ESEM administrative entity.

Consultation also highlighted that new projects are currently facing challenges securing offtake in the market, even in their early years, and not simply the longer-term ‘tenor gap’ identified in the NEM Review. Although outside the Terms of Reference, stakeholders shared a range of perspectives on the implications for the in-market period and ESEM contract tenors, and these are set out in the report for consideration as part of auction design.

In Phase 2 of the co-design process, the Convening Group will engage legal support to develop long-form contract templates, which is expected to take approximately four months. The Working Group is expected to provide a recommendation on the draft long-form contracts ahead of the May 2027 ECMC meeting.

The industry co-design process drew on the deep expertise of Working Group members across market trading, portfolio planning, energy procurement, project development and financing, as well as their networks across industry groups, energy businesses, advisory firms and academic institutions. Support from the Convening Group provided continuity with the broader NEM Review reform process, connection to jurisdictional processes, access to the combined capabilities of DCCEEW and ASL to support analytically robust recommendations, and practical secretariat support. L.E.K. Consulting provided independent coordination between the Working Group and Convening Group, both between workshops and through facilitation of workshop sessions.

Overview of the industry-led electricity contract co-design process

DCCEEW and ASL convened an industry-led Working Group comprising representatives from across the electricity sector. The Convening Group, comprising representatives of DCCEEW and ASL, supported the Working Group's operations, with the AER participating as an observer. The Working Group was established to co-design an initial set of standardised electricity contracts for use in the ESEM and potentially the MMO.

Working Group members

The Working Group included representatives from generation and storage project developers (both 'gen-tailers' and Independent Power Producers), project financiers, and energy buyers (including both retailers and large customers). Members brought deep expertise across market trading, portfolio planning, energy procurement, project development and financing, as well as networks across industry groups, energy businesses, advisory firms and academic institutions. The members were:

- Tom Arnold, ACEN Australia
- Ally Bonakdar, NAB
- Paul Curnow, Akaysha Energy
- Stephanie Easton, Iberdrola Australia
- Paul Grzinic, Firmus
- Nick Hawke, Clean Energy Finance Corporation
- Declan Kelly, Flow Power
- Andrew Mulder, RWE
- Jialin Shen, Ampyr
- Daniel Teng, Origin Energy
- Andrew Wilkins, SA Water

In addition to the core Working Group members, two L.E.K. Consulting Partners – Lucy Carter and Jeff Forrest – were engaged as independent facilitators for the Working Group process, providing independent coordination between the Working Group and Convening Group, both between workshops and through facilitation of workshop sessions. Lucy and Jeff participated as non-voting members of the Working Group.

About the NEM Review

The Energy and Climate Ministerial Council (ECMC) commissioned the National Electricity Market Wholesale Market Settings Review (the NEM Review) to examine how wholesale market arrangements can support the transition to a renewable-based electricity system while maintaining resource adequacy and affordability.

The NEM Review's final report, delivered in December 2025, included two key recommendations requiring standardised electricity contracts: the ESEM and the MMO.[1]

The NEM Review included a pilot industry-led co-design process during the final stages of the NEM Review in 2025 to recommend contract designs for the NEM Review's final report. Co-convened by the NEM Review Panel, the AER and the Australian Financial Markets Association, the pilot brought together industry representatives across six workshops, supported by intersessional presentations and analysis, to consider potential contract structures for bulk energy, shaping and firming services.

The pilot identified potential contract options and developed an initial evaluation framework, culminating in a set of recommendations to the NEM Review Panel. Following the success of the pilot co-design process, the Review's final report also recommended that an industry-led co-design process should be convened to define the set of derivative contracts for use in these mechanisms.

The Working Group took the pilot's findings and analysis into account in its assessment of contract structures but was not bound by the pilot's recommendations and independently revisited the evaluation criteria, contract options and preferred designs to develop its own recommendations.

The industry-led co-design process

The co-design process commenced prior to approval of National Electricity Law and National Electricity Rules amendments by ECMC. Contract templates developed through this process for use in the ESEM will be subject to ratification through requirements outlined in legislative amendments, if those amendments are approved by ECMC.

This co-design process primarily considered contracts for use in the ESEM. However, it was also important that any contract structures developed were capable of being subject to an MMO in the future. This required that contracts be fungible and capable of being listed on platform(s) subject to the MMO.

The contract structures developed through this process are intended for use in the first ESEM tender, anticipated to occur in late 2027. Subsequent co-design processes may be required to refine or expand the suite of available contracts based on market experience, technological developments, or evolving policy requirements. The anticipated cadence of future co-design processes is every four years, though a more frequent cadence may be required in the early years of ESEM operation.

The process ran from early May to November 2026, comprising six full-day in-person workshops[2] supported by intersessional technical analysis and stakeholder consultation. The process progressed from the assessment of potential contract models through to the development of final recommendations:

1. **Foundations**: focused on aligning Working Group members' foundational understanding of the required contract types and potential models, considering the analysis required to inform decision-making, and agreeing on how participants would work together throughout the process.
2. **Contract features**: focused on exploring the potential contract models and assessing their relative advantages and disadvantages against the agreed evaluation criteria, starting with contract models considered in the pilot process and building on the set of options and refining features. This also involved identifying and undertaking additional analysis required to support decision-making.

[1] For further information on the ESEM and MMO, see the Department of Climate Change, Energy, the Environment and Water, National Electricity Market Wholesale Market Settings Review (December 2025)
[2] The process was originally planned as five workshops. Workshop 3 was split into two parts to allow for additional discussion time, giving six workshops in total.

3. **Contract selection**: focused on evaluating potential contract options against the results of analysis commissioned after Workshop 2 to select a preferred structure for each service.
4. **Contract design:** focused on refining the key design features of the preferred contract structures.
5. **Implementation planning**: focused on developing and aligning on the preferred implementation approach. This involved establishing a high-level implementation roadmap to guide the next steps.
6. **Recommendations and final report:** focused on aligning Working Group participants on refining the recommendations to be delivered in the final report.

The Convening Group observed the Working Group's operations and provided administrative and resourcing support, including continuity with the broader NEM Review reform process, connection to jurisdictional processes, and access to the combined capabilities of DCCEEW and ASL to support analytically robust recommendations. The Convening Group members were not voting members of the Working Group. DCCEEW appointed L.E.K. Consulting as the independent facilitator to support the design and delivery of workshops and the broader co-design process, with Lucy Carter and Jeff Forrest of L.E.K. Consulting undertaking this role.

The process was also designed to support strong engagement across the electricity sector. The Convening Group briefed jurisdictions on the Working Group's outcomes periodically throughout the process. The Working Group's recommendations also informed other NEM Review implementation work, such as the legislative and rules package and the broader ESEM and MMO policy design.

Working Group members engaged with industry groups and associations through formal and informal briefings, while process transparency was supported through the publication of workshop minutes, facilitation materials, and public webinars. Intersessional briefings and forums also drew on input and perspectives from external stakeholders, including from the Australian Energy Market Operator, the Australian Industry Group, Australian Aluminium Council, Australian Energy Council, Australian Financial Markets Association, Clean Energy Council, Clean Energy Investor Group, Coalition for Community Energy, Energy Consumers Australia, Energy Efficiency Council, Energy Networks Australia, Energy Users' Association of Australia, Smart Energy Council, and St Vincent de Paul Society.

A series of public webinar sessions were held following workshops to provide industry with updates on the process, outcomes from previous workshops and an opportunity for questions. Where time did not allow for all questions to be addressed in the webinar sessions, questions were considered after the session and written responses published online.

A structured industry consultation process was also included as part of the design process to gather structured feedback from sector participants on the initial designs and design choices and considerations, which gave industry the opportunity to provide feedback either directly or through industry bodies. This feedback was considered and integrated into design considerations and decision-making.

Objectives of the Working Group

Terms of reference

The Working Group was tasked with developing standardised electricity derivative contract structures covering the three core ESEM services as defined in the NEM Review Final Report (i.e., bulk energy, shaping and firming). The intended purpose of these contracts is to support new electricity services to enter the market via the ESEM, and to be suitable for possible use in the MMO. The instruments were to be developed in the form of a final contract template.[3]

In achieving this, the Working Group was responsible for:

- Preparing a high-level workplan, in consultation with the Convening Group, including the scope and timing of any technical, legal, or analytical support required;
- Developing its own procedures and ways of working where required;
- Preparing contract evaluation criteria, based on policy requirements, guiding principles and other attributes the Working Group identified as important, including any raised through consultation with external stakeholders;
- Identifying, shortlisting and recommending preferred forms of contracts for the three services (bulk energy, shaping and firming);
- Providing regular updates to external stakeholders (e.g. other industry participants, governments and non-government organisations), in a form agreed with the Convening Group;
- Developing the Final Contracts Recommendation report; and
- Reviewing the meeting notes, discussion papers and other records prepared by the Convening Group prior to publication.

The Working Group was not responsible for procuring technical, legal or analytical support (which was requested through the Convening Group), broader ESEM or MMO policy design beyond contract structures, legislative or regulatory drafting, detailed implementation planning (although it was to identify key implementation considerations), or producing and publishing meeting notes, discussion papers and other records.

The Working Group could also make non-binding recommendations beyond the Terms of Reference, which the Convening Group would consider on topics such as the approach to developing the index, or complementary policy support required to support market entry or bankability, such as force majeure mechanisms under bilateral contractual arrangements. The Convening Group could likewise request advice on relevant topics, such as how a contract structure might apply to a technology not expected to make up the bulk of a service.

The Final Report of the 2026 Working Group was required to contain:

- A summary of the co-design process and approach;
- Recommended commercial terms sheets for bulk energy, shaping and firming, where new contract structures are required;

[3] For example, a template confirmation for use with the latest 2002 ISDA Master Agreement and 2006 AFMA Electricity Markets Addendum.

- Rationale for the recommended contracts, including evaluation against requirements and the Working Group's evaluation criteria;
- Trade-offs or limitations in the recommended approach;
- Areas of Working Group consensus and disagreement (if any);
- Implementation considerations and dependencies; and
- Lessons learnt for future contract co-design processes.

Developing terms sheets for standardised electricity contracts

The Terms of Reference for the Working Group describe its role to develop standardised electricity contracts that are intended to address three key needs:

- helping buyers and sellers manage risk in an increasingly weather-dependent electricity system;
- underpinning the MMO by supporting market liquidity and price transparency; and
- supporting the ESEM by simplifying contract underwriting, increasing the number of potential buyers and enabling contracts to be recycled back into the market.

To meet these needs, the NEM Review identified three electricity services for which standardised contracts should be developed:

- **Bulk energy:** means a service that is capable of generating electricity (measured in megawatt hours) from an eligible renewable energy source under the Future Made in Australia (Guarantee of Origin) Act 2024 (Cth), section 69. Examples of services that could provide bulk energy include onshore wind and utility-scale solar.
- **Shaping:** means a service that is capable of consuming or generating electricity from one or more bidirectional units or voluntarily scheduled resources, or consuming and ceasing to consume electricity from one or more voluntarily scheduled resources. Volume is measured in megawatts of capacity and megawatt hours of storage or availability. For example, utility-scale battery energy storage systems could provide shaping services.
- **Firming:** means a service that is capable of providing production capacity that dispatches electricity continuously for at least 8 hours (measured in megawatts of capacity). For example, gas-fired generation could provide firming services.

The following sections examine the criteria for evaluating contract design options, contract options considered for each service, and their respective features and trade-offs.

Contract evaluation criteria

Overview of proposed evaluation criteria

The Working Group considered the evaluation framework developed during the NEM Review pilot co-design process as a starting point for developing evaluation criteria and considered whether any new evaluation criteria or changes were required. This process resulted in seven evaluation criteria for assessing potential contract designs:

1. **Efficient at allocating risks:** Allocates risks to buyers and sellers according to their ability to manage them, preserving incentives for optimal investment and operational decisions.
2. **Bankable:** Supports projects to be developed with reasonable financing terms for new projects, including projects being considered 'investable' for both debt and equity.
3. **Operationally achievable:** Can be readily implemented in practice and performs a materially useful role in the market, rather than simply representing the best available option.
4. **Complementary within a set of ESEM contracts:** Works alongside other standardised contracts to provide sufficient risk coverage without material gaps or overlaps, supporting portfolio risk management for retailers and large energy users.
5. **Adaptable to the future market:** Continues to perform as intended as market conditions evolve.
6. **Simple to value:** Enables buyers and sellers to confidently determine a contract price. Contracts involving more parameters, conditional features or difficult-to-estimate variables may be more challenging to value accurately.
7. **Attractive for both sellers and buyers:** Supports the entry of new electricity services while appealing to energy buyers seeking to manage their portfolios.

Overall, the Working Group made six refinements to the pilot framework:

- Previously, fungibility had been included as a criterion. It was removed because it is now an explicit requirement under the Working Group's Terms of Reference for all contracts under consideration.
- Cross-technology competition was excluded because it is also addressed in the Terms of Reference.
- Bankability, previously considered within efficient risk allocation, was established as a standalone criterion to reflect the importance of securing reasonable financing terms for new projects. Bankability covers a broad set of criteria for projects being considered 'investable', including both debt and equity perspectives.
- Operationally achievable was added as a criterion to reflect the importance of contracts being implementable in practice and performing a useful role in the market.
- Attractive for both sellers and buyers was added as an explicit criterion to reflect the requirements for the contracts to be suitable for both the ESEM and for use with the MMO, and to explicitly recognise the need for contracts to provide value to energy buyers.
- The pilot's "works as a portfolio" criterion became "complementary within a set" with added detail on meeting the needs of retailers and large energy users.

Prioritisation and application of evaluation criteria

The Working Group considered rankings for the seven evaluation criteria to help inform decisions where trade-offs arose between contract options. The rankings were not intended to be definitive but several key principles were clear from the exercise:

- Bankability (1) and being operationally achievable (2) were the highest-ranked criteria.
- Being efficient at allocating risks (3) and attractive to sellers and buyers (4) were the mid-ranked criteria.
- Being adaptable to a future market (5), simple to value (6) and complementary within in a set (7) were the lowest-ranked criteria

The role of bankability and operational achievability reflected the focus on designing contracts that would be suitable as an instrument to support market entry but all of the nominated criteria were given an average ranking of at least ‘very important’ – reaffirming that all of the criteria would need to be met and addressed in the contract designs.

Bulk energy contracts

The proposed contract design

The Working Group's preferred product design for bulk energy was the ex-post Regional Reference Power Purchase Agreement (RRPPA). The RRPPA contract provides:

- The buyer with exposure to the performance of a Regional Reference Fleet (RRF) of renewable generators for a particular technology type (onshore wind or utility-scale solar).
- The seller with long-term contract settlement revenue for a preferred technology type and region, with a fixed price for volumes calculated based on the performance of the RRF.

Please see more detail of the proposed contract structures in Attachment 1.

Figure 1: Table of the RRPPA bulk energy contract key settlement terms

Key Term	Description
Fixed Price ($/MWh)	$**XX**/MWh ***Notes**: The Fixed Price ($/MWh) is the agreed amount that the seller will receive for the Notional Quantity.*
Floating Price ($/MWh)	The spot price (in $/MWh) set by the Australian Energy Market Operator (AEMO) for a trading interval at the Regional Reference Node, subject to cap and floor terms.
Contract Capacity (MW)	**XX** MW of capacity of the specified Technology within the NEM Region.
Calculation Period (CP)	The Calculation Period shall be aligned to the AEMO NEM settlement calendar and occur weekly.
Notional Quantity$_{TI}$ (MWh)	The quantity of electricity (MWh) that applies for a Trading Interval. $Notional\ Quantity_{TI} = Contract\ Capacity \times \frac{TI\ Duration}{60} \times Regional\ Reference\ Index_{TI}$, where • TI Duration is the number of minutes in a Trading Interval (5 minutes).
Settlement Amount$_{CP}$ ($)	$Settlement\ Amount_{CP} = \sum_1^n Notional\ Quantity_{TI} \times (Floating\ Price_{TI} - Fixed\ Price)$, where • n is the number of Trading Intervals in the Calculation Period. For Trading Intervals where: • the Floating Price is greater than $600/MWh, the Floating Price shall be taken to be $600/MWh. • the Floating Price is less than $0/MWh, the Floating Price shall be taken to be $0/MWh. ***Notes**:* • *Where the Settlement Amount is negative (reflecting a low-price scenario), the Buyer must pay the absolute value of the Settlement Amount to the Seller.* • *Where the Settlement Amount is positive (reflecting a high-price scenario), the Seller must pay the value of the Settlement Amount to the Buyer.*
Treatment of green certificates	Green certificates shall be retained by the Seller. ***Note**: The Working Group notes that green certificates by their nature are tied to the physical plant and hence should be held by the Seller to maintain fungibility.*

Figure 2: Table of the RRPPA bulk energy contract index terms

Key Term	Description
Regional Reference Fleet (RRF)	The RRF contains all Operational projects of the specified Technology within the specified NEM Region with a Nameplate Capacity of 30MW or greater. ***Notes:*** • *The RRF will be published annually by the ESEM Administrator.* • *Nameplate Capacity is envisaged to be determined using the most recent version of AEMO's NEM Generation Information Spreadsheet published at the time of determining the RRF.* • *The Working Group identified further work will be required to define 'operational' projects, considering projects that are in commissioning, and outages.* • *The Working Group envisages that hybrid projects could be included in the RRF, where the dispatched output of the variable renewable energy (VRE) component can be identified separately in AEMO 5-minute dispatch data. This will likely require a separate dispatchable unit identifier (DUID) for VRE and storage components. The Working Group envisages that a hybrid project that is not included in the RRF could still bid for a RRPPA contract.*
Regional Reference Fleet Capacity (MW)	RRF Capacity is the total nameplate capacity (MW) of the RRF. $RRF\ Capacity = \sum_1^n Nameplate\ Capacity_n$, where: • n is the number of projects within the RRF. • Nameplate Capacity$_n$ is the nameplate capacity (MW) registered with AEMO for each project.
Scaling Factor$_n$	$Scaling\ Factor_n = \min(1, \frac{Contribution\ Cap \times RRF\ Capacity}{Nameplate\ Capacity_n})$, where: • n represents an individual project. • Contribution Cap is a percentage determined by the ESEM Administrator for the specified Region. ***Note**: Each project within the RRF is scaled so that its contribution to the Regional Reference Index (RRI) is capped. This seeks to limit index inter-year variability and skewing of the index by one particular project, particularly in regions with smaller RRFs at ESEM commencement. The Working Group had considered 10% as a reasonable starting position for the Contribution Cap but noted that this could vary for different states and technologies.*
Regional Reference Index$_{TI}$ (RRI)	The Regional Reference Index (RRI) represents the capacity factor of the RRF for a Trading Interval, accounting for scaling. $RRI_{TI} = \frac{\sum_1^n Scaling\ Factor_n \times Dispatched\ Output_{n,TI} \times LF_n}{\sum_1^n Scaling\ Factor_n \times Nameplate\ Capacity_n}$, where • n is the number of projects within the RRF. • Dispatched Output$_{n,TI}$ (MW) is the generation output (MW) of project n within the RRF in a Trading Interval as per AEMO 5-minute dispatch data. • LF$_n$ represents the applicable marginal and distribution loss factors for project n.

The agreement is a swap, where the volume is derived from the RRI, which reflects the performance of all projects within the RRF, a fleet of generators within the corresponding NEM region. This diversified RRI used for settlement reduces the volume risk for buyers relative to a structure where the buyer carries all volume risk for an individual project and retains incentives for the sellers to outperform the RRF.

The proposed contract has a price cap of $600/MWh, which provides the seller with protection from potentially large exposures to loss during high price events if the performance of a project deviates from the

fleet. An uncapped bulk energy product would have limited effectiveness as a hedge for high prices for buyers given index volumes during high price periods would be uncertain, and renewable generation output and high prices are often negatively correlated. This means the value of index volume above the cap to buyers is significantly less than the cost it imposes on sellers.

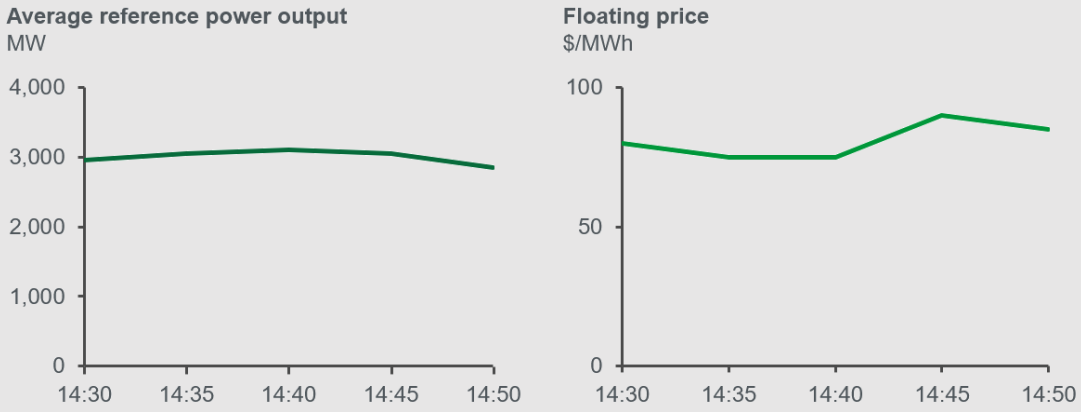
The $0/MWh price floor provides a hedge for buyers against negative price periods and preserves the incentive for sellers to respond to significantly negative price signals by curtailing generation.

Figure 3: Settlement example for the ex-post RRPPA swap (illustrative) (1 of 2)

Assumptions:

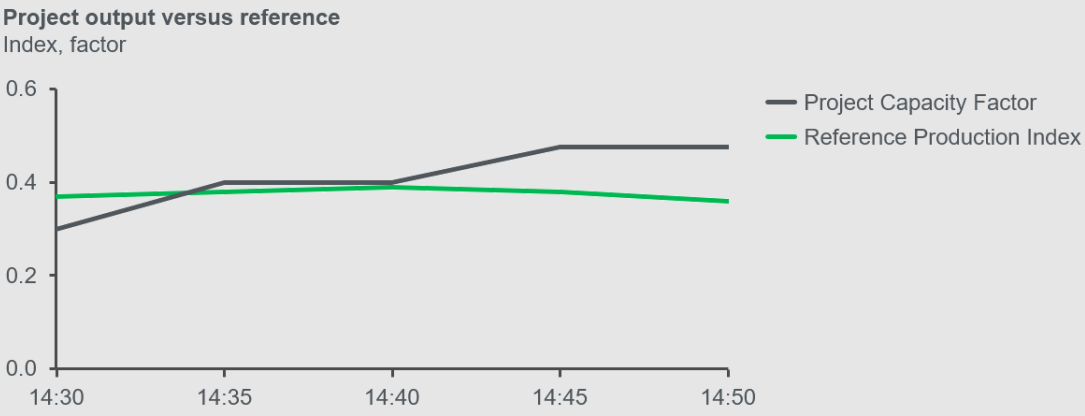
Contract capacity	*Plant capacity*	*Fixed price*	*RRF Capacity*	*Calculation period*
100MW	*100MW*	*$100/MWh*	*8000MW*	*5 trading intervals*

1. *RRF performance*



RRI (average) = 0.38
RRF DWAP = $81/MWh

2. *Project performance*



Project capacity factor (average) = 0.41
Project DWAP = $82/MWh

3. *Contract settlement over calculation period*

Notional quantity (total) = 100MW × 5 × 1/12 × 0.38 = 16 MWh

Settlement amount = 16 MWh × ($81 - $100) = (-$304)

4. *Seller net position over calculation period*

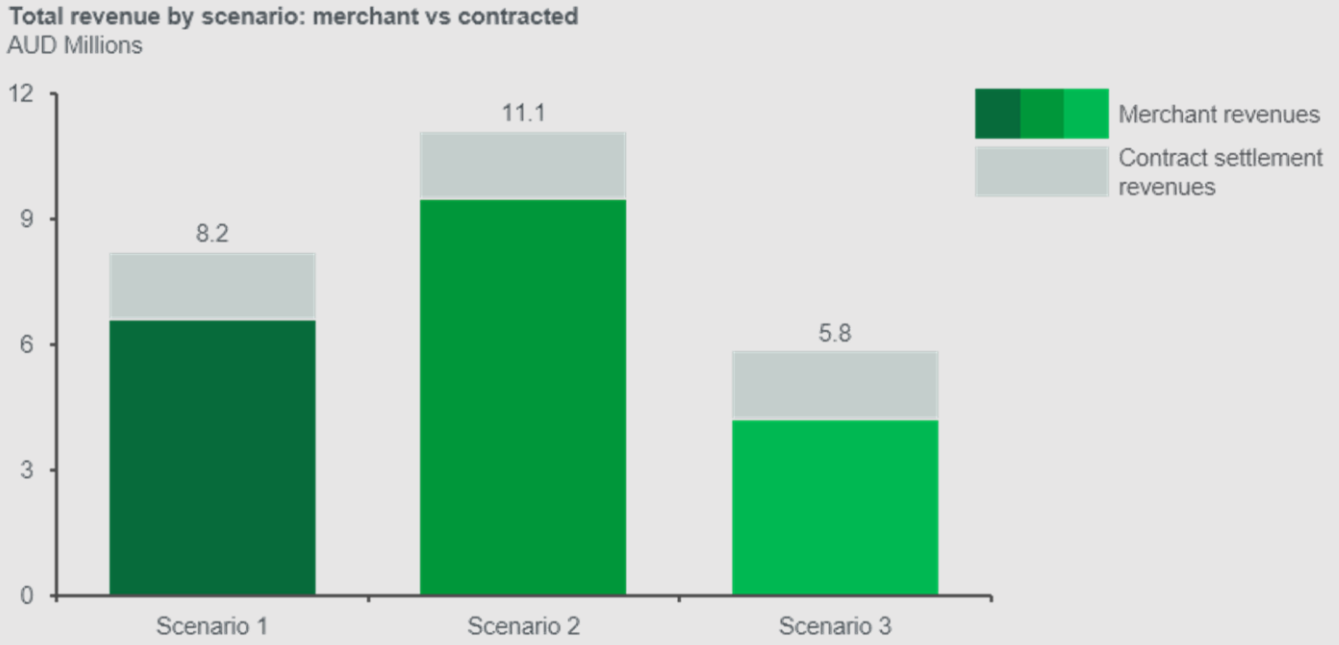
Merchant revenue = (100MW × 5 × 1/12 × 0.41) × $82 = $1,401

Seller net position = $1,401 - (-$304) = $1,705

Figure 4: Settlement example for the ex-post RRPPA swap (illustrative) (2 of 2)

Assumptions:

Contract capacity	*Plant capacity*	*Fixed price*	*Average DWAP*	*RRI*	*Calculation period*
100MW	*100MW*	*$100/MWh*	*$80/MWh*	*0.375*	*Quarter (2190 hours)*



Project matches RRF	**Project outperforms RRF**	**Project underperforms RRF**
Volume and shape match	20% higher volume and DWAP	20% lower volume and DWAP

Settlement = *Notional Quantity × (Floating Price − Fixed Price)*
= (100 × 2190 × 0.375) × (80 − 100)
= 82,125 MWh × −20 $/MWh
= $1.6m paid from buyer to seller in all three scenarios

Figure 3 illustrates settlement for a 100 MW project over a quarter in three scenarios. Because settlement depends on the RRI and the regional price rather than the project's own output, the buyer pays the seller the same $1.6m in all three scenarios, whether the project matches, outperforms or underperforms the RRF. The scenarios differ in the seller's net position: a project that matches the fleet is effectively hedged at the fixed price, an outperforming project keeps the benefit of its higher volume and prices, and an underperforming project bears the shortfall.

Rationale for the proposed contract design

The Working Group selected the ex-post RRPPA swap to balance project bankability with a fungible and effective hedge for buyers. Three key features informed the proposed structure.

Fungible structure

Fungibility was essential for ESEM contract recycling, secondary market development and potential future use under the MMO. The RRPPA settles against a regional index rather than the output of an individual project. Buyers therefore receive a standard, tradable product that is not exposed to asset-specific risks, while sellers remain exposed to a profile that reflects actual generation for a specific technology type in their region. The RRF for each technology type is considered at the regional level (being each of the five regions into which the NEM is divided under the National Electricity Rules for the operation of the wholesale market) rather than sub-regionally to support liquidity.

Variable volume settlement based on the RRI

Variable renewable generation is subject to variability at a daily and seasonal level. The Working Group identified that adopting fixed volumes as the basis for settlement of bulk energy contracts would introduce significant basis risk for both wind and solar projects. The basis risk is most significant when volumes are fixed for specific trading intervals (such as fixed time-of-day blocks) but is still significant in some scenarios for fixed volumes across a long contract period (such as for the proposed DWA swap).

The Working Group concluded that to reduce basis risk while maintaining sufficient liquidity, the contracts should be ex-post, technology specific, regional and be settled based on ex-post volumes. An ex-post index reflects the actual production profile of each technology within a region and evolves with the fleet.

Technology-specific contracts narrow the pool of participants, but the Working Group considered each regional market deep enough to support liquid trading.

Efficient risk allocation

Among the ex-post options, the key choice was who bears volume risk. The DWA swap, provided volume certainty to buyers, resulting in volume risk remaining with projects. Analysis and feedback from financiers indicated that exposure to both project-specific and fleet-wide volume risk would be a barrier to bankability. The revenue swap resolved this but shifted substantial volume risk to buyers, reducing its value as a hedge for buyers.

The RRPPA sits between these options. Buyers hold fleet-wide volume risk, while sellers hold project-specific risk and retain an incentive to outperform the RRF. Sellers no longer need to defend a fixed volume as settlement is against the variable generation of the RRF. Preliminary independent analysis also indicates it provides cash-flow certainty to facilitate the debt financing of such projects.[4]

Bankability

Bankability was a key consideration for design of the RRPPA and other bulk energy products. The settlement of the bulk energy contract based on the RRF introduces basis risk – that is, the risk that

[4] Preliminary findings from the independent modelling; findings are subject to further refinement, sensitivity testing and validation.

variations between an individual asset's performance and the performance of the RRF reduces the effectiveness of the hedge. Bankability was a material concern and regarded as a threshold issue for the contracts being able to meet the goal of bringing new energy generation into the market. Consideration of bankability informed several contract design choices, notably the inclusion of the $600/MWh price cap due to the basis risk that projects would need to manage.

Multiple analytical studies were undertaken to assess bankability and cash flow volatility with a view to building confidence that the proposed contract would be bankable. This included back-testing and forecasting studies to assess performance under different weather year scenarios in different regions. Analytical studies considered by the Working Group included the review of written contributions and presentations from Griffith University researchers, Baringa consultants, and the ASL internal modelling team. This modelling focused primarily on assessing the impact of cash flow variations on proponents' ability to maintain debt service coverage ratios above assumed lock-up thresholds and demonstrated an RRPPA product could deliver the level of revenue certainty required to facilitate debt financing of new projects. This test was regarded as critical for projects to be able to secure debt financing.

In addition to an overall bankability assessment, analysis also considered levels of contract coverage to optimise the value of the contracts as a hedge. As a point of difference to traditional PPAs, it was determined that the optimal level of contract coverage would vary based on project characteristics. However, maintaining optimal contracting levels could materially support bankability, and the optimal contract level could be reasonably forecast based on project characteristics.

Stakeholder feedback and design choices

The proposed ex-post RRPPA swap was seen as the best design option based on the contract evaluation criteria, particularly due to its effectiveness in balancing project bankability, efficient risk allocation and buyer value. Industry consultation identified four key design issues requiring consideration: negative-price provisions, price caps, RRF design and the treatment of hybrid projects.

Negative-price provisions

Stakeholders broadly recognised the need for a mechanism to account for negative spot market prices but differed in their views on the preferred mechanism. Sellers generally favoured a $0/MWh price floor to support revenue certainty and bankability, while buyers preferred a volume knock-out to preserve a clear market signal not to dispatch during negative price periods.

The Working Group considered four options: (1) no negative-price provision, (2) a $0/MWh price floor, (3) a $0/MWh price floor with a volume knock-out at more negative prices, and (4) a $0/MWh volume knock-out.

The Working Group aligned on supporting a $0/MWh price floor. A volume knock-out would eliminate buyer payments during negative-price periods but would likely increase bid prices when projects were tendering for contract, as the volume knockout added significant downside risks for the seller. There were also some concerns that the knock-out may have the potential to distort bidding behaviour around the $0/MWh price threshold, particularly in scenarios where ESEM contracts underpinned a material share of generation in the market.

A further consideration for the Working Group was whether the index for the bulk energy product would be based on output as-generated or based on an availability forecast such as unconstrained intermittent generation forecasts (UIGF) used by AEMO's dispatch engine. As-generated volume may be preferable as the basis for the RRI due to its relative simplicity, alignment with volume dispatched in the physical market and lower potential to distort market outcomes, either through forecasts or in the award of contracts through

the ESEM contract auction processes. As-generated volume also provides buyers with greater certainty on contract volumes as the basis for settlement is actual dispatch, not theoretical availability.

The Working Group discussed the risk of an as-generated RRF output dropping significantly in negative price scenarios. This could arise if a large share of generating assets in the RRF held ESEM contracts and opted to fully curtail during a negative price period. If generators holding ESEM contracts did not fully curtail during negative price periods, due to the weak relationship between individual project output and overall contract settlement volume, they would still be incentivised not to out-perform the RRF and therefore may still reduce production and drive the RRI lower.

If this behaviour were to become the norm, particularly as the share of projects within the RRF holding ESEM contracts increases, the RRI may provide limited hedging value during negative price periods and has the potential to operate similarly to a knockout. This scenario may have impacts for the reliability of contracted revenues and could impact bankability or drive higher contract prices to account for the risk. The Working Group identified that performance of the RRI during negative price periods would potentially vary for different technologies, particularly where they had different proportions of generation backed by ESEM and non-ESEM contracts.

Modelling of the price floor that informed the Working Group discussions assumed that volume would be preserved for negative prices, like operation and settlement under a traditional run-of-plant PPA. The Working Group expects that a price floor on the RRPPA would perform somewhere in between the modelled price floor and a volume knockout.

Overall, the Working Group was supportive of adopting a zero-price floor and an RRI based on as-generated output. To support the Working Group's recommendation that the RRI based on as-generated output and to demonstrate that projects would be bankable, the Working Group recommended that further analysis on the behaviour of the RRF in negative price periods be considered during the detailed design phase. The proposed scope would be to consider the potential rate and scale of RRI movements during negative price periods, how different technology indices may perform individually or when operating simultaneously, and the impact if ESEM contracts cover a higher share of the RRF.

Price caps

Basis risk between a project's output and the RRF output creates a potential short exposure that would not exist in a traditional asset-linked run-of-plant PPA. A price cap limits the floating price paid from the seller to the buyer during very high price periods. It would reduce the downside risks for the seller and reduce the high price coverage available under the contract for the buyer. In consultations, sellers generally supported a price cap to limit exposure to extreme wholesale prices, particularly during outages, network constraints or when generation differs from the RRF output. Buyers raised concerns that a cap would reduce hedge value and transfer residual price risk to them. Lower caps reduce seller risk but provide less protection for buyers.

The Working Group considered four options: (1) no price cap, (2) a $600/MWh cap, (3) a cap linked to the administered price cap (APC), and (4) a $300/MWh cap. The Working Group affirmed that a price cap should remain a feature of the contract, as the value to sellers of improved bankability outweighs the reduction in hedge value for buyers. This was particularly influenced by consideration that potential floating payments for spot prices above the cap create a significant risk for sellers but provide a much more limited hedge value to buyers given the index volume variability and the expectation of weak or negative correlation to high price events.

Whilst a $300/MWh cap would provide more protection for sellers from high price events, the $600/MWh cap was beneficial in preserving a higher portion of the total project value within the contract. This would

support more competitive and comparative tender pricing. Analysis also supported the higher cap reducing the overall cost to buyers.

The fixed $600/MWh cap price was preferred, reflecting its alignment with the proposed firming product and existing APC, and the Working Group considered that the cap should match the firming strike price. Aligning the price cap with the strike price for the firming contract is an intentional design feature to enable buyers to use these products in a set to most efficiently hedge risk without a price gap or overlap, with the firming contract able to provide coverage for the desired load volume.

The Working Group considered a stakeholder proposal to index the strike price to the APC but decided this would create significant uncertainty for buyers and sellers outside administered pricing periods and create a new source of uncertainty that may be reflected in higher contract prices. Any such change to the cap strike price should be made deliberately after review and consultation and the starting assumption is that the change would apply for future auction rounds, not retrospectively. The price cap should not be directly linked to the APC, which may be changed for other reasons, at relatively short notice, and therefore could inadvertently materially affect the contract function and value.

RRI design

Some stakeholders raised concerns about seller basis risk arising from differences between individual project generation and the RRF. They also sought greater transparency regarding fleet composition, project eligibility, index updates and governance.

The Working Group selected a Regional Reference approach to balance volume risk and support contract fungibility. Detailed index methodology and governance arrangements remain subject to further development.

Treatment of hybrid and emerging technologies

The Working Group considered three approaches to including hybrid projects in the RRF: (1) excluding hybrids to preserve the technology-specific generation profile, (2) including hybrids where renewable generation can be separately identified at the dispatchable unit identifier (DUID) level, and (3) including hybrids at the station level.

The Working Group agreed that a hybrid project could be included in the RRF where its renewable component can be separately identified in AEMO 5-minute dispatch data, which will likely require a separate DUID for the renewable and storage components. A hybrid project that is not included in the RRF could still bid for a contract, as the project output is not required for contract settlement against the RRF. The detailed approach, including how to manage any added basis risk for solar and wind projects, remains to be resolved and requires further consideration during long-form drafting.

Whilst the Working Group focused on index design for wind and solar projects, it was considered feasible to create indices for other non-dispatchable technologies in the NEM, such as offshore wind.

Shaping contract

The proposed contract design

The Working Group's preferred product design for shaping energy was the ex-ante Daily Dynamic Block Spread (DDBS) swap.

Figure 5: Table of shaping key settlement terms (please see more detail of the proposed contract structures in Attachment 1)

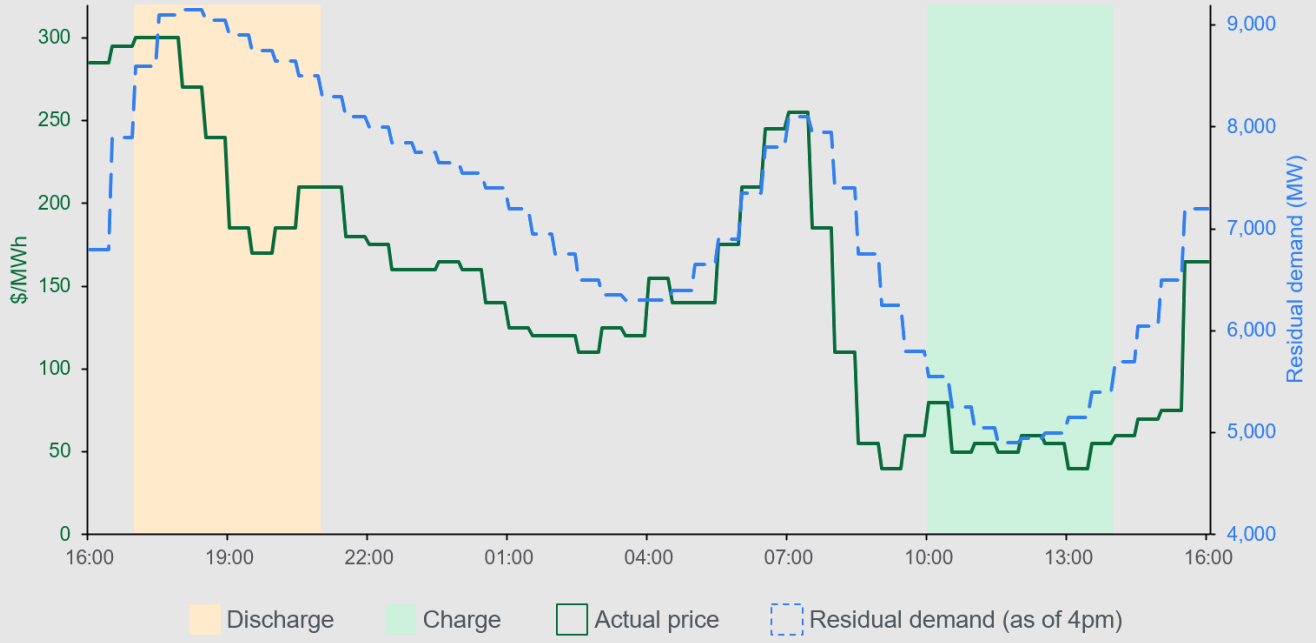
Key Term	Description
Shaping Duration	**XX** hours **Note**: The duration of the Charge/Discharge Blocks. e.g. 2 hours means both Charge and Discharge Blocks are 2 hours.
Fixed Spread ($/MWh)	$**XX**/MWh ***Note***: The Fixed Spread represents the agreed difference ($/MWh) between the average Floating Price in the nominated Discharge Block(s) and Charge Block(s).
Contract Capacity (MW)	**xx** MW
Floating Price ($/MWh)	The Spot Price (in $/MWh) set by AEMO for a Trading Interval at the Regional Reference Node.
Calculation Period (CP, days)	The CP (days) shall be aligned to the AEMO NEM settlement calendar and occur weekly.
Daily Shaping Period	A Daily Shaping Period commences at the Trading Interval ending at **16:05** and finishes at the Trading Interval ending at **16:00** the following day.
Determining Charge and Discharge Blocks	The ESEM Administrator will determine Charge and Discharge Blocks based on forecast Residual Demand, where: $Residual\ Demand_{TI} = Operational\ Demand_{TI} -$ $(Solar\ PV\ Generation\ Forecast_{TI} + Wind\ Generation\ Forecast_{TI})$ • Charge Blocks are the forecast periods of lowest residual demand in the Daily Shaping Period. • Discharge Blocks are the forecast periods of highest residual demand in the Daily Shaping Period. In determining the Charge and Discharge Blocks, the ESEM Administrator must: • Nominate two or less Charge Blocks and two or less Discharge Blocks per day. • Nominate Charge Blocks and Discharge Blocks such that the total of each is equal to the Shaping Duration. • Nominate a Charge Block or Discharge Block that is 6 or more Trading Intervals (30 minutes) in duration. **Note**: the Working Group has selected Residual Demand as the preferred method for determining Charge and Discharge Blocks, due to its high correlation with price in an energy system with a high penetration of renewables. Limits on the Charge and Discharge Blocks are applied to manage some Seller exposure risk, whilst ensuring the product is still valuable in hedging Buyer exposures over morning and

	evening peak periods. The Working Group has not elected to include any terms related to Round Trip Efficiency and hence the Seller would consider this in its bid.
Publishing Nominations	The ESEM Administrator will publish nominated Charge and Discharge Blocks at **13:00** each day for the following Daily Shaping Period. **Note**: the Working Group considered that over 3hrs notice was preferable to provide sufficient notice for Sellers to manage exposures.
Realised Spread ($/MWh)	$Realised\ Spread_n = Discharge\ Price_n - Charge\ Price_n$, where: • n is a Daily Shaping Period. • Discharge Price ($/MWh) is the average Floating Price during the defined Discharge Block(s) for a Daily Shaping Period. Charge Price ($/MWh) is the average Floating Price during the defined Charge Block(s) for a Daily Shaping Period.
Notional Quantity (MWh)	The quantity of electricity (MWh) that applies for a Daily Shaping Period. $Notional\ Quantity = Contract\ Capacity \times Shaping\ Duration$
Settlement Amount ($)	$Settlement\ Amount = Notional\ Quantity \times \sum_1^n (Realised\ Spread_n - Fixed\ Spread)$, where: • n is the number of Daily Shaping Periods in the Calculation Period. *Notes:* • *Where the Settlement Amount is negative (reflecting a low realised spread scenario), the Buyer must pay the absolute value of the Settlement Amount to the Seller;* • *Where the Settlement Amount is positive (reflecting a high realised spread scenario), the Seller must pay the Settlement Amount to the Buyer.*

Figure 6: Settlement example for the DDBS swap (illustrative)

In this example for the DDBS swap, the calculated day-ahead residual demand (i.e., where residual demand equals operational demand minus forecast variable renewable energy) is used to determine the charge and discharge periods for a day.

The swap would be settled based on the difference between the fixed spread and the realised spread, calculated as the ex-post difference between the average prices in the charge and discharge periods.



Rationale for the proposed contract design

The Working Group selected a DDBS swap to balance effective protection against intraday price volatility with seller bankability and operational practicality. Six key design choices informed the proposed structure.

- **Flexibility on duration:** The proposed shaping contract has flexibility on the duration of the contract. For example, the contract may be procured in a range of durations, and blocks of different duration may be offered within the same auction round, subject to balancing the need for liquidity and market depth for each contract type. It is considered unlikely blocks of longer than eight hours would be offered given overlap with the minimum duration required to participate in a firming service ESEM auction, and challenges blocks of longer than eight hours may create in determining non-overlapping charge and discharge blocks within a day.
- **Ex-ante rather than ex-post settlement:** An ex-post approach was initially considered attractive because it would align with the bulk energy product, capture actual high- and low-price periods and align bidding behaviour more strongly with sellers' price expectations. However, an ex-post contract would expose sellers to significant settlement risk, as they could not reliably predict or match these periods. In the current market, the settlement risk issue was considered too large for the contract to be considered bankable. The Working Group therefore preferred ex-ante nomination, with blocks determined shortly before the start of each Daily Shaping Period to capture much of the available price spread while providing greater certainty over settlement obligations. Within each Daily

Shaping Period, the nominated charge and discharge blocks operate in a similar way to a virtual tolling agreement.

- **Dynamic daily blocks:** To balance the preference for ex-ante settlement, charge and discharge blocks for the contract are set dynamically and day-ahead. This means they are expected to track much more closely to actual high- and low-price periods on the day, which maps more closely to the expected outcome from ex-post settlement. This also accounts for being adaptable to shifting load patterns or behaviours over time, as the contract settlement periods have an inbuilt adaptability to change. The additional complexity also preserves value in the contracts when recycled.
- **Nominations linked to physical forecast rather than price forecast:** The Working Group chose to use residual demand as the basis for nominations, which made it possible to use an ex-ante methodology for block nominations. This approach aligns with the periods in which the system has a physical need for shaping generation output over the course of the day and is not linked to generator price bidding behaviour in pre-dispatch.
- **Flexibility in charge and discharge blocks:** Requiring a single continuous block would simplify operations but could miss price peaks and troughs occurring at different times of the day. The Working Group therefore allowed up to two distinct blocks for charging and discharging, balancing price spread capture with operational simplicity. This enables discharge across morning and evening peaks, and charging during overnight and midday low-price periods.
- **Timing of the Daily Shaping Period:** The Working Group considered different start times, balancing alignment with existing market conventions, battery operating patterns and forecast availability. Its current preferred position is a 16:05 start, with nominations at 13:00 on the same calendar day, which rely only on pre-dispatch data. The short period between nomination and beginning of the Daily Shaping Period is designed to maximise the forecast accuracy whilst still giving sellers time to prepare their positions. It also aligns with the transition between daytime solar generation and evening peak demand, when batteries are likely to be charged and ready to discharge.
- **Block duration and operating constraints:** The Working Group preferred 30-minute blocks to align with available market forecasts and avoid the operational complexity of shorter intervals. It also chose not to prescribe whether charging or discharging must occur first, as additional sequencing rules would increase complexity and sellers can manage these constraints based on their assets' capabilities.

Stakeholder feedback and design choices

The proposed DDBS swap seeks to balance effective price protection for buyers, bankability for sellers and operational practicality. Industry consultation identified three key design issues requiring consideration: the dynamic block-setting methodology, nomination arrangements and the timing of the Daily Shaping Period.

Dynamic block-setting methodology

Stakeholders differed on the use of residual demand forecasts to determine charge and discharge blocks. Sellers generally favoured the dynamic approach for its ability to capture greater price spreads than fixed blocks, while some buyers raised concerns that nominated blocks may not coincide with actual high- and low-price intervals. Stakeholders also questioned whether residual demand would remain a reliable predictor of prices as market conditions evolve.

The Working Group considered three approaches: (1) forecast residual demand, (2) weekly blocks based on prevailing data, and (3) fixed blocks determined at auction. The forecast residual demand approach was preferred to improve the capture of intraday price spreads, while providing sellers with advance notice. Ongoing monitoring of forecast performance and governance of the block-setting methodology require further consideration.

Daily Shaping Period

The consultation draft proposed a Daily Shaping Period of 09:05-09:00. On review, the Working Group raised concerns that setting blocks a day ahead for this period required combining two forecast datasets: pre-dispatch and Medium-Term Projected Assessment of System Adequacy data. Some also questioned whether the period would accommodate different storage operating patterns, for example, by accommodating days with higher residual demand through the middle of the day.

The Working Group considered five options for the Daily Shaping Period: (1) 09:05-09:00, (2) 00:05-00:00, (3) 04:05-04:00, (4) 16:05-16:00, and (5) flexible Daily Shaping Periods. The Working Group's preferred option is a Daily Shaping Period of 16:05-16:00, which relies only on pre-dispatch data and starts the Daily Shaping Period before the evening peak demand period. It was noted that this came with some trade-offs in the reduced preparation window for sellers between the release of pre-dispatch data and the commencement of the Daily Shaping Period, and embedding differences between the nomination timing and settlement arrangements for other services.

A Daily Shaping Period of 16:05 to 16:00 was considered the best option across multiple regions to minimise the potential for back-to-back discharge blocks occurring across days. Sellers raised concern about high residual demand (discharge) blocks immediately before and at the start of a new Daily Shaping Period. Sellers have some capacity to predict these occurrences, and it was determined that simplicity outweighed the benefits of introducing new mechanisms to explicitly avoid them. The Working Group considered proposals for flexible Daily Shaping Periods and for explicit rules on the sequencing of nominated charge and discharge blocks to ensure they could be physically backed by a storage project. The Working Group determined that the benefits of these mechanisms were outweighed by the relative simplicity of a fixed Daily Shaping Period.

The Working Group discussed that the optimal Daily Shaping Period may change over time. The view of the Working Group was that, while sellers are expected to need ex-ante block nominations to secure bankability, the timing of the Daily Shaping Period should not materially impact the value or bankability of the long-term contract. The Working Group concluded that with sufficient consultation and notice to the market, resetting of the Daily Shaping Period or even the block nomination methodology in the future would be feasible without imposing a large implementation cost.

The Working Group identified that further consideration should be given to whether additional buyer protections, such as a $0/MWh realised spread floor, are required to mitigate the risk that unforeseen extreme market conditions result in realised price outcomes materially diverging from the spreads of the nominated blocks, which could lead to an inverse settlement payment from the buyer to the seller and potentially reduce the attractiveness of the product to buyers. Further consideration may also be warranted on whether there is potential for large deviations between ex-post market price outcomes and the daily nominated block periods (including the potential for inverse settlement) and how effectively nominated blocks can be physically backed through a range of market trading conditions.

Nomination arrangements

Stakeholders recognised the value of advance notice for operational planning and risk management but raised concerns about forecast changes between nomination and dispatch. Some suggested shorter nomination timeframes or opportunities to revise nominated periods, while others questioned whether the consultation draft's 16:00 nomination time provided the appropriate balance between forecast accuracy and operational certainty.

The consultation draft used a 16:00 nomination time for the Daily Shaping Period, with charge and discharge blocks determined using forecast residual demand. Following feedback, the Working Group's preferred position changed to a Daily Shaping Period of 16:05 to 16:00, with nominations at 13:00 on the same calendar day, because this relies only on pre-dispatch data and places the evening peak at the start of the period.

Firming contracts

Overview of the proposed contract design

The Working Group's preferred product design for firming energy was the $600/MWh cap.

Figure 7: Table of firming key settlement terms (please see more detail of the proposed contract structures in Attachment 1)

Key Term	Description
Floating Price ($/MWh)	The Spot Price (in $/MWh) set by AEMO for a Trading Interval at the Regional Reference Node.
Strike Price ($/MWh)	$600/MWh **Note**: *The Strike Price is the Floating Price ($/MWh) above which Cap Repayments occur.*
Contract Capacity (MW)	**XX** MW
Contract Price ($/MWh)	$**XX**/MWh *Note: the Contract Price ($/MWh) is the agreed amount that the Seller will receive for the Notional Quantity.*
Calculation Period (hrs)	The Calculation Period (hrs) shall be aligned to the AEMO NEM settlement calendar and occur weekly.
Notional Quantity (MWh)	The quantity of electricity (MWh) that applies for the Calculation Period. $Notional\ Quantity = Contract\ Capacity \times Calculation\ Period$
Contract Fixed Premium ($)	The Buyer shall pay the Seller the contract premium. Contract Premium=Notional Quantity × Contract Price
Cap Repayment Amount ($)	$Cap\ Repayment\ Amount = Notional\ Quantity \times (\sum_1^n Max\ (0, Floating\ Price_{TI} - Strike\ Price))$, where • n is the number of Trading Intervals in the Calculation Period. • The Seller must pay the Buyer the Cap Repayment Amount for each Calculation Period.
Settlement Amount ($)	$Settlement\ Amount = Cap\ Repayment\ Amount - Contract\ Premium$ ***Notes:*** • *Where the Settlement Amount is negative, the Buyer must pay the absolute value of the Settlement Amount to the Seller.* • *Where the Settlement Amount is positive, the Seller must pay the value of the Settlement Amount to the Buyer.*

Rationale for the proposed contract design

The Working Group selected a $600/MWh cap contract to balance buyer protection against high wholesale prices with seller bankability and incentives for investment in firming capacity.

Four key considerations informed this decision.

- **Alignment with generation costs**: The conventional $300/MWh strike historically reflected the cost of bringing peaking generation into the market. As these costs have increased, $600/MWh strike was considered more appropriate for supporting investment in new firming assets, particularly gas peakers.

- **Suitability for long-term contracts:** The cap strike needs to be resilient for the lifetime of the long-term project contract. The $300/MWh cap strike was set under much lower average price and market price cap dynamics. The $600/MWh was deemed to be more suitable for the future market as a fixed strike price given it will need to accommodate potentially decades of inflation.
- **Interaction with regulatory settings**: Higher strike prices were less attractive because the APC can limit payouts during sustained high-price periods.
- **Protection during prolonged high-price periods**: The Working Group recognised that a $600/MWh cap would not protect buyers against sustained prices below the strike, such as during wind droughts. However, a lower-strike product could be substantially more expensive, and it was unclear which technologies could economically provide this protection over extended periods. This was not considered sufficient justification for selecting a lower strike, and it was noted that $300/MWh cap products are widely traded on bilateral markets and the introduction of the ESEM contract would not prevent this market from continuing to operate.

The availability of new ESEM contracts is an important mechanism to support the entry of new firming capacity into the NEM, but this may also depend on other regulatory and market settings. As with other types of generation, gas generation will require a range of market support factors to be viable. For gas, these include long-term gas supply and transport agreements, supply chains that can deliver gas turbines, and suitable development sites with regulatory and planning approval. The ESEM will be an important mechanism to support entry but may not be sufficient if developers face other commercial barriers.

Stakeholder feedback and design choices

The proposed $600/MWh cap contract seeks to balance buyer protection against high wholesale prices with seller bankability. Industry consultation identified two key design issues: strike price selection and suitability across firming technologies.

Strike price selection

Sellers generally favoured the $600/MWh strike, noting that it preserves merchant revenues, provides headroom above operating costs and may reduce premiums. Buyers raised concerns that it leaves exposure between $300/MWh and $600/MWh unmanaged, providing less protection than a conventional $300/MWh cap.

The Working Group considered five strike prices ranging from $200/MWh to $5,000/MWh and the $600/MWh strike was preferred to balance buyer protection and seller risk, while aligning with the existing APC. The Working Group noted that the ESEM contracts are designed to complement, rather than replace, existing market products. The expectation is that buyers wanting protection at $300/MWh would still be able to purchase a conventional $300/MWh cap.

Suitability across firming technologies

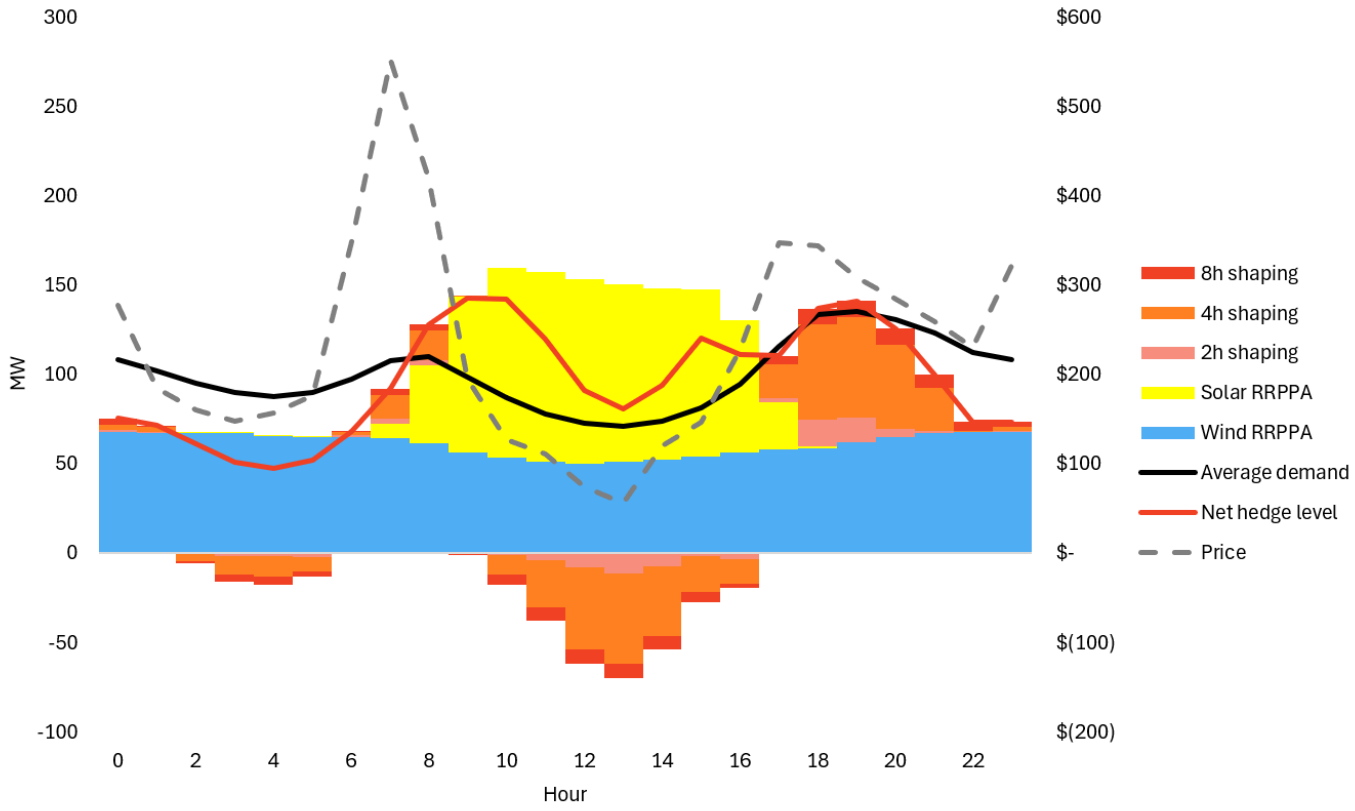
Stakeholders questioned whether a single strike price could accommodate different operating characteristics. Some raised concerns that the $600/MWh cap may not adequately support longer-duration firming assets, while demand response providers suggested duration-limited caps and noted that duration or run time limitations tied to assets in a demand response portfolio may not meet the contract fungibility requirements.

The Working Group assessed the trade-offs between strike prices, with lower strikes providing broader buyer protection but greater seller obligations. The suitability of the proposed $600/MWh cap across technologies and potential alternative product variants requires further consideration.

Operation of contracts for portfolio hedging

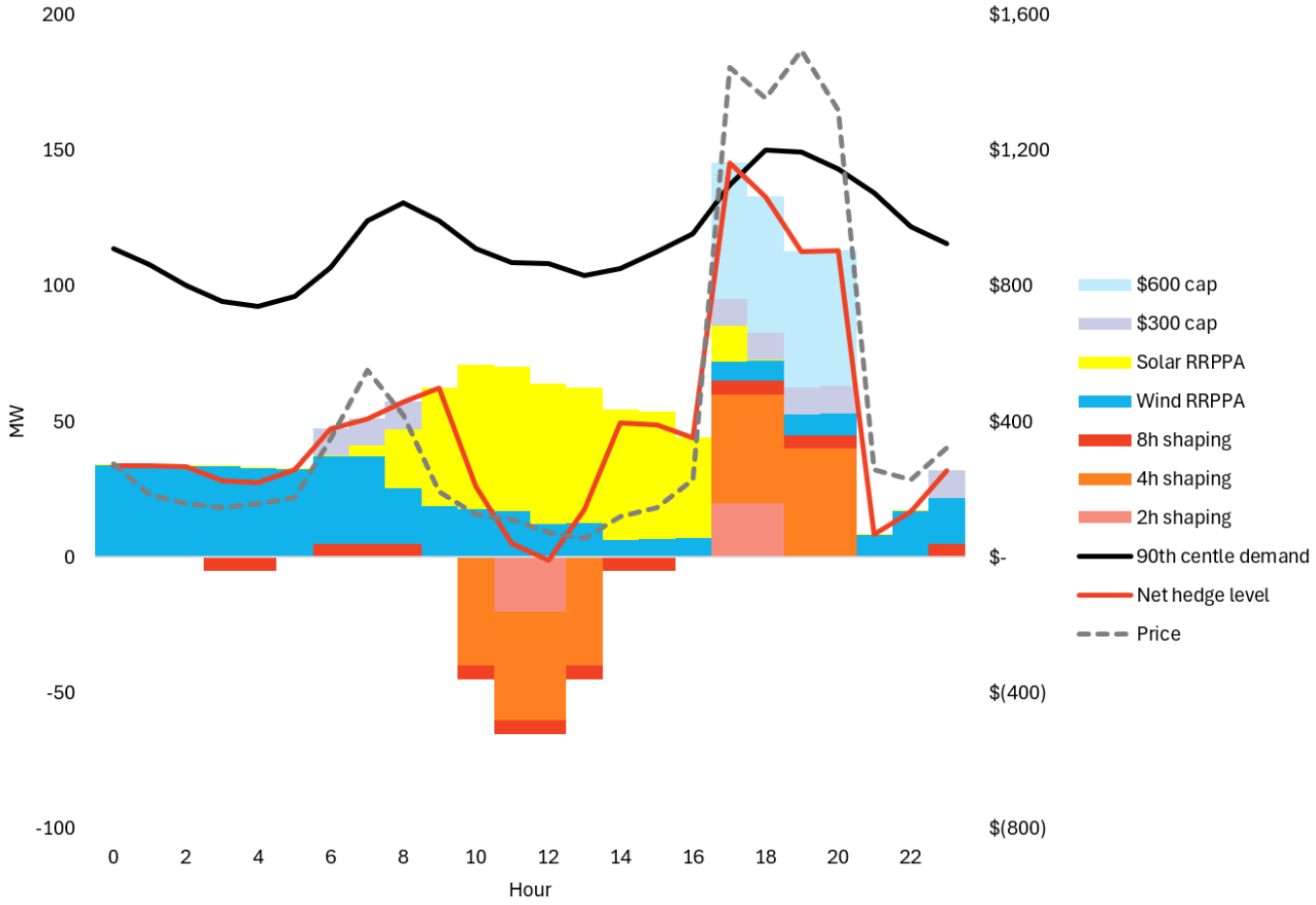
The ESEM contracts are not intended to replace existing market contracts but the evaluation criteria specify that they should be complementary within a set of ESEM contracts, and attractive for both sellers and buyers. Together, these criteria mean the contracts need to work alongside each other to hedge load. Figure 8 illustrates how the contracts could be combined to cover a typical daily load shape for an illustrative day in Queensland. Figure 8 illustrates how the contracts operate together to provide hedging on a day with high pricing.

Figure 8: Illustration of how ESEM contracts can be combined to hedge load over a typical day[5]



[5] Note that Figure 8 reflects the volume hedges the buyer has in place. The buyer also has contracted cap coverage, which is active above a strike price. These cap contracts are not reflected in the average volume hedges in Figure 8, but are reflected in Figure 9 which represents a stressed day with elevated pricing.

Figure 9: Illustration of how ESEM contracts hedge load over a stressed day



Note for Figure 8: When prices exceed $600/MWh, the solar RRPPA and the wind RRPPA will settle up to $600/MWh, not the spot price, reducing the hedge they provide during high prices.

The contracts are designed to be complementary in several ways. The $600/MWh price cap in the bulk energy contract is aligned with the strike price of the firming contract, so that the high-price protection provided by the firming product starts at the level at which the price cap limits the coverage under the bulk energy contract. The nomination methodology for the shaping contract uses variable renewable generation as an input to the residual demand calculation, allocating discharge blocks when the bulk energy contracts are least able to cover demand and buyers of bulk energy contracts are most likely to be left exposed to high prices.

The products are also intended to work together to cover a load shape, in a similar way to how baseload swaps, peak swaps and caps complement each other in the market today. Bulk energy contracts manage the price and volume risks of variable wind and solar generation, shaping contracts manage the risks created by differences in prices across the day, and firming contracts manage the risks of high spot prices. Buyers, and the intermediaries that serve them, can combine and repackage these products to meet their specific risk management needs.

Further analysis on the operation of the proposed suite of contracts to hedge different load profiles is planned but could not be completed within the timeframes for publication of this report. This is expected to be completed and shared in 2027.

Residual risk

Taken together, the contracts generally provide good coverage, but they have some limitations. Stakeholders raised concerns about “dead band risk” – sustained high prices that remain below the cap threshold – as can commonly occur during wind droughts. The Working Group recognised this as a limitation of the contract set defined by the three services set out in the Terms of Reference.

The Working Group acknowledged that the three contract types on their own can leave any electricity consumer with residual exposure between their consumption and the contract coverage. This hedging gap is common today with hedging products available for buyers. The Working Group also acknowledged that buyers will continue to use alternative contracts (outside of the ESEM contracts) to manage their exposures. Buyers will also be able to contract from retailers and financial intermediaries that can carry residual exposures on their behalf.

Contract types assessed

In identifying the recommended ESEM contracts discussed above, a broader range of contract types and features were considered. While these contract types were not recommended, some of the key design options and considerations are documented here to better illustrate the rationale for selecting the preferred contracts and provide a record for future design processes.

Bulk energy contract types

Bulk energy contracts are designed to manage financial risks associated with zero-emissions electricity generation, particularly the variability in wind and solar generation volumes and wholesale electricity prices. Before aligning on the preferred RRPPA structure, four contract types were evaluated: a reference ex-post revenue swap, ex-post RRPPA swap,[6] reference ex-post dispatch-weighted average (DWA) price swap, and time-of-day block price swap.

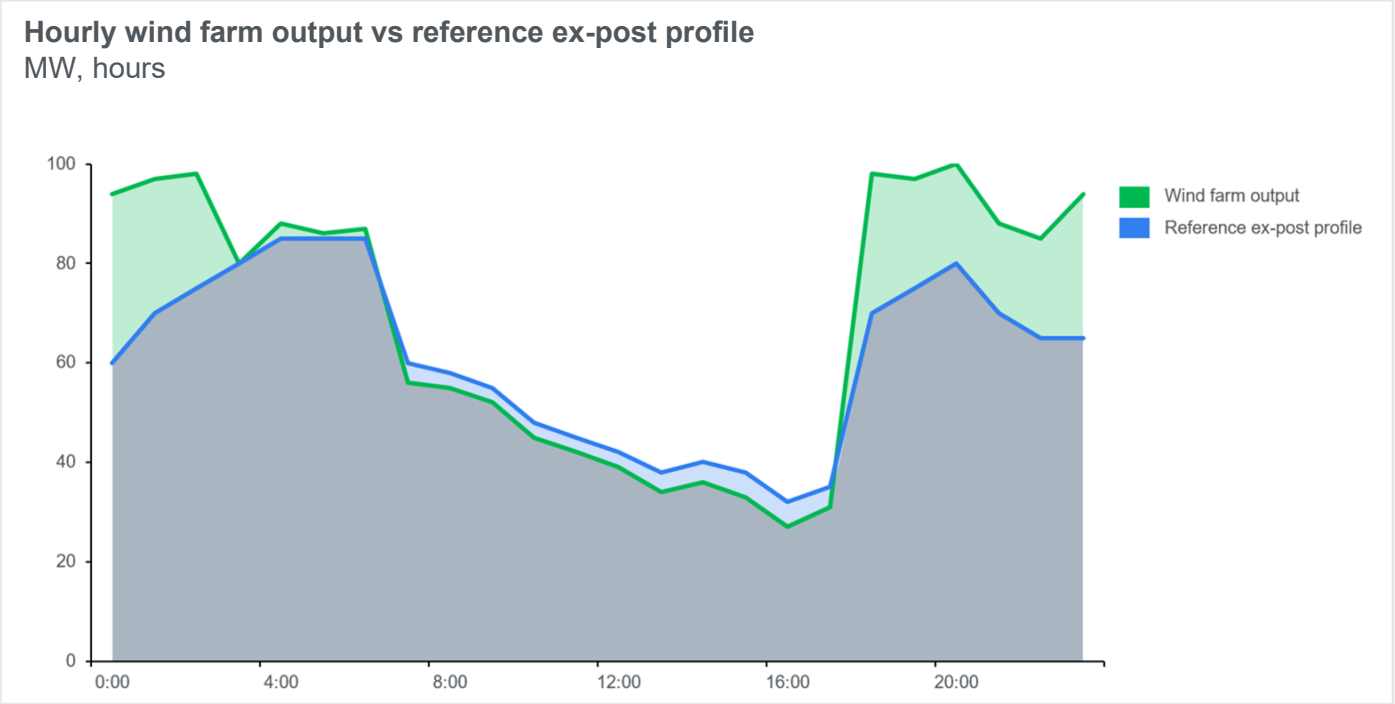
The three ex-post swap contract types are all variations of ex-post, index-based swap contracts. These contracts all involve a fungible financial derivative contract, where payments are based on the performance of a reference fleet of assets in a specified region. The contracts are settled with reference to an index, which reflects the aggregated output of generators of the same technology type within the region.

Settling the contracts with reference to an index introduces basis risk for the seller of the contract – that is, the risk that performance of the generator differs from performance of the index. Basis risk is a material new source of risk for sellers relative to current contracting approaches such as traditional power purchase agreements. It was a significant consideration in quantitative assessments of the contract performance, including assessments of bankability. However, the RRF is an important design feature for buyers, as settlement on RRF output removes exposure to asset-specific risks and enables the contracts to be standardised. This standardisation allows buyers of the contract to purchase a contract that serves as a more flexible, liquid, long-term hedging instrument.

The RRF means that the contracts are technology-specific – for example, there would be different reference fleets for onshore wind farm contracts and utility-scale solar contracts. This is required so that the output profile reflects the shape of a typical generator for each technology type. The technology-specific design means the contracts are best suited to generation types with enough buyers and sellers in each region to maintain liquidity in the contract market and to ensure that the index is not overly influenced by some assets.

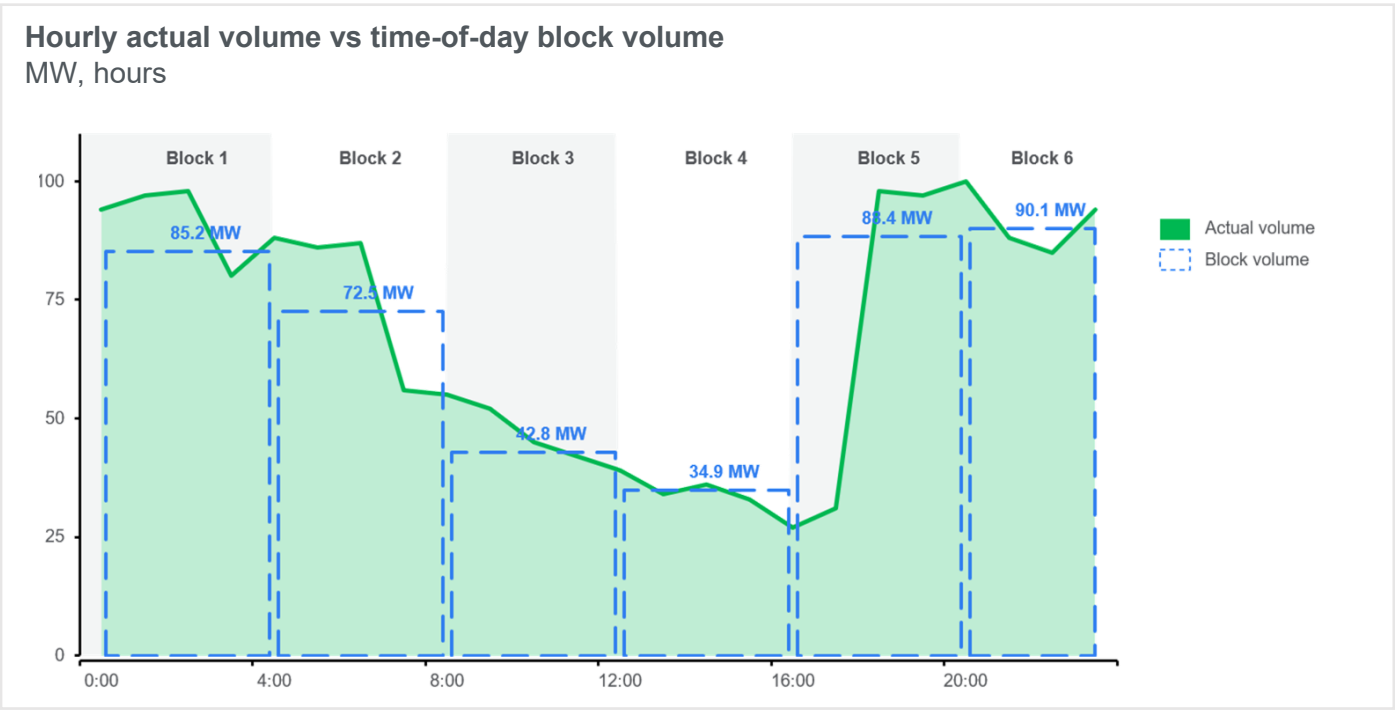
[6] The ex-post RRPPA swap was not part of the initial set of bulk energy contract structures. The Working Group identified it, in consultation with industry, between Workshops 2 and 3 as an additional structure for consideration.

Figure 10: Ex-post reference swaps are settled based on the output of a reference index (illustrative)



The time-of-day block price swaps operate on a different basis to the reference index swaps. For these types of contracts, settlement is based on average prices in time-block intervals over the course of the day, as illustrated in Figure 11. This means contracts could be designed to be technology neutral, with differences in payments reflecting daily production profiles rather than referencing asset type. A key consideration for this type of contract is the duration and profile of the time block intervals. Longer intervals may not provide clear price signals and could cause market discontinuities at interval edges, but shorter intervals add complexity to forecasting energy output and there may be challenges sustaining liquidity across all intervals of the day.

Figure 11: Time-of-day swaps settle with reference to pricing in prescribed time blocks (illustrative)

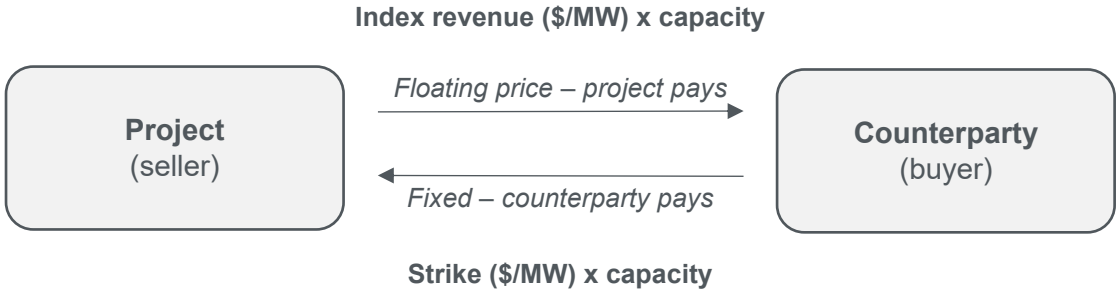


Each of the proposed bulk energy contracts is a type of fixed-for-floating swap. The swap is a financial contract designed to manage the risk associated with buying and selling energy on the physical market. The seller of the contract (e.g., an onshore wind asset or utility-scale solar asset) pays the buyer a floating amount for energy that mirrors volatility in the electricity spot market. The buyer (e.g., a retailer or large energy user) receives the floating payment and in exchange pays the seller a fixed amount.

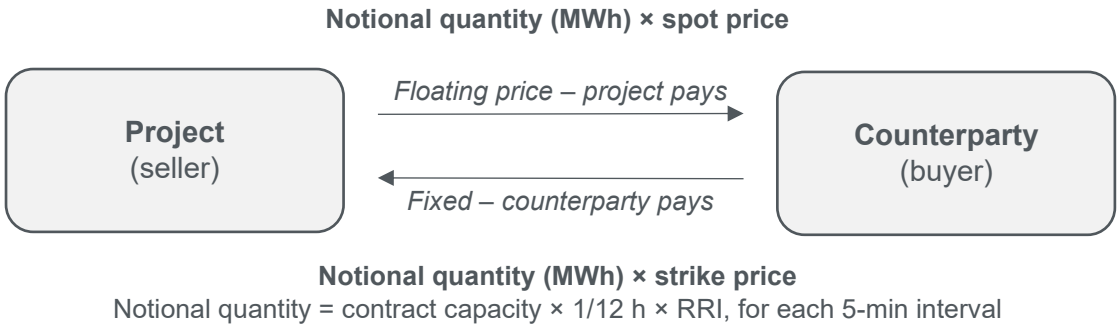
Both parties in this exchange can reduce risk through reducing financial uncertainty and volatility of payments. The floating price the seller pays mirrors the price it receives for selling electricity in the wholesale market, and the floating price the buyer receives offsets the cost of buying electricity in the wholesale market.

In the case of ESEM contracts, an ESEM administrative entity with an investment-grade credit rating would act as the counterparty to both sides of the contracts to provide credit support and market liquidity. The role of the administrator may also mean the fixed price the seller receives and that the buyer pays may not be the same. The following descriptions provide a simplified view of the financial exchange between parties, leaving out the role of the administrator, to illustrate the differences in contract types.

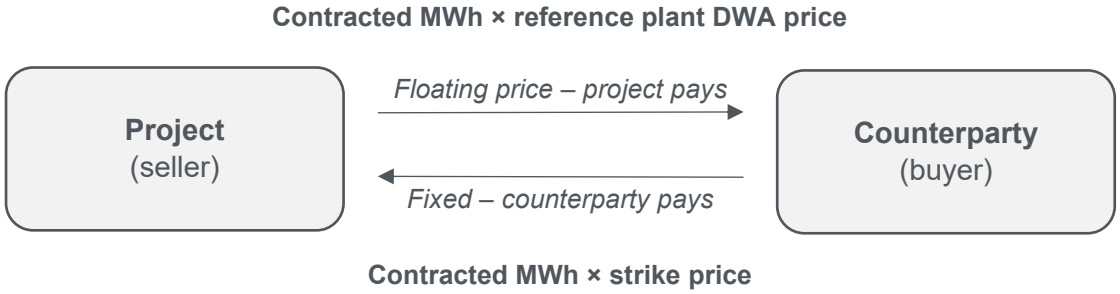
Reference ex-post revenue swap contracts exchange a fixed revenue ($/MW) for the floating revenue ($/MW) of a generic reference plant or group of plants, determined retrospectively (ex-post). The swap provides the seller with a fixed revenue payment that hedges both price and volume of generation covered by the contract, meaning the volume risk (that is, the risk that the amount of electricity produced varies from the production of the RRF) is transferred to the buyer. It hedges the seller against systematic risks associated with the production profile of the RRF. The contract provides an incentive for sellers to match or outperform the revenue earned by the reference plant on a per megawatt basis, as the seller retains the benefit of outperforming the index.



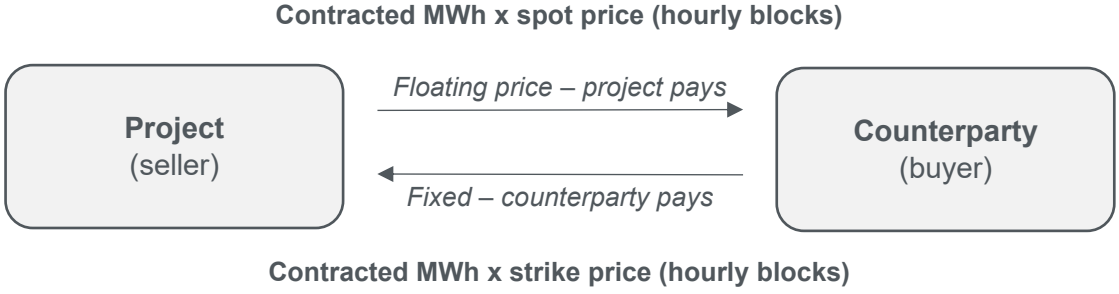
Ex-post RRPPA swap contracts exchange a fixed strike price ($/MWh) for the floating Regional Reference Price ($/MWh), applied to a volume (MWh) derived from the output of the RRF and determined retrospectively (ex-post). The RRF reflects the performance of all projects in the region that are captured by the RRF design, so the buyer is exposed to the regional load shape for a particular technology type (e.g., onshore wind) – not a specific asset. The seller receives contract settlement revenue for the duration of the contract at the fixed price for volumes calculated using the RRI. The RRPPA provides a hedge against systematic risks associated with wind and solar generation profiles (shape) and volumes. Volume risk is shared between buyers and sellers as settlement volumes follow the output of the RRF but sellers receive only limited protection against basis risks. The contract incentivises sellers to match or outperform the output of the RRF.



Reference ex-post DWA swap contracts exchange a fixed strike price ($/MWh) for the floating dispatch-weighted average price ($/MWh) of a reference plant or group of plants, determined retrospectively (ex-post) for a fixed generation volume. The DWA swap provides sellers with a hedge against systematic risks associated with wind and solar generation profiles (shape) but does not protect against generation volume risk. The contract incentivises sellers to match or outperform the DWA price achieved by the reference plant while meeting their contracted generation volume.



Time-of-day block price swap contracts exchange a fixed strike price ($/MWh) for the floating market price ($/MWh) during specified hourly blocks across the day for a fixed generation volume. The swap provides limited protection against systematic and plant-specific risks, with the effectiveness of the hedge dependent on the generation profile established in advance (ex-ante). The contract incentivises sellers to meet or exceed their contracted electricity volume (MWh) during periods when wholesale prices are above $0/MWh.



Bulk energy contract design choices

All four bulk energy contracts leave buyers and sellers exposed to some risks not fully covered by the contract. For a seller, basis risk arises when a generator's actual output differs from the reference used to calculate contract payments. This would mean variations from the output of the reference fleet in the case

of the ex-post reference swaps or variations from contracted outputs in time blocks in the case of the time-of-day block swap. In some cases, there are design choices that could reduce the level of basis risk but with the trade-off of reducing market liquidity by limiting the pool of potential buyers or sellers.

Generally, buyers value certainty over the contract volume, cost and timing of electricity production. Sellers value predictable revenue without taking on generation obligations they may be unable to meet. The way risks are allocated between buyers and sellers differs between the contract types but there are several dimensions of design choices:

1. **Ex-ante versus ex-post settlement:** Ex-ante refers to contract parameters, such as volumes or time periods, being specified in advance, while ex-post refers to settlement values being calculated retrospectively. Ex-ante commitments can provide buyers with greater certainty over contracted coverage but expose sellers to the risk that contracted volumes do not match actual generation. Ex-post reference measures can better reflect actual renewable generation but give buyers less certainty over the level of protection they will receive.
2. **Basis for settlement:** Contracts may settle against predefined time-of-day blocks or a reference index representing the performance of a plant or group of plants. Reference indices can better reflect renewable generation profiles but may not match individual plant or buyer needs. Time-of-day blocks provide predictable coverage but may not align with generation or demand patterns (shape risk).
3. **Reference index:** The design of the reference index and reference fleet is relevant for the Revenue, RRPPA and DWA swap contract types. The design must consider factors such as which generators to include, asset weightings, the process for updating the index, integrity of data sources and who will administer it, and whether to use as-dispatched generation or some other approach. These considerations will be influenced by regional factors and ESEM auction volumes.
4. **Allocation of volume risk:** Volume risk arises when the quantity of electricity generated differs from the reference amount and is distinct from price risk. Fixed-volume contracts (e.g., a DWA swap) provide buyers with certainty over the contracted volume but expose sellers to mismatches between the sold volumes and the produced volumes. Contracts linked to reference generation volumes or revenue (e.g., a Revenue swap) reduce sellers' fixed-volume obligations but leave buyers exposed to variability in the volume or revenue covered.
5. **Technology neutral:** Technology-neutral contracts apply across generation technologies, while technology-specific contracts reflect the output profile of a particular technology, such as onshore wind or utility-scale solar. Technology-neutral contracts support broader participation but may increase seller basis risk where generation profiles differ.

Additional design features, such as price caps, floors, knock-outs and time-block selection, can help mitigate residual risks. The preferred RRPPA contract design combines ex-post settlement based on a technology-specific RRF, with volume risk distributed between buyers and sellers, a $600/MWh price cap and $0/MWh price floor. This set of features was chosen based on optimising the contract performance against the defined evaluation criteria.

Shaping contract types

Shaping contracts are designed to manage financial risks associated with differences in wholesale electricity prices throughout the day, particularly between periods of high and low prices. Three contract types were considered: (1) time-of-day block spread (nominated blocks), (2) evening peak block, and (3) high-low contiguous spread.

Shaping contracts provide price certainty for shifting load across the day, helping to manage the variability of renewable output and incentivising technologies such as battery storage. They are swaps that pay the buyer the spread between the top-of-day price (when a battery would discharge) and the bottom-of-day price (when it would charge), less a swap premium (the fixed price payable to the seller). The graphs below are an illustrative example, showing a day where prices are lowest in the middle of the day and highest in the evening. In this case the low and high price intervals are measured over the lowest and highest priced contiguous time blocks. The seller receives a fixed price, similar to tolling arrangements that operate under some contracts today, and may choose to operate to maximise value capture from the spot market, or to hedge risk by following nominations as prescribed.

Figure 12: Daily charge and discharge schedule for a contiguous block spread contract (illustrative)

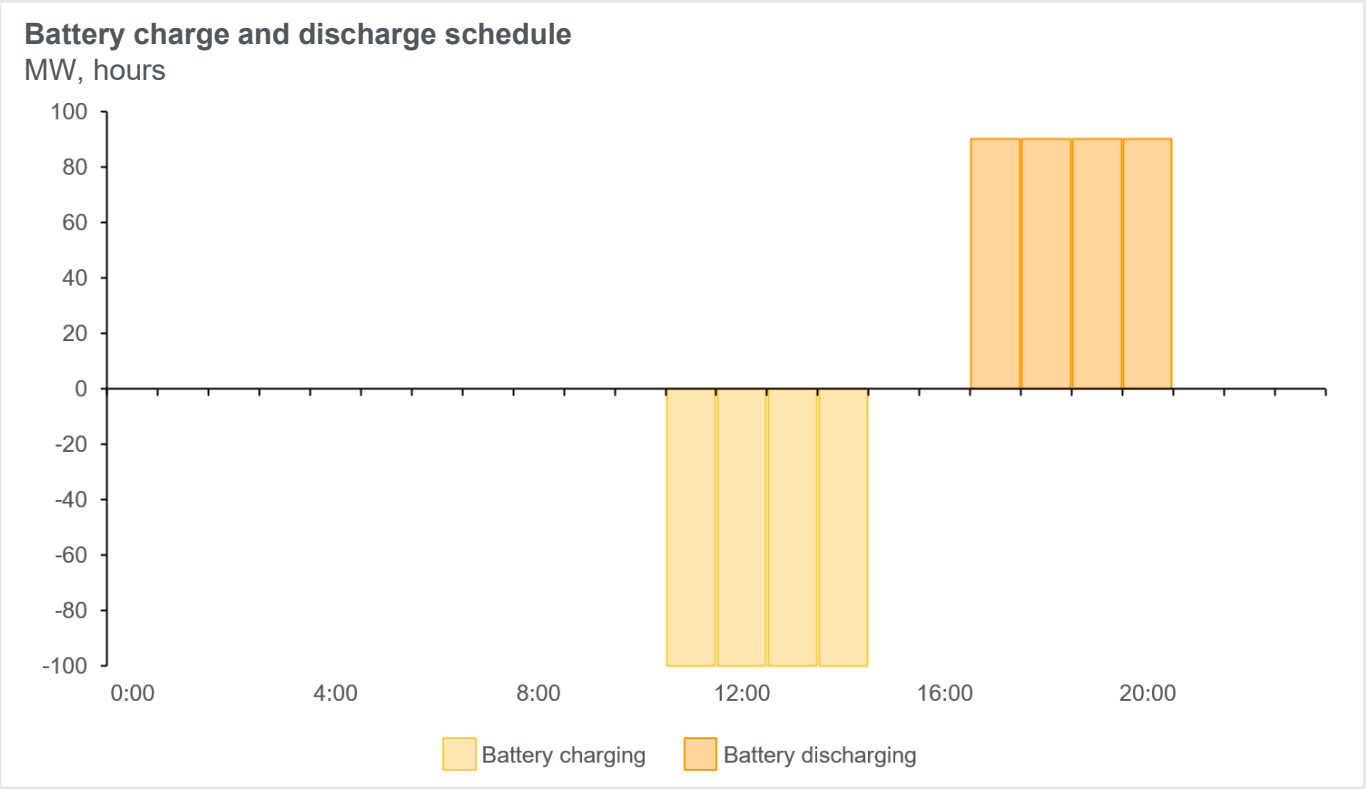
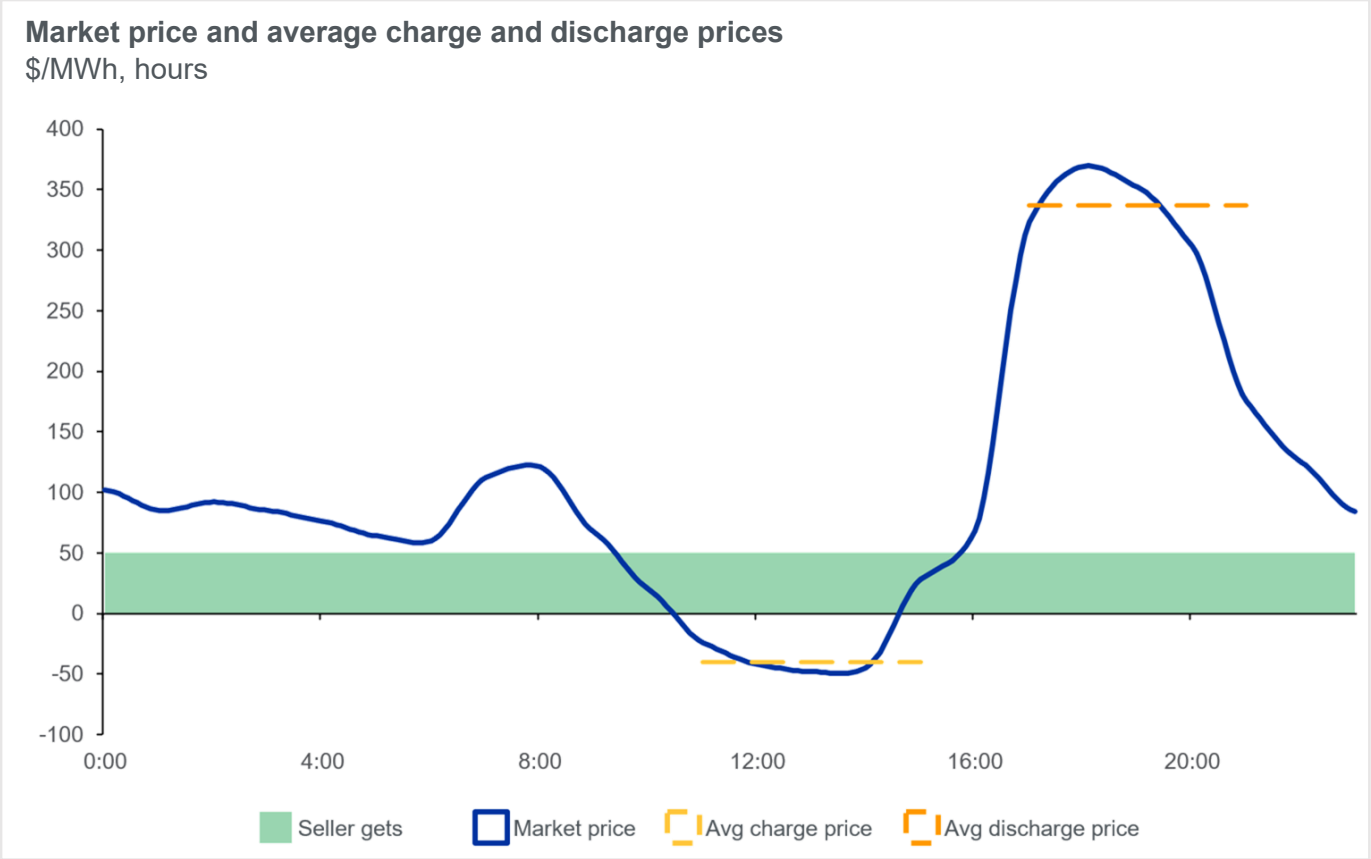


Figure 13: Market price over a day against the average charge and discharge prices (illustrative)



Each of the proposed shaping contracts is a type of high-low spread swap. The swap is a financial contract designed to manage the risk associated with shifting energy from low- to high-demand times of the day. Like bulk energy contracts, both the seller and buyer of the swap can reduce risk through reducing financial uncertainty and volatility of payments. The daily spread price the seller pays mirrors the price it receives for operating a battery in the wholesale market, and receiving this payment may offset the buyer's cost of electricity in the wholesale market.

There are several variations for the types of swaps considered:

- **Fixed time-of-day block spread (nominated blocks)** contracts exchange payments based on the price difference between specified time-of-day blocks, with the relevant blocks nominated in advance (e.g., nominated one year ahead). Nominating blocks well in advance provides predictability for sellers and supports their ability to manage price risk but may offer less precise protection for buyers if actual periods of high and low prices differ from those nominated.
- **Evening peak block** contracts use a time-of-day block swap covering a fixed evening period, with the spread measured against a $0/MWh floor. The fixed evening period provides a relatively simple and predictable structure for sellers, reflecting the historical consistency of evening price peaks. However, buyers remain exposed to price risks where periods of elevated prices fall outside the predefined evening block.
- **High-low contiguous spread** contracts settle based on the difference between high and low electricity prices on an ex-post basis, using the highest-priced contiguous time block to determine the high-price component of the spread. By reflecting actual market prices determined ex-post, these contracts provide more targeted and certain protection for buyers against variations in intraday electricity prices. They also have the advantage that asset operators have a strong

incentive to align operations to their best real-time estimates of when actual high and low time blocks will occur. However, the uncertainty around which periods will experience the highest prices makes the contract more challenging for sellers to hedge, with the potential for significant settlement exposure.

Shaping contract design choices

A key trade-off across the three shaping contract types is between simplicity and predictability for sellers and the effectiveness of price risk protection for buyers. Five considerations underpin this trade-off:

1. **Ex-ante versus ex-post settlement:** Ex-ante structures, such as fixed or nominated time blocks, make payments more predictable for sellers but may miss periods of high prices. Ex-post contracts settle on actual price differences, giving buyers more targeted protection and providing sellers with the strongest incentive to align operations with their best real-time estimates of high- and low-price intervals. However, ex-post settlement would expose sellers to charge and discharge blocks that would only be known after the event, meaning operators could face very large short-term losses. This was considered a material barrier that would mean ex-post structures were not sufficiently bankable.
2. **Contiguous versus split blocks:** charge and discharge blocks could be contiguous or may be allowed to occur at non-contiguous intervals throughout the day. Options ranged from a single charge block and a single discharge block to a small number of blocks (for example, two of each per day), to more granular intervals. The trade-off is between accurately capturing the day's highs and lows and giving operators enough flexibility to reliably capture those intervals.
3. **Price versus demand as the basis for setting blocks:** The charge and discharge blocks of the swap may be measured directly based on price forecasts or based on forecast demand. For an ex-ante contract, price was considered a poor basis for settlement given the potential for the operation of batteries to change the expected timing of forecast high- and low-priced periods. Demand-based measures, in particular residual demand (operational demand less wind and solar generation), were seen as more practical because they reflect system capacity, including how this will evolve over time as the system goes through transition. Using residual demand also limits the potential for market price distortions to arise from assets' behaviour in response to contract incentives.
4. **Setting the nominations and shaping periods:** Several choices are available in relation to setting the nominations and shaping periods. An initial consideration is how far in advance to fix time blocks for measuring the intra-day price spread. Fixing blocks far in advance of settlement allowed for more operational planning time for sellers but carried a greater risk of blocks not aligning to high and low-price intervals so providing a poor hedge for buyers. Day-ahead blocks were seen to provide the best coverage for buyers from the ex-ante options. A further consideration was the daily shaping period, with multiple considerations including timing the window to reduce the chance of overlapping with a charge or discharge block, market data release timing and market precedents.
5. **Block duration:** A key consideration for shaping products will be the duration of charge and discharge blocks. Blocks could potentially vary from short windows of one to two hours up to longer windows of up to eight hours. Windows shorter than a couple of hours may be more difficult for assets to follow and play a less useful role in shifting load. Longer-duration products over eight hours may not produce a meaningful daily spread price and may intersect with the operation of cap products. Subject to maintaining sufficient liquidity, the ESEM administrator could procure products with different durations, e.g., contracts for four- and six-hour batteries procured in a single procurement round. These decisions would be made by the administrator.

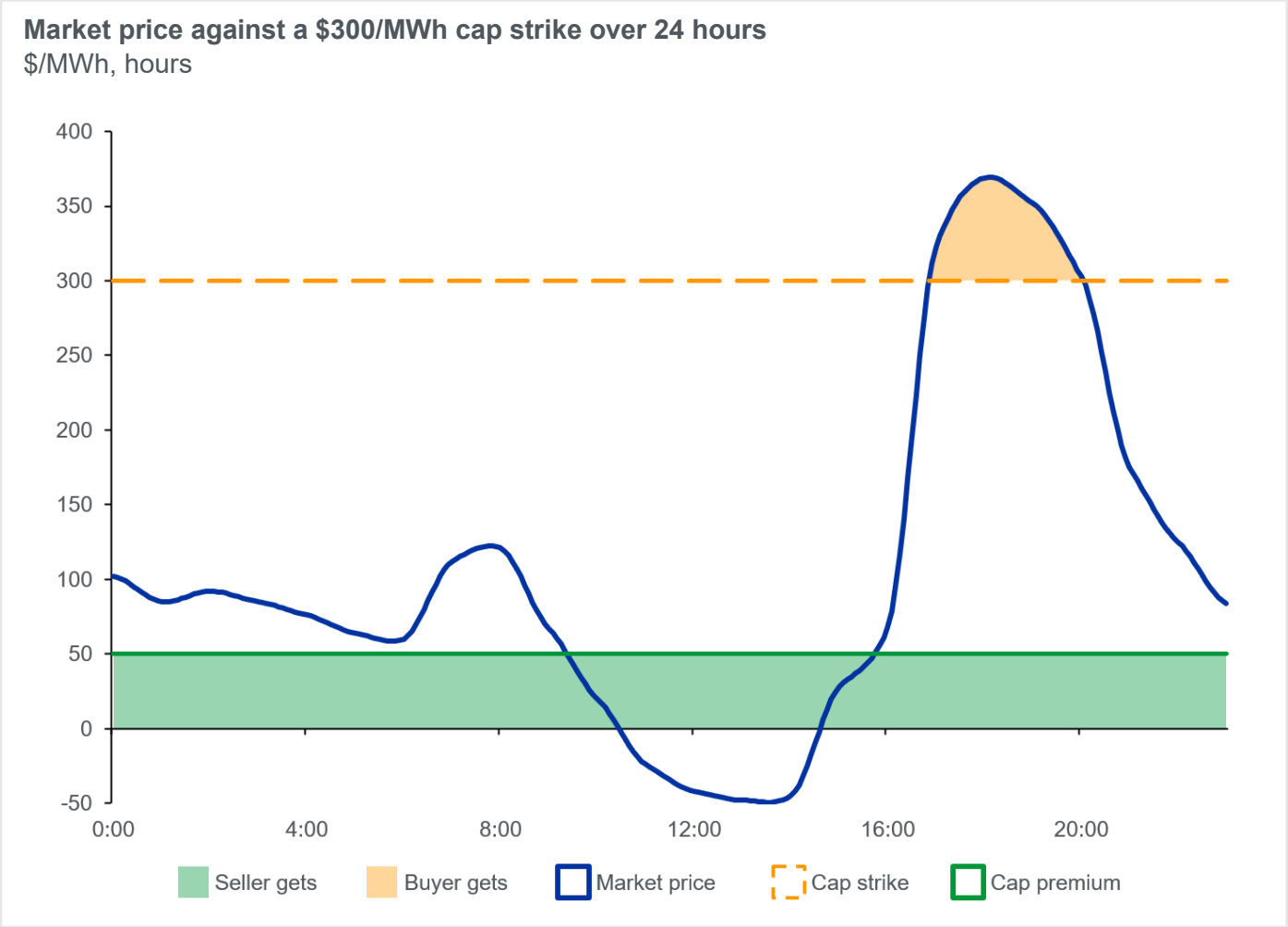
The preferred contract structure is ex-ante, provides the option of up to two contiguous charge blocks and two contiguous discharge blocks each day, uses residual demand as the basis for setting charge and discharge blocks and has a Daily Shaping Period from 16:05 to 16:00. It is assumed the duration of charge and discharge blocks over the course of the day may range from around 2 hours to up to 8 hours, though this is not explicitly specified and contracts with different duration windows may be considered subject to market needs.

Firming contract types

Firming contracts are designed to manage financial risks associated with periods of elevated wholesale electricity prices. These contracts operate like insurance, where buyers pay sellers a premium in exchange for financial protection when wholesale prices exceed an agreed threshold (the strike price), based on the difference between the two prices. Five strike prices were considered ($200, $300, $600, $1,500 and $5,000/MWh).

For each strike price, the cap is activated once the spot market price rises above it, at which point the seller pays the buyer the difference. While the spot price is at or below the strike, no payment is made.

Figure 14: Strike cap contract payoffs to buyer and seller over a day (illustrative)



Firming contract design choices

The primary difference between these contracts is the level of price protection provided and the associated cost and risk. The level of price protection provided to buyers, the premiums they pay and the potential payout obligations for sellers vary across strike prices:

- **Lower strike prices ($200–$300/MWh)** provide broader protection for buyers but attract higher premiums and expose sellers to more frequent and substantial payouts, particularly during plant outages. Buyers also face counterparty credit risk if sellers cannot meet their obligations. The $200 cap provides the broadest protection at the highest premium, while the $300 cap is an established, exchange-listed and highly liquid market product.
- **The $600/MWh strike price** provides protection against typical scarcity events at a lower premium and with reduced seller payout risk. Its alignment with the administered price cap (APC)[7] means sellers have no payout obligations during administered pricing, although buyers remain exposed to prices below $600/MWh.
- **Higher strike prices ($1,500–$5,000/MWh)** attract lower premiums and expose sellers to fewer payouts but provide narrower protection for buyers. The $1,500 cap covers more severe price spikes, while the $5,000 cap covers rare, isolated events. Both may cease paying out during sustained high-price events if the cumulative price threshold (CPT) triggers administered pricing.

Contract types and interdependencies between contract choices

Buyers combine hedging contract types to manage price and volume risks across their consumption profiles. Products operating in the current market include baseload swaps, peak swaps and caps, amongst others. These products reflect a market dominated by coal and gas generation and may be combined to provide a price and volume hedge that is matched to an energy user's load shape.

As wind, solar and storage come to make up a larger share of the energy supply in the NEM, the alternative contract structures being considered through this process and elsewhere reflect their different operating characteristics. The Working Group noted that retailers build portfolios of positions to manage financial risk, and that approaches to contracting and hedging differ based on each retailer's strategy, generation assets and customer portfolio.

The ESEM contracts are not intended to be the only contracts used in the market. They can complement existing products and have been designed to complement each other, so that buyers can combine them to meet their energy risk management needs.

The set of ESEM contracts will operate in parallel with existing contract types. Bilateral or bespoke PPAs, virtual tolling, caps and other contract types may continue to operate alongside the introduction of the ESEM. Intermediaries may also have a role in restructuring long-term contracts into other load shapes, such as baseload swaps, morning and evening peak swaps or super peak contracts. The Working Group considered that the fungibility of ESEM contracts supports the development of liquid secondary markets, and that intermediaries will continue to repackage ESEM products into structures that meet buyers' needs.

The set of ESEM contracts has also been designed for contracts to complement each other and operate effectively as a set. For example, the $600 cap price on the bulk energy contract aligns with the strike price for the cap. This design provides protection for sellers against basis risk during high price events while giving buyers the ability to more precisely hedge volumes using caps without risking duplication of cap price coverage.

It is further recognised that there may be some electricity services that are not covered by the set of initial ESEM contracts that have been developed through this process. Services that may not be supported to the

[7] The cumulative price threshold (CPT) is the rolling sum of 5-minute spot prices over the preceding 7 days, set at a level equivalent to a number of hours at the market price cap (7.5 hours in mid-2026, rising to 8.5 hours by 2027). When the CPT is breached, AEMO applies the APC of $600/MWh, which holds spot prices at that level until prices ease.

extent required for overall market operations or to meet jurisdictional requirements may be covered through new ESEM contract types developed in future or be covered by complementary policy mechanisms if required.

Implementation considerations and required future work

The Working Group's responsibility was limited to contract design, so ESEM and MMO policy design, legislative drafting and detailed implementation planning sit with other NEM Review bodies. This section sets out the issues discussed but not resolved, or outside the Working Group's scope, that need further work. Force majeure protections, contract recycling and market-making arrangements are being progressed in parallel and, while important to implementation, fall outside the scope of this co-design process.

Some of the design issues outlined below will be addressed during Phase 2 of the co-design process. A short outline of Phase 2 is included at the end of this section.

Index design for bulk energy products

Aligning on a final index design is the main remaining design item for the bulk energy contract. The Working Group considered key design choices to establish the operability of the proposed bulk energy contract. Several aspects require further development before implementation.

- **Index calculation methodology:** The Working Group considered using actual dispatched generation, forecast generation availability or synthetic generation output as the index's underlying measure. Further work is required to finalise the methodology, including how curtailment and dispatch behaviour are reflected.
- **Reference fleet composition:** The proposed index is based on a regional, technology-specific reference fleet. Detailed rules are required on which projects qualify for inclusion, whether minimum capacity or commissioning-date thresholds apply, and how individual projects are weighted to avoid excessive influence from larger assets.
- **RRF updates:** Further work is required to determine how new projects, retirements and outages are reflected in the RRF, including the timing of updates and how the RRF evolves over the contract term. These choices affect the stability of settlement volumes and the extent of basis risk borne by participants.
- **Index administration and governance:** Arrangements for calculating, maintaining and publishing the index need to be established, including data sources, verification requirements and procedures for managing methodology changes over long contract tenors. The intention of the Working Group is that the methodology for the RRI would remain consistent without any significant future change. Changes within contracts would not be acceptable, as they may materially impact the value of contracts and multiple indices for different contracts would reduce liquidity in the secondary market.
- **Hybrid projects:** The Working Group considered whether hybrid projects could be included in the RRF, noting that unless the output of generation could be measured independently from the other components of the system the project may distort the index.

Aligning on the final RRI design will form a significant part of the next phase of the contract design process. The Working Group formed an initial view that generators included in the RRF should be at least 30MW and that a cap on the weighting of large projects should limit their weighting to a maximum of 10% of the RRF. Further work is required to define how hybrid projects are included in the RRF but the Working Group's preferred position is that the renewable generation component should be included in the RRF where it can be separately measured.

Offtake market limitations and implications for the tenor gap and in-market period

The NEM Review proposed the ESEM as a solution to the tenor gap. At the time the mechanism was proposed, it was assumed that commercially attractive projects would secure market-based offtake for an initial in-market period. Securing longer-term offtake was assumed to be more challenging due to a structural mismatch in tenor preferences between buyers and sellers.

Consultation highlighted that new projects are currently facing challenges securing offtake in the market, even in their early years. Although outside the Terms of Reference, stakeholders shared a range of perspectives about this emerging dynamic::

- Auction designers will need to carefully consider the required in-market period and may need to consider shortening the period to reflect market conditions.
- Auction designers will also need to consider the duration of ESEM contracts, with some views that support should be long-dated (e.g., 20-year tenors).
- The lead time from the ESEM tender processes (prior to financial close) to projects reaching commercial operation exacerbate challenges with offtake as buyers typically prefer to procure offtake with shorter lead times to commencement.
- If there is a systemic shortage of contracted offtake during the in-market period, this may be reflected in higher ESEM contract prices, create bankability barriers that limit project supply or both.
- A shorter (or waived) in-market period would reposition the role of the ESEM from a tenor support mechanism to a more substantive funding mechanism for a progressively larger share of projects in the market. This should be explicitly considered through the detailed design process and in subsequent market analysis.
- Some buyers highlighted the importance of an in-market period requirement to preserve signals and incentives for efficient project selection.

Multiple stakeholders explicitly raised shifting expectations on the tenor gap and in-market period over the course of the co-design process and it is expected these perspectives will need to be explored further.

Nominations process design for shaping products

The proposed dynamic nomination approach for the DDBS swap introduces some new operational requirements and implementation arrangements that will require further development. The datasets used to forecast and calculate residual demand will need to be more clearly defined – it is expected these will be based on AEMO forecast data but the precise data will need to be specified. The parties and platforms responsible for the daily calculation and publication of nominated block periods will also need to be defined.

It may be possible for the timing of the Daily Shaping Periods to be amended over time to reflect market conditions without this change materially impacting contract value. To enable this, the approach to setting or updating the Daily Shaping Period should be defined in advance. Further consideration may also be warranted for whether a mechanism may be required to limit the potential for inverse settlement on days where prices in the ex-ante nominated charge and discharge blocks differ substantially from ex-post settlement prices.

Interdependencies between the cap strike price and other regulatory settings

The proposed $600/MWh cap strike price aligns with the existing Administered Price Cap (APC) in the NEM. Administered pricing limits spot prices to $600/MWh if sustained periods of high prices in the NEM breach a set Cumulative Price Threshold. This would reduce payouts under higher-strike contracts during sustained high-price periods.

The Working Group considered explicitly linking the $600/MWh strike to the APC but preferred a fixed strike, given the importance of the strike price to contract value, and uncertainty that a linked price would create for both buyers and sellers. Further consideration may be needed on the implications for the ESEM cap product if the APC were to be amended in future, including implications for buyer protection, seller risk and contract value. The cap strike was also selected to align with other ESEM contract types, most notably the $600/MWh cap on bulk energy contracts.

Considerations for hybrid projects

The treatment of hybrid projects, particularly solar hybrids, requires further consideration to support their participation in the ESEM while preserving the integrity of the RRF used for bulk energy contract settlement.

- **Eligibility for ESEM contracts:** Further clarity is required on tender eligibility for hybrid projects, including whether they can participate concurrently across bulk energy, shaping and firming products, and any associated metering requirements.
- **Inclusion in the RRF:** The Working Group's direction is that hybrid projects may be included where the renewable component can be separately measured, which will likely require a separate DUID for the renewable and storage components. Including storage output could weaken the index's alignment with the underlying renewable generation profile and increase seller basis risk, while excluding hybrids could reduce the index's representativeness as hybrid deployment increases. Further work is required to define how this applies in each region and technology, and to manage the basis risk that including hybrids could add.
- **ESEM tender offer structure:** While outside the Terms of Reference, the Working Group took the position that it should be possible for projects to submit contingent offers for multiple services to enable hybrid projects to effectively participate in the tender. It is envisioned that projects may commonly bid for both bulk energy and shaping contracts within a combined bid structure. There were some concerns raised that projects offered multiple contracts may face challenges to co-optimise production to reduce basis risk while subject to an export limit on the projects' combined capacity. This issue may warrant further consideration when considering the inclusion of hybrid projects in the RRF but may also be a factor to be managed by sellers when determining optimal levels of contract coverage.

Force majeure protections on financial derivative contracts

Force majeure was consistently raised over the course of the co-design process as an essential contract feature to enable bankability. A force majeure event is an extraordinary event or circumstance beyond a party's reasonable control that prevents or delays performance, and which could not have been overcome by reasonable diligence. Examples of force majeure events could include natural catastrophes, network outages, market disruptions or cyber-attacks. Many force majeure events are also only partially insurable or uninsurable, leaving residual risk largely with project owners.

Force majeure applies differently to contracts that are linked to the physical delivery of energy than to contracts that are based on financial settlement. ESEM contracts will be subject to financial settlement based on the index performance, rather than being linked to a particular physical asset. This means that to providing force majeure protections currently contained within the contract for a PPA would require complementary policy support and need to be addressed bilaterally between the seller and an ESEM administrative entity.

It was recognised both within the Working Group and through consultation processes that force majeure protections were required for contracts to be bankable as a lack of protection could result in large, unexpected losses during force majeure events. A particular concern was the treatment of network outages, where a downstream failure outside the control of the generator could cut off access to the energy market for an extended period. This would be beyond the control of the project but could potentially drive large financial losses over an extended outage period.

In the final workshop, a proposed approach to force majeure relief for ESEM projects was presented by the DCCEEW team. The proposed approach was presented as a draft position for consideration and centred on three principles:

- Focus only on risks that cannot be reasonably addressed by the market.
- Maintain risk management signals where possible. As an example, this may mean projects are not protected against grid congestion, as projects should be incentivised to locate in areas less likely to suffer from congestion.
- Only provide relief against contracted obligations, such that projects would be relieved of obligations to make payments during a force majeure event but not receive payments.

It was also recognised that current government procurement processes, such as the Capacity Investment Scheme, provide guidance on appropriate terms of force majeure protections. This approach was accepted as an appropriate starting point for policy development. The proposed solution involved an entity that could enter into bilaterial force majeure protections for individual projects, as a separate but complementary scheme to the ESEM. Force majeure provisions would need to be appropriately defined within a bilateral contract between the seller and such an entity to render such contracts bankable.

Contract administration and asset recycling considerations

The proposed contracts are intended to support ESEM contract recycling and potential future MMO. The ESEM administrator will recycle ESEM contracts into the market – that is, resell contracts on-market to buyers over time. Further work is required to design trading and auction arrangements, which fall outside the Working Group’s Terms of Reference.

The NEM Review recommended that the AER would designate contracts to be used under Market Making Obligations (MMO). The AER may designate contract types it determines are necessary, which may include the ESEM contracts or other contract types. Further assessment is required of the proposed bulk energy and shaping products' liquidity, tradability and interoperability once the details of the MMO mechanism and asset recycling processes are more advanced. The Working Group considered the contracts broadly workable for these purposes, although detailed arrangements fall outside its scope and are being developed in parallel.

It is expected that the AER will establish trading volumes, bid-offer spreads, trading periods, approved platforms and participant obligations, which will determine how the contracts can be traded in practice.

Phase 2 of the co-design process

The Working Group is working towards providing final contract templates (for example, a template confirmation for use with the 2002 ISDA Master Agreement). These documents will likely be developed in close consultation with legal experts (such as AFMA's Documentation Committee). Development of final contract templates is anticipated to require approximately four months, commencing upon completion of Phase 1.

The Convening Group will engage legal support for the development of the long-form contracts. The Convening Group is expected to seek formal feedback from the Working Group and a recommendation on the proposed draft long-form contracts prior to the mid-2027 ECMC meeting.

An ESEM administrative entity (once appointed) will be responsible for designating and publishing contracts following recommendations from the Working Group.

Reflections on the industry co-design process

Building trust between industry and government

The co-design process demonstrated the value of collaboration between industry and the public sector in policy design and reform. Beyond producing commercially grounded recommendations, it helped build trust between industry and government. The Working Group retained genuine ownership of its recommendations, with the Convening Group providing support and policy guidance. This gave both parties a shared stake in the outcome. It also established a constructive working relationship that should serve ESEM implementation and future reform processes well.

Importance of transparency and industry engagement

Transparency and industry engagement were central to ensuring the co-design process reflected a broad range of industry perspectives and maintained stakeholder confidence. The Working Group adopted a structured approach, including circulating meeting minutes, identifying issues requiring external input and undertaking targeted consultation with relevant industry participants. Public webinars, written responses to questions and a structured industry consultation process gave the broader sector visibility of the Working Group's reasoning as it developed.

Working Group members brought deep expertise across market trading, portfolio planning, energy procurement, project development and financing. Just as importantly, their networks across industry groups, energy businesses, advisory firms and academic institutions extended the reach of the consultation well beyond its formal channels. This enabled industry feedback to inform contract design in real time while maintaining a focused and efficient decision-making process. It also helped ensure the final contract recommendations were both commercially relevant and practical to implement.

Reflections and lessons on establishing effective co-design processes

The effectiveness of the process relied on foundations agreed at the first workshop and revisited throughout. Members were briefed on their obligations under competition and consumer law, including restrictions on sharing competitively sensitive information, and discussions were held under Chatham House rules. The Working Group also agreed principles for how it would work together. These centred on a public purpose mindset, ownership of the recommendations, constructive participation and openness.

A staged workplan and clearly defined roles gave members a shared understanding of the process and its intended outcomes. The independent facilitators led the process but did not hold voting rights or advocate for particular positions, which supported balanced discussion across the perspectives represented.

Working within time constraints

The time available for the process was both helpful and challenging. The compressed timetable of six workshops between May and November 2026 forced the Working Group to focus on the design choices that mattered most. However, even the expanded program of workshops, intersessional forums and industry consultation occasionally felt rushed, particularly where complex design questions required industry input within short windows. Given the urgency of enabling new investment through the first ESEM

tender, more time was not an option. Future processes facing similar urgency should front-load consultation on the most complex design questions.

Balancing strategic framing and analysis

Thoughtful analysis was crucial to the process. An analytical basis for key design choices strengthened confidence in the recommendations, and the analytical support provided through the Convening Group was both necessary and highly valuable. However, there was a right time to bring in the analysis. The early workshops were devoted to a thorough qualitative framing of the needs each contract must serve, the evaluation criteria and the relative merits of candidate contract structures. Because this strategic framing came first, the analysis commissioned after Workshop 2 could be targeted at the questions that genuinely distinguished between options, rather than attempting to analyse every option exhaustively. Striking this balance between strategic framing and targeted analysis is an important lesson for future co-design processes.

Reaching consensus and reflecting minority views

The Working Group sought to reach decisions by consensus. Members contributed the perspectives of their organisations and sectors while considering the effects of design choices across the market.

Surveys and polling were used within workshops and in advance to test the range of views, identify areas of alignment and confirm preferred positions following discussion. These tools informed discussion rather than serving as firm evidence for a particular design choice. Strong dissenting views were discussed before the group aligned on a final position. The group remained open to presenting split opinions where there were strongly held differences that could not be resolved. However, in all cases the Working Group found a path to a preferred recommendation, even where that recommendation did not represent every Working Group member’s preferred position. Where there was a view that issues would benefit from additional analysis or review subject to additional information on other aspects of the NEM Review implementation or related work, this has been noted.

Appendices and background materials

Appendix A: Glossary

This glossary explains the key terms and acronyms used in this report. Definitions describe how each term is used in the context of the ESEM contract co-design process.

Term	Definition
Administered price cap (APC)	The limit on spot prices ($600/MWh) that applies in the NEM during administered pricing, which is triggered when the cumulative price threshold is breached.
AEMO	The Australian Energy Market Operator, which operates the NEM and sets the spot price for each trading interval.
AER	The Australian Energy Regulator. The AER participated in the Convening Group as an observer and will designate contracts for market making under the MMO.
ASL	AusEnergy Services Limited, which, together with DCCEEW, convened the Working Group.
Bankability	The extent to which a contract supports reasonable financing terms for new projects, by giving sellers sufficient revenue certainty.
Basis risk	The risk that the output or revenue of a seller's generator differs from the reference used to calculate contract payments, such as a reference index or predefined time blocks.
Bulk energy	One of the three ESEM services: the capability to generate zero-emissions electricity. Bulk energy contracts manage the price and volume risks of variable wind and solar generation.
Cap contract	A contract under which the buyer pays the seller a premium and, when the spot price rises above the strike price, receives the difference between the spot price and the strike price.
Contiguous	Consecutive time intervals forming a single, uninterrupted block. A high-low contiguous spread measures the highest and lowest prices over the highest- and lowest-priced contiguous time blocks.
Contract recycling	The process by which the ESEM administrator sells ESEM contracts back into the market, so that they can be accessed by a wider pool of buyers.
Convening Group	The industry-led contract co-design process was convened by DCCEEW and ASL, with the AER participating in an observer role. The Convening Group supported the Working Group's operations.
Cumulative price threshold (CPT)	A threshold on cumulative spot prices over a set period which, when breached, triggers administered pricing.
Daily Dynamic Block Spread swap	The Working Group's preferred shaping contract. Charge and discharge blocks are identified in advance using forecast residual demand, and the contract settles against the realised price difference between those blocks.

Term	Definition
DCCEEW	The Australian Government Department of Climate Change, Energy, the Environment and Water, which co-convened the Working Group.
Derivative contract	A financial contract whose payments are determined by reference to a market price or index, rather than by physical delivery of electricity.
ECMC	The Energy and Climate Ministerial Council, which commissioned the NEM Review.
ESEM	The Electricity Services Entry Mechanism, a NEM Review recommendation to support the entry of new electricity services into the market through a tender for standardised contracts.
Ex-ante	Specified in advance of settlement, such as contract volumes or time periods that are fixed or nominated before the settlement period.
Ex-post	Calculated retrospectively after the settlement period, based on actual outcomes.
Ex-post RRPPA swap	The Working Group's preferred bulk energy contract. The Regional Reference Power Purchase Agreement swap exchanges a fixed strike price for the floating Regional Reference Price, applied to a volume derived retrospectively from the RRI.
Firming	One of the three ESEM services: dispatchable capacity that can be called on during periods of high prices. Firming contracts manage the risk of high spot prices for buyers.
Force majeure	An extraordinary event or circumstance beyond a party's reasonable control that prevents or delays performance, and which could not have been overcome by reasonable diligence.
Fungible	Standardised and interchangeable, so that a contract can be traded, recycled and combined with others without reference to a particular project or counterparty.
Idiosyncratic risk	Risk that is specific to an individual asset or project, rather than shared across the broader market or reference fleet.
Market Making Obligation (MMO)	A NEM Review recommendation that designated market participants may be subject to market-making requirements, such as trading volumes and bid-offer spreads, to support market liquidity and price transparency.
NEM	The National Electricity Market.
NEM Review	The National Electricity Market Wholesale Market Settings Review, commissioned by the ECMC, which delivered its final report in December 2025.
PPA	Power purchase agreement: a long-term contract under which a buyer purchases electricity from a generator.
Price floor	A negative-price provision that sets a minimum price for settlement. The Working Group preferred a $0/MWh price floor for the bulk energy contract.

Term	Definition
Regional Reference Fleet (RRF)	The group of wind or solar generators of a single technology type within a NEM region whose combined output (RRF output) and capacity (RRF capacity) are used to calculate the RRI.
Regional Reference Index (RRI)	An index between 0 and 1, calculated for each trading interval as RRF output divided by RRF capacity, after scaling and loss factors. It is used to derive the volumes settled under the bulk energy contract.
Regional Reference Node	The pricing point within a NEM region at which AEMO sets the regional spot price, and against which the bulk energy contract is settled. RRF output and RRF capacity are measured at this node after applying marginal and distribution loss factors (MLFs).
Regional Reference Price	The floating price under the bulk energy contract: the spot price ($/MWh) set by AEMO for a trading interval at the Regional Reference Node, subject to a cap of $600/MWh and a price floor of $0/MWh.
Residual demand	Operational demand less wind and solar generation based on pre-dispatch volumes.
Shaping	One of the three ESEM services: the capability to consume or generate from bidirectional units (such as batteries). Shaping contracts manage the risks created by differences in wholesale prices across the day.
Strike price	The price threshold in a contract. Under a cap contract, payments are made to the buyer when the spot price is above the strike price.
Swap	A derivative contract in which two parties exchange a fixed payment for a floating payment.
Systematic risk	Risk shared across the market or reference fleet, such as the shape of wind and solar generation profiles within a region.
Time-of-day block price swap	A swap that exchanges a fixed strike price for the floating market price during specified hourly blocks across the day, for a fixed volume.
Volume knock-out	A negative-price provision under which contract volume is excluded from settlement in intervals when the spot price falls below a set level, such as $0/MWh.
Volume risk	The risk that the quantity of electricity generated differs from expectations, as distinct from changes in its price.
Wind drought	A prolonged period of low wind output, sometimes referred to as a dunkelflaut (a German term for a period of low wind and solar output). Wind droughts can lead to sustained high prices that remain below the cap threshold.

Appendix B: Summary of published supporting analysis

Analysis Name	Description	Prepared by	Reference
Bulk Energy contract analysis	Analysis to assess proposed "Shape swap", "Revenue swap" and "RoP PPA" contract designs for wind projects in a potential future NSW market state.	Griffith University	Meeting 4 Attachment 1
Bulk Energy contract analysis	Analysis using historical market outcomes to model cash-flows using contemporary fixed costs to demonstrate the performance of the contract structures under consideration.	DCCEEW	Meeting 4 Attachment 2
Shaping contract analysis	Analysis to test the performance of several shaping contract design features using historical dispatch data.	ASL	Meeting 4 Attachment 3
Firming contract analysis	Analysis to compare the performance of different firming contract design features using historical dispatch data.	ASL	Meeting 4 Attachment 3
Bulk Energy contract swap tool	An illustrative tool prepared to demonstrate contract settlement calculations under select scenarios to support understanding of risk allocations of each approach.	ASL	Meeting 4 Attachment 5
Bulk Energy index modelling	Extension of analysis prepared for Meeting 4 to support the Working Group's consideration of a range of index design features.	DCCEEW	Meeting 5 Discussion Materials
Forward Looking Shaping Product Analysis	Analysis to support the selection of Daily Shaping Period intervals and defendability of back-to-back discharge periods based on a future NEM state and varying weather years.	Griffith University	Meeting 7 Attachment 2
Historical Shaping Product Analysis	Historical analysis to support the selection of Daily Shaping Period intervals and defendability of back-to-back discharge periods.	ASL	Meeting 7 Attachment 2
RRPPA Bankability Assessment	Independent bankability analysis of RRPPA design.	Baringa Partners	Final Report Attachment 2
RRPPA cash flow modelling	Cash flow modelling of proposed RRPPA in comparison to a RoP PPA.	ASL	Final Report Attachment 3
RRPPA Cash Flow Tool	Tool to support industry in understanding RRPPA product design.	Developed by ASL with input from Working Group members	Final Report Attachment 4

Analysis Name	Description	Prepared by	Reference
Illustrative Customer Load Hedging Tool	Tool to support industry in understanding the recommended contract structures and how they may be able to be used individually or as a set to hedge customer load.	WG Members supported by DCCEEW	Final Report Attachment 5