Designing the ESEM to unlock new investment

Analysis of the NEM Review's recommendations

February 2026

Clean Energy Investor Group

About CEIG

The Clean Energy Investor Group (CEIG) represents domestic and global renewable energy developers and investors, with approximately 18GW of renewable energy capacity in the NEM across 139 power stations and a combined portfolio value of more than $41 billion. CEIG members' project pipeline is estimated to be more than 150GW across Australia.

In the spirit of reconciliation, the Clean Energy Investor Group acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community.

We pay our respect to their Elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

Executive summary

CEIG supports the NEM Review Panel's findings and agrees with its assessment of the challenge facing new clean energy investment. In particular, the Panel correctly identified the key barrier as the mismatch between the long lifespans of projects and the shorter tenor of available contract terms.

However, CEIG remains concerned that the proposed design of bulk energy ESEM contracts for wind projects does not yet provide a strong investment signal. The pilot Contract Co-design Working Group focused too heavily on contract fungibility, rather than the requirements for investment entry, an issue compounded by the absence of pure-play wind developer representation.

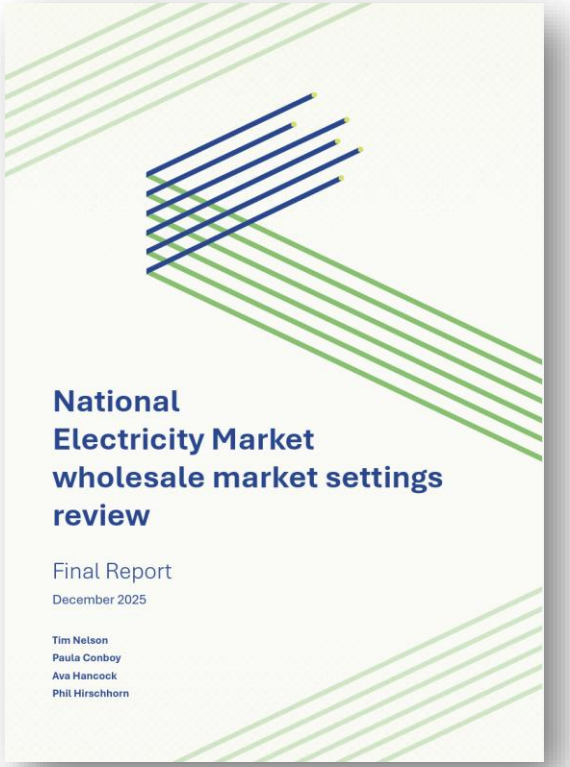
As a result, the shortlisted contracts for wind projects risk introducing new and untested risks relative to established market practice, where run-of-plant PPAs remain the standard. If left unaddressed, these issues could undermine confidence in the ESEM as a mechanism to support new wind investment.

Risks

- Shortlisted contracts for wind projects (DWA swaps, capped time-of-day blocks and baseload swaps) introduce additional cost, complexity and wind-specific risk,
- This may increase consumer costs; or
- Lead to lower participation in the ESEM if products are too complex or poorly aligned with wind developers' risk profiles.

Way forward

The 2026 contract co-design process should be industry-led, transparent, and inclusive, coordinated by the AER and ESEM Administrator, guided by the pilot learnings, and clearly focused on enabling new investment, with fungibility and other features treated as supporting considerations.



Introduction

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Introduction to the NEM Review

- Nov 2024: Australian Government commissioned an independent panel to review NEM wholesale settings, with a focus on promoting investment in firmed renewable energy and reducing price volatility.
- Aug-25: Panel released its Draft Report.
- Sep-Oct 2025: Panel co-convened a contract co-design pilot with industry, AER, and AFMA and explored contracts to manage risk in a firmed renewables system for ESEM and MMO.
- 16 Dec 2025: Final Report released with 12 core recommendations for short-, medium-, and long-term market improvements, along with Supplementary Materials provided as guidance for implementation.
- Dec-25 Ministers' response: Agreed in principle to the core recommendations, with the exception of Queensland.

Summary of CEIG's engagement

- (Dec-24 and Mar-25): Commissioned two Castalia reports (Discussion Paper & Solutions Paper)
- (Sept-25): Lodged submission to the Panel's initial consultation and Draft Report
- (Aug-25 to Nov-25): Engaged Castalia & Baringa to inform CEIG's response and ensure recommendations reflected investor realities
- (Aug-25): Established the CEIG NEM Review Working Group with CEIG Member experts
- (Aug-25 to Dec-25): Attended weekly peak body meetings with the Panel
- (Sept-25 to Oct-25): Closely engaged with the Panel's Contract Co-design Working Group process via Baringa's analysis, which has been published in the NEM Review Supplementary Materials

Documents available at www.ceig.org.au/news-resources

Context & investment trends

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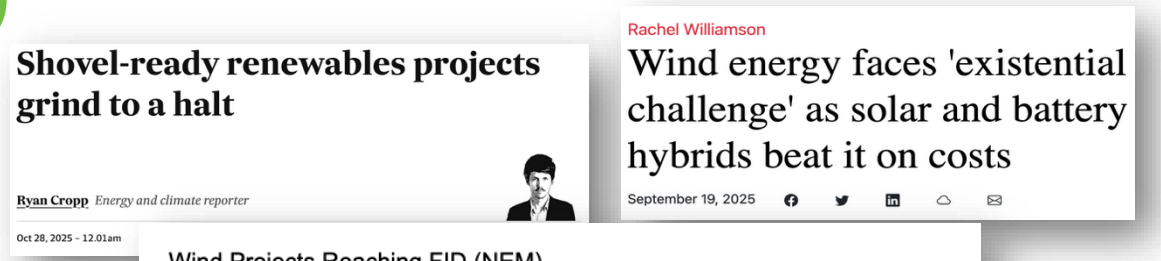
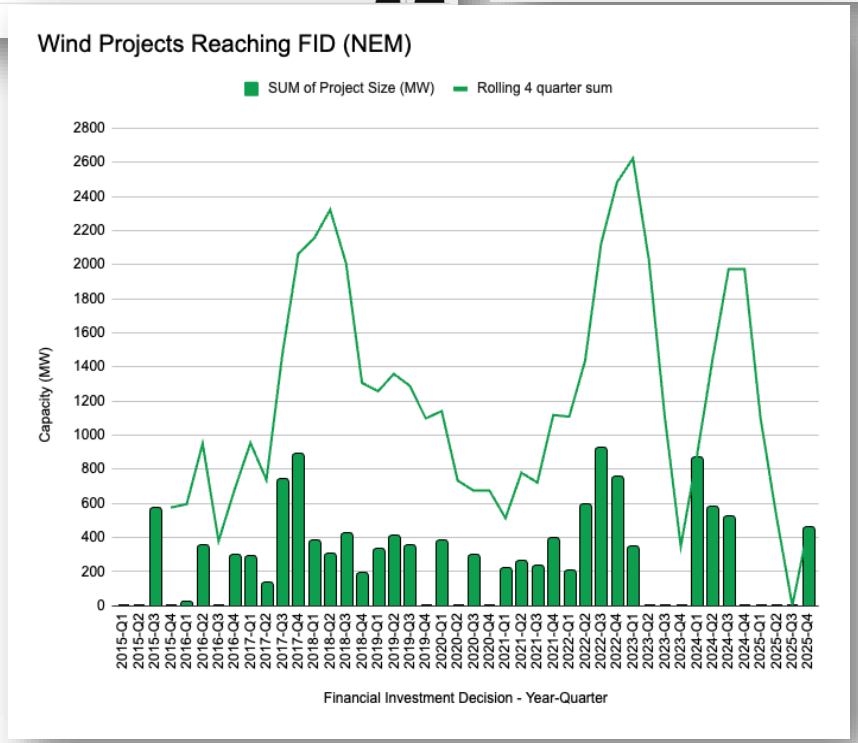
Wind not reaching FID

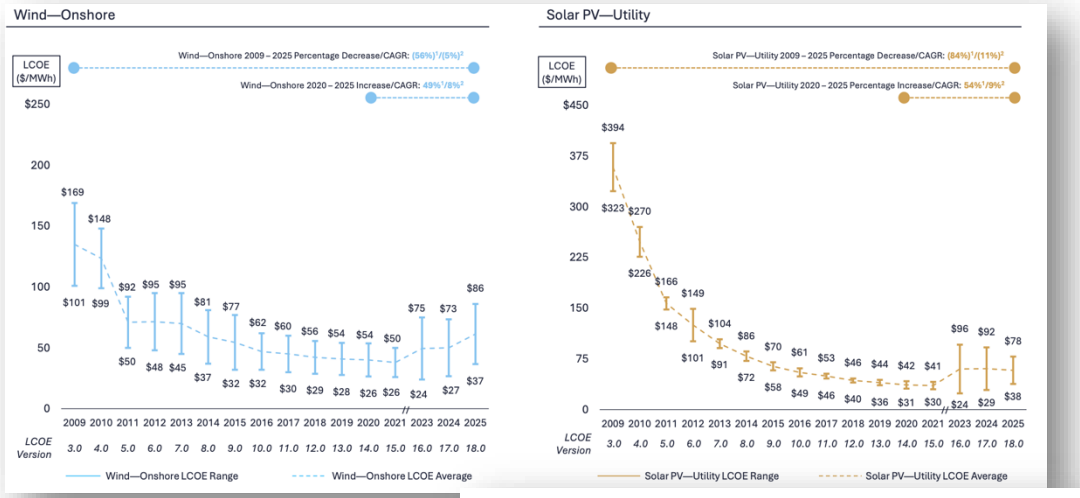
- Only 2 wind projects reached FID in 2025 in the NEM, totalling 0.46GW (down from 1.97GW in 2024)
- From 2023 through to 2025, utility-scale PV averaged 1.63GW per year reaching FID, 75% higher than wind, which averaged 0.93GW per year.
- Key barriers: Planning and regulatory delays, funding uncertainty, rising construction costs, transmission constraints.
- “What wind projects need for FID to happen is certainty, and we’re not seeing market reform happening fast enough.” - *Ty Christopher, University of Wollongong Energy Futures Network*
- Implication: getting wind contract design right is critical to unlocking investment.



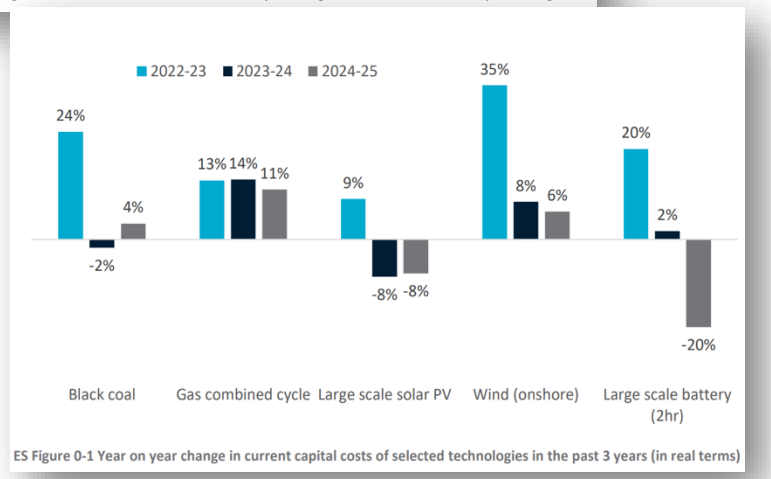


Source: Analysis using RenewMap data

Cost of wind is increasing



Source: LCOE, Lazard, June 2025



ES Figure 0-1 Year on year change in current capital costs of selected technologies in the past 3 years (in real terms)

Source: GenCost 2024-25, CSIRO, July 2025

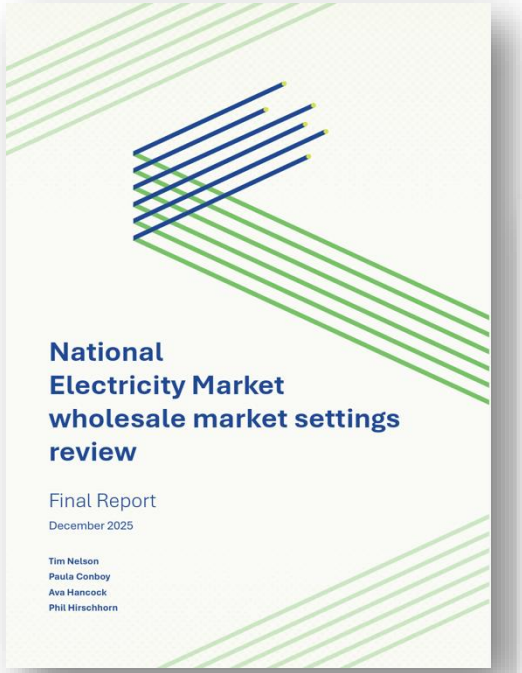
- Solar and battery capital costs continue to fall, wind costs are rising
  - Solar ↓ ~8%/yr
  - Batteries ↓ 20% (2024-25)
  - Wind ↑ 8% (2023-24), ↑ 6% (2024-25)
- Despite higher costs, wind remains essential. Grid modelling, including AEMO's ISP, shows wind is critical to achieving net zero at least cost and provides a critical complement to solar generation
- The 2025 IIO report finds that wind generation can place downward pressure on wholesale electricity prices due to its diverse generation profiles and complementarity with demand
- 1 GWh increase in wind generation can reduce daily prices by up to $1.30/MWh across major Australian markets

CEIG's position on ESEM & contract design

Clean Energy Investor Group

CEIG position

- The **key barrier to attracting new clean energy investment is the mismatch between project lifespans and available contract terms** ('tenor gap')
- Support standardised, fungible contracts on the back end to improve liquidity in the derivatives market, but **must prioritise investment entry over contract fungibility** on the front end.
- CEIG supports the shortlisted ESEM contracts for **shaping and firming services.**
- For **bulk VRE (wind)**, the proposed standardised contract structures **may introduce new risks** where contract profiles do not adequately reflect the variability of generation.
- **Transmission remains a critical enabler** for successful ESEM delivery.
- **CEIG supports running regular tender processes based on price competition,** with non-financial considerations managed outside the ESEM through complementary policy frameworks rather than merit criteria.
- **ASL should serve as ESEM Administrator,** given its deep commercial expertise and understanding of market operations and investor needs.


National Electricity Market wholesale market settings review

Final Report

December 2025

Tim Nelson
Paula Conboy
Ava Hancock
Phil Hirschhorn

Clean Energy Investor Group

50 Camberwell Road Hawthorn East VIC 3123

17 September 2025

Associate Professor Tim Nelson
Chair, NEM Review Panel
Commonwealth Government
Lodged online at: DCCEEW Consultation hub

Dear Mr Nelson,

Response to the National Electricity Market (NEM) Review Panel's draft report on the NEM wholesale market settings review

The Clean Energy Investor Group (CEIG) welcomes the opportunity to provide feedback on the NEM Review Panel's (the Panel) draft report on the draft NEM wholesale market settings review Report (the draft Report) published in August 2025.

CEIG represents domestic and global renewable energy developers and investors, with more than 16GW of installed renewable energy capacity across more than 76 power stations and a combined portfolio value of around $38 billion. CEIG members' project pipeline is estimated to be more than 46GW across Australia. CEIG strongly advocates for an efficient transition to a clean energy future on behalf of the investors who will provide the low-cost capital required for this transition.

Key Points

- **CEIG supports maintaining the current spot market,** complemented by mechanisms like the ESEM to address "missing money" and support timely entry of new generation and storage infrastructure, with incremental reforms preferred over a full redesign.
- **CEIG seeks clarity on the MMO's scope and recommends it apply mandatorily only to large generators with a retail position,** remaining voluntary for other large portfolio generators and single-asset owners, with ESEM-contracted generators exempt during their contract term.
- CEIG emphasises that **MMO design, careful management of recycled ESEM contracts, and ongoing monitoring of market movements are critical** to

1

NEM review | CEIG & Baringa perspectives on bulk energy contracting

The market benefits from a diverse and competitive developer landscape

CEIG's membership of 28 investor businesses have a combined portfolio of 11GW of operational clean energy projects across 70 power stations. ESEM contract choices can support developers

Right sizing contracting levels prior to and during the ESEM window to support financing

Noting that market PPAs remain an option, developers will seek fluency in ESEM contracts and re-balancing to anticipate cashflow variability.

Volatility, negative prices and shape risks remain key concerns for contracting

Entry of generation to supply Bulk Energy requires striking a balance of risk between sellers and buyers. The starting point risk allocation is PPAs, and ESEM contracts need to support developers, even those without portfolio risk management.

About CEIG - Clean Energy Investor Group

What ESEM contracts will be most useful for developers?

While we understand fungibility is a top priority, the starting point for bankability for Bulk Energy are PPAs. Of the fungible options, ex-post contracts offer benefits in reducing earnings variability and are a more natural fit for the uncertain generation profiles of VRE assets.

What capability will pure play developers need to operate with ESEM contracts?

While PPAs are proven, developers may need to re-balance ESEM contracting levels, trade derivatives, manage compliance, licencing, ISDAs, credit risk or exchange participation and clearing, whether directly or via partners.

Contributing to an entry mechanism

It is valuable for investors and developers to follow the progress of the Panel and Contract Co-design Working Group and to contribute their perspectives into this dynamic process.

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Summary of Contract Co-design process

Clean Energy Investor Group

Contract Co-design Working Group participants

- **Sept-Oct 2025:** the NEM Review Panel co-convened (with the AER and AFMA) a contract co-design pilot process with a working group of industry representatives, which met 4 times.
- **Firms represented on the working group:** AGL, Akaysha Energy, ANZ, ASX, Commonwealth Bank, Enel X, Iberdrola, Macquarie Bank, Hydro Tasmania/Momentum Energy, Origin Energy, SA Water and Stanwell.
- **Representation gap:** Participants in the pilot Contract Co-design Working Group were selected by the Panel, with no pure-play wind developer representation (i.e. developers whose core business and risk exposure is wind project development).
- **Lessons for future Contract Co-design Working Group:** Future Contract Co-design Working Group should have transparent, industry-led participant selection, ensuring balanced representation across technologies and investor types.
- **Wider engagement group:** The Panel also held weekly meetings with peak bodies across all elements of the NEM Review. This proved highly valuable, and CEIG would welcome this engagement continuing through the implementation phase in 2026.

Ranked list of contract attributes

Agreed contract attributes	Description
Fungible	Can be separated from any individual buyer or seller and on-sold
Simple to value	Contracts requiring a point of view on more parameters and more conditionality can be more challenging to value accurately
Works as a portfolio (modular, assessed across services)	Covers all risks when used together with other contracts in set: No gaps / No overlaps
Assigns risk to buyers and sellers based on who can best manage	Assigns risks to buyers and sellers based on who is best placed to manage, and thus preserve incentives for optimal investment/operational decisions
Adaptable to future market	Can flex as market conditions change in future
Cross-technology competition	Multiple technologies able to be compared

Key insight: High trader representation in Contract Co-design Working Group led to prioritisation of contract fungibility over investment entry.

Lesson: Revisit ESEM & contract design priorities - financeability and new investment entry must come before fungibility.

Source: NEM Review Supplementary Materials, Page 103

*Note: Financeability and whether products are useful to buyers are captured within the 'assigns risk' item

Outcomes from Workshop 2

	Bulk energy	Shaping	Firming
Ex-post*	**Reference (ex-post) dispatch-weighted average swaps**	**Heads–tails spread (aka. high-low or top-bottom)**	**Cap**
		Time-limited cap/floor	Cap with Ltd exercise events
			TWA/DWA spread
Fungible virtual ownership	Reference (ex-post) revenue swap	Standardised virtual toll	Energy limited swap
			Heat rate option
Time of day (ToD) blocks	**ToD swap (capped)**	**ToD swap (uncapped)**	**Cap**
		ToD spread	
		Time-limited cap/floor	
Fixed shape offtake ownership	Fixed profile swap	Peak/off-peak spread	
	Proxy revenue swap		
Exchange-traded today	Baseload (TWA) swap *(sold to ESEM by intermediaries)*	Morning and evening peaks *(subset of ToD swaps)*	**Cap**
Plant-specific virtual offtake/ownership	Run-of-plant PPA	Revenue swap	Toll /dispatch rights
		Virtual toll	
Non-energy	REGO offtake		

**Originally titled 'Fungible virtual offtake' this set was referred to as 'ex-post' in subsequent workshops*

CCD Working Group shortlisted bulk energy contracts:

1. DWA swap
2. Capped ToD blocks
3. Baseload swaps

Shortlisted contracts across Contract Co-design workshops 1 & 2

Source: NEM Review Supplementary Materials, Page 104

High-level assessment of bulk energy contract options

See complete Baringa assessment in Appendix

Contract type	Contract	Volume risk (sell-side)	Shape risk (sell-side)	Curtailment risk (sell-side)	Seller implications	Buyer implications
Virtual offtake	• Ex-post DWA swap	• **High volume risk** of fixed volume commitment per month vs variable plant energy yield.	• **Some shape risk** if plant profile is less valuable than reference profile	• **Low curtailment risk**. • Only exposed to lost merchant value of curtailed generation, which is typically low.	• High volume risk remains, so could be challenging for bankability (to be tested) • Need for hedging, e.g. portfolio integration or 3rd party insurance for standalone assets (weather?)	• Fungible, easy to transact • Ex-post shape complicates live trading • Firm volume easy to integrate (particularly with storage)
Virtual ownership	• Ex-post revenue swap	• **Low volume risk** of variable volume per reference MW • Exposed to differences from regional reference.	• **Some shape risk** if plant profile is less valuable than reference profile	• **Low curtailment risk**. • Only exposed to lost merchant value of curtailed generation, which is typically low.	• Lower volume and shape risk could achieve bankability (to be tested) • Single asset developers/investors may still need a third party to manage volume and shape risk	• Fungible, easy to transact • Ex-post shape complicates live trading • Non-firm volume more reliant on firming.
Time of day blocks	• ToD block swap (capped?)	• **High volume risk** of fixed volume commitment	• **High shape risk** of fixed supply against shape commitment	• **Low curtailment risk**. • Only exposed to lost merchant value of curtailed generation	• Similar but slightly better than Shaped Offtake. Easier to hedge modular/liquid blocks.	• Fungible, easy to transact. • Firm ToD blocks easier to combine with other ToD blocks (storage, firming)
Shaped offtake	• Fixed-shape swap	• **High volume risk** of fixed volume commitment	• **High shape risk** of fixed supply against shape commitment	• **Low curtailment risk**. • Only exposed to lost merchant value of curtailed generation	• Lowest bankability given volume and shape risk. Strongest need for insurance (e.g. weather) & hedging • Sophisticated investors/utilities with trading capability likely advantaged	• Fungible, easy to transact • Shaped profile firm but harder to integrate into larger portfolio
Plant specific virtual ownership	• Run-of-plant PPA	• **Some volume risk** as only paid for energy sent out	• **No shape risk** held be generator (fixed $/MWh regardless of shape)	• **High curtailment risk** (only paid for energy sent out)	• High bankability, but curtailment is a challenge (and increasing?) • High accessibility, manageable for all types of developers/investors	• Hard to firm, hard to transact. • Limited to large, sophisticated buyers
Other	• REGO offtake	• **Some volume risk** as REGOs only received for energy sent out	• **No shape risk** held be generator (fixed REGO yield regardless of shape)	• **High curtailment risk** (REGOs only generated for energy sent out)	• High bankability for underwritten green certificate • No contract support for black • High accessibility	• Voluntary demand may be insufficient, thus need new policy signal (e.g. extend LRET)

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Idiosyncratic risk comparison – developer considerations

	Operational timescale (e.g. annual)	Long timescale (e.g. 5+ years)
Revenue swap	• **Value risk** when earning less revenue ($/MW) than reference • Major underperformance (e.g. blown transformer) may cause negative PnL via contract liability, but likely insurable • **Variable volume may be better complemented by buy-side firming**	• Exposed to **falling capacity value relative to evolving reference fleet** as plant technology improves. Conversely, may benefit if reference revenue value falls (e.g. declining resource quality as favourable locations built) • Can manage exposure by adjusting contract position (carries risks if merchant share increases)
DWA swap	• **Value risk** when volume falls short of contracted volume during high wind DWAP (i.e. dunkelflaute scenario) • **Fixed volume/variable shape may be better complemented by sell-side firming, buy-side shaping**	• Exposed to **changing DWP relative to reference fleet DWP** (e.g. future larger WTGs improving DWP vs current WTGs by capturing lighter winds). Conversely, may benefit from declining DWP of reference fleet as projects forced to lower quality resource areas. • Can attempt to manage through changing volume exposure (poor hedge?)
ToD blocks	• **Shape and volume risk** against firm ToD shape • Challenges of matching ToD shape to seasonality while maintaining liquidity • May need complex active management to balance position against long-range weather forecasts and climactic drivers	• **Exposed to changing capture rate** (e.g. anticorrelation between resource availability and spot value) • May need to consider readjusting position to balance evolving risk vs return, along with changing resource availability (e.g. poorly-understood climate change impacts on cloud formation)
PPA	• **Curtailment risk** from reliance on energy sent-out (even when uneconomic)	• Exposed to changing MLF and average curtailment levels of site • Current **challenges getting PPAs with sufficient tenor**

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Outcomes from the pilot CCD process

The Panel has concluded:

- Industry-led process remains the right approach, co-convened by ESEM Administrator & AER, with CEFC as a standing participant of the group
- Determination that a set of contracts can meet the Panel's objectives (fungibility, supporting ESEM, MMO)
- Preferred bulk VRE contract: Ex-post Dispatch-Weighted Average (DWA) swap
- Contracts would only proceed subject to testing of operational, financial, and legal feasibility (i.e. contract documentation, system integration, and residual risks), noting that capped Time of day (ToD) blocks could be a workable option if issues with DWA swaps cannot be resolved

Risks from pilot Contract Co-design conclusions

- **Panel correctly identified the problem** (insufficient new investment due to tenor gap) **but has solved for a different one** (fungibility of financial contracts, rather than entry of new physical plants)
- **The Panel's shortlisted contracts** (DWA, ToD, baseload swaps) **would introduce new risks** for wind projects participating in bulk VRE ESEM contracts
- Increased risk may translate to:
  - **Higher costs** (to hedge those contracts)
  - **Low ESEM participation** if products are too complex for wind developers to engage
- Pilot Contract Co-design Working Group conclusions were reached **without input from a pure-play wind developer**, limiting consideration of wind-specific challenges
- Potential new barrier to wind investment by **introducing unnecessary cost, complexity, and risk** at a time when investment acceleration is critical

Summary CEIG recommendations

- **CEIG overall supports the NEM Review Panel's Contract Co-design Working Group findings,** including shortlisted contracts for shaping & firming.
- **One concern remains**: Wind projects need contracts that are investable and reflect wind generation profiles. DWA swap products are not commonly used for bulk energy in the market today.

Recommendations for future contract co-design process:

- **Industry-led & flexible:** the Contract Co-design Working Group should be collaborative, industry-driven, and adaptable, coordinated jointly by the ESEM Administrator (recommended: ASL) and the AER, who should facilitate rather than direct outcomes.
- **Clear framework:** Guided by transparent Terms of Reference with clear objectives, timelines, and evaluation criteria.
- **Prioritise entry:** Contract design should first and foremost enable new investment, with fungibility and other features treated as secondary considerations that support this goal.
- **Diverse representation:** Open, transparent selection reflecting all market participants (developers, retailers, offtakers, financiers, traders, demand-side, network service providers, etc). Must include >3 pure-play developers (at least 2 wind).
- **Apply learnings from contract co-design pilot process:** Carry forward process lessons, not contract outcomes. Allow sufficient time for testing and refinement, and ensure contracts are practical and financeable.

List of acronyms

- **AEMO** – Australian Energy Market Operator
- **AER** – Australian Energy Regulator
- **AFMA** – Australian Financial Markets Association
- **ASL** – AusEnergy Services
- **CEFC** – Clean Energy Finance Corporation
- **DWA** – Dispatch-Weighted Average
- **ESEM** – Electricity Services Entry Mechanism
- **FID** – Final Investment Decision
- **GW** – Gigawatt
- **IIO Report** – Infrastructure Investment Objectives Report
- **ISP** – Integrated System Plan
- **MMO** – Market Making Obligation
- **NEM** – National Electricity Market
- **PPA** – Power Purchase Agreement
- **ToD** – Time of Day
- **VRE** – Variable Renewable Energy

Appendix

Appendix 1: NEM Review Contracts Co-design – input to Working Group

NEM review

Contracts Co-Design – input to WG

Clean Energy Investor Group
October 2025

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NEM review | CEIG & Baringa perspectives on bulk energy contracting

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Input on shortlist bulk energy contracts

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Baringa high-level assessment of bulk energy contract options

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Virtual Ownership contracts as a risk management tool for developers

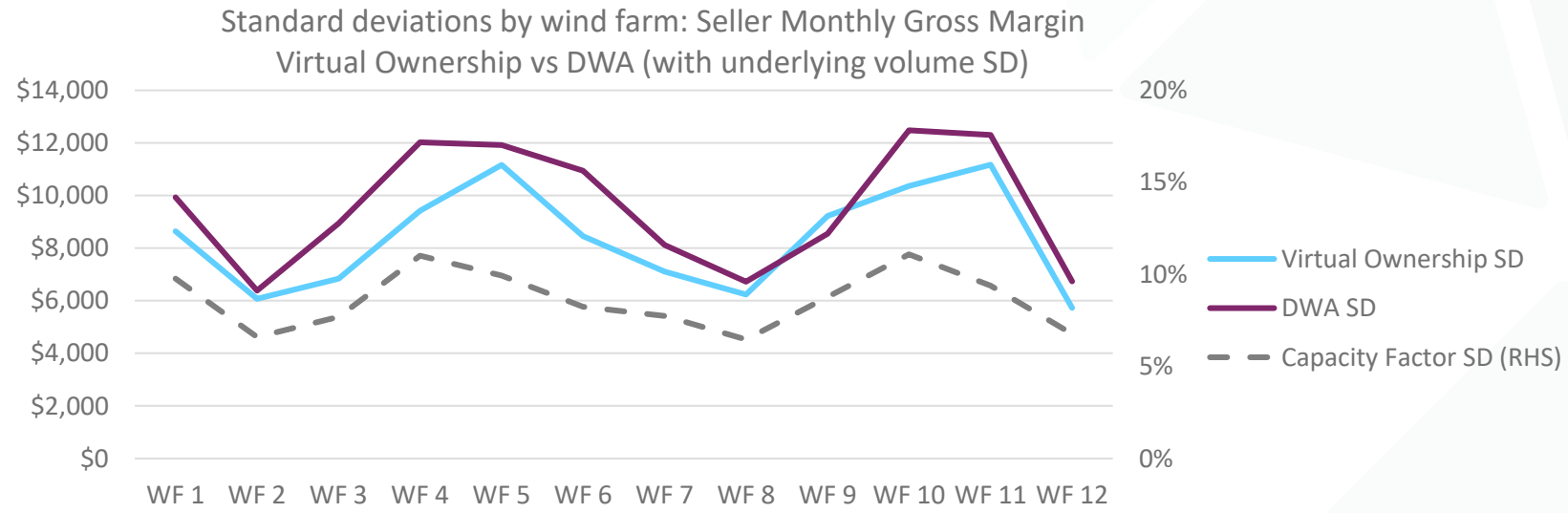
Reference ex-post revenue swap (Virtual Ownership) is **potentially the most effective quarterly cashflow hedge for sellers**[1].

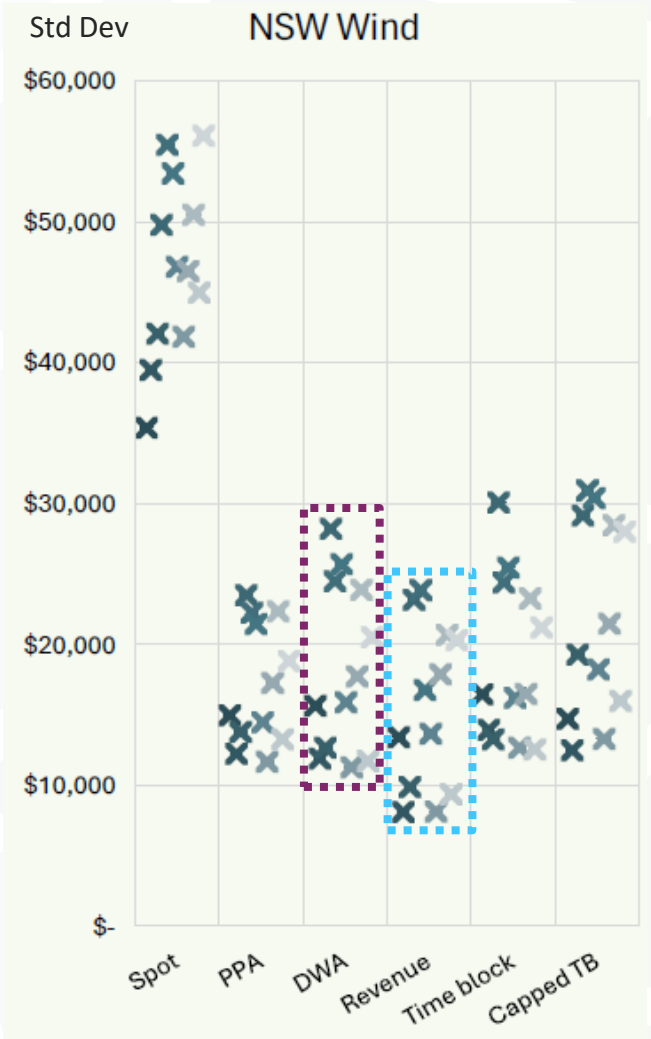
An ESEM revenue swap provides both missing money and transfer of risk from developer to ASL (assumed as the initial ESEM purchaser), particularly **Dunkelflaute** risks.

This systemic risk likely requires out of market support as a key supply risk, noting subdued merchant appetite to build assets to manage these extreme risks.

When revenue swaps are recycled, market buyers take on uncertain volume (likely discounted), and **need shaping and firming to support retail portfolios** (same as current ownership of VRE)

Favouring **DWA swaps puts Dunkelflaute risks back on to developers, adding a relative hurdle**.





1. Based on **lowest standard deviation** of quarterly Gross Margins in NSW for wind and solar in initial analysis to date.

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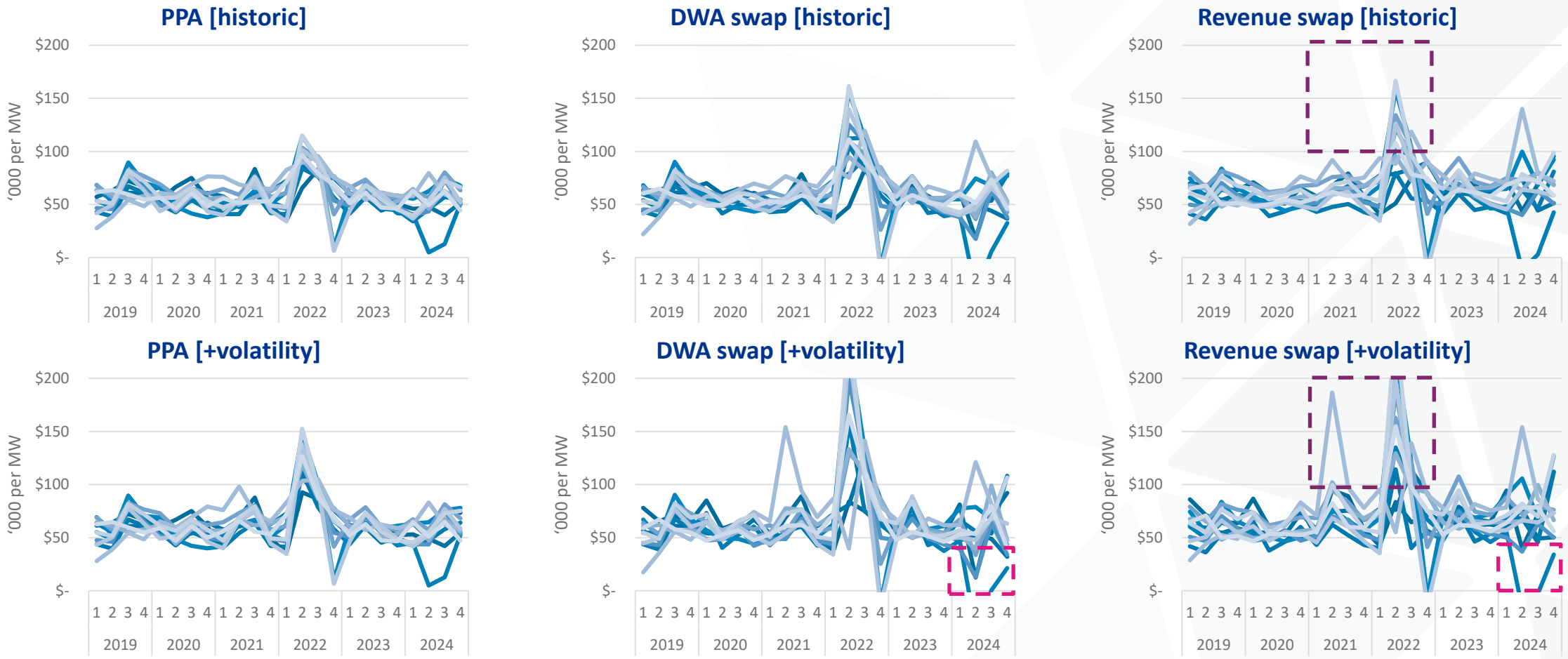
Testing volatility impacts: Equity upside potential if outage risk insured.

More **equity upside potential** from volatility in DWA swap and Revenues swap vs traditional PPA. Enhanced in '+ volatility' cases.

While plant **outages require insurance or rebalancing** to reduce risk of losses. **How do these compare for financing?**



+ volatility = Comparing NSW wind contracted GMs assuming prices >$750/MWh set to $17,000/MWh.

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Idiosyncratic risk comparison – developer considerations

	Operational timescale (e.g. annual)	Long timescale (e.g. 5+ years)
Revenue swap	• **Value risk** when earning less revenue ($/MW) than reference • Major underperformance (e.g. blown transformer) may cause negative PnL via contract liability, but likely insurable • **Variable volume may be better complemented by buy-side firming**	• Exposed to **falling capacity value relative to evolving reference fleet** as plant technology improves. Conversely, may benefit if reference revenue value falls (e.g. declining resource quality as favourable locations built) • Can manage exposure by adjusting contract position (carries risks if merchant share increases)
DWA swap	• **Value risk** when volume falls short of contracted volume during high wind DWAP (i.e. dunkelflaute scenario) • **Fixed volume/variable shape may be better complemented by sell-side firming, buy-side shaping**	• Exposed to **changing DWP relative to reference fleet DWP** (e.g. future larger WTGs improving DWP vs current WTGs by capturing lighter winds). Conversely, may benefit from declining DWP of reference fleet as projects forced to lower quality resource areas. • Can attempt to manage through changing volume exposure (poor hedge?)
ToD blocks	• **Shape and volume risk** against firm ToD shape • Challenges of matching ToD shape to seasonality while maintaining liquidity • May need complex active management to balance position against long-range weather forecasts and climactic drivers	• **Exposed to changing capture rate** (e.g. anticorrelation between resource availability and spot value) • May need to consider readjusting position to balance evolving risk vs return, along with changing resource availability (e.g. poorly-understood climate change impacts on cloud formation)
PPA	• **Curtailment risk** from reliance on energy sent-out (even when uneconomic)	• Exposed to changing MLF and average curtailment levels of site • Current **challenges getting PPAs with sufficient tenor**

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Input on TWA swaps for bulk energy

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TWA Swaps and contract design: CEIG feedback

Consistent with the original intent, the ESEM proposals should continue to support stand-alone entry of bulk energy, shaping and firming (as three distinct services)

- Hybrid assets could then sell multiple services (products) into a single auction round process
- Bundling services together into a single product – as is proposed with TWA (baseload) swaps – would be inconsistent with the intent of ESEM to procure the right volume of each of the services

Contracts that expose generators to unknown future revenue risk – such as TWA (baseload) swaps – are unacceptable for supporting single-asset entry for bulk energy

- Renewable developers are not necessarily traders or hedgers, and continued strong competition (including from pure play developers) will be important to support the scale of investment required
- Bulk energy contracts should support single-asset entry for bulk energy, without a need for additional physical shaping/firming, hedging or life-of-plant rebalancing

CEIG maintains that traditional PPAs offer the best entry mechanism for pure-play renewable developers, however if the Panel requires a fungible bulk energy contract, **CEIG recommends the 'Ex-post contract family'** as best suited to supporting entry (provided they can pass bankability hurdles):

- The Ex-post Revenue Swap is preferred due to reduced volume risk for suppliers (especially wind)
- The Ex-post DWA Swap could be acceptable, but it is less preferable due to increased volume risk

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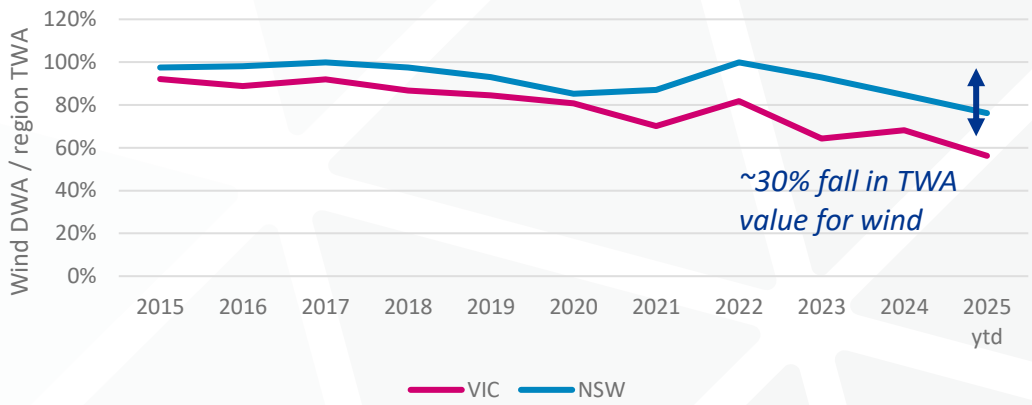
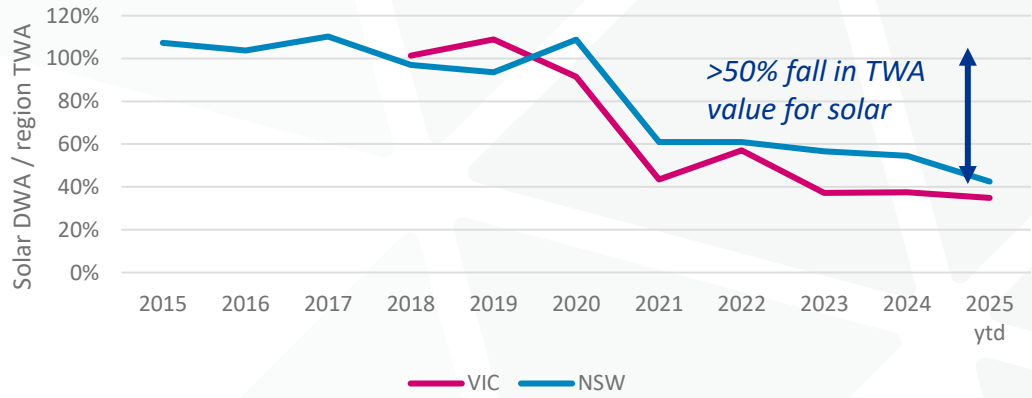
TWA swaps leave renewable sellers exposed to changing capture rates

- TWA swaps hedge against shifts in baseload (flat) energy value
- Where technology-specific dispatch-weighted average (DWA) prices move relative to TWA prices, sellers are exposed to the difference
- **Renewable DWAs have shifted significantly vs TWA prices over time, and are anticipated to shift further** relative to TWAs as coal plant retire and storage enters the market
  - TWA swaps would leave sellers exposed to these shifts
- If ESEM were to procure TWA swaps, renewable sellers would need to obtain hedging to cover DWA movements against TWA prices. Options to hedge include:
  - Self-hedge physically via integration into portfolio (e.g. sell smoothed portfolio output to ESEM, not single-asset output)
  - Seek financial hedges for DWA vs TWA value (availability unclear)

Capture rate (DWA vs TWA) of wind has fallen



Capture rate (DWA vs TWA) of solar has fallen sharply



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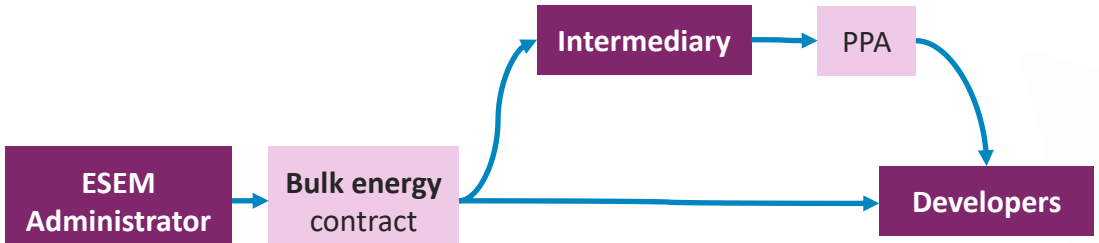
TWA swaps undermine the technology-linked benefits of bulk energy contracts, harming contract value to developers and blurring ESEM functionality

Bulk energy contracts allow developers to contract with ESEM directly



Bulk energy contracts **may be bankable** to support single renewable assets

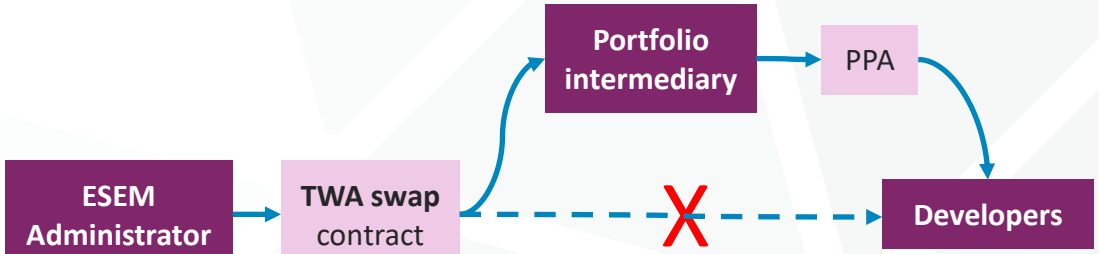
For developers

- **Multiple contracting options:** directly with ESEM or indirectly via PPA to intermediary
- Protection against **short and long term revenue variability**
- **Bankable revenue** to support debt finance (note: to be tested)

For the ESEM

- **Transparency into per-technology pricing** needed to deliver entry
- **Transparent provenance** of specific supported assets
- **Visibility into development progress** and milestones (FID etc)
- Unbundles bulk energy service from shaping and firming services, **supporting targeted service entry**

TWA Swaps support generation portfolios but not single assets



TWA swaps **likely unbankable** for single renewable assets

For developers

- Exposure to **revenue variability & volatility**
- Generators **fully exposed to falling capture rate** (DWA/TWA) over time.
- Revenue **unlikely bankable** for single asset. Bankable for portfolio of generation + shaping + firming
- Developers may be forced to contract via portfolio intermediary (e,g, IPP), **lowering competition and reducing margins**

For the ESEM

- **Less visibility into technology costs** (hidden inside portfolio)
- **Unclear link to supported assets** (hidden inside portfolio). May need to include e.g. REGO handover to ensure support goes to renewables.
- Flat TWA swaps bundle energy, shaping and firming services into a single service contract: **limited ability for ESEM to target specific energy services for entry**

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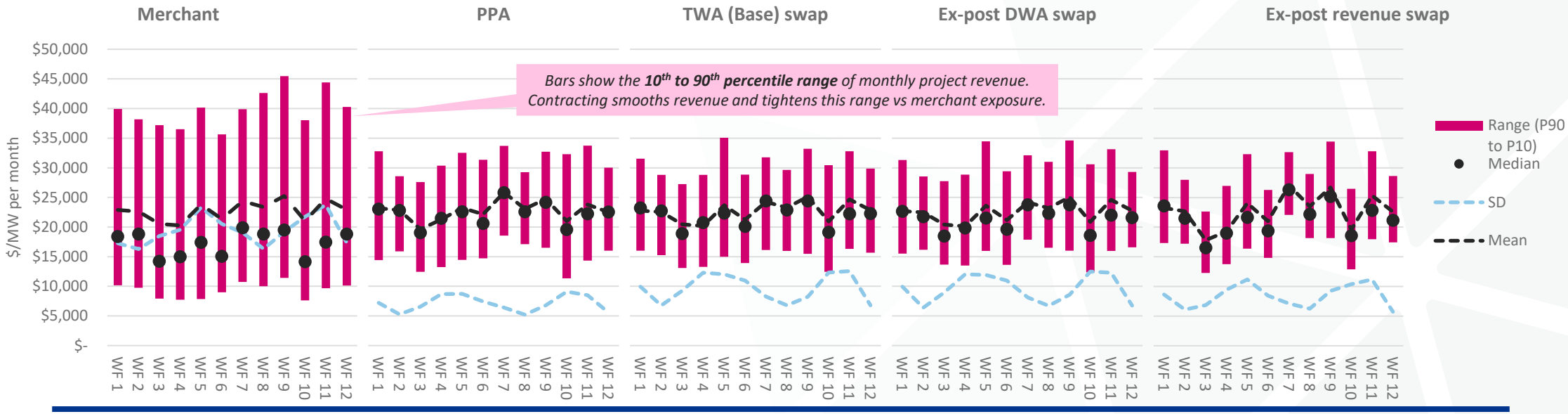
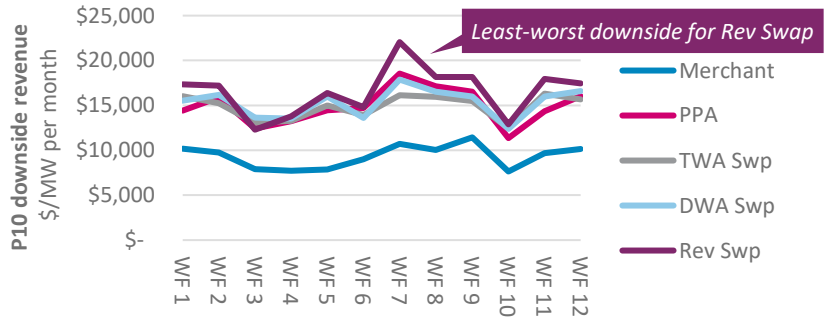
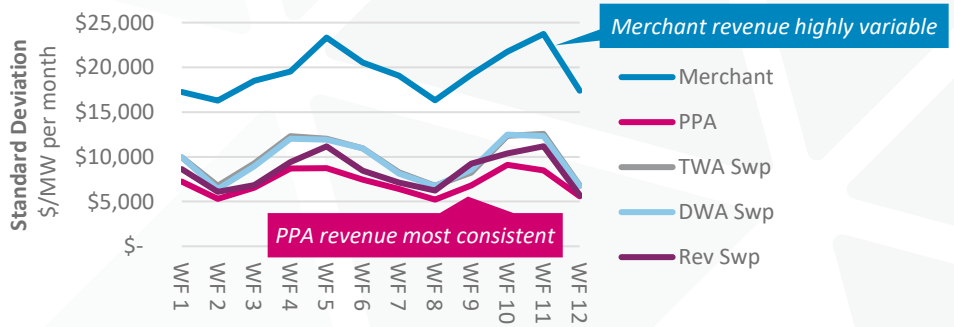
Time Weighted Average (TWA) Swaps leave generators more exposed to downside revenue risk than other options, reducing bankability and entry support



Debt access is limited by the lowest revenue expected in a period. Looking at P10 'low' revenue risk, Revenue Swaps provide the best downside protection while **TWA Swaps expose projects to more downside risk than other contracts.**



Standard deviation (SD) describes revenue variability (unpredictability). PPA revenue is the most consistent followed closely by Revenue Swap revenue. TWA and DWA Swaps have similar variability by this measure.



NSW wind data, CY2019–2024. 80% contracting assumed in all cases. Strike prices set to deliver average revenue equal to merchant revenue in all cases: $96/MWh for PPA, DWA Swap, & Revenue swap; $104/MWh for TWA swap. Note that TWA Swaps require a higher strike price to support the lower DWA value of wind vs TWA value.

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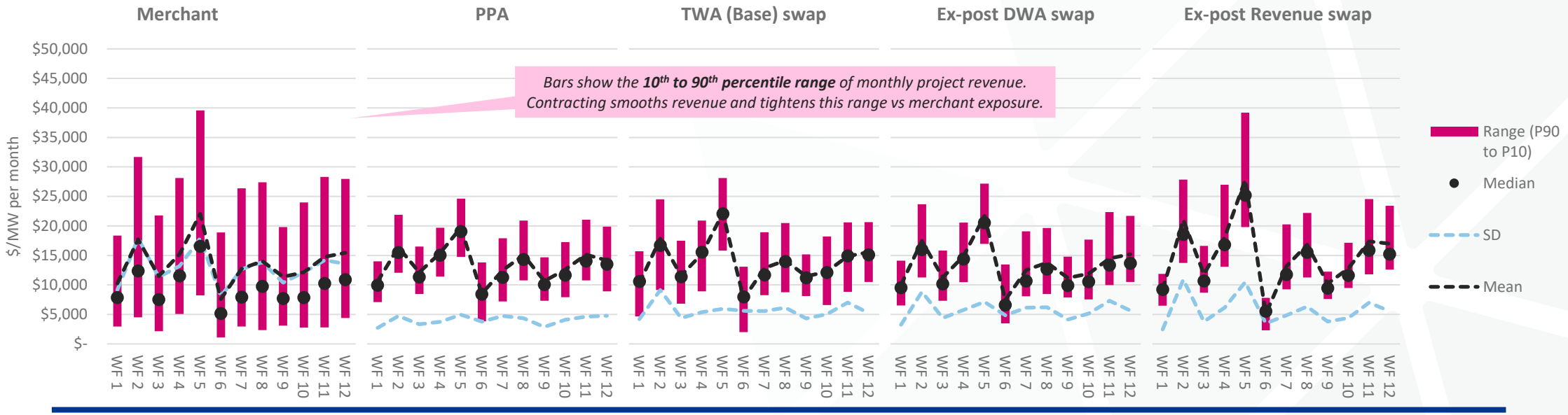

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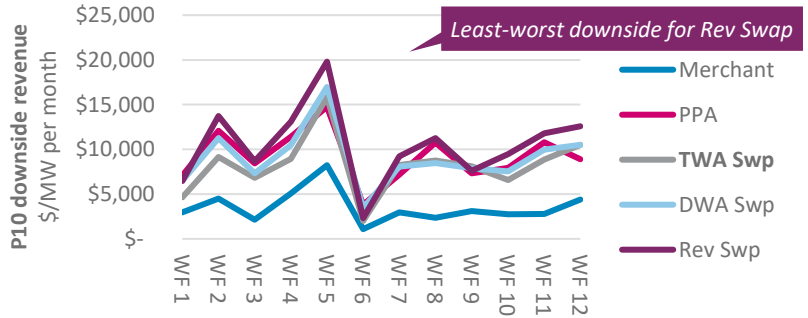

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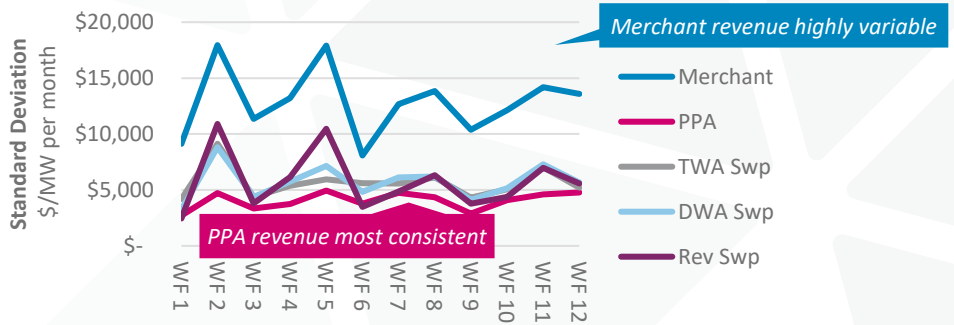

VIC wind data, CY2019–2024. 80% contracting assumed in all cases. Strike prices set to deliver similar average revenue equal to merchant revenue in all cases: $60/MWh for PPA, DWA Swap, & Revenue swap; $80/MWh for TWA swap. Note that TWA Swaps require a higher strike price to support the lower DWA value of wind vs TWA value.

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