Benchmark Lithium BESS Costs

WEM Procedure - BRCP Update

The Economic Regulation Authority

12 November 2025

→ **The Power of Commitment**

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Executive summary

The Coordinator of Energy (Coordinator) has changed the Benchmark Flexible Capacity Provider from a lithium Battery Energy Storage System (BESS) that has a duration of 4-hours (200 MW / 800 MWh) to a 6-hour (200 MW / 1,200 MWh) system[1].

Previously, the hypothetical BESS, as determined by the Coordinator of Energy, was a notional new facility which was expected to be able to provide both peak and flexible capacity and used a lithium technology, with:

- 200 MW Injection[2]
- 800 MWh energy storage
- Located in an unconstrainted 330 kV connection near Kwinana or Pinjar

This hypothetical facility was to provide Reserve Capacity to the South West Interconnected System (SWIS). The ERA is updating the WEM Procedure – BRCP to account for the changes in the Benchmark Capacity Provider to a 200 MW / 1,200 MWh (6-hour duration) BESS for its determination of the 2028/2029 Benchmark Reserve Capacity Prices.

Consistent with the Coordinator of Energy's latest determination, the Benchmark Peak Capacity Provider is a lithium BESS, with:

- 200 MW Injection
- 1,200 MWh energy storage
- a 330 kV connection to Clean Energy Link North.

This report presents a proposed update of the Wholesale Electricity Market (WEM) Procedure for determining the Benchmark Reserve Capacity Price (BRCP), supporting the Economic Regulation Authority's (ERA) review in accordance with Clause 4.16.3 of the Electricity System and Market (ESM) Rules[3]. The current WEM Procedure - BRCP defines the BRCP[4] as a per megawatt of Capacity Credits estimate of the annualised total capital cost to build and connect a hypothetical BESS and an annualised fixed operating and maintenance (O&M) cost component.

The updated WEM Procedure for determining the BRCP provides a framework for estimating the annualised capital and fixed O&M costs of a notional BESS facility providing Reserve Capacity to the SWIS. The methodology in this update report builds on the approach established in the 2024 Benchmark Reserve Capacity Price Procedure Update report (the **Previous Report**)[5], with key recommendations and assumptions retained unless otherwise stated. Key recommendations and changes are reflective of the design and cost factors that impact the WEM Procedure – BRCP. These recommendations and changes from the Previous Report were the result of the reference technology change, and any significant change in market conditions. For this report, assumptions and positions from the Previous Report are generally retained, with some updates proposed relating to the change in energy capacity between 4 and 6 hours, and some adjustments proposed for the estimation approach to future costs. The updates proposed relating to the change in capacity from 4 to 6 hours are mainly within the land size requirements due to Injection remaining the same as the previous hypothetical BESS.

GHD will subsequently provide advice on costs to advise on the BRCP Determination in the form of a separate report.

[1] AEMO, **2025 Review of Benchmark Capacity Providers: Coordinator of Energy Determination**, 30 Sept 2025.
[2] Injection as defined as the quantity of power or energy sent into a Network. As per ESM Rules; 11. Glossary p763.
[3] Electricity Industry (Electricity System and Market) Regulations 2004: Electricity System and Market Rules (27 Sep 2025)
[4] **WEM Procedure - Benchmark Reserve Capacity Prices, Clause 2.2.2 and Clause 2.2.3**
[5] GHD was previously engaged by the ERA in 2024 to provide advice in updating the BRCP Procedure for 4-hour BESS.

Summary of recommendations

An overview of the recommendations for the key areas for consideration in the BRCP Procedure are summarised below:

Table 1 Summary of recommendations

Key area	Overview of recommendations
Design specifications and assumptions	• Increase energy capacity from 800 MWh to 1200 MWh. • Retain Lithium Iron Phosphate (LFP) as the reference sub-chemistry, with review in three years from Version 8 of the WEM Procedure – BRCP (August 2024). • Increase land requirement to 7.3 ha to accommodate the larger BESS yard. • Maintain BESS facility technical life at up to 20 years and finance term at 15 years. • Continue to oversize power capacity (MW) by 25% and energy capacity (MWh) by 10% to meet performance requirements, and revisit on an annual basis to ensure ESM Rule compliance is maintained. • Continue to treat Peak and Flexible Capacity as operationally equivalent, with one full charge/discharge cycle per day.
Development and capital costs	• Retain the same cost categories and BESS components from the Previous Report. • Update estimate accuracy class from +/-50% in the Previous Report to AACE Class 5 (+100% / -50%). • Transmission costs to be retained from the Previous Report. • Continue to allow flexibility in sourcing cost information; do not require a single provider (e.g., Western Power or Landgate) as the sole source. • Recommendations and rationale from the prior analysis are retained; cost categories should be estimated annually and reflect current market conditions. • Retain engineering, procurement and construction (EPC) as contracting strategy.
Fixed O&M costs	• Retain the same fixed O&M cost categories as the Previous Report. • Corporate overheads and consulting costs (including legal, regulatory, and engineering support) should remain fixed, regardless of energy throughput beyond Peak and Flexible Capacity requirements. • Site security and local government rates may be included within other reasonable costs and do not need explicit reference in the procedure. • Continue to estimate these categories using appropriate methods, with adjustments as needed to reflect the relevant Reserve Capacity Cycle.
Adjustment to future costs	• No adjustment for battery modules/enclosures or power conversion system; use present-day pricing. • Maintain flexibility to explore alternative escalation techniques for land costs if suitable data is available. • Apply CPI for electrical and civil Balance of Plant (BoP), transmission connection capital costs, and as a fallback for land costs if suitable alternative escalation costs cannot be sourced. • Update WPI to use Electricity, Gas, Water and Waste Services (EGWWS) sector index for connection agreement, market registration and licensing, environmental and development approvals, owner's design and project management, and legal, financing, and insurance costs. • Retain a 60/40 split (WA Wage Price Index for EGWWS/CPI) for installation labour and temporary equipment hire, and for BESS O&M. • Retain an 80/20 split (WA Wage Price Index for EGWWS/CPI) for connection switchyard and transmission line O&M. • No adjustment to finance term (remains at 15 years).

Design specifications and assumptions

The design specifications and operating assumptions are recommended to inform the WEM Procedure – BRCP update and are summarised in Table 2. The specifications and assumptions have been developed to align with the ESM Rules' requirements and the ERA's likely updates to the associated WEM Procedure - BRCP.

The previously defined operation assumptions for Peak and Flexible Capacity Providers are retained with further discussions on the basis for this position in Section 2.3.

Table 2 BRCP service requirements

Parameter	Version 8 of the WEM Procedure – BRCP	Proposed update to the WEM Procedure – BRCP
BRCP requirements		
Capacity	200 MW Injection	200 MW Injection
Operational duration	4 hours[6]	6 hours[7]
Operating temperature	41ºC	41ºC
Lithium sub chemistry	Lithium iron phosphate (LFP)	Lithium iron phosphate (LFP)
Additional specifications [GHD analysis, assumptions]		
BESS Technical life (years)	Up to 20 years (warranty may be shorter)	Up to 20 years (warranty may be shorter)
Finance Term	15 years	15 years
Land requirements	6.5 ha	7.3 ha
Operational assumptions		
Peak	1 cycle per day, full charge and discharge	1 cycle per day, full charge and discharge
Flexible	1 cycle per day, full charge and discharge	1 cycle per day, full charge and discharge

LFP continues to represent the benchmark for reliability and market acceptance for BESS in Australia. Given the significant differences in cost, life span, and warranty characteristics across lithium sub-chemistries, it is recommended that the position outlined in Section 2.1.6 of Version 8 of the WEM Procedure – BRCP (August 2024) be retained.

Based on the information outlined in this report and with consideration of the current provisions in the WEM Procedure - BRCP, we recommend the updated Procedure reflect the items as per below.

– Definition of the Reference Technology reflects:
  - Retaining Lithium Iron Phosphate (LFP) as the sub-chemistry, still to be subject to review in three years from August 2024 (3 years from the Version 8 of the BRCP).
  - Installed capacity to enable Injection of 200 MW on day 1 of operation.
  - Battery module provisions to enable 1,200 MWh charge and discharge on day 1 of operation.
– Land area required should be updated to provide for a larger BESS yard. Consideration for the BESS substation, connecting assets to the Western Power network, and all buffer zones remain the same. Assuming the transmission connection arrangements outlined in Section 0 of this report, the BRCP's BESS will require a land area of 7.3 ha.

For the WEM Procedure - BRCP, GHD recommends retaining from the Previous Report oversizing of the BESS to achieve the installed capacity and energy requirements, as per Section 2.2.1. This sizing is to be revisited on an annual basis as the power capability is linked to ESM Rule requirements that may change, and the energy capacity can vary based on the design of the BESS and maturity of the technology.

[6] Equivalent to 0.25C. C-rate is defined as the inverse duration of the battery. C-rate = current (amps) / capacity (amp-hours).
[7] Equivalent to 0.167C. C-rate is defined as the inverse duration of the battery. C-rate = current (amps) / capacity (amp-hours).

The basis for the oversizing of the BESS power (MW Injection) and energy (MWh storage) capacity is as per the analysis presented in the Previous Report. Based on our analysis, the factors that were considered in the WEM Procedure - BRCP were to account for the following:

– For power capacity:
  - Temperature derating for operation at 41 degrees Celsius.
  - Reactive power compensation to comply with generator performance standards in the ESM Rules and expected equipment losses.
  - Voltage stability requirements, in accordance with ESM Rules.
– For battery energy capacity:
  - Capacity loss from calendar fade during the time between battery enclosure delivery and energisation.
  - Temperature effects of idle batteries, alongside calendar fade.

Additionally, there may be site-specific or project-specific considerations that would impact the development of a BESS cost estimate. These factors may not necessarily align with the factors listed above or within the Previous Report and so do not need to be specified in the BRCP update to ensure this update is not overly prescriptive.

The rationale for treating Peak and Flexible Capacity as operationally equivalent remains unchanged. The requirement is for the BESS Facility to have a storage duration of 6-hours. Both services require the BESS to deliver certified capacity during relevant Trading Intervals, and the same minimum specifications and assumptions apply. It is recommended to retain the assumption from the Previous Report of one full charge and discharge cycle per day.

The approach to plant life and operational assumptions remains unchanged from the Previous Report. The effective life of a BESS is mainly determined by battery module usage, with warranties often used as a proxy. Investor views on end-of-life performance and return periods vary, so the WEM Procedure - BRCP should continue to outline principles rather than specify exact terms. Investor views on BESS end of life, period of return and preferences on level of performance are variable year on year. As such, the BRCP update should continue to articulate the underlying principles rather than prescribe a fixed period. While the technical life expectation of the BESS remains as 20 years the finance term should remain as 15 years which is unchanged from the Previous Report.

Development and capital costs

The following costs are included as part of the expected capital costs of the BESS. Costs will be presented in the Determination update report and will be accurate to AACE[8] Class 5 (+100% / -50%).

– Supply and installation of a BESS facility as per WEM Procedure - BRCP clause 3.3.1 including:
  - Battery containers
  - Power Conversion System (PCS)
  - BESS Substation
  - BESS and BESS substation electrical and civil balance of plant (BoP)
– Transmission connection capital costs
– Land costs
– Connection agreement, market registration and licensing costs
– Environmental and development approval costs
– Owner’s design and project management costs
– Legal, financing and insurance costs

As per the Previous Report, it is recommended that the WEM Procedure - BRCP requires estimation of the following categories of development and capital costs that will vary from year to year:

– BESS supply and installation costs

[8] Association for the Advancement of Cost Engineering

– Transmission connection capital costs (HV substation supply and install)
– Land costs
– Other reasonable costs including but not limited to:
    - Connection agreement, market registration and licencing costs
    - Environmental and development approvals
    - Owner's design and project management
    - Legal, financing and insurance costs.

The rationale and recommendations presented in the Previous Report apply. BESS supply and installation costs are to continue to include all standard components; lithium-ion battery modules/enclosures, power conversion system, electrical and civil balance of plant, and associated installation labour and temporary equipment hire. Transmission connection capital costs need to cover all assets required to connect to the 330 kV Western Power network, under the connection arrangement prescribed in Version 8 of the WEM Procedure - BRCP. The connection arrangement is currently based on a generic three breaker mesh substation configured in a breaker and a half arrangement with cut in cut out onto an existing transmission line.

The BRCP Procedure update should allow flexibility in sourcing information, enabling the ERA to obtain cost inputs from a range of qualified providers rather than specifying a single source (such as Western Power for transmission asset costs, and Landgate for land cost[9]).

Fixed O&M costs

The ongoing fixed O&M costs for the BESS broadly fall into the following categories:

– BESS, BESS substation and BoP maintenance services
– Corporate overheads and various consulting services
– Local government rates
– Site security services
– Connection asset fixed maintenance services
– Transmission network service charges (for use of the upstream Western Power network).

Variable costs for the BESS plant such as battery module replacement have not been included in the fixed O&M costs.

The recommendation for fixed O&M cost estimation remains as set out in the Previous Report. The WEM Procedure - BRCP will need to require estimation of the following fixed O&M cost categories, which may vary from year to year:

– BESS, BESS substation and BoP maintenance
– Corporate overheads, consulting services and other reasonable fixed costs
– Transmission connection asset maintenance
– Transmission network service charges for use of the upstream Western Power network.

Corporate overheads and consulting costs including legal, regulatory, and engineering support, should continue to represent costs that are fixed regardless of energy throughput beyond the Peak and Flexible Capacity requirements. Site security and local government rates, while relatively minor, may be included within the allowance for other reasonable costs and do not need to be explicitly referenced in the WEM Procedure - BRCP.

Consistent with the approach for development and capital cost items, the cost categories identified for fixed O&M can be estimated using different methods, with adjustments made as necessary to reflect the timing of the relevant Reserve Capacity Cycle. The WEM Procedure - BRCP should continue to reflect the categories listed above to ensure transparency in the cost estimation process and to allow for appropriate adjustments to future prices, as recommended in the Previous Report.

[9] Alternatives include suitably qualified cost estimation services, government agencies such as PoweringWA for transmission assets cost inputs.

Adjustment to future costs

The approach to cost adjustments remains as set out in the Previous Report. The need to adjust estimated costs to reflect Year 3 of the relevant Reserve Capacity Cycle will depend on the nature of the cost estimation approach and whether those costs are reasonably expected to change over time. For most costs estimated through the BRCP methodology, some form of adjustment is likely to be required, as certain inputs, such as construction labour, are expected to vary year to year.

It is recommended that the WEM Procedure - BRCP continues to provide for adjustments where costs have been determined at a different date from that required for Year 3 of the relevant Reserve Capacity Cycle. Adjustment factors (escalations) should be clearly identified wherever they are used.

Table 3 Adjustments to reflect future prices - BESS development and capital costs

Item	Suggested adjustment	Comment
Lithium-ion battery modules/enclosures	None	Developments in in technology is ongoing as investment in Australia grows.
Power Conversion System	None	Improvements are being made in system efficiency and control software, despite being a mature technology.
Electrical and control BoP	CPI	Note that the ERA approved access arrangement for by Western Power states the use of CPI for escalation of costs for their assets.
Civil BoP	CPI	
Installation labour & temporary equipment hire	60%: WA Wage Price Index (WPI) - EGWWS 40%: CPI	60/40 of cost indexed separately for labour and temporary equipment hire. Based on GHD knowledgebase and experience in the absence of market data[10]
Transmission connection capital costs	CPI	As per Western Power's Policy Statement – Transmission Connection Price. [11]
Land cost	explore alternative suitable escalation techniques for land prices near the existing 330 kV network, if suitable data is unavailable, CPI adopted as default	GHD analysis of historical land price trend has differed from CPI trend based on Landgate document[12] Since land cost forms a relatively small proportion of overall cost, CPI considered a reliable fall back.
Connection agreement, market registration and licencing costs	WA WPI – industry index for electricity, gas, water and waste services. EGWWS	
Environmental and development approvals		
Owner's design and project management		
Legal, financing and insurance costs		
Finance term	None	While the technical life expectation of the BESS remains as 20 years the finance term should remain as 15 years.

[10] Rationale from Section 5.1.1 of the Previous Report is retained
[11] Western Power, Appendix F.2 Tariff Structure Statement (ERA Approved), 31 March 2023, p. 55. Available at: **WP-AA5-Approved-Access-Arrangement-Appendix-F-2-Tariff-Structure-Statement-Clean-PDF-Version.PDF (erawa.com.au)**
[12] **LAND VALUES FOR THE 2024 BENCHMARK RESERVE CAPACITY PRICE**

Table 4 Adjustments to reflect future prices - Fixed operating and maintenance items

Item	Suggested adjustment	Comment
BESS operating and maintenance	60% WA WPI – EGWWS, 40% CPI	
Connection switchyard and transmission line operating and maintenance	80% WA WPI – EGWWS, and 20% CPI	
Transmission network service charges	CPI	As per Western Power's Policy Statement – Transmission Connection Price. [13]

[13] Western Power, Appendix F.2 Tariff Structure Statement (ERA Approved), 31 March 2023, p. 55. Available at: **WP-AA5-Approved-Access-Arrangement-Appendix-F-2-Tariff-Structure-Statement-Clean-PDF-Version.PDF (erawa.com.au)**

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1. Introduction

The Economic Regulation Authority (ERA) is reviewing the WEM Procedure - BRCP: Benchmark Reserve Capacity Price (WEM Procedure - BRCP) as required by clause 4.16.3 of the Electricity System and Market Rules (ESM) (previously Wholesale Electricity Market (WEM) Rules).

Clause 2.2.3 of the current WEM Procedure - BRCP (version 8 dated August 2024), requires the BRCP to be calculated on a per megawatt (MW) of Capacity Credit basis, based on an estimate of the annualised total capital cost to build, and annualised fixed O&M cost to maintain a hypothetical lithium BESS[14] component, with:

- 200 MW Injection
- 800 MWh energy storage
- Located at an unconstrainted 330 kV connection near Kwinana or Pinjar

This hypothetical system would provide Reserve Capacity to the SWIS. The ERA intends to update the WEM Procedure - BRCP so that the Benchmark Capacity Provider is 200 MW / 1,200 MWh (6-hour duration) BESS for the 2028/2029 BRCP in accordance with the Coordinator of Energy's 30 September 2025 determination[15].

The Benchmark Peak Capacity Provider will be a lithium battery energy storage system (BESS), with:

- 200 MW Injection
- 1,200 MWh energy storage
- a 330 kV connection to connect to Clean Energy Link – North

The Benchmark Flexible Capacity Provider has the exact same specification.

The aim is for the BRCP to include all reasonable fixed costs expected to be incurred in the development of the Benchmark Capacity Providers, including annual fixed O&M costs to operate the facility in the Southwest Interconnected System (SWIS).

The WEM Procedure - BRCP documents the method and processes that the ERA follows annually to determine the Flexible BRCP and Peak BRCP for each Reserve Capacity Cycle. In accordance with clauses 4.16.2 and 4.16.2A of the ESM Rules, the two BRCPs are:

- **Peak BRCP** expressed in $/MW of Peak Capacity Credits per year, that reflects the expected annualised capital cost and fixed O&M costs of the Benchmark Peak Capacity Provider. Where the Benchmark Peak Capacity Provider is a notional new facility expected to provide Peak Capacity at the lowest annual capital cost and fixed O&M cost.
- **Flexible BRCP** expressed in $/MW of Flexible Capacity Credits per year, that reflects the expected annualised capital cost and fixed O&M costs of the Benchmark Flexible Capacity Provider. Where the Benchmark Flexible Capacity Provider is a notional new facility expected to provide Flexible Capacity at the lowest annual capital cost and fixed O&M cost. Facilities receiving Flexible Capacity Credits must meet all the same requirements as Peak Capacity Credits and the ramping requirements as determined by the Coordinator of Energy[16].

The BRCP is used as an input to the determination of the administered Reserve Capacity Price.

1.1 Purpose of this report

GHD has been engaged by the ERA to make recommendations for updates to the Benchmark Reserve Capacity Procedure (BRCP) to reflect the change of the BESS used to calculate Peak and Flexible BRCP from a 200 MW / 800 MWh (4 hour) BESS to a 200 MW / 1,200 MWh (6 hour) BESS located along the Clean Energy Link – North transmission route.

[14] As per 2.1.5 and 2.1.6 of Version 8 of the BRCP (WEM) Procedure **WEM Procedure - Benchmark Reserve Capacity Prices**
[15] **2025 Review of Benchmark Capacity Providers: Coordinator of Energy Determination Addendum 9 October 2025**
[16] BRCP Reference Technology Review - Consultation Paper, 2 November 2023

1.2 Method

GHD's recommendation builds on the Previous Report (see Table 5 for reference) to guide the updates to the WEM Procedure - BRCP version 8. An overview of key changes is presented that would impact key costs in the following areas:

- Development and capital costs
- Transmission connection costs
- Land area and costs
- Fixed O&M costs

1.3 Reference Documentation and Definitions

The reference documentation in Table 5 is to be read in conjunction with this report:

Table 5 Reference documentation

Description	Revision / Date	Commentary
WEM Procedure - BRCP	Version 8 1 Aug 2024	**WEM Procedure - Benchmark Reserve Capacity Prices**
ESM Rules	30 Oct 2025	Previously WEM Rules **electricity_system_and_market_rules_30_october_2025.pdf**
Previous Report	15 March 2024	WEM Procedure - BRCP update following change in reference technology from open cycle gas turbine to BESS
BCP Reference Technology Review Consultation Paper	2 November 2023	**epwa-brcp_reference_technology_review-v2.1.pdf**
Benchmark Reserve Capacity Price costs for 2027/28	29 Nov 2024	
WEM Procedure: Capacity Credit Allocations	Version 7.0 1 Oct 2023	**capacity-credit-allocations---v70.pdf**
WEM Procedure: Electric Storage Resource Obligation Intervals	Version 2.0 11 Jul 2023	**electric-storage-resource-obligation-intervals.pdf**
Electric Storage Resource Obligation Intervals for 2023-24 Capacity Year	2021	**2021-esroi-analysis.pdf**
WEM Procedure: Mid Peak and Flexible Electric Storage Resource Obligation Intervals	Version 4.0 20 June 2025	**final-mpfesroi-wem-procedure---june-2025---clean_.pdf**
Western Power AA5 Approved Access Arrangement	31 Mar 2023	**WP-AA5-Approved-Access-Arrangement-Clean-PDF-Version.PDF**
Western Power Appendix F.2 Tariff Structure Statement	31 Mar 2023	**WP-AA5-Approved-Access-Arrangement-Appendix-F-2-Tariff-Structure-Statement-Clean-PDF-Version.PDF**
2025 Wholesale Electricity Market Electricity Statement of Opportunities	Version 2 1 July 2025	**2025-wem-electricity-statement-of-opportunities.pdf**

The terms referred to throughout this document are defined in Table 6.

Table 6 Definitions of terms and acronyms

Term	Definition
AACE	Association for the Advancement of Cost Engineering
AEMO	Australian Energy Market Operator
BESS	Battery Energy Storage System
BOL	Beginning of life
BoP	Balance of plant
BRCP	Benchmark reserve capacity price
CPI	Consumer price index
EGWWS	electricity, gas, water and waste services
EPC	Engineering, procurement and construction
ERA	Economic Regulation Authority
ESM Rules	Electrical System and Market Rules (formerly WEM Rules)
ESROI	Electric Storage Resource Obligation Intervals
GHD	GHD Pty Ltd
GPS	Generator Performance Standard
HV	High voltage
Injection	Active power (in MW) that the Benchmark Capacity Provider delivers into the SWIS at its connection point
kV	Kilovolt
kW	Kilowatt
LFP	Lithium iron phosphate
MW	Megawatt
MWh	Megawatt hour
NMC	Nickel Manganese Cobalt
O&M	Operating and maintenance
OEM	Original Equipment Manufacturers
PCS	Power conversion system
SWIS	Southwest interconnected system
WEM Rules	Wholesale Electricity Market Rules
WPI	Wage price index

1.4 Limitations

This report: has been prepared by GHD for The Economic Regulation Authority and may only be used and relied on by The Economic Regulation Authority for the purpose agreed between GHD and The Economic Regulation Authority as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than The Economic Regulation Authority arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for

events or changes occurring subsequent to the date that the report was prepared except for the updated revision of this report which shall be produced following stakeholder feedback.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared a preliminary cost basis set out in of this report ("Cost Basis") using information reasonably available to the GHD employee(s) who prepared this report; and based on assumptions and judgments made by GHD.

The Cost Basis has been prepared for the purpose of updating the WEM Procedure - BRCP and must not be used for any other purpose.

The Cost Basis is preliminary only. Actual prices, costs and other variables may be different to those used to prepare the Cost Basis and may change. Unless as otherwise specified in this report, no detailed quotation has been obtained for actions identified in this report. GHD does not represent, warrant or guarantee that a BESS can or will be undertaken at a cost as per the Cost Basis presented.

Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected as the planning level, there remains a chance that the cost will be greater than expected, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the user and the nature of any given project. The user or developer should therefore select appropriate confidence levels to suit their particular risk profile.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

2. Design specifications and assumptions

The design specifications and operating assumptions recommended to inform the BRCP and the WEM Procedure – BRCP updates are summarised in Table 7 below. The specifications and assumptions have been developed to align with the ESM Rules' requirements and the ERA's intended updates to the WEM Procedure – BRCP to align with the Coordinator of Energy's latest determination.

The specifications and assumptions are the same for the Peak and Flexible Reserve Capacity Providers. Table 7 also includes an index for further discussion on the rationale for the recommended specifications and assumptions.

Table 7 BRCP service provider requirements

Parameter	BRCP service requirement	Comment
ESM Rule requirements [dated 30 Oct 2025]		
Capacity	200 MW Injection	See discussion in section 2.2 below.
Operational duration	6 hours (0.167C)[17]	Based on update intended by the ERA.
Operating temperature	41ºC	ESM Rule requirement 4.10.1. (fA).ii
Additional specifications [GHD analysis, assumptions]		
Lithium sub chemistry	Lithium iron phosphate (LFP)	See discussion in section 2.1 below.
BESS life (years)	Up to 20 years (warranty may be shorter)	See discussion in section 2.4 below.
Land requirements	7.3 ha	See discussion in section 0 below.
Operational assumptions		
Peak	1 cycle per day, full charge and discharge	See discussion in section 2.3 below.
Flexible	1 cycle per day, full charge and discharge	See discussion in section 2.3 below.

The requirements outlined in Table 8 as identified in the BRCP Reference Technology Review Consultation Paper, continue to be maintained as the requirements for Flexible Capacity Providers.

These requirements are set in addition to the service requirements for Peak Capacity (reflected in Table 7 of this report). All BESS technologies considered can achieve both the Peak and Flexible Capacity requirements. Hence, we have not recommended any specific design differences for the Flexible Capacity Providers to account for the Table 8 requirements, as per the Previous Report.

Table 8 Flexible Capacity requirements[18]

Parameter	Flexible Capacity requirements
Power Ramp rate	100% capacity in 30 min
Start time	30 min
Minimum online generation	25%
Capacity factor	Daily operation

[17] C-rate is defined as the inverse duration of the battery. C-rate = current (amps) / capacity (amp-hours). A 0.25C C-rate indicates a 4-hour charge/discharge duration whilst a 1C value would refer to 1 hour duration for charging/discharging.
[18] Energy Policy WA, BRCP Reference Technology Review - Consultation Paper, 2 November 2023

2.1 Lithium sub-chemistry

As outlined in the Previous Report, LFP has continued to demonstrate a favourable balance of cost-effectiveness, safety, and cycle life, and continues to be the predominant choice for grid-scale BESS projects in Australia.

It is acknowledged that there have been notable developments from lithium BESS OEMs in recent years, with emerging chemistries and technologies being trialled internationally. However, deployments of these alternative sub-chemistries for large scale, stationary storage within Australia remain limited, and LFP continues to be the benchmark for reliability and market acceptance for large scale BESS in Australia.

Given the significant differences in cost, life span, and warranty characteristics between lithium sub-chemistries, it is recommended the position in Section 2.1.6 of Version 8 of the WEM Procedure – BRCP (August 2024) is retained. That is for LFP to be retained as the reference sub-chemistry in the update for WEM Procedure – BRCP version 9. This approach provides clarity and consistency for stakeholders, while recognising that the field is evolving. Accordingly, it is further recommended that the specified sub-chemistry be subject to review three years from the date of Version 8 of the WEM Procedure - BRCP, due August 2027, regardless of whether the Reference Technology changes.

2.2 Installed capacity considerations

The considerations from the Previous Report regarding power capacity remain unchanged. To ensure the BESS can deliver 200 MW Injection capacity at the beginning of its life, it is necessary to account for temperature derating, reactive power compensation, and voltage stability.

The recommended approach is to provide the required reactive power compensation[19] and voltage stability[20] through a power capacity uplift of the inverters, rather than relying on switched reactive plant. The total power capacity uplift required to address these factors remains at 25%, as previously proposed.

To ensure the BESS meets its required energy capacity at the beginning of life, it is recommended to oversize the initial installed energy capacity. Lithium-based batteries experience degradation over time due to factors such as calendar fade[21] and exposure to high temperatures, particularly during storage before commissioning. The proposed energy capacity uplift remains at 10%, providing sufficient contingency to offset early degradation and ensure 1,200 MWh on Day 1 of operation (i.e. 1 October of Year 3 of the Reserve Capacity Cycle[22]).

2.2.1 Installed power and energy

Based on the ESM requirements for reactive power compensation, temperature deratings for power, and estimated energy capacity loss over time discussed above, the following is recommended for a BESS to be able to inject 200 MW and have 1,200 MWh storage at the beginning of life (BOL):

– Oversizing the power capability (i.e. the total inverter capacity) by 25%, and
– Oversizing the energy capacity (i.e. the battery modules/enclosures) by 10%.

A specification that sizing of the BESS components consistent with these values is expected to enable the BESS to be assigned 200 MW of capacity credits (for both Peak and Flexible Capacity) in the first year of operation. As described in the Previous Report, it is expected that the annual throughput of the BESS would be lower than the Operational Assumption as explained in Section 2.3 for Peak and Flexible Capacity.

2.3 Operational assumptions

The Previous Report established that the operational use of a BESS under the WEM[23] is shaped by the requirements for Peak and Flexible Capacity services, with obligations defined by the relevant Trading Intervals and the facility's certified duration. These obligations are governed by clause 4.11.3A of the ESM (previously

[19] Reactive power compensation requirements as per ESM Rule A12.3.2.1 and A12.3.3.1 ('A' refers to Appendix A) (27 Sept 2025)
[20] Voltage stability requirements as per ESM Rule A12.3.3.2 (27 Sept 2025)
[21] Calendar fade is a particular consideration where the battery suffers time-based degradation irrespective of how or whether it is used.
[22] **WEM Procedure - Benchmark Reserve Capacity Prices** Clause 2.1.6
[23] Now called the ESM

WEM) Rules, which requires AEMO to determine and publish the Electric Storage Resource Obligation Intervals (ESROI) in consultation with Market Participants.

The 2025 Electricity Statement of Opportunities (ESOO)[24] indicates ESROI for 2027-28 is now 6-hours. This is driven by high rooftop solar penetration and recent heatwaves. This has extended peak demand late into the evening resulting in an increased risk of unmet electricity demand for trading intervals between 2000hrs and 2230hrs.

The rationale established in the Previous Report regarding the operational treatment of Peak and Flexible Capacity remains unchanged. Both services are fundamentally aligned in terms of their operational requirements for BESS assets. The same minimum specifications and operating assumptions apply, as the BESS must be capable of delivering its certified capacity during the relevant Trading Intervals (i.e. the ESROI), regardless of whether it is called upon for Peak or Flexible Capacity.

Maintaining the operating assumption of one full charge and discharge cycle per day, as established in the WEM Procedure – BRCP, version 8, also avoids the need for frequent updates in response to incremental changes in market rules or dispatch intervals. This provides clarity and consistency for stakeholders, while ensuring the WEM Procedure - BRCP remains practical and adaptable as market requirements evolve.

2.4 Life of the plant

As described in the Previous Report, life of the BESS is ultimately limited by the technical life of the key components of the BESS and dependent on the how the BESS is operated. However, the technical life may be different from the equipment warranty and different to the financing term (or the life over which investors require a return on their capital expenditure). Each key component, expected life, and key considerations are listed in Table 9.

Table 9 Life of key components

Component	Expected design life	Commentary
Battery modules/enclosures	15 – 20 years	The OEM typically warrants the remaining energy capacity of a BESS year on year with exceptions and adjustments based on use case. This warranted energy capacity takes into account the degradation of the batteries over time. Throughput based warranties are less common.
Power conversion system (PCS)	20 years	Highest risk to equipment lifespan is mainly software becoming redundant within 20 years, requiring overhaul. Other key components, such as switching equipment, are managed through a maintenance regime. Further discussion on O&M costs will be provided in the Determination.
Electrical and control Balance of Plant (BoP) including the BESS substation	20 years	Highest risk to plant lifespan is control and communications architecture becoming redundant, requiring overhaul before 20 years. The remaining primary equipment in the substation has an expected design life of 50 years. When taking into account appropriate maintenance and replacement of sensitive components such as circuit breakers and switching equipment. Further discussion on O&M costs will be provided in the Determination.
Civil Balance of Plant (BoP)	50 years	Foundation, bunds and skids are typically made from concrete and generally not considered a limiting factor.

Most generally, the life of the batteries is tied to their state of health (SOH). Batteries are generally considered to be at their end of life when the SOH is below a certain threshold (typically 70%-80%) or when the SOH is observed to be rapidly degrading. However, the investors' appetite for replacement or decommissioning will ultimately determine at which SOH threshold the battery is at the end of life.

[24] AEMO, 2025 Wholesale Electricity Market Electricity Statement of Opportunities, June 2025 **2025-wem-electricity-statement-of-opportunities.pdf**

The comparison of degradation between a 4-hour and a 6-hour BESS is broadly consistent with the analysis previously undertaken for shorter-duration systems discussed in the Previous Report. The Previous Report described differences in degradation between <2-hour BESS and 4-hour BESS and shows that 4-hour BESS is expected to degrade less over time.

As such, a lower discharge rate (0.167C for a 6-hour BESS) is expected to reduce throughput-related degradation compared to a 4-hour BESS. However, calendar-based degradation remains inherent, and some throughput degradation will occur over time. There is limited published market data on long-term performance at 0.167C, but established trends indicate that degradation is typically faster at the beginning of operating life. Based on our current understanding, functional differences in degradation between 4-hour and 6-hour BESS configurations are marginal[25]. The 4-hour and 6-hour BESS are expected to perform similarly due to degradation management systems, such as, their energy management systems, thermal control, and monitoring.

Accordingly, no changes are recommended to the BRCP Procedure regarding the financial term (15 years) or technical life (20 years) assumptions for the reference technology.

2.5 Land requirements

2.5.1 BESS and BESS substation

A preliminary layout was prepared in the Previous Report, indicating that a minimum of 1.6 ha would be required for a 200 MW / 800 MWh BESS. Seeing as no further PCS would be required, the BESS yard of a 200 MW / 1,200 MWh BESS would require only sufficient land and spacing for additional battery containers. As such a minimum land allowance of 2.4 ha would be required for a 200 MW / 1,200 MWh BESS (additional 100 units of 4 MWh battery containers). The land allowance would account for space required for balance of plant.

The land allowance was estimated based on battery containers with an energy rating of 4 MWh and PCS units with a power rating of 4 MW, in line with current tier one (1) OEM capacity and dimensions. While there may be some variation in the battery container sizes, this will have minimal impact on the land requirements due to the energy density of the LFP batteries being consistent across the market. This is considered to be a reasonable approach until 3 years after the date of issue of the Previous Report.

A BESS substation is required for stepping up the system voltage of the BESS (33 kV at the terminals of the outgoing transformer) to 330 kV (Western Power network voltage). Seeing as the HV equipment requirements are unchanged between a 4-hour and 6-hour BESS with the same power Injection (200 MW), a land allowance of 0.4 ha as determined in the Previous Report is considered reasonable. This includes a sufficient buffer zone to account for noise (of the substation), clearances and fencing.

Finally, depending on the distance between the BESS and the substation, as well as the site plot shape, we would expect to allow for an additional 0.5 ha to 1 ha uplift to account for the land between the BESS substation and the Western Power substation.

Based on the above requirements, the estimated land that the BESS development (and associated assets) would require is between 3.3 ha to 3.8 ha.

2.5.2 Western Power Substation

Assuming a dedicated 330 kV Western Power substation would be built for the BESS with a cut-in cut-out arrangement to an existing transmission line (such as Clean Energy Link – North). The substation configuration is assumed to be a generic three breaker mesh substation configured in a breaker and a half arrangement[26]. A land allocation of 3.5 ha would be considered reasonable based on similar capacity projects with a dedicated Western Power substation. The land allocation accounts for allowances for access roads and an additional buffer around the perimeter of the fence.

[25] OEM's can provide throughput or duty-based degradation curves as adjustments to their typical warranty.
[26] As per WEM Procedure: Benchmark Reserve Capacity Price [Version 8] clause 3.4.6 (b) (iii)

2.5.3 Total land area required

The total land requirements including the BESS facility (3.8 ha) and Western Power substation (3.5 ha) is approximately 7.3 ha.

2.6 Recommendations for the WEM Procedure - BRCP

Based on the information outlined in this report and with consideration of the current provisions in the WEM Procedure - BRCP, we recommend the updated Procedure reflect the items as per below.

– Definition of the Reference Technology reflects:
  - Retaining Lithium Iron Phosphate (LFP) as the sub-chemistry, still to be subject to review in three years from August 2024 (3 years from the Version 8 of the BRCP).
  - Installed capacity to enable Injection of 200 MW on day 1 of operation.
  - Battery module provisions to enable 1,200 MWh charge and discharge on day 1 of operation.
– Land area required should be updated to provide for a larger BESS yard. Consideration for the BESS substation, connecting assets to the Western Power network, and all buffer zones remain the same. Assuming the transmission connection arrangements outlined in Section 0 of this report, the BRCP's BESS will require a land area of 7.3 ha.

For the WEM Procedure - BRCP, we would retain the recommendation from the Previous Report of oversizing of the BESS to achieve the installed capacity and energy requirements as per Section 2.2.1. Sizing to be revisited on an annual basis as the power capability is linked to ESM Rule requirements that may change, and the energy capacity can vary based on the design of the BESS.

The basis for the oversizing of the BESS power and energy is as per the analysis presented in the Previous Report. Based on our analysis, the factors that could be considered in the WEM Procedure - BRCP are:

– For power capacity:
  - Temperature derating for operation at 41 degrees Celsius.
  - Reactive power compensation to comply with generator performance standards in the ESM Rules and expected equipment losses.
  - Voltage stability requirements, in accordance with ESM Rules
– For battery energy capacity:
  - Capacity loss from calendar fade during the time between battery enclosure delivery and energisation.
  - Temperature effects of idle batteries, alongside calendar fade.

However, should the WEM Procedure - BRCP specify the ERA engage a suitably qualified consultant to develop BESS cost estimates, factors raised in the Previous Report such as calendar fade and temperature effects may not necessarily be considered as under the other consultant's cost estimate development and so do not need to be specified in the WEM Procedure - BRCP.

The rationale for treating Peak and Flexible Capacity as operationally equivalent remains unchanged. The requirement for BESS to have a storage duration of 6-hour. Both services require the BESS to deliver certified capacity during relevant Trading Intervals (i.e. the ESROI), and the same minimum specifications and assumptions apply. It is recommended to retain the assumption from the Previous Report of one full charge and discharge cycle per day.

The approach to plant life and operational assumptions remains unchanged from the Previous Report. The effective life of a BESS is mainly determined by battery module usage, with warranties often used as a proxy. Investor views on end-of-life performance and return periods vary, so the WEM Procedure - BRCP should continue to outline principles rather than specify exact terms. Investor views on BESS end of life, period of return and preferences on level of performance are variable year on year. On this basis, the conservative financing term of 15 years is recommended to be retained in line with the Previous Report.

3. Development and Capital Cost Considerations

The capital cost considerations for the BESS remain consistent with those outlined in the Previous Report. The key components include:

– Installation and labour for:
  - Battery modules/enclosures
  - Power conversion system (PCS)
  - Electrical and control balance of plant (BoP)
  - Civil BoP
– Equipment hire

Additional capital overheads are also part of the capital cost considerations, such as:

– Transmission connection
– Land
– Environmental and development approvals
– Owner's design and project management
– Legal, financing and insurance

Costs will be presented in the Determination update report and will be accurate to AACE[27] Class 5 (+100% / -50%). The AACE provides framing characteristics and typical estimation methodologies so GHD proposes moving to application of this framework from the Previous Report[28]. Class 5 was chosen to align with the Previous Report lower bound of -50%.

3.1 BESS supply and installation costs

Key components of the capital cost for a BESS system fall broadly into one of five categories:

– Battery modules/enclosures
– Power Conversion System (PCS)
– Electrical and control balance of plant (BoP)
– Civil BoP
– Installation labour & associated temporary equipment hire

Summary of key considerations for equipment supply and installation costs in the Previous Report are detailed in Table 10.

It is recommended that engineering, procurement and construction (EPC) contracting strategy be adopted for this update, retaining the contracting strategy assumed in the Previous Report. Under an EPC arrangement, a single contractor is responsible for the design, procurement, and construction of the BESS, with these responsibilities reflected in the unit costs and overheads. However, it is important to note that there is a reduced appetite for an EPC contracting arrangement in new projects for developers and contractors. The final contracting strategy is dependent on an owner's risk appetite and contractor market conditions at the time of engagement. These caveats, as outlined in the Previous Report, continue to apply for this update.

[27] Association for the Advancement of Cost Engineering
[28] Previous Report referenced an accuracy +/- 50%.

Table 10 Summary of key considerations for equipment supply and installation costs in the Previous Report

Cost Item	Basis and key factors assumed in Previous Report
Battery modules/enclosures	Assumed LFP battery modules, including uplift for power and energy capacity. It should be noted that the cost of battery modules proportional to the total system cost will increase there are more containers are being purchased compared to the system described in Version 8 of WEM Procedure - BRCP.
Power Conversion System (PCS)	Accounted for uplift for temperature derating, reactive power and losses
Electrical & control BoP	Includes substation, cables, transformers, switchgear; and is estimated based on energy storage capacity
Civil BoP	Foundations, bunds, equipment pads; and is estimated based on energy storage capacity
Installation labour & temporary equipment hire	Site construction labour and temporary equipment hire; and is estimated based on energy storage capacity

3.2 Capital overheads considerations

The rationale for all additional capital overheads remains unchanged from the Previous Report:

– Transmission connection
– Land
– Environmental and development approvals
– Owner's design and project management
– Legal, financing, and insurance

The only consideration for the BRCP update would be to account for amendments and updates to all standards, codes, and regulations referenced in the Previous Report.

3.3 Recommendations for the WEM Procedure - BRCP

As per the Previous Report, it is recommended that the WEM Procedure - BRCP require estimation of the following categories of development and capital costs that will vary from year to year:

– BESS supply and installation costs
– Transmission connection capital costs
– Land costs
– Other reasonable costs including but not limited to:
    - Connection agreement, market registration and licencing costs
    - Environmental and development approvals
    - Owner's design and project management
    - Legal, financing and insurance costs.

The rationale and recommendations presented previously apply. BESS supply and installation costs should continue to include all standard components; lithium-ion battery modules/enclosures, power conversion system, electrical and civil balance of plant, and associated installation labour and temporary equipment hire. Transmission connection capital costs should cover all assets required to connect to the 330 kV Western Power network, under the connection arrangement prescribed in Version 8 of the WEM Procedure - BRCP. The connection arrangement is currently based on a generic three breaker mesh substation configured in a breaker and a half arrangement with cut in cut out onto an existing transmission line.

While Western Power's input remains valuable for ensuring feasibility and compliance with network standards, it is not required to be the sole source of cost estimates.

Land costs are still best informed by Landgate data, but the estimation process should allow for alternative sources if needed, while retaining the ERA's ability to request Landgate input. All cost categories should be

estimated using transparent methods, with adjustments made as necessary to reflect the timing of the relevant Reserve Capacity Cycle.

4. Fixed operating & maintenance costs

The ongoing fixed operating and maintenance (O&M) costs for the BESS broadly fall into the following categories:

– BESS, BESS substation, and BoP maintenance services
– Corporate overheads and various consulting services
– Local government rates
– Site security services
– Connection asset fixed maintenance services
– Transmission storage service charges (for use of the Western Power network).

Variable costs for the BESS plant such as battery module replacement have not been included in the fixed operating and maintenance costs.

The approach to fixed O&M costs remains unchanged from the Previous Report. The rationale for estimating O&M requirements for a 6-hour BESS is consistent with that for a 4-hour BESS, as the increase in duration does not materially affect staffing levels or the basis for substation, security, network, and service charges. Adjustments to staffing levels may be required to reflect the larger BESS yard, but the overall O&M framework and cost structure are maintained.

Costs will be presented in the Determination update report and will be accurate to AACE[29] Class 5 (+100% / -50%), with appropriate uplift levels applied to O&M of the BESS yard.

4.1 Recommendations for the WEM Procedure - BRCP

The recommendation for fixed O&M cost estimation remains as set out in the Previous Report. The WEM Procedure - BRCP should require estimation of the following fixed O&M cost categories, which may vary from year to year:

– BESS, BESS substation and BoP maintenance
– Corporate overheads, consulting services and other reasonable fixed costs
– Transmission connection asset maintenance
– Transmission network service charges for use of the Western Power network

Corporate overheads and consulting costs including legal, regulatory, and engineering support, should continue to represent costs that are fixed regardless of energy throughput beyond the Peak and Flexible Capacity requirements. Site security and local government rates, while relatively minor, may be included within the allowance for other reasonable costs and do not need to be explicitly referenced in the WEM Procedure - BRCP.

Consistent with the approach for development and capital cost items, the cost categories identified for fixed O&M can be estimated using different methods, with adjustments made as necessary to reflect the timing of the relevant Reserve Capacity Cycle. The WEM Procedure - BRCP should continue to reflect the categories listed above to ensure transparency in the cost estimation process and to allow for appropriate adjustments to future prices, as recommended in the Previous Report.

[29] Association for the Advancement of Cost Engineering

5. Estimation approach for future costs

It is recommended that the cost adjustments proposed in the Previous Report are retained in the BRCP update to reflect the Procedure requirement for estimations to be made as of 1 April (for Capital) and 1 October (for fixed O&M) in Year 3 of the Reserve Capacity Cycle. Costs will be presented in the Determination update report and will be accurate to AACE[30] Class 5 (+100% / -50%).

5.1 Development and capital cost adjustments

The adjustments to future costs are as per the Previous Report and summarised in Table 11. The table shows adjustments to development and capital cost estimates to account for cost differences between the present and the Year 3 Reserve Capacity Cycle required for the BRCP. Generally, the Previous Report recommended an approach to apply the same escalation indices as previously; consumer price index (CPI) for most equipment and materials, wage price index (WPI) for labour-driven costs. We now propose to update this so that the WPI reflects the industry index for electricity, gas, water and waste services (EGWWS).

Table 11 Adjustments to reflect future prices - BESS development and capital costs

Item	Suggested adjustment	Comment
Lithium-ion battery modules/enclosures	None	Developments in in technology is ongoing as investment in Australia grows.
Power Conversion System	None	Improvements are being made in system efficiency and control software, despite being a mature technology.
Electrical and control BoP	CPI	Note that the ERA approved access arrangement for by Western Power states the use of CPI for escalation of costs for their assets.
Civil BoP	CPI	
Installation labour & temporary equipment hire	60%: WA Wage Price Index (WPI) - EGWWS 40%: CPI	60/40 of cost indexed separately for labour and temporary equipment hire. Based on GHD knowledgebase and experience in the absence of market data[31].
Transmission connection capital costs	CPI	As per Western Power's Policy Statement – Transmission Connection Price [32].
Land cost	Explore alternative suitable escalation techniques for land prices near the existing 330 kV network. If suitable data is unavailable, CPI adopted as default.	GHD analysis of historical land price trends has differed from CPI trends based on Landgate documents[33]. Since land cost forms a relatively small proportion of overall cost, CPI should be considered a reliable fall back if no suitable alternative found.
Connection agreement, market registration and licencing costs	WA WPI – industry index for electricity, gas, water and waste services. EGWWS	
Environmental and development approvals		
Owner's design and project management		
Legal, financing and insurance costs		

[30] Association for the Advancement of Cost Engineering
[31] Rationale from Section 5.1.1 of the Previous Report is retained
[32] Western Power, Appendix F.2 Tariff Structure Statement (ERA Approved), 31 March 2023, p. 55. Available at: **WP-AA5-Approved-Access-Arrangement-Appendix-F-2-Tariff-Structure-Statement-Clean-PDF-Version.PDF (erawa.com.au)**
[33] **LAND VALUES FOR THE 2024 BENCHMARK RESERVE CAPACITY PRICE**

Consistent with the Previous Report, no adjustment rate is proposed to project future Year 3 Capacity Cycle battery module prices. Given the current scale of BESS development and the rapid evolution of battery markets, it is considered most appropriate for developers to assess present-day market conditions for battery modules and enclosures, rather than relying on projections or adjustments from previous years. Present-day pricing, together with data from previous iterations, continues to provide an effective benchmark for cost estimation in the BRCP context.

While industry practice involves signing contracts for individual projects well in advance of delivery, the agreed price reflects market conditions at the time of contract execution. A quotation for a new engagement at any point between now and delivery would differ, subject to prevailing market conditions.

5.2 Fixed O&M adjustments

The adjustments to future costs are as per the Previous Report and summarised in Table 12 which shows adjustments to fixed operating and maintenance estimates to account for cost differences between now and the Year 3 Reserve Capacity Cycle required for the BRCP.

Table 12 Adjustments to reflect future prices - Fixed operating and maintenance items

Item	Suggested adjustment	Comment
BESS operating and maintenance	60% WA WPI – EGWWS, 40% CPI	
Connection switchyard and transmission line operating and maintenance	80% WA WPI – EGWWS, and 20% CPI	
Transmission network service charges	CPI	As per Western Power's Policy Statement – Transmission Connection Price [34].

5.3 Recommendations for the WEM Procedure - BRCP

The approach to cost adjustments remains as set out in the Previous Report. The need to adjust estimated costs to reflect Year 3 of the relevant Reserve Capacity Cycle will depend on the nature of the cost estimation approach and whether those costs are reasonably expected to change over time. For most costs estimated through the BRCP methodology, some form of adjustment is likely to be required, as certain inputs, such as construction labour, are expected to vary year to year.

It is recommended that the WEM Procedure - BRCP continue to provide for adjustments where costs have been determined at a different date from that required for Year 3 of the relevant Reserve Capacity Cycle. Adjustment factors (escalations) should be clearly identified wherever they are used.

[34] Western Power, Appendix F.2 Tariff Structure Statement (ERA Approved), 31 March 2023, p. 55. Available at: **WP-AA5-Approved-Access-Arrangement-Appendix-F-2-Tariff-Structure-Statement-Clean-PDF-Version.PDF (erawa.com.au)**

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