Decision on the benchmark reserve capacity price to apply in the 2022/23 capacity year

16 December 2019

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1. Decision

In accordance with clause 2.26 of the *Wholesale Electricity Market Rules* (1 November 2019) the Economic Regulation Authority approves:

- The revised value for the benchmark reserve capacity price for the 2022/23 capacity year of $141,900 per megawatt per year, as proposed by the Australian Energy Market Operator (AEMO).

In accordance with clause 4.16.8 of the market rules, the approved revised value for the benchmark reserve capacity price will apply with effect from the date and time specified in a notice to be published on AEMO's website.

2. Background

The South West Interconnected System (SWIS) is a small, geographically-isolated electricity system. To provide a reliable supply of electricity for consumers, the Wholesale Electricity Market (WEM) was designed to have adequate electricity generation available to continuously satisfy demand, including during supply emergencies. Each year, AEMO procures enough generation capacity to deliver a reliable electricity supply by assigning capacity credits to generators and demand-side management providers, such as large industrial power users.

The benchmark reserve capacity price (BRCP) is calculated each year as an input to an administered mechanism used by AEMO to determine the price of capacity credits.[1]

Clause 4.16 of the market rules requires the ERA to develop a market procedure that specifies the method and process AEMO must follow in determining the BRCP (as explained in more detail in section 3).

The current market procedure requires AEMO to calculate the BRCP based on the annualised capital cost and fixed operating and maintenance costs of a peaking generation facility at the time the capacity is delivered.

Capacity costs are calculated at the time the capacity is delivered to ensure the system has adequate generation capacity when the system operator needs capacity to be available, typically when demand is high. A gas generation plant can turn up and down more quickly than a coal plant and often sets the price in the balancing market when demand is high. Therefore, the calculation references costs for a peaking gas plant.

AEMO must follow the principles and steps in the market rules and market procedure to propose and consult on a revised value for the BRCP.[2] [3] The steps include:

- Preparing, and publishing on its website, a draft report describing how it has arrived at the proposed BRCP.
- Advertising the draft report in newspapers widely distributed in Western Australia.

[1] A reserve capacity auction is run if insufficient capacity credits have been allocated to satisfy the reserve capacity requirement. To date, a reserve capacity auction has never been held. Therefore, capacity prices are calculated through an administrative process.

[2] Rule Change Panel, 2019, *Wholesale Electricity Market Rules 1 November 2019*, clauses 4.16.3(b) and 4.16.5 (online).

[3] ERA, 2013, Market Procedure: *Maximum Reserve Capacity Price*, (online).

- Requesting submissions from all sectors of the energy industry in Western Australia, including end-users.[4]

After considering submissions received on the draft report, AEMO must propose a final revised value for the BRCP to the ERA for approval. The market rules require the ERA to review AEMO's final report, including all submissions received by AEMO in response to the draft report, and to decide whether to approve a revised BRCP value.[5]

To make its decision, the ERA must consider only whether:

- The revised value for the BRCP proposed by AEMO reasonably reflects the application of the method and guiding principles described in clause 4.16 of the market rules.
- AEMO has carried out an adequate public consultation process.

The market rules require that, where the ERA rejects a revised BRCP, it must give reasons and may direct AEMO to carry out all or part of the review process under clause 4.16 again.[6] This should be carried out in accordance with any directions or recommendations of the ERA.

All annual values in this paper represent capacity years, unless otherwise noted.[7]

3. Summary of the market procedure

The BRCP is calculated by undertaking a technical, bottom-up cost evaluation of the entry of a new 160 MW open cycle gas turbine generation facility in the SWIS in the relevant capacity year. This year, it is the 2020 BRCP to apply in the 2022/23 capacity year.

The 2020 BRCP calculation assumes that the gas turbine power plant would begin operating on 1 October 2022. Therefore, capital costs are escalated to 1 April 2022, recognising the plant must be built, tested and commissioned before it can operate. Fixed operation and maintenance costs are escalated to 1 October 2022.

The BRCP comprises the:

- Capital cost of building a 160 MW open cycle gas turbine power station with an inlet cooling system in the SWIS, including a margin to cover legal, approval, financing and other costs and contingencies.[8] [9]
- Costs of connecting the power station to the transmission system.[10]
- Costs of building liquid fuel storage and handling facilities.[11]
- Land cost for developing and constructing the power station.[12]

4 Rule Change Panel, 2019, *Wholesale Electricity Market Rules 1 November 2019*, clause 4.16.6 (online).

5 Ibid, clause 2.26.1

6 Ibid, clause 2.26.2

7 A capacity year is a period of 12 months commencing at the start of the trading day on 1 October each year.

8 Expressed in Australian dollars per MW and as determined in step 2.3 of the market procedure.

9 ERA, 2013, Market Procedure: *Maximum Reserve Capacity Price*, step 2.8 (online) .

10 Ibid. step 2.4

11 Ibid. step 2.6

12 Ibid. step 2.7

- Cost of funding, estimated by a weighted average cost of capital (WACC).[13]
- Fixed operation and maintenance costs of the power station and transmission facilities.

Using these parameters, the market procedure provides methods for estimating annualised fixed operating and maintenance and annualised capital costs, which are used to calculate the BRCP.[14]

4. The ERA's assessment

Consistent with the approach in previous years, AEMO undertook a review of the 2020 BRCP and on 27 September 2019 released a draft report for public consultation. AEMO received one submission from Alinta Energy (refer to section 4.4).[15]

On 27 November 2019, AEMO provided its final report to the ERA. AEMO proposed a BRCP of $141,900 per MW per year for capacity year 2022/23; 8 per cent lower than the 2019 BRCP that applies in capacity year 2021/22.[16]

Table 1 provides a summary of the calculated values of input parameters used to estimate the BRCP and compares calculated values for capacity years 2022/23 and 2021/22 as shown in AEMO's final report.

AEMO has attributed the decrease in the BRCP for the 2022/23 capacity year to a reduction in the WACC from 5.35 per cent to 3.51 per cent (real). This stems from a negative risk free rate due to low Commonwealth Government bond yields over the measurement period, and the inflation estimate. The effect of the lower WACC has been slightly offset by:

- Increased power station costs and transmission costs, mainly due to a weakening Australian dollar to United States dollar exchange rate.[17]
- Increased fixed operation and maintenance costs from higher insurance premiums.

The ERA has reviewed AEMO's draft and final reports, its BRCP calculation spreadsheets, and public submissions received in response to the draft report. The ERA also reviewed reports from consultants GHD and PricewaterhouseCoopers, which AEMO commissioned for the review.

The approach to evaluating many of the inputs to the proposed 2020 BRCP was unchanged from previous years. These inputs are shown as shaded rows in Table 1, and details on the

13 Ibid. step 2.9

14 Ibid. step 2.10

15 AEMO, 2019, *Draft Report: 2020 Benchmark Reserve Capacity Price for the 2022/23 Capacity Year*, (online).

16 In its draft report AEMO estimated that the benchmark reserve capacity price for the 2022/23 capacity year is $142,500 per MW per year. Similar to the calculations in previous reviews, AEMO updated the benchmark reserve capacity price in its final report to the ERA based on more recent estimate of debt risk premium, a component of the WACC.

17 The Australian dollar to United States dollar exchange rate has weakened from AU$1.00 = US$0.7584 for the 2019 BRCP to AU$1.00 = US$0.7332 for the 2020 BRCP. Power station costs are provided by the manufacturer in US dollars. This is due to GHD using the GTPro Thermoflow software package which estimates the cost for the power plant in US Dollars. The presence of internationally traded commodities such as copper and steel which are used to construct the open cycle gas turbine are also trade in US dollars.

calculation of these inputs are already provided in AEMO's final report and so are not repeated in this paper.

This decision paper focuses on where there has been either a change in the calculation or where AEMO implemented changes to enhance the calculation of the 2020 BRCP. There are three instances of these changes, where AEMO sought to improve the:

- Calculation of asset insurance costs by using a single quote from a vetted independent broker with a history in power generation insurance (section 4.1).
- Calculation of land costs by using an average of the estimated cost for the North Country (section 4.2). This is in line with the ERA's recommendation in its previous determination.[18]
- Selection of corporate bonds for the calculation of debt risk premium (section 4.3). AEMO used a larger sample of bonds issued by the Australian utilities on Australian and international markets to estimate a bond yield curve.

[18] ERA, 2019, *Decision on the benchmark reserve capacity price to apply in the 2021/22 capacity year,* (online)

Table 1. Main components of the BRCP proposed for 2022/23 compared to those approved for 2021/22

Parameter	Units	Approved BRCP and calculated values for 2021/22	Proposed BRCP and calculated values for 2022/23	Reason for change (when compared to the 2021/22 benchmark reserve capacity price)
Benchmark reserve capacity price	**$/MW/year**	**154,200**	**141,900**	**Combined effect of the change in underlying parameters.**
Power station expected capacity credit allocation	MW	151.40	152.28	The proposed capacity credit value has increased by 0.88 MW due to efficiency improvements in gas turbine design.[19]
Weighted average cost of capital	%	5.35	3.51	The real risk free rate estimate for the 2020 BRCP is -1.35 per cent, which is significantly lower than 0.28 per cent calculated in the 2019 BRCP, resulting in a 2.5 per cent decrease in the value of WACC for the 2020 BRCP. (Refer to section 4.3).
Power station costs	$/MW	843,379	859,629	The estimated capital cost of the reference power station has increased by 1.9 per cent compared to last year's cost because of the lower Australian US dollar exchange rate.
Factor for legal, financing, approvals, contingencies and other costs	%	17.15	17.16	The margin is similar to last year's value.
Transmission connection works	$/MW	179,028	181,760	Transmission connection costs increased by 1.5 per cent. This is from an increase in easement costs of 10.8 per cent linked to the increase in land costs. Shallow connection costs also increased by 2.8 per cent.[20]
Fixed fuel costs	$	7,109,638	7,213,564	The fixed fuel cost estimate increased by 1.5 per cent, mainly due to a 7.7 per cent increase in the price of delivered diesel.
Land costs	$	2,295,991	2,536,250	Land costs have increased by 10.5 per cent. (Refer to section 4.2)
Total capital cost	$	191,011,923	194,116,340	Combined effect of the change in components of capital cost.
Annualised capital cost	$/year	18,835,625	16,860,715	Combined effect of the change in components of capital cost.
Annualised fixed operation and maintenance cost	$/MW/year	29,776	31,168	Generation operating and maintenance costs increased by 0.6 per cent due to slight escalation of wages and an increase in the power station capital cost. Switchyard and transmission line costs both decreased by 1 per cent, due to a decrease in the connection cost operating and maintenance escalation factors. This year's estimate of insurance costs has increased by 15.5 per cent. This was due to an increase in the asset replacement premiums from 0.24 per cent in the 2019 BRCP to 0.29 per cent in the 2020 BRCP, as advised by AEMO's insurance broker. (Refer to section 4.1) Fixed network access costs have increased by 3.3 per cent due to an increase in system charges.

19 GHD, 2019, *Australian Energy Market Operator Benchmark Reserve Capacity Price Project Report - 2020 BRCP for the SWIS*, pg. 8, (online).

20 AEMO does not have visibility into the components of this calculation provided by Western Power for confidentiality reasons.

4.1 Insurance costs

Insurance costs are a component of fixed operating costs and maintenance costs. The market procedure stipulates that annual insurance costs are to be estimated at 1 October, the beginning of the relevant capacity year. For the 2020 BRCP, this is 1 October 2022. However, the market procedure does not provide any guidance on the calculation of insurance costs other than the insurance should cover power station asset replacement, business interruption and public and products liability insurance.[21]

For the 2019 BRCP, the ERA recommended that AEMO obtain insurance quotes from several independent insurance brokers. AEMO implemented this recommendation and the insurance quotes received from insurance brokers varied considerably.[22] AEMO calculated an average of all the quotes and used this for the insurance cost within the fixed operating and maintenance parameter of the 2019 BRCP calculation.

For the 2020 BRCP, AEMO changed the method of calculating insurance costs. This was because previously the quotes provided by several insurance brokers were not directly comparable, for example, because of differences in the degrees of cover. Instead, AEMO obtained a single quote from a trusted independent broker with a history in power generation insurance to calculate insurance costs.[23]

Asset insurance costs increased from $4,672.49 per MW per year for the 2019 BRCP to $5,393.43 per MW per year for the 2020 BRCP - an increase of 15.4 per cent. This increase was due mainly to an increase in the asset replacement premiums from 0.24 per cent in the 2019 BRCP to 0.29 per cent in the 2020 BRCP, as advised by AEMO's insurance broker. AEMO considered this to be more representative of the current insurance market conditions.

AEMO's revised approach of obtaining a single quote for the 2020 BRCP from an independent broker with a history in power generation insurance is reasonable. The estimation of insurance costs based on quotes from multiple independent brokers in the 2019 BRCP resulted in large variances. This variation could be because there are limited incentives for brokers to provide the most accurate insurance quotes for the sampling exercise.

The ERA is satisfied that AEMO has calculated fixed operating and maintenance costs in accordance with clause 4.16 of the market rules and the market procedure.

4.2 Land costs

Step 2.7 of the market procedure states that AEMO must request the Western Australian Land Information Authority (Landgate) to provide valuations on parcels of industrial land. The market procedure specifies that the analysis undertaken by Landgate must include six regions within the SWIS where generation projects are most likely to be proposed and should provide a broad cross-section of options such as access to fuel and utilities.[24]

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21 As required under network access arrangements with Western Power

22 See AEMO website, *Draft Report: 2019 Benchmark Reserve Capacity Price for the 2021/22 Capacity Year, 2018*, p14-15, (online).

23 AEMO uses this broker for its insurance policies therefore an internal vetting process has already been performed. This broker has requested to remain anonymous.

24 The market procedure specifies the six regions as Collie, Kemerton Industrial Park, Pinjar, Kwinana, North Country and Kalgoorlie.

Landgate assessed the land sites for each region in or near existing industrial estates for land that would be suitable for the development of a power station. Landgate provided its estimate of the cost of each land parcel as at 30 June 2019, excluding transfer duty, which is added by AEMO using the Office of State Revenue's online calculator. Landgate used 3 hectare sites for all locations except Kemerton, where the smallest available lot was 5 hectares.

For the 2019 BRCP, Landgate included the value of two sub-regions in the North Country: Eneabba and Geraldton. AEMO advised the ERA that the choice of two land sites in the North Country region was due to its large size compared to the other regions specified in the market procedure. AEMO explained that the use of an average value over two land sites better represented the average value of land in the North Country region.[25] The market procedure allows AEMO to include additional locations if it considers this is appropriate. Therefore, AEMO's approach to using two land sites from the North Country region was reasonable.

AEMO then calculated the mean of the value of the seven parcels of land provided by Landgate and escalated the average land cost to 1 April 2021.

The ERA's decision on the 2019 BRCP noted the inclusion of two sites in the North Country region weighted the average land value result more heavily towards the land value in North Country relative to other regions.[26] Sample land costs from the North Country region were the least expensive across all regions and skewed the results downwards.

The ERA recommended that the calculation method could alternatively estimate the average of the two land values in the North Country region first and then estimate the land cost value by taking an average of land costs in the remaining five regions and the average land cost estimated for the North Country region. In line with the recommendation in the ERA's 2019 BRCP report, AEMO revised its approach for the 2020 BRCP and calculated the total land cost estimate using an average estimate for the North Country region.

Land costs increased from $2.3 million in the 2019 BRCP to $2.5 million for the 2020 BRCP - an increase of 10.5 per cent. The ERA's recommended change to the method for calculating average land costs has removed the problem of results from the North Country region being skewed downwards, with land values being more representative of the current market.

The ERA is satisfied that AEMO has calculated land costs in accordance with clause 4.16 of the market rules and the market procedure.

4.3 Estimation of the weighted average cost of capital

The WACC is a calculation of a company's cost of capital in which each category of capital, debt and equity, is proportionately weighted. The risk free rate is a component of this WACC calculation. The WACC reduced from 5.35 percent in the 2019 BRCP to 3.51 per cent for the 2020 BRCP. This reduction was caused by a reduction in the nominal risk free rate.

AEMO calculated a nominal risk free rate from the annualised yield of Commonwealth Government bonds with maturity dates of roughly 10 years. The calculated nominal risk free rate from these bonds reduced from 2.71 per cent in the 2019 BRCP to 0.98 per cent in the 2020 BRCP. This was mainly due to the low Commonwealth Government bond yields recorded in the second half of 2019.

[25] AEMO's reserve capacity market team, 'RE: ERA 2019 Benchmark Reserve Capacity Price Comments' [email], 21 December 2018.

[26] ERA, 2019, *Decision on the benchmark reserve capacity price to apply in the 2021/22 capacity year,* (online)

The nominal risk free rate is adjusted for inflation to determine the real risk free rate of return. The market procedure stipulates that AEMO must use the Reserve Bank of Australia's inflation forecasts or the mid-point of the Reserve Bank's target inflation range outside of the forecast period. The expected rate of inflation used for the 2020 BRCP is 2.36 per cent. This figure is weighted more towards the Reserve Bank's 2 per cent to 3 per cent target rate of inflation, which is higher than the current inflation rate of 1.6 per cent.

The use of expected inflation rate resulted in a decrease of the real risk free rate from 0.28 per cent in the 2019 BRCP to -1.35 per cent in the 2020 BRCP.

If the current rate of inflation, 1.6 per cent, had been used in the calculation, the real risk free rate would have increased from -1.35 per cent to -0.61 per cent. If the -0.61 per cent real risk free rate had been used, the calculated WACC would have been 4.28 per cent and more reflective of current market conditions. However, AEMO must calculate the WACC in line with the market procedure. Therefore, it retained a risk free rate of -1.35 per cent in its calculation of WACC.

Alinta Energy raised concerns regarding the 2020 BRCP negative real risk free rate and the WACC calculation method which are explained in section 4.4.

4.4 Public consultation process

On 27 September 2019, AEMO published a draft report on the 2020 BRCP. AEMO received one submission from Alinta Energy.

Alinta Energy was concerned that the WACC estimation method used did not adequately reflect the risks encountered by private investors building generation assets in the WEM. Alinta suggested that the proposed 2020 BRCP, which was 8 per cent lower than the 2019 BRCP, was primarily driven by the WACC which had been set well below levels that would be applicable for funding peaking generators.

Alinta Energy was also concerned that there was evidence in AEMO's draft report that the current method to calculate the WACC for the BRCP resulted in a manifest error where the "negative real risk-free rate of return does not reflect Australian market conditions."[27] Alinta Energy suggested that it was a "significant market failure if the primary investment signal for a market did not reflect the current market conditions."[28] Alinta Energy recommended that the ERA reject the proposed 2020 BRCP and direct AEMO to recalculate the real risk free rate.

AEMO acknowledged Alinta Energy's concerns raised in the public consultation process regarding the calculation of the WACC for the BRCP. Step 2.9 of the market procedure specifies the method that AEMO is obliged to follow when calculating the WACC. AEMO met with the ERA Secretariat to discuss the concerns raised by Alinta Energy, and to determine whether the market procedure provided any flexibility for AEMO's WACC calculation.

The WACC calculation market procedure is specific: some parameters are hard-coded, such as the market risk premium and debit issuance costs, and guidance is provided for the calculation of other parameters, such as the nominal risk free rate of return and expected inflation. AEMO's approach to calculating WACC was consistent with the market procedure.

27 Alinta, 2019, *Submission to Draft Report: 2020 Benchmark Reserve Capacity Price (BRCP) for the 2022-23 Capacity Year,* p. 1.

28 Ibid.

A suitably-designed market procedure provides confidence in the market and facilitates investments in generation capacity. It is important that AEMO does not deviate from the market procedure to provide certainty for investors. However, the market rules provide for a periodic review of the market procedure to ensure it suitably serves the objectives of the market (section 4.5).

4.5 The ERA's review of the BRCP method

Under market rule 2.26.3, the ERA periodically reviews the methods used to calculate the annual BRCP and Energy Price Limits.

Market participants and AEMO have raised concerns about the method for calculating the BRCP over the last three annual BRCP approval processes.

These concerns include the use of a 160 MW open cycle gas turbine as the reference technology for the calculation, the method for calculating transmission connection costs, and the calculation of WACC parameters.

The ERA will address these and any other concerns about the BRCP calculation method in its next review of the market rules and market procedure to commence in early 2020. This will include all the method issues raised by market participants and AEMO through the annual price determination process.

5. Conclusion

The ERA is satisfied that AEMO has met the requirements of the market rules in proposing the 2020 BRCP to apply in the 2022/23 capacity year for the following reasons:

- The proposed revised value of the 2020 BRCP reasonably reflects the application of the method and guiding principles described in clause 4.16 of the market rules.
- AEMO has carried out an adequate public consultation process.

Based on the above assessment, the ERA approves the proposed revised BRCP value of $141.900 per MW per year for the BRCP to apply in the 2022/23 capacity year. The approved revised BRCP value will apply with effect from the date and time specified in a notice to be published on the AEMO's website.