Economic Regulation Authority

2023 Benchmark Reserve Capacity Price for the 2025/26 capacity year

Final determination

21 December 2022

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Contents

Executive summary ..... **ii**

1. Introduction **1**

1.1 BRCP determination process 2
1.1.1 BRCP market procedure 2
1.1.2 Stakeholder submissions 2
1.2 Changes between the draft and final determinations 3
1.3 Network access quantities and penalties for high emissions technologies 3

2. The BRCP calculation **5**

2.1 Expected capacity credits 7

3. Annualised capital costs of the power station **8**

3.1 Weighted average cost of capital 9
3.1.2 Changes to the WACC from the draft and final determinations 11
3.2 Power station costs 12
3.2.1 Cost escalation factors 12
3.2.2 Changes to the cost escalation factors since the draft determination 14
3.2.3 Power station generator model selection 15
3.3 Other capital cost components 16

4. Annualised fixed O&M costs **17**

4.1 Asset insurance costs 17
4.1.1 Changes to asset insurance costs between draft and final determinations 18
4.2 Fixed network access and ongoing charges 19
4.2.1 Stakeholder submissions 20
4.2.2 Changes between draft and final determinations 21
4.3 Other operating and maintenance components 21

List of appendices

Appendix 1 List of Tables **22**

Appendix 2 List of Figures **23**

Appendix 3 Components of the 2023 BRCP final determination compared to 2022 BRCP **24**

Appendix 4 Changes between the 2023 BRCP final and draft determinations **25**

Appendix 5 Annualised capital costs **26**

Appendix 6 Other operating and maintenance costs **29**

Appendix 7 Submissions received **31**

Appendix 8 Weighted Average Cost of Capital **34**

Executive summary

The Economic Regulation Authority has determined the 2023 Benchmark Reserve Capacity Price (BRCP) to be $193,400 per megawatt per year. The Australian Energy Market Operator (AEMO) will use the BRCP to determine the Reserve Capacity Price for the 2025/26 capacity year.[1] The Reserve Capacity Price is the price paid to generators for each megawatt (MW) of capacity that they make available to Western Australia's Wholesale Electricity Market (WEM) in that year.[2]

The BRCP and Reserve Capacity Price are components of the WEM's Reserve Capacity Mechanism (RCM), which aims to ensure that there is enough capacity installed in the South West Interconnected System (SWIS) to meet electricity demand. The RCM provides price signals for capacity providers, like generators, to enter the market and make their capacity available. The revenue from making capacity available adds to revenues from generating electricity and providing essential system services to generate an overall return for investors.

The BRCP is a benchmark value of capacity, based on a cost estimate of building and connecting a hypothetical 160 MW open cycle gas turbine (OCGT) generator to the SWIS. The BRCP market procedure defines the size and type of generator and the method for calculating the BRCP, which the ERA has followed in making this determination.[3]

The 2023 BRCP final determination of $193,400 per MW per year is 16.7 per cent higher than the 2022 BRCP ($165,700 per MW per year).[4] This change is mostly due to a higher cost of capital from rising interest rates, which is slightly offset by lower forecast steel and copper prices (illustrated in Figure 2). Since the 2022 BRCP determination, there have been major global supply chain disruptions and a rapid rise in interest rates in response to high inflation. These have resulted in increasing the cost components underlying the BRCP.

The 2023 BRCP final determination is also higher than the 2023 BRCP draft determination ($185,200 per MW per year). This increase is due to updates to the cost forecasts (called cost escalation factors) and higher financing and insurance costs since the draft determination. The ERA considered that labour costs, materials costs, and exchange rate forecasts which underlie the cost escalation factors needed to be updated to reflect more recent outlooks for global financial conditions. Submissions to the draft determination highlighted that the cost escalation factors prepared at that time may not reflect the latest cost expectations since financial market conditions have experienced rapid changes.

The ERA's 2023 BRCP final determination used data and analysis from independent consultants (GHD Advisory and PricewaterhouseCoopers), Western Power and Landgate. These reports are available on the ERA's website.[5]

1 The reserve capacity timeline is defined in Wholesale Electricity Market Rules (WA), 6 December 2022, Rule 4.1, (online).

2 All holders of capacity credits receive capacity payments. Although generators are the largest capacity credit holders, capacity credits can be provided to storage and demand side programmes. Generators that do not participate in the Reserve Capacity Mechanism (or are ineligible) do not receive capacity payments.

3 Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, section 2.1, (online).

4 The 2022 BRCP is available on the ERA's website - Economic Regulation Authority, 'Benchmark Reserve Capacity Price', (online).

5 Economic Regulation Authority, 'Benchmark Reserve Capacity Price', (online).

1. Introduction

The South West Interconnected System (SWIS) in Western Australia is a geographically isolated electricity system. The SWIS stretches from Kalbarri in the north to Kalgoorlie in the east, down to Albany in the south of Western Australia. The SWIS uses a Wholesale Electricity Market (WEM) to encourage competition between generators and retailers of electricity, minimise the long-term cost of electricity for consumers, and to promote the economically efficient, safe and reliable production, and supply of electricity within the SWIS.[6]

To ensure a reliable supply of electricity to meet consumer demand, including peak demand periods, the WEM features a Reserve Capacity Mechanism (RCM). The RCM incentivises capacity to be built and made available in the SWIS by paying capacity providers to make their capacity available, regardless of whether they are required to supply electricity.[7] The amount that generators are paid for each megawatt of available generating capacity is called the Reserve Capacity Price.

AEMO determines the Reserve Capacity Price which depends on the Benchmark Reserve Capacity Price (BRCP) and the level of excess reserve capacity for the relevant capacity year.[8] Excess reserve capacity is the surplus of reserve capacity relative to the amount of reserve capacity required for the relevant capacity year. In general, the lower the excess reserve capacity, the higher the Reserve Capacity Price.[9] The ERA determines the BRCP component using the process set out in the BRCP market procedure, which is discussed below.

The BRCP is determined in advance to provide an indication of forward capacity prices to facilitate investment decisions. This determination, the 2023 BRCP, provides a price signal for the upcoming 2025-26 capacity year.

The BRCP market procedure requires the ERA to determine the BRCP based on a cost estimate of building and connecting a new 160 MW Open Cycle Gas Turbine (OCGT) generator that is expected to make its capacity available in two years' time. This assessment is a bottom-up, engineering-based cost estimate of a 160 MW OCGT generator with enough fuel to operate for 14 hours continuously at its maximum rated capacity.[10] This assessment includes:

- Fixed operating and maintenance costs for the power station, fuel handling, and transmission connection components.
- Land costs.
- Liquid fuel storage and handling facilities.
- Transmission connection costs.

6 These are three of the objectives of the WEM which are detailed in Wholesale Electricity Market Rules (WA), 6 December 2022, Rule 1.2.1, (online).

7 For convenience, the term 'generators' has been used to refer to suppliers of reserve capacity as they are the dominant group. All providers of capacity to the RCM are remunerated and this includes demand side programmes and storage (i.e., batteries, hydro, etc.).

8 AEMO determines the Reserve Capacity Price using the formula in the WEM Rules – Wholesale Electricity Market Rules (WA), 6 December 2022, Rule 4.29.1, (online).

9 At 30 per cent excess reserve capacity, the Reserve Capacity Price becomes zero whilst at 10 per cent excess capacity, the Reserve Capacity Price is around 50 per cent of the BRCP.

10 Details of the power station requirements are defined in Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, section 2.1, (online). The power station must be able to operate on distillate fuel. All OCGT references in this determination refer to an OCGT that must be able to run on distillate fuel.

- Other ancillary and infrastructure costs that are normally incurred when developing a power station.
- Allowances for legal, insurance, financing, and environmental approvals costs including a contingency margin.

The remainder of this report details how the ERA determined the final 2023 BRCP based on the different cost component estimates underlying the BRCP.

1.1 BRCP determination process

The ERA commenced the 2023 BRCP determination process in July 2022 and published its draft determination on 5 October 2022.[11] Submissions closed on 16 November 2022. The submissions received are referenced throughout this report, and are summarised in section 1.1.2 below, with a consolidated description and response to each issue in Appendix 7. [12]

This report details how the ERA made its final determination. Throughout this determination:

- Cost and price estimates are in Australian dollars excluding goods and services tax, unless otherwise specified.
- All references to the 2023 BRCP refer to the ERA's BRCP determination of $193,400 per MW per year applicable to the 2025/26 capacity year, unless otherwise specified.

1.1.1 BRCP market procedure

How the ERA assesses and makes its BRCP determination is set out in the BRCP market procedure.[13] The ERA became responsible for calculating and determining the BRCP from 1 July 2021 (from the 2022 BRCP onwards). Previously, AEMO was responsible for calculating the BRCP, which was then submitted to the ERA for approval. This transfer of responsibility was effected by the WEM Rules.

However, the ERA has not updated the BRCP market procedure to reflect the transfer of responsibility from AEMO to the ERA as it is awaiting the completion of Energy Policy WA's (EPWA) review of the RCM, which includes the BRCP and how it is determined.[14] Once EPWA's review is complete, the ERA will update the BRCP market procedure in consultation with stakeholders.

1.1.2 Stakeholder submissions

The ERA received four submissions to the draft determination from Alinta Energy, the Australian Energy Council, Collgar Wind Farm and Synergy. The submissions raised the following issues, which are addressed in the relevant sections of this report:[15]

[11] Economic Regulation Authority, 'Benchmark Reserve Capacity Price', (online).

[12] Submissions are published on the ERA's website – Economic Regulation Authority, 'Benchmark Reserve Capacity Price', (online).

[13] Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, (online).

[14] The ERA is conducting the BRCP determination as per the BRCP Market Procedure and has taken on all roles that were previously AEMO's responsibility.

[15] Stakeholder submissions are available on the ERA's BRCP website – Economic Regulation Authority, 'Benchmark Reserve Capacity Price', (online).

- Concerns that the cost escalation factors (these include forecasts for labour costs, the Australian Dollar exchange rate, and materials costs) may be understated given the changing financial market conditions (see section 3.2.2).
- The escalation factor for Western Power's transmission costs may not be appropriate (see section 4.2.1).
- Whether the interest rates used for calculating the weighted average cost of capital need to be uplifted from the figures determined in July 2022 (see section 3.1.2).
- The need to consider the Minister's draft statement of policy principles that applies to high emissions technologies in future BRCP determinations (see section 1.3).

The ERA's response to each issue is consolidated in Appendix 7.

1.2 Changes between the draft and final determinations

The ERA acknowledges that financial market conditions have changed rapidly since its draft determination was published. As a result, the ERA has updated the BRCP cost escalation factors with more recent information, which has contributed to the increase in the BRCP (see Appendix 4).

The increase in the BRCP between the final determination ($193,400 per MW per year) and the draft determination ($185,200 per MW per year), is due to the revised cost escalation factors, together with updates to the weighted average cost of capital (WACC) (see section 3.1.2) and insurance costs (see section 4.1.1).

1.3 Network access quantities and penalties for high emissions technologies

To determine the BRCP, the ERA must estimate the quantity of capacity credits that a 160 MW OCGT generator is expected to receive in the relevant capacity year (see section 2.1). Each capacity credit is equivalent to 1 MW of reserve capacity.

The SWIS is undergoing reforms which includes changing how generators can access the network which can affect how many capacity credits a generator can receive.[16] EPWA, as part of the transition to constrained network access, developed and consulted on a framework clarifying how capacity credits will be allocated to generators given network constraints in the SWIS.[17] To account for network constraints, generators will receive a Network Access Quantity (NAQ), which is used in determining its capacity credit allocation.[18] A generator's NAQ will be affected by the capacity that it can provide to the grid from that part of the network. Generally, given how NAQs will be allocated to generators, a new generator connecting to a congested section of the network will likely receives less capacity credits than if it connected in a less congested area.

The NAQ process is expected to be in place by the 2025/26 capacity year and could apply to a new BRCP 160 MW OCGT generator. Information on how a generator's NAQ will be

16 Constrained network access will commence as part of the new WEM on 1 October 2023 – Australian Energy Market Operator, 'WEM Reform Implementation Update', (online) [accessed 13 September 2022].

17 Information papers on constrained network access is available on EPWA's website – Energy Policy WA, 'Constrained Network Access Consultation Papers', (online) [accessed 3 December 2022].

18 EPWA, Western Power and AEMO are working on network limit advice and capacity constraint equations for the SWIS, which will set out the amount of NAQ that each generator can receive.

determined and its effect on the BRCP is not finalised at the time of making this determination. Additionally, the State Government is currently assessing the future requirements for low emissions electricity supply to allow businesses to decarbonise. This assessment may affect generators' NAQs if it leads to changes to network congestion.[19]

As more information is released on the above matters, the ERA will assess how they could affect future BRCP determinations. Where these require changes to the BRCP market procedure, the ERA will undertake the required review and consultation process to implement them.

Another issue which the ERA acknowledged in its draft determination report, and was raised in Synergy's submission, is the Minister for Energy's Draft Statement of Policy Principles: Penalties for high emission technologies in the WEM.[20] Synergy stated that this may need to be considered in future BRCP determinations.[21] The ERA will consider the implications of these policy principles on future BRCP determinations once they are finalised.

19 Government of Western Australia media statement, 24 August 2022, 'Assessment of electricity demand to inform WA's future network', (online) [accessed 8 September 2022].

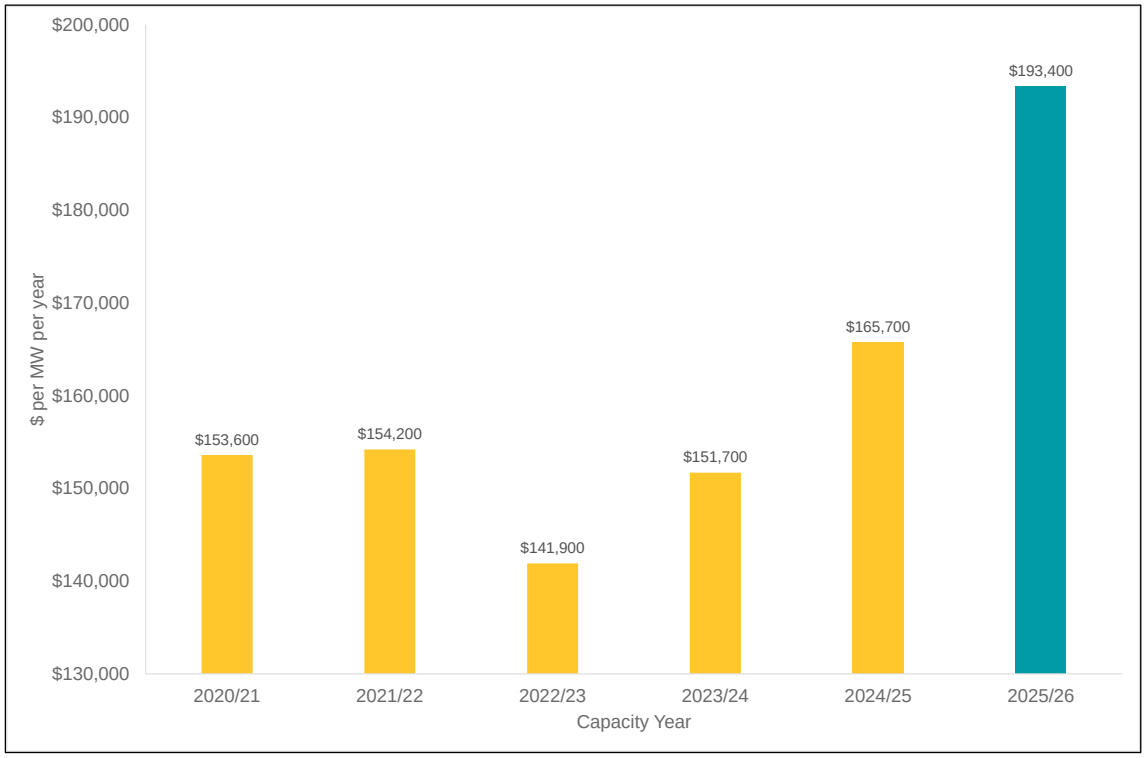
20 Energy Policy WA, 2022, *Draft Statement of Policy Principles: Penalties for high emission technologies in the Wholesale Electricity Market*, (online) [accessed 8 September 2022].

21 Synergy, 2022, Submission to *2023 benchmark reserve capacity price for the 2025/26 capacity year, Draft determination*, (online).

2. The BRCP calculation

The ERA has determined that the 2023 BRCP is $193,400 per MW per year for the 2025/26 capacity year.[22] Figure 1 shows the BRCP since the 2020/21 capacity year.

Figure 1: BRCP from 2020/21 by capacity year



Source: AEMO Benchmark Reserve Capacity Price webpage (online), ERA Benchmark Reserve Capacity Price webpage (online), and ERA's analysis of BRCP data.

The formula for calculating the BRCP is:[23]

$$BRCP = Annualised\ Fixed\ Operations\ and\ Maintenance + \frac{Annualised\ Capital\ Costs}{Expected\ Capacity\ Credits}$$

Table 1 provides a comparison of the 2023 BRCP determination and its components against the 2022 BRCP values.

Table 1: The 2023 BRCP determination compared to the 2022 BRCP determination

Component	2023 BRCP determination	2022 BRCP determination	Change from 2022
BRCP ($/MW/year)	**193,400**	**165,700**	**27,700 +16.7%**
Annualised capital costs ($/year)	23,757,776	19,887,082	3,870,694 +19.5%

22 As required by Wholesale Electricity Market Rules (WA), 6 December 2022, Rule 4.16, (online).

23 Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Clause 2.10.1, (online). The annualised fixed operations and maintenance cost is expressed in dollars per MW per year.

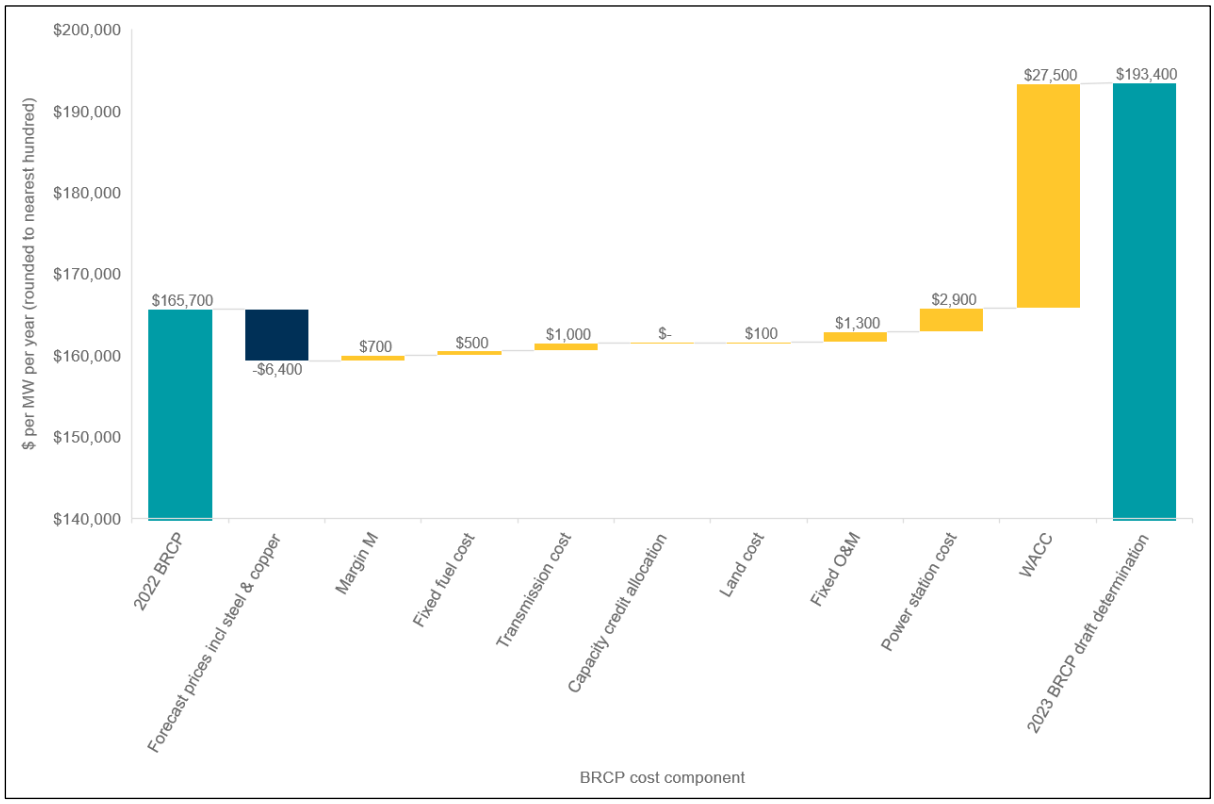
Component	2023 BRCP determination	2022 BRCP determination	Change from 2022
Annualised fixed O&M costs ($/MW/year)	36,228	34,131	2,097 +6.1%
Expected capacity credits (MW)	151.17	151.12	+0.05 capacity credits +0.03%

Source: ERA analysis of BRCP data

The breakdown of the different components underlying the annualised capital costs is detailed in chapter 3 and Appendix 4, with the annualised fixed operations and maintenance (O&M) costs discussed in chapter 4 and Appendix 6. The small change in expected capacity credits is discussed in section 2.1.

Figure 2 illustrates the change between the 2023 BRCP determination and 2022 BRCP by cost component.

Figure 2: Changes between the 2023 BRCP determination and 2022 BRCP by BRCP cost component[24]



Source: ERA analysis of BRCP data. Figures may not add up due to rounding.

The following chapters detail those components with large changes that are driving the overall increase from the 2022 BRCP. The components with minor impacts are detailed in the appendices to this report.

[24] A consolidated list of changes to the BRCP cost components is in Appendix 3.

2.1 Expected capacity credits

The expected capacity credits for the BRCP 160 MW OCGT generator is 151.17 MW. The amount of expected capacity credits is based on the likely output of the generator operating at 41 degrees Celsius, adjusted for site conditions, as required by the market procedure.[25] The ERA accepted the recommendation of its independent consultant, GHD Advisory (GHD), regarding an appropriate 160 MW OCGT generator model to use as a proxy for the ERA's determination based on their assessment of OCGT generators worldwide (see section 3.2.3).[26] This generator model is similar to generator models recommended for determining previous BRCPs.

The number of expected capacity credits for the BRCP 160 MW OCGT generator is slightly higher than that for the 2022 BRCP (151.12 MW). This increase is due to updated information from the generator's manufacturer. The amount of expected capacity credits has not changed from the ERA's BRCP draft determination.

[25] See Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, section 3.4 (online); and Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Clause 2.3.1, (online).

[26] Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, sections 3.2 to 3.4 (online).

3. Annualised capital costs of the power station

The 2023 BRCP annualised capital costs of the BRCP 160 MW OCGT generator is $23.8 million, which is 19.5 per cent or $3.9 million higher than the annualised capital costs calculated for the 2022 BRCP. The annualised capital cost is the largest contributor to the 2023 BRCP increase and is mostly driven by an increase in financing costs (weighted average cost of capital (WACC)).

Table 2 shows the change in the cost components between the 2022 BRCP and the 2023 BRCP determinations. The main changes affecting the annualised capital cost components of the BRCP (the WACC and power station costs) are discussed below with the remaining items discussed in Appendix 5.

Table 2: Comparison of the annualised capital cost components for the 2023 BRCP final determination with the 2022 BRCP determination

Component	2023 BRCP determination	2022 BRCP determination	Change from 2022
Annualised capital cost ($/year)	**23,757,776**	**19,887,082**	**3,870,694 +19.5%**
160 MW OCGT power station cost ($/MW)	819,378	844,150	-24,772 -2.9%
Margin (%)	16.42	16.21	Up 0.21 percentage points +1.3%
Transmission cost ($/MW)	195,935	186,877	9,058 +4.8%
Fixed fuel cost ($)	8,632,788	7,398,376	1,234,412 +16.7%
Land cost ($)	3,048,874	2,699,666	349,208 +12.9%
WACC (%)	8.82	6.08	Up 2.75 percentage points +45.2%
Expected capacity credits (MW)	151.17	151.12	+0.05 capacity credits +0.03%

Source: ERA analysis of BRCP data

Note: The change in the values do not directly correspond to changes in the BRCP due to the operation of the calculation specified in the BRCP market procedure.[27] For example, although land costs have increased by 12.9 per cent, this has a smaller effect on the BRCP than the 4.8 per cent increase in transmission costs as the transmission cost component is a larger contributor to the annualised capital cost component.

[27] Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, clause 2.10.1, (online).

3.1 Weighted average cost of capital

The weighted average cost of capital is the largest contributor to the increase of the 2023 BRCP from the 2022 BRCP. The cost of capital represents the minimum return that a firm must earn on an asset to satisfy its creditors, owners and other providers of capital. A weighted average cost of capital (WACC) weights a firm's cost of capital in line with its debt to equity financing structure. For the BRCP, the WACC is used to estimate the financing costs of the power station and represents the long-term required rate of return when determining the power station's annualised cost. Consequently, small changes in the WACC can have a large effect on the BRCP, as the power station's life is projected over 50 years.

The ERA has reviewed and calculated the annual WACC components (see Table 3):

- the nominal risk free rate
- the debt risk premium
- the corporate tax rate.[28]

For the 2023 BRCP final determination, the nominal pre-tax WACC is 8.82 per cent (see Table 3). This is higher than the 6.08 per cent nominal pre-tax WACC calculated for the 2022 BRCP.[29] The increase in the nominal risk free rate (up 2.24 percentage points) is the main driver of this change and is discussed below.

Table 3: WACC values for the 2023 BRCP compared to the 2022 BRCP WACC values

Parameter	2023 BRCP final determination value	2022 BRCP value[30]
WACC		
Nominal pre-tax WACC (%)	**8.82**	**6.08**
Cost of equity parameters		
Nominal risk free rate (%)	3.96	1.72
Equity beta	0.83	0.83
Market risk premium (%)	5.90	5.90
Pre-tax return on equity (%)	10.42	7.78
Cost of debt parameters		
Nominal risk free rate (%)	3.96	1.72
Debt risk premium (%)	2.369	1.697
Debt issuance costs (%)	0.100	0.100
Pre-tax return on debt (%)	6.43	3.52

[28] The WACC components that are required to be reviewed by the ERA are in Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, section 2.9, (online).

[29] Economic Regulation Authority, 2021, *2022 benchmark reserve capacity price for the 2024/25 capacity year: Final determination,* p. 8, (online).

[30] Ibid, p. 8.

Parameter	2023 BRCP final determination value	2022 BRCP value[30]
Other parameters		
Debt proportion (gearing) (%)	40	40
Franking credits (gamma) (%)	50	50
Corporate tax rate (%)	30	30

Source: ERA analysis of BRCP data

The 2023 BRCP final determination WACC is higher than that proposed for the draft determination. Details on these differences is included in section 3.1.2 below.[31]

3.1.1.1 Nominal risk free rate

The risk free rate is the return an investor expects from investing in an asset with no risk and is a fundamental component of the WACC. To estimate a long-term risk free rate of return, the BRCP market procedure requires the ERA to use 10-year Commonwealth Government bonds as a proxy for risk free assets in Australia.[32] The BRCP WACC calculation uses a nominal risk free rate, which includes financial markets' inflation expectations.

For this final determination, the ERA's estimate of the nominal risk free rate is 3.96 per cent.[33] This is higher than the 1.72 per cent nominal risk free rate used for the 2022 BRCP.[34] The increase is due to higher interest rates on the 10-year Commonwealth Government bonds used to estimate the 2023 BRCP WACC. Over the last year, financial markets have experienced large upward pressure on interest rates as central banks have increased rates to curb inflation.

3.1.1.2 Debt risk premium

The debt risk premium is the return above the risk free rate that lenders require to compensate them for lending funds to a firm. The debt risk premium compensates debt holders for the possibility of default by the issuer and is closely aligned with the risk of the business. The BRCP market procedure requires the ERA to assess corporate bonds that have a credit rating of BBB (or equivalent).[35,36] A bond's credit rating reflects the probability of default of the issuer, which is the risk that the bondholder bears. The ERA's approach to determining the debt risk premium for the BRCP is detailed in Appendix 8.

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31 Full submissions are available on the ERA's website (Economic Regulation Authority, 'Benchmark Reserve Capacity Price', (online)) with a summary and responses detailed in Appendix 7.

32 Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Clause 2.9.7, (online). To calculate the risk free rate, the market procedure uses indicative mid rates published by the Reserve Bank of Australia. Where there are no Commonwealth Government bonds with a maturity of exactly 10 years, the ERA interpolates the risk free rate on a straight line basis.

33 The nominal risk free rate of 3.96 per cent is based on a 20-trading day averaging period up to 31 October 2022.

34 Economic Regulation Authority, 2021, *2022 benchmark reserve capacity price for the 2024/25 capacity year: Final determination,* p. 8, (online).

35 Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Clause 2.9.7(h), (online).

36 BBB is a credit rating designated by Standard and Poor's and indicates that a business is of medium credit quality and is investment grade – Investopedia, 'Investment Grade', (online) [accessed 9 November 2022].

For this final determination, the ERA calculated the debt risk premium to be 2.369 per cent.[37] This is higher than the 1.697 per cent debt risk premium used for the 2022 BRCP.[38] The difference is due to changes in credit markets since the 2022 BRCP determination.

3.1.1.3 Corporate tax rate

The Australian corporate tax rate is 30 per cent and has not changed since the 2022 BRCP.

3.1.2 Changes to the WACC from the draft and final determinations

Table 4 shows the differences in the WACC values used between the draft and final determinations due to changes in credit markets. The WACC figures for the 2023 BRCP draft determination were determined up to 29 July 2022 with updated figures for the 2023 BRCP final determination revised to 31 October 2022.

Table 4: WACC for the 2023 BRCP compared to the approved 2023 BRCP WACC values

Parameter	2023 BRCP final determination value (up to 31 Oct 2022)	2023 BRCP draft determination value (up to 29 July 2022)	Change in percentage points
Cost of equity parameters			
Nominal risk free rate (%)	3.96	3.45	+0.51
Equity beta	0.83	0.83	-
Market risk premium (%)	5.90	5.90	-
Pre-tax return on equity (%)	10.42	9.82	+0.60
Cost of debt parameters			
Nominal risk free rate (%)	3.96	3.45	+0.51
Debt risk premium (%)	2.369	2.508	-0.139
Debt issuance costs (%)	0.100	0.100	-
Pre-tax return on debt (%)	6.43	6.06	+0.37
Other parameters			
Debt proportion (gearing) (%)	40	40	-
Franking credits (gamma) (%)	50	50	-
Corporate tax rate (%)	30	30	-

[37] The debt risk premium of 2.369 per cent is based on a 20-trading day averaging period up to 31 October 2022.

[38] Economic Regulation Authority, 2021, *2022 benchmark reserve capacity price for the 2024/25 capacity year: Final determination,* p. 8, (online).

Parameter	2023 BRCP final determination value (up to 31 Oct 2022)	2023 BRCP draft determination value (up to 29 July 2022)	Change in percentage points
Weighted Average Cost of Capital			
Nominal pre-tax WACC (%)	**8.82**	**8.32**	**+0.50**

Source: ERA analysis of BRCP data

Synergy's submission to the draft determination stated that due to the rise in interest rates, the BRCP's financial assumptions may be too conservative.[39] As is standard practice for the BRCP determination, the ERA updates the WACC between the draft and final determinations to account for changing interest rate forecasts that affects the BRCP. The increase in the 2023 BRCP final determination's WACC is a driver of the increase in the BRCP from the draft determination.

3.2 Power station costs

Power station development costs decreased to $819,378 per MW (down 2.9 per cent from 2022) mostly driven by larger forecast decreases in the short term for material prices (steel and copper) which are a significant part of the BRCP's building costs.[40]

Since the BRCP 160 MW OCGT generator is to be built in the future, forecasts for these input costs are required to estimate the cost of building the power plant in time for the 2025/26 capacity year.[41] The ERA engaged PricewaterhouseCoopers (PwC) to forecast these input costs, called cost escalation factors, for the 2023 BRCP (see Table 5).[42]

3.2.1 Cost escalation factors

Table 5 sets out the cost escalation factors used to estimate the different power station's capital costs components by financial year.

Table 5: Cost escalation factors used to calculate the 2023 BRCP by financial year

Cost Escalation Factor	Financial year				
	2022/23	**2023/24**	**2024/25**	**2025/26**	**2026/27**
Labour costs – operations and maintenance (% change)	2.81	3.06	3.06	3.06	2.95
Labour costs – construction (% change)	2.65	2.90	2.90	2.90	2.79
AUD/USD ($)	0.7030	0.7517	0.7692	0.7692	0.7692

39 Synergy, 2022, Submission to *2023 benchmark reserve capacity price for the 2025/26 capacity year, Draft determination*, (online).

40 This is the total capital cost escalated to 1 April 2025 divided by the expected capacity credits of 151.17 MW. Expected capacity credits for the power station is discussed in section 2.1.

41 This approach of applying cost escalation factors to the BRCP reference generator priced at today's costs has been used consistently in previous BRCP determinations.

42 Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, section 2.3, (online).

Cost Escalation Factor	Financial year				
	2022/23	2023/24	2024/25	2025/26	2026/27
Steel price (% change)	-43.82	-10.63	-4.17	-2.26	-3.12
Copper price (% change)	-23.14	-3.13	2.44	2.20	0.18

Source: Economic Regulation Authority, December 2022, 2023 Benchmark Reserve Capacity Price*, Report prepared by PwC (online).*

The cost escalation factors were provided to GHD who determined a power station escalation factor to apply to the power station costs (see Table 6).[43] The power station escalation factor is applied to the current price of the BRCP 160 MW OCGT generator to estimate its future cost.

Table 6: Power station escalation factors

Cost escalation	Total applicable power station escalation factor (%)
2022 BRCP[44]	-4.1
2023 BRCP[45]	-8.6

Source: Economic Regulation Authority, 8 December 2022, Power station and associated costs*, Report prepared by GHD Advisory, chapter 2 (online); and Economic Regulation Authority, 2021,* Power station and associated costs*, Report prepared by GHD Advisory, chapter 2 (online).*

The overall power station cost decreased as a lower power station escalation factor was used for the 2023 BRCP determination than for the 2022 BRCP determination. The lower power station escalation factor is driven by lower steel and copper price forecasts which are due to an expected oversupply of these materials, particularly in 2023.[46]

Table 7: Change in cost escalation factors between the 2022 and 2023 BRCP

Cost Escalation Factor	2022/23	2023/24	2024/25	2025/26
Labour costs – operations and maintenance (percentage points)	+0.36	+0.36	+0.36	+0.64

43 The cost escalation factors are used to estimate the power plant, fixed operating and maintenance, fixed fuel and margin M costs as at the dates required by the BRCP market procedure. Details of each cost escalation is in Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory (online).

44 The -4.1 per cent is the overall escalation factor applied to the power station cost using the cost escalation factors from the 2022 BRCP. This is calculated as the final estimated cost of the generator relative to the cost of the generator today ($126,073,156 / $131,397,654 – 1) – Economic Regulation Authority, 2021, *Power station and associated costs*, Report prepared by GHD Advisory, chapter 2 (online).

In the 2022 BRCP, the cost escalation factor was provided as a yearly annualised figure (-2.36 per cent). For the 2023 BRCP, the reporting of this figure was changed to the total applicable power station cost escalation factor which provides a more accurate reference of how much the cost escalation forecasts affect the total cost of the power station.

45 The -8.6 per cent is the overall escalation factor applied to the power station cost using the cost escalation factors from the 2023 BRCP. This is calculated as the final estimated cost of the generator relative to the cost of the generator today ($123,862,427 / $135,508,167 – 1) – Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, chapter 2 (online).

46 Economic Regulation Authority, December 2022, *2023 Benchmark Reserve Capacity Price,* Report prepared by PricewaterhouseCoopers (online).

Cost Escalation Factor	2022/23	2023/24	2024/25	2025/26
Labour costs – construction (percentage points)	+0.64	+0.64	+0.64	+0.92
AUD/USD (cents)	-8.33	-1.46	+0.29	+0.29
Change in Steel price (percentage points)	-15.85	-0.42	+2.81	+0.53
Change in Copper price (percentage points)	-14.53	-1.52	-1.4	-0.14

Source: Economic Regulation Authority, December 2022, 2023 Benchmark Reserve Capacity Price*, Report prepared by PwC (online).*

The lower power station escalation costs led to an overall decrease in total capital costs of 1.7 per cent.[47] Although the total capital costs decreased, when combined with the WACC to provide annualised capital costs, the annualised capital costs have increased when compared to the 2022 BRCP determination (see start of chapter 3 and section 3.1).

3.2.2 Changes to the cost escalation factors since the draft determination

Financial conditions over the latter half of 2022 have changed rapidly. In these circumstances, it is prudent for the ERA to update the cost escalation factors since the BRCP draft determination. This has not been necessary in previous BRCP determination processes. Submissions from stakeholders highlighted that the cost escalation factors used in the ERA's BRCP draft determination were from July 2022 and do not reflect more recent financial forecasts.

The ERA engaged PwC to update the cost escalation factors using the same methodology for the draft determination but with more recent data.[48] The ERA's 2023 BRCP final determination uses updated cost escalation factors estimated as of 29 November 2022. The difference between the cost escalation factors in the draft and final determinations is detailed in Table 8. This is one of the drivers of the increase in the BRCP since the draft determination.

Table 8: Change in cost escalation factors between the 2023 BRCP final and draft determinations

Cost Escalation Factor	2022/23	2023/24	2024/25	2025/26
Labour costs – operations and maintenance (percentage points)	+0.02	+0.02	+0.02	+0.02
Labour costs – construction (percentage points)	+0.16	+0.16	+0.16	+0.16
AUD/USD (cents)	-1.39	-0.46	-0.58	-0.58
Steel price (percentage points)	-16.64	+10.04	+9.27	+1.31

47 Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, section 3.5, (online).

48 Economic Regulation Authority, December 2022, *2023 Benchmark Reserve Capacity Price,* Report prepared by PricewaterhouseCoopers (online).

Cost Escalation Factor	2022/23	2023/24	2024/25	2025/26
Copper price (percentage points)	-14.19	+8.77	+6.85	+2.05

Source: Economic Regulation Authority, 2022, 2023 Benchmark Reserve Capacity Price*, Report prepared by PwC (online).*

The main changes between the cost escalation factor estimates were:

- A slight rise in overall labour costs.
- A lower revised exchange rate.
- To steel and copper prices that are expected to fall further than originally forecast for 2022/23 in the draft determination but increase over the remaining years.

This has contributed towards the increase in the BRCP between the draft and final determinations with details in Appendix 4.

Submissions from stakeholders also suggested that the ERA consider other data sources when determining the cost escalation factors. For example, Alinta Energy suggested S&P Global for steel and copper price forecasts and the Australian Energy Council suggested CIBC and ING for exchange rates.[49]

The ERA is considering these alternatives but has not sought changes to PwC's methodology for preparing the 2023 BRCP determination cost escalation factors. Although submissions provided alternative data sources, as noted above, none provided evidence of how they would improve the accuracy of the BRCP cost escalation factor forecasts. The ERA is mindful that changing forecasting methods must be considered carefully, and more time is required to adequately assess this for future determinations. This is to ensure that including alternative data forecasts aids forecasting accuracy and minimises the risk of biasing forecasts to the upside or downside as it can significantly affect the BRCP. Further assessment of the alternative data sources proposed by stakeholders will be conducted for future BRCP determinations.

3.2.3 Power station generator model selection

The ERA engaged GHD to assess the appropriate generator for the 2023 BRCP determination. GHD selected the Siemens SGT5-2000E as it closely aligns with the power station requirements in the BRCP market procedure.[50] The power station requirements are that it:

- Is an industry standard OCGT power station with a nominal nameplate capacity of 160 MW prior to installing any inlet cooling system.
- Can use distillate for its fuel.
- Has a capacity factor of 2 per cent. This means that the BRCP generator is expected to generate at its maximum capacity for 2 per cent of the year.

[49] These submissions are available on the ERA's website – Economic Regulation Authority, 'Benchmark Reserve Capacity Price', (online).

[50] Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, chapter 3, (online).

When determining the capital costs of this power station, GHD incorporated other power station requirements, such as:[51]

- Technologies that are required to demonstrate good practice for developing this type of power station, like nitrous oxide burners.
- An inlet air cooling system and water receival and storage facilities to allow 14 hours of continuous operation where this would be cost effective.

This generator is similar to the generator used in the 2022 BRCP determination.

3.3 Other capital cost components

The other power station cost components, including land costs and fixed fuel costs, did not significantly contribute to the increase in power station capital costs. These are covered in Appendix 5.

[51] Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, chapter 3, (online).

4. Annualised fixed O&M costs

The annualised fixed operating and maintenance (O&M) cost for the 2023 BRCP is $36,228 per MW per year, up 6.1 per cent from the 2022 BRCP ($34,131 per MW per year). This increase is mostly due to a rise in asset insurance costs and inflation related increases to Western Power's network access and ongoing charges estimates.

The O&M costs component consists of five parts: generation O&M costs, switchyard O&M costs, transmission line O&M costs, asset insurance costs, and network charges. These costs are expected to be annually incurred in operating and maintaining the BRCP 160 MW OCGT generator and are detailed in Table 9.[52]

Table 9: Comparison of 2023 BRCP determination annualised fixed O&M costs to the 2022 BRCP determination

Component	2023 BRCP determination	2022 BRCP determination	Change from 2022
Annualised fixed O&M costs ($/MW/year)	**36,228**	**34,131**	**2,097 +6.1%**
Generation O&M costs ($/MW/year)	15,934	15,318	616 +4.0%
Switchyard O&M costs ($/MW/year)	572	576	-3 -0.6%
Transmission line O&M costs ($/MW/year)	36	36	-0.2 -0.6%
Asset insurance costs ($/MW/year)	7,154	6,426	728 +11.3%
Fixed network access and ongoing charges ($/MW/year)	12,531	11,775	756 +6.4%

Source: ERA analysis of BRCP data. Some figures may not add up due to rounding.

The main drivers of the fixed O&M cost increase are discussed below with the remainder covered in Appendix 6.

4.1 Asset insurance costs

The asset insurance costs cover power station asset replacement, business interruption and public and products liability insurance. To maintain consistency with previous insurance estimates for the BRCP, the ERA sourced the insurance quote from an independent insurance broker, which is one of the leading global insurance brokers with expertise in power generation

[52] These fixed operation and maintenance costs have been escalated to 1 October 2025.

insurance, particularly in Western Australia.[53] The asset insurance cost components are detailed in Table 10.

Table 10: Comparison of 2023 BRCP final determination asset insurance costs to the 2022 BRCP determination

Component	2023 BRCP determination	2022 BRCP determination	Change from 2022
Asset insurance costs ($/MW/year)	**7,154**	**6,426**	**728** **11.3%**
Asset replacement insurance ($/year)	614,560	588,066	26,494 +4.5%
Business interruption insurance ($/year)	283,711	228,984	54,727 +23.9%
Public and products liability insurance ($/year)	167,783	142,452	25,331 +17.8%

Source: ERA analysis of insurance cost information provided for the 2023 BRCP.

Asset insurance costs for the 2023 BRCP determination rose by 11.3 per cent to $7,154 per MW per year when compared to the asset insurance costs for the 2022 BRCP. This is mostly due to significant increases in the cost of business interruption and public and products liability insurance.

Business interruption insurance increased due to the higher business interruption insurable value of the power station.[54] The business interruption insurable value rose to over $29 million which is based on the expected total annual value of BRCP payments.[55] This is greater than the $25 million business interruption insurable value used in the 2022 BRCP.

The increase in public and products liability insurance is due to an increase in perceived risks in the electricity sector, particularly around new technologies disrupting the industry, global supply chain and related inflationary issues, and broader geopolitical, environmental and pandemic related concerns.

4.1.1 Changes to asset insurance costs between draft and final determinations

Due to the changes in the underlying BRCP components, this increased the insurable amounts for a BRCP 160 MW OGT generator. Table 11 details the changes which are due to the higher replacement value of the generator and the rise in the insurable value for business interruption.

[53] The insurance broker is the same broker used by AEMO and then the ERA for determining past BRCPs. For confidentiality, the broker has requested to not be named.

[54] The business interruption value of the power station is the expected capacity credits multiplied by the expected BRCP.

[55] The total expected annual value is the number of expected capacity credits (151.17) multiplied by the BRCP ($193,400 per MW per year) which totals over $29 million.

Table 11: Comparison of 2023 BRCP final to draft determination asset insurance costs

Component	2023 BRCP final determination	2023 BRCP draft determination	Change
Asset insurance costs ($/MW/year)	**7,154**	**6,904**	**250** **+3.6%**
Asset replacement insurance ($/year)	614,560	594,279	20,281 +3.4%
Business interruption insurance ($/year)	283,711	269,285	14,426 +5.4%
Public and products liability insurance ($/year)	167,783	166,074	1,709 +1.0%

Source: ERA analysis of insurance cost information provided for the 2023 BRCP.

4.2 Fixed network access and ongoing charges

The other main contributor to the rise in fixed O&M costs is the increase in Western Power's fixed network access and ongoing charges to $12,531 per MW per year, an increase of 6.4 per cent (or $756 per MW per year) when compared to the 2022 BRCP value ($11,775 per MW per year).

Network access charges were determined using Western Power's network access tariffs data from the 2021/22 price list, as the 2022/23 price list will not be published before the ERA must determine the 2023 BRCP.[56] Since the fixed network access and ongoing charges are a small contributor to the BRCP, changes to these prices will not significantly affect the overall BRCP.

In line with how network access charges have been assessed in previous BRCP determinations, the ERA applied the highest Transmission Reference Tariff 2 unit price from across the regions where the BRCP can be located.[57] The Muja Power Station substation has the highest unit price, which the ERA used to estimate the fixed network access charges applicable to the BRCP generator. This charge is based on the cost to Western Power of that generator using the SWIS network and depends on factors including the location, transmission line-length and the complexity of the grid connection.

The other inputs for this cost component are:

- Control system service charges – this is the general overhead of Western Power's control system costs applied to generators proportionately per kilowatt.
- Transmission metering service charges – this is a fixed daily charge per revenue meter.

Table 12 provides a comparison of these cost inputs against the 2022 BRCP values for fixed network access and ongoing charges. Although Western Power's price list has not changed,

[56] The Transmission Reference Tariff 2 was used as it applies to generators – Western Power, 2021, *2021/22 Price List*, (online) [accessed 29 August 2022].

[57] These regions are Collie, Kemerton Industrial Park, Pinjar, Kwinana, North Country (Eneabba and Geraldton) and Kalgoorlie – Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Clause 2.7.1 (online).

the cost escalation (i.e., inflation expectations) for the 2023 BRCP is higher than those for the 2022 BRCP, which results in the cost increase.

Table 12: Comparison of 2023 BRCP determination fixed network and ongoing charges to the 2022 BRCP determination

Component	2023 BRCP determination	2022 BRCP determination	Change from 2022
Control system service charge ($/year)	121,390	121,349	41 +0.03%
Transmission metering ($/year)	3,209	3,209	No change
Use of system charge ($/year)	1,520,128	1,519,625	503 +0.03%
Total annual Western Power charges ($)	1,644,726	1,644,183	543 +0.03%
Cost per MW per year[58]	12,531	11,775	756 +6.4%

Source: ERA analysis of BRCP data

The 2023 BRCP fixed network and ongoing charges were calculated as of July 2022 with the total cost per MW figure escalated by the forecast inflation rates to 1 October 2025 as required by the BRCP market procedure.

4.2.1 Stakeholder submissions

Alinta Energy stated that Western Power's report did not mention Western Power's Access Arrangement, particularly regarding Western Power's escalation rate used for determining transmission costs for the BRCP.[59]

Western Power must prepare its transmission cost estimates for the BRCP as per the BRCP market procedure. Ernest & Young verified that Western Power followed the BRCP market procedure in producing its report, which includes their escalation rate.[60] Given that the ERA has no evidence that Western Power did not follow the BRCP market procedure, the ERA concludes that the figures provided by Western Power meet the requirements for the BRCP's determination.

58 Includes escalation by forecast inflation – Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, section 2.2 (online).

59 Alinta Energy, 2022, Submission to *2023 benchmark reserve capacity price for the 2025/26 capacity year, Draft determination*, (online).

60 Economic Regulation Authority, 2022, *Total Transmission Cost Estimate for the Benchmark Reserve Capacity Price for 2025/26*, Report prepared by Western Power, Appendix 1, (online).

Transmission cost information is confidential and is required to be independently verified - Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Clause 2.4.1(g), (online).

4.2.2 Changes between draft and final determinations

Western Power's fixed network access and ongoing charges have not changed since the draft determination however updated inflation forecasts has led to a slight forecast cost increase (see Table 13).

Table 13: Comparison of 2023 BRCP final determination fixed network and ongoing charges to the 2023 BRCP draft determination

Component	2023 BRCP final determination	2023 BRCP draft determination	Change from 2022
Control system service charge ($/year)	121,390	121,390	No change
Transmission metering ($/year)	3,209	3,209	No change
Use of system charge ($/year)	1,520,128	1,520,128	No change
Total annual Western Power charges ($)	1,644,726	1,644,726	No change
Cost per MW per year[61]	12,531	12,393	138 +1.1%

Source: ERA analysis of BRCP data

4.3 Other operating and maintenance components

The other components making up the fixed operating and maintenance costs (generation O&M, switchyard O&M and transmission line O&M) did not significantly contribute to its increase. These components are covered in Appendix 6 and are similar to the 2022 BRCP amounts.

[61] Includes escalation by forecast inflation – Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, section 2.2, (online).

Appendix 1 List of Tables

Table 1: The 2023 BRCP determination compared to the 2022 BRCP determination 5
Table 2: Comparison of the annualised capital cost components for the 2023 BRCP final determination with the 2022 BRCP determination 8
Table 3: WACC values for the 2023 BRCP compared to the 2022 BRCP WACC values 9
Table 4: WACC for the 2023 BRCP compared to the approved 2023 BRCP WACC values 11
Table 5: Cost escalation factors used to calculate the 2023 BRCP by financial year 12
Table 6: Power station escalation factors 13
Table 7: Change in cost escalation factors between the 2022 and 2023 BRCP 13
Table 8: Change in cost escalation factors between the 2023 BRCP final and draft determinations 14
Table 9: Comparison of 2023 BRCP determination annualised fixed O&M costs to the 2022 BRCP determination 17
Table 10: Comparison of 2023 BRCP final determination asset insurance costs to the 2022 BRCP determination 18
Table 11: Comparison of 2023 BRCP final to draft determination asset insurance costs 19
Table 12: Comparison of 2023 BRCP determination fixed network and ongoing charges to the 2022 BRCP determination 20
Table 13: Comparison of 2023 BRCP final determination fixed network and ongoing charges to the 2023 BRCP draft determination 21
Table 14: Comparison of BRCP cost components between the 2023 BRCP determination and 2022 BRCP 24
Table 15: Changes of components between the 2023 BRCP final and draft determinations 25
Table 16: Comparison of the capital costs between the 2023 BRCP determination and 2022 BRCP determination 26
Table 17: Comparison of 2023 BRCP annualised fixed O&M costs to the 2022 BRCP determination 29
Table 18: Submissions to the 2023 BRCP draft determination and issues raised 31
Table 19: Summary and response to submissions to the 2023 BRCP draft determination 31
Table 20: CAPM parameters for the BRCP calculation 36
Table 21: WACC for the 2023 BRCP compared to the approved 2022 BRCP WACC values 39

Appendix 2 List of Figures

Figure 1: BRCP from 2020/21 by capacity year 5
Figure 2: Changes between the 2023 BRCP determination and 2022 BRCP by BRCP cost component 6

Appendix 3 Components of the 2023 BRCP final determination compared to 2022 BRCP

Table 14 is a consolidation of the differences between 2023 and 2022 of each component of the BRCP.

Table 14: Comparison of BRCP cost components between the 2023 BRCP determination and 2022 BRCP

Component	2023 BRCP determination	2022 BRCP determination	Change from 2022
Expected capacity credits (MW)	151.17	151.12	0.05
Weighted Average Cost of Capital	8.82%	6.08%	Up 2.75 percentage points
160 MW OCGT power station cost ($/MW)	819,378	844,150	-24,772
Margin for legal, financing, and other costs	16.42%	16.21%	Up 0.21 percentage points
Transmission Costs ($/MW)	195,935	186,877	9,058
Fixed Fuel Costs ($)	8,632,788	7,398,376	1,234,412
Land Costs ($)	3,048,874	2,699,666	349,208
Generation O&M cost ($/MW/year)	15,934	15,318	616
Switchyard O&M cost ($/MW/year)	572	576	-3
Transmission Line O&M cost ($/MW/year)	35.7	35.9	-0.2
Asset Insurance Costs ($/MW/year)	7,154	6,426	728
Fixed Network Access and ongoing charges ($/MW/year)	12,531	11,775	756
Total Capital Costs ($)	**193,514,674**	**192,172,433**	**1,342,241**
Annualised capital costs ($/year)	**23,757,776**	**19,887,082**	**3,870,694**
Annualised fixed O&M ($/MW/year)	**36,228**	**34,131**	**2,097**
BRCP ($/MW/year)	**193,400**	**165,700**	**27,700**

Source: ERA analysis of BRCP data

Appendix 4 Changes between the 2023 BRCP final and draft determinations

Changes to the cost escalation factors (see section 3.2.2), which underpins most of the BRCP calculation, and the WACC (see section 3.1.2) has changed many cost components between the draft and final determinations. Table 15 consolidates these changes together.

Table 15: Changes of components between the 2023 BRCP final and draft determinations

Component	2023 BRCP final determination	2023 BRCP draft determination	Change
Expected capacity credits (MW)	151.17	151.17	-
Weighted Average Cost of Capital	8.82%	8.32%	Up 0.51 percentage points
160 MW OCGT power station cost ($/MW)	819,378	802,679	16,699
Margin for legal, financing, and other costs	16.42%	16.38%	Up 0.04 percentage points
Transmission Costs ($/MW)	195,935	195,935	-
Fixed Fuel Costs ($)	8,632,788	8,588,684	44,104
Land Costs ($)	3,048,874	3,017,820	31,054
Generation O&M cost ($/MW/year)	15,934	15,699	235
Switchyard O&M cost ($/MW/year)	572	570	3
Transmission Line O&M cost ($/MW/year)	35.7	35.6	0.2
Asset Insurance Costs ($/MW/year)	7,154	6,904	250
Fixed Network Access and ongoing charges ($/MW/year)	12,531	12,393	138
Total Capital Costs ($)	**193,514,674**	**189,870,739**	**3,643,935**
Annualised capital costs ($/year)	**23,757,776**	**22,611,263**	**1,146,513**
Annualised fixed O&M ($/MW/year)	**36,228**	**35,602**	**625**
BRCP ($/MW/year)	**193,400**	**185,200**	**8,200**

Source: ERA analysis of BRCP data. Some figures may not add up due to rounding.

Appendix 5 Annualised capital costs

The formula for calculating the BRCP capital costs is:[62]

$$CAPCOST = ((PC \times (1 + M) + TC) \times CC + FFC + LC) \times (1 + WACC)^{\wedge}0.5$$

The values for each input in the capital cost formula is provided in Table 16. An explanation of each of the unshaded input values is provided below the table.[63]

Table 16: Comparison of the capital costs between the 2023 BRCP determination and 2022 BRCP determination

Component	2023 BRCP determination	2022 BRCP determination	Change from 2022
160 MW OCGT power station cost (PC) ($/MW)	819,378	844,150	-24,772 -2.9%
Weighted Average Cost of Capital (WACC)	8.82%	6.08%	Up 2.75 percentage points +45.2%
Expected capacity credits (CC) (MW)	151.17	151.12	0.05 +0.03%
Margin for legal, financing, and other costs (M) (%)	16.42	16.21	Up 0.21 percentage points +1.3%
Transmission Costs (TC) ($/MW)	195,935	186,877	9,058 +4.8%
Fixed Fuel Costs (FFC) ($)	8,632,788	7,398,376	1,234,412 +16.7%
Land Costs (LC) ($)	3,048,874	2,699,666	349,208 +12.9%
Total Capital Costs ($)	**193,514,674**	**192,172,433**	**1,342,241 +0.7%**
Annualised capital costs ($/year)	**22,757,776**	**19,887,082**	**3,870,694 +19.5%**

Source: ERA analysis of BRCP data

Note: Shaded components are discussed in section 2.1 or chapter 3.

62 Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Clause 2.10.1, (online).

63 The power station costs and WACC are discussed in chapter 3, and expected capacity credits in section 2.1.

This appendix covers the other components that were minor contributors to the overall change in the power station capital costs. Changes between the draft and final determination values are due to updated cost escalation factors which are detailed in Appendix 4.

Margin cost (M)

The 'M' margin includes costs for regulatory approval, financing, contingencies and legal.[64] This margin is added as a percentage of the capital cost of developing the power station and is 16.42 per cent for this final determination based on the estimated costs from GHD. This is higher than the 2022 BRCP value (16.21 per cent) as the costs for all of these services have increased.[65]

Transmission costs

Western Power estimated the shallow connection costs for the 2023 BRCP determination at $25.3 million.[66] Applying the specific escalation requirements set out in the BRCP market procedure, this comes to $195,935 per MW.[67] Shallow connection costs include the construction of a substation, two kilometres of overhead line and the associated easement for that line.[68] The increase of 4.85 per cent compared to the 2022 BRCP is driven by increases in land, substation, and transmission line costs.

Western Power's estimates are available in Western Power's report, published on the ERA's website.[69] Western Power's estimates have been verified by Ernest & Young that they comply with the BRCP market procedure as the underlying data is confidential and cannot be published. The ERA is satisfied that Western Power's estimates meet the requirements for the BRCP.

Fixed fuel costs

Fixed fuel costs are estimated at $8.6 million for the 2023 BRCP, 16.7 per cent higher than for the 2022 BRCP. This increase is due increases in the construction costs of fuel storage and supply facilities and the rising diesel price which has been affected by worldwide events including the COVID-19 pandemic, global supply issues and disruptions to oil and gas markets.

The fixed fuel costs include the development and construction of an onsite liquid fuel storage and supply facility with supporting infrastructure. In addition, 14 hours of fuel is added to the

64 Full details are in Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, section 6, (online).

65 Details on the capital cost of the power station is in Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, section 3.5, (online).

66 Economic Regulation Authority, 2022, *Total Transmission Cost Estimate for the Benchmark Reserve Capacity Price for 2025/26*, Report prepared by Western Power, p. 5, (online).

67 Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Clause 2.4.1, (online). and Economic Regulation Authority, 2022, *Total Transmission Cost Estimate for the Benchmark Reserve Capacity Price for 2025/26*, Report prepared by Western Power, p. 6, (online).

68 The ERA provided the land costs to Western Power for their calculation. The land costs are from Economic Regulation Authority, 2022, *Land values for the 2023 Benchmark Reserve Capacity Price*, Report prepared by Landgate (online).

69 Economic Regulation Authority, 2022, *Total Transmission Cost Estimate for the Benchmark Reserve Capacity Price for 2025/26*, Report prepared by Western Power, (online).

costs, as required by the BRCP market procedure, which includes the cost of delivery and any excise rebate.[70]

Land costs

The land costs provided by Landgate for the six regions assessed under the BRCP market procedure increased to $3.0 million for the 2023 BRCP. This is $349,208 higher than the 2022 BRCP land costs due to increases in land costs for all regions except Eneabba (part of the North Country region). Landgate's assessment is available on the ERA's website.[71]

The hypothetical land sites were assessed for each region specified in the BRCP market procedure (Collie, Kalgoorlie, Kemerton Industrial Park, Kwinana, North Country, and Pinjar) that are suitable for building a BRCP 160 MW OCGT generator. These assessments were made as of 30 June 2022 with the ERA applying the applicable transfer duty. The per hectare cost used for the BRCP is averaged over these regions and escalated to 1 April 2025.[72]

The increase in land costs between the draft and final determinations is due to updated inflation data (see Appendix 4).

[70] Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, section 2.6, (online).

[71] Economic Regulation Authority, 2022, *Land values for the 2023 Benchmark Reserve Capacity Price*, Report prepared by Landgate (online).

[72] The land costs are escalated to 1 April 2025 as the land must be acquired prior to construction of the BRCP reference generator. This is specified in Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Clause 2.7.5, (online).

Appendix 6 Other operating and maintenance costs

This appendix covers the other components that contributed to the increase in the fixed operating and maintenance costs discussed in chapter 4 and are detailed in Table 17.

Table 17: Comparison of 2023 BRCP annualised fixed O&M costs to the 2022 BRCP determination

Component	2023 BRCP determination	2022 BRCP determination	Change from 2022
Annualised fixed O&M costs ($/MW/year)	**36,228**	**34,131**	**2,097 +6.1%**
Fixed network access and ongoing charges ($/MW/year)	12,531	11,775	756 +6.4%
Asset insurance costs ($/MW/year)	7,154	6,426	728 +11.3%
Generation O&M costs ($/MW/year)	15,934	15,318	616 +4.0%
Switchyard O&M costs ($/MW/year)	572	576	-3 -0.6%
Transmission line O&M costs ($/MW/year)	35.7	35.9	-0.2 -0.6%

Source: ERA analysis of BRCP data. Some figures may not add up due to rounding.

Note: Shaded components are discussed in chapter 4.

Changes between the draft and final determination values is detailed in Appendix 4 and is due to updated cost escalation factors.

Generation O&M cost

Generation O&M costs are an estimate of the operating and maintenance costs of a 160 MW OCGT generator operating on diesel fuel (as required by the BRCP market procedure).[73] These costs are estimated over the generator's operating life of up to 60 years with the generator operating at its maximum output for 2 per cent of each year.[74] Additionally, an allowance for balance of plant costs is included, which includes items like the servicing of pumps, water plants and fire systems.

The increase in generation O&M cost ($616 per MW per year or 4.0 per cent) is largely driven by the increase in labour costs (see Table 5) for services including plant operations, electrical

[73] Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, section 2.1, (online).

[74] Details on fixed operating and maintenance costs are in Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, section 2.5, (online). This excludes the costs of gas connections as the BRCP market procedure requires the OCGT to be able to run on diesel.

sub-contractors, and corporate overheads.[75] Other increases include rates, market fees and balance of plant costs.[76]

Switchyard operating and maintenance costs

The estimated switchyard O&M cost ($572 per MW per year) was lower than for the 2022 BRCP. This small decrease is due to the short term forecast fall in material costs as detailed in the cost escalation factors estimates (see Table 5).[77]

The switchyard O&M costs are derived from the isolator on the high voltage side of the generator's transformer and does not include any generator transformer or switchgear costs. These costs are based on the annual charge for connection assets and includes estimates of overheads, machine hire and labour for maintenance services. Details are available in GHD's report on the ERA's website.[78]

Transmission line operating and maintenance costs

The estimated transmission line O&M cost ($35.7 per MW per year) did not significantly change from the 2022 BRCP value. The minor decrease is due to the short term forecast fall in material costs as detailed in the cost escalation factors estimates (see Table 5).[79]

The transmission line O&M is derived from a transmission line that is assumed to be a single circuit 330 kilovolt construction with two conductors per phase with a 60-year asset life. The line can transport up to 200 megavolt amperes with a power factor of 0.8 as required by the BRCP market procedure. Further details are available in GHD's report on the ERA's website.[80]

75 Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, section 4.3, (online) – for details of these costs.

76 The changes in generation O&M is available in: Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, Table 10, p. 13, (online).

77 Economic Regulation Authority, 8 December 2022, *Power station and associated costs*, Report prepared by GHD Advisory, sections 2.4 and 4.3, (online) – discusses how the cost escalation for switchyard O&M is derived and applied.

78 Ibid, section 4.4, (online).

79 Ibid, sections 2.4 and 4.3, (online) – discusses how the cost escalation for switchyard O&M is derived and applied.

80 Ibid, section 4.4, (online).

Appendix 7 Submissions received

Four submissions were received in response to the ERA's 2023 BRCP draft determination from:

- Alinta Energy
- Australian Energy Council (AEC)
- Collgar Wind Farm
- Synergy.

Table 18 provides a summarised overview of the issues raised in the submissions.

Table 18: Submissions to the 2023 BRCP draft determination and issues raised

		Issue					
		Labour & Construction Costs	**Commodity prices**	**Exchange Rate**	**Transmission Costs**	**Interest Rates**	**Penalties for High Emissions**
Submitter	Collgar	X	X	X			
	Alinta	X	X	X	X		
	AEC	X	X	X			
	Synergy		X			X	X

Source: Submissions to the ERA's 2023 BRCP draft determination (online).

Most of the issues raised are on the cost escalation factors (labour and construction costs, commodity forecasts and the exchange rate which are addressed in sections 3.2.1 and 3.2.2). Table 19 details the ERA's response to each issue raised.

Table 19: Summary and response to submissions to the 2023 BRCP draft determination

Submitter	Submission question or comment	ERA response
Collgar, Alinta and AEC	**Labour and construction costs** Submissions regarding labour and construction costs raised concerns that these costs may be understated given ongoing labour market issues and higher forecasts from the Australian Bureau of Statistics.	Given the rapidly evolving financial market conditions, the ERA considers that it is prudent to update the cost escalation factors which includes labour and construction costs (see section 3.2.1).[81] This has resulted in an overall increase in labour costs which is included in the final BRCP.
Collgar, Alinta, AEC and Synergy	**Commodity price forecasts** All submissions queried the forecast fall in steel and copper prices and whether they will continue to trend downward. Various alternative sources were cited	Given the rapidly evolving financial market conditions, the ERA considers that it is prudent to update the cost escalation factors which includes steel

[81] An updated PwC report is available on the ERA's website – Economic Regulation Authority, December 2022, *2023 Benchmark Reserve Capacity Price,* Report prepared by PricewaterhouseCoopers, (online).

Submitter	Submission question or comment	ERA response
	that indicate that the expected fall in materials prices is significantly less than what PwC had forecast.	and copper price forecasts (see section 3.2.1).[82] This has resulted in a larger short term fall in steel and copper prices followed by an overall increase in prices over the remainder of the forecast period. The ERA's updated material prices are consistent with Synergy's submission which states that consensus forecasts point to lower demand for these commodities in the short term.
Collgar, Alinta and AEC	**Exchange Rate forecasts** The submissions on exchange rates stated concerns that the forecast exchange rate is higher than other exchange rate forecasts by other institutions such as ING and CIBC.	Given the rapidly evolving financial market conditions, the ERA considers that it is prudent to update the cost escalation factors which includes the Australian Dollar to US Dollar exchange rate (see section 3.2.1).[83] This has resulted in an overall decrease in the exchange rate which contributes towards a higher final BRCP.
Alinta	**Transmission costs** Western Power's Total Transmission Cost Estimate for the BRCP report did not reference or update its transmission cost escalation factor based on its revised Access Arrangement and reports of transformer shortages.	Western Power prepared its transmission costs based on the BRCP Market Procedure, which was verified by Ernst & Young.[84] Western Power must calculate its transmission cost escalation factor based on historical costs.[85] The ERA is confident that Western Power followed the process in the BRCP market procedure correctly when determining the transmission cost escalation factor with no evidence to the contrary.
Synergy	**Interest rates** The interest rate assumption in the ERA's BRCP draft determination may be too conservative.	The interest rates underlying the WACC can significantly affect the BRCP. Synergy's submission points out that ten-year Treasury bonds were 3.92 per cent at the end of October 2022. The ERA's draft determination had a WACC based on Treasury bond interest rates as of 29 July 2022. When finalising the BRCP determination, the ERA updates the WACC to incorporate interest rate changes since the draft determination. This update has increased the WACC by 0.51 percentage points since the

82 An updated PwC report is available on the ERA's website – Economic Regulation Authority, December 2022, *2023 Benchmark Reserve Capacity Price,* Report prepared by PricewaterhouseCoopers, (online).

83 Ibid.

84 Economic Regulation Authority, 'Benchmark Reserve Capacity Price', (online).

85 Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Clause 2.4.1(d), (online).

Submitter	Submission question or comment	ERA response
		draft determination, based on interest rates up to 31 October 2022. This has contributed to the increase in the BRCP since the draft determination (see section 3.1.2).
Synergy	**Penalties for high emissions technologies** Penalties for high emissions technologies has not been factored into the BRCP determination.	The ERA has not received a final version of the policy principles for penalties for high emission technologies (see section 1.3). These penalties could apply to a BRCP 160 MW OCGT generator. As these principles are not final, the ERA does not have enough detail on if or how these penalties would apply to a BRCP 160 MW OCGT generator. The ERA will assess the effect of the penalties on the BRCP once they are known.

Source: Submissions to the ERA's 2023 BRCP draft determination (online).

Appendix 8 Weighted Average Cost of Capital

The weighted average cost of capital (WACC) is a calculation of a firm's cost of capital in which each component of capital, debt and equity, is proportionately weighted.

When calculating the BRCP, the WACC is used in:

- Estimating financing costs, which are added into the reference power station's capital expenditures. This accounts for project financing costs before the commissioning of the power station and the realisation of revenues from participation in the wholesale electricity market.
- Converting the power station's capital costs into an annualised cost that can be recovered over the assumed life of the power station. In this annuity approach, the WACC represents a long-term required rate of return over the life of the asset.

Calculation of the WACC in the market procedure

Section 2.9 of the market procedure directs the ERA on how the WACC for the BRCP is to be calculated.[86] Specifically, clauses 2.9.6 and 2.9.7 of the market procedure detail the high-level framework to be used:

> 2.9.6 [ERA] shall compute the WACC on the following basis:
>
> (a) The WACC shall use the Capital Asset Pricing Model (CAPM) as the basis for calculating the return to equity.
>
> (b) The WACC shall be computed on a Pre-Tax basis.
>
> (c) The WACC shall use the standard Officer WACC method as the basis of calculation.
>
> 2.9.7 The pre-tax Officer WACC shall be calculated using the following formulae:

$$WACC_{\ nominal} = \frac{1}{(1 - t(1 - \gamma))} R_e \frac{E}{V} + R_d \frac{D}{V}$$

Where:

R_e is the nominal return on equity (determined using the Capital Asset Pricing Model) and is calculated as:

$$R_e = R_f + \beta_e \times MRP$$

Where:

R_f is the nominal risk free rate for the Capacity Year;

β_e is the equity beta; and

MRP is the market risk premium.

R_d is the nominal return on debt and is calculated as:

[86] Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Section 2.9, (online).

$$R_d = R_f + DM$$

Where:

R_f is the nominal risk free rate for the Capacity Year;

DM is the debt margin, which is calculated as the sum of the debt risk premium (DRP) and debt issuance cost (d).

t is the benchmark rate of corporate income taxation, established at either an estimated effective rate or a value of the statutory taxation rate;

γ is the value of franking credits;

$\frac{E}{V}$ is market value of equity as a proportion of the market value of total assets;

$\frac{D}{V}$ is market value of debt as a proportion of the market value of total assets;

The nominal risk free rate, for a Capacity Year is the rate determined for that Capacity Year by [ERA] on a moving average basis from the annualised yield on Commonwealth Government bonds with a maturity of 10 years:

  - using the indicative mid rates published by the Reserve Bank of Australia; and
  - averaged over a 20-trading day period;

- The debt risk premium, DRP, for a Capacity Year is a margin above the risk free rate reflecting the risk in provision of debt finance. This will be estimated by [ERA] as the margin between the observed annualised yields of Australian corporate bonds which have a BBB (or equivalent) credit rating from Standard and Poor's and the nominal risk free rate. [ERA] must determine the methodology to estimate the DRP, which in the opinion of [ERA] is consistent with current accepted Australian regulatory practice.[87]
- If there are no Commonwealth Government bonds with a maturity of 10 years on any day in the period referred to in step 2.9.7(g), [ERA] must determine the nominal risk free rate by interpolating on a straight line basis from the two bonds closest to the 10 year term and which also straddle the 10 year expiry date.
- If the methods used in step 2.9.7(i) cannot be applied due to suitable bond terms being unavailable, [ERA] may determine the nominal risk free rate by means of an appropriate approximation.

Since the ERA is responsible for calculating the 2023 BRCP, the ERA must estimate the WACC following the market procedure. The ERA's annual BRCP determination involves two sets of components listed in clause 2.9.3:

- Annual components, which require review each year. This comprises the risk free rate, debt risk premium and corporate tax rate.
- Structural components, which are fixed in the market procedure and remain constant between the ERA's five-yearly methodology reviews of the BRCP. As part of the annual review, the ERA may review and determine values for structural components that differ from those specified in the market procedure if it considers that a significant economic

[87] The ERA has adopted an alternative 'Bond-Yield Approach' to establishing the DRP and has applied this since its Final Decision on revisions proposed by WA Gas Networks (WAGN) to the access arrangement for the Mid-West and South-West gas distribution systems in 2011.

event has influenced those components. These structural components include the market risk premium, equity beta, debt issuance costs, franking credit value and gearing ratio.

Clause 2.9.8 of the market procedure details the parameters that the CAPM must use as variables each year (see Table 20):

Table 20: CAPM parameters for the BRCP calculation

CAPM Parameter	Notation	Review frequency	Value
The following variables are to be determined[88]			
Nominal risk free rate (%)	R_f	Annual	
Debt risk premium (%)	DRP	Annual	
Corporate tax rate (%)	t	Annual	
The following variables are specified in the market procedure			
Market risk premium (%)	MRP	5-Yearly	5.90
Asset beta	β_a	5-Yearly	0.5
Equity beta	β_e	5-Yearly	0.83
Debt issuance costs (%)	d	5-Yearly	0.100
Franking credit value	γ	5-Yearly	0.50
Debt to total assets ratio (%)	$\frac{D}{V}$	5-Yearly	40
Equity to total assets ratio (%)	$\frac{E}{V}$	5-Yearly	60

Source: ERA analysis of BRCP data

Updated annual WACC

The ERA has reviewed and calculated the annual components listed in the market procedure, which are the nominal risk free rate, the debt risk premium, and the corporate tax rate.

Nominal risk free rate

The risk free rate is the return an investor would expect when investing in an asset with no risk. This is the rate of return an investor receives from holding an asset with a guaranteed payment stream. Since there is no likelihood of default, the return on risk free assets compensates investors for the time value of money.

The BRCP market procedure uses Commonwealth Government bonds as the proxy for risk free assets in Australia for estimating the risk free rate of return. To estimate the risk free rate, the BRCP market procedure requires the use of indicative mid rates published by the Reserve

[88] See Table 3 for these values for the 2023 BRCP.

Bank of Australia. Where there are no Commonwealth Government bonds with a maturity of exactly 10 years, the ERA interpolates the risk free rate on a straight line basis.

The use of a 10-year term for the risk free rate is to reflect a long-term rate of return for the capital costs of the reference generator. This is consistent with the purposes of the BRCP calculations and aligns the WACC to represent a long-term rate of return for the capital costs over the life of the reference plant.

The BRCP process uses a nominal risk free rate, which includes a component for the market expectations of inflation.

For the 2023 BRCP WACC, the ERA determined a nominal risk free rate of 3.96 per cent.[89] This is higher than the 1.72 per cent nominal risk free rate used for the 2022 BRCP.[90]

Debt risk premium

The debt risk premium is the rate of return above the risk free rate that lenders require to compensate them for lending funds to a firm. The debt risk premium compensates debt holders for the possibility of default by the issuer.

The debt risk premium is closely aligned with the risk of the business. When issuing debt in the form of bonds, a credit rating can be assigned that reflects the probability of default of the issuer, and therefore the risk present in that entity's bonds. The BRCP market procedure requires the use of a BBB (or equivalent) credit rating from Standard and Poor's.[91]

The ERA uses a "revised bond yield approach" to determine the debt risk premium at a point in time by: [92]

- Determining the benchmark sample, which requires identifying a sample of relevant corporate bonds that have a BBB credit rating (or equivalent).[93]
- Converting the bond yields from the benchmark sample into Australian dollar equivalent yields.
- Calculating an average Australian dollar equivalent bond yield for each bond across the averaging period.
- Estimating yield curves on the bond data by applying various techniques including Gaussian Kernel, Nelson-Siegel and Nelson-Siegel-Svensson techniques.[94]

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89 The nominal risk free rate of 3.96 per cent is based on a 20-trading day averaging period up to 31 October 2022.

90 Economic Regulation Authority, 2021, *2022 benchmark reserve capacity price for the 2024/25 capacity year: Final determination,* p. 8, (online).

91 Economic Regulation Authority, 2020, *Market Procedure: Benchmark Reserve Capacity Price*, Clause 2.9.7(h), (online).

92 Economic Regulation Authority, 2018, *Final Gas Rate of Return Guidelines Explanatory Statement*, chapter 10, (online).

93 The market procedure details that a benchmark generator for the purposes of BRCP having a credit rating of BBB.

94 The Gaussian Kernel method recognises that the observed spreads on bonds with residual maturities close to the target tenor (or maturity) contains more relevant information for estimation. The Nelson-Siegel model captures many of the typical observed shapes that the yield curve assumes over time. As an extension of the Nelson-Siegel model, the Nelson-Siegel-Svensson method incorporates additional flexibility to more precisely capture the movement of the yield curve in a more volatile market.

- Estimating the 10-year cost of debt by averaging the three yield curves of 10-year cost of debt based on the techniques used in the previous step.
- Calculating the debt risk premium by subtracting the 10-year risk free rate (or base rate) from the 10-year cost of debt.

The ERA estimates the latest value of the debt risk premium over the specified averaging period each year for the BRCP.

For the 2023 BRCP WACC, the ERA determined the debt risk premium of 2.369 per cent.[95] This is higher than the 1.697 per cent debt risk premium used for the 2022 BRCP.[96]

Corporate tax rate

The ERA has reviewed the corporate tax rate which has not changed from the 30 per cent rate.

Updated BRCP WACC

This appendix provides a WACC for the BRCP based on the approach detailed in the BRCP market procedure and the 20-trading day averaging period ending 31 October 2022.

For the 2023 BRCP, the indicative nominal pre-tax WACC is 8.82 per cent (see Table 21). This is higher than the 6.08 per cent nominal pre-tax WACC for the 2022 BRCP.[97]

95 The debt risk premium of 2.369 per cent is based on a 20-trading day averaging period up to 31 October 2022.

96 Economic Regulation Authority, 2021, *2022 benchmark reserve capacity price for the 2024/25 capacity year: Final determination,* p. 8, (online).

97 Ibid, p. 8.

Table 21: WACC for the 2023 BRCP compared to the approved 2022 BRCP WACC values

Parameter	2023 value	2022 value[98]
Cost of equity parameters		
Nominal risk free rate (%)	3.96	1.72
Equity beta	0.83	0.83
Market risk premium (%)	5.90	5.90
Pre-tax return on equity (%)	10.42	7.78
Cost of debt parameters		
Nominal risk free rate (%)	3.96	1.72
Debt risk premium (%)	2.369	1.697
Debt issuance costs (%)	0.100	0.100
Pre-tax return on debt (%)	6.43	3.52
Other parameters		
Debt proportion (gearing) (%)	40	40
Franking credits (gamma) (%)	50	50
Corporate tax rate (%)	30	30
Weighted Average Cost of Capital		
Nominal pre-tax WACC (%)	**8.82**	**6.08**

Source: ERA analysis of BRCP data

Differences between the WACC used in the draft and final determinations are detailed in section 3.1.2.

[98] Economic Regulation Authority, 2021, *2022 benchmark reserve capacity price for the 2024/25 capacity year: Final determination,* p. 8, (online).