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Dear Luke

2018 Benchmark Reserve Capacity Price Debt Risk Premium for the South West Interconnected System, using the ERA's 'Bond Yield Approach'

The Australian Energy Market Operator (AEMO) engaged PricewaterhouseCoopers Consulting (Australia) Pty Limited (PwC) to advise the debt risk premium (DRP)¹ that would be derived by applying the Economic Regulation Authority of Western Australia's (ERA) 'Bond Yield Approach'. The estimate of the DRP will be used by AEMO, in conjunction with various other parameters, to estimate a Weighted Average Cost of Capital (WACC), a necessary input into determining the 2018 Benchmark Reserve Capacity Price (BRCP).

AEMO requested the DRP be estimated over the 20 business days ending on and including 22 September 2017 (the First Period) and 17 November 2017 (the Second Period). This second memorandum provides our estimate of the DRP for the First Period and the Second Period.

As instructed by you, we have applied the ERA's 'Bond Yield Approach' that was set out in the ERA's Final Decision on Proposed Revisions to the Access Arrangement for the Goldfields Gas Pipeline (Goldfields Decision)². AEMO requires PwC to use Australian corporate bonds which have a BBB (or equivalent) credit rating from Standard and Poor's, and to use Commonwealth Government bond yields as the risk free rate, in estimating the DRP as per version 6 of the ERA's Market Procedure document.³

The ERA's 'Bond Yield Approach' changed following the Goldfields Decision. Compared with the 'Bond Yield Approach' from previous years, the new approach is much more extensive. A more detailed explanation is provided at Appendix A.

¹ For the avoidance of doubt the estimated DRP reflects only the risk margin attributable to debt financing, and not other debt related costs such as financing, arrangement and underwriting fees.

² See Final Decision on Proposed Revisions to the Access Arrangement for the Goldfields Gas Pipeline (pages 565-592) - <https://www.erawa.com.au/cproot/14401/2/GGP%20-%20GGT%20-%20AA3%20-%20Amended%20Final%20Decision%20-PUBLIC%20VERSION.PDF>

³ <https://www.erawa.com.au/cproot/14362/2/Market%20Procedure%20-%20Maximum%20Reserve%20Capacity%20Price.pdf>



This advice is provided pursuant to the scope and terms set out in the consultancy agreement commencing 19 September 2017 between PwC and AEMO.

Results

As shown in Table 1 below, we have derived a DRP of 180 basis points for the Second Period applying a modified version of the ERA's 'Bond Yield Approach' to estimating a DRP.⁴

The ERA's 'Bond Yield Approach' for regulated gas businesses applies a sample of bonds with a credit rating of between BBB- and BBB+. As part of the ERA's investigation into a WACC for regulated gas businesses, it found that Australian gas businesses had a credit rating that lied within the range BBB-, BBB to BBB+.⁵ Further, the ERA's 'Bond Yield Approach' uses Australian Dollar interest rate swap yields as the risk free rate.

AEMO, in contrast to WA's regulated gas businesses and in accordance with its BRCP market procedures⁶, can only:

- consider corporate bonds with a BBB credit rating; and
- use Commonwealth Government Security (CGS) yields as the risk free rate to estimate the DRP.

Although we have followed the ERA's 'Bond Yield Approach', to be consistent with the BRCP procedures we have restricted the sample of bonds to only those with a Standard and Poor's credit rating of BBB and applied CGS yields as the risk free rate to estimate the DRP. We note that this resulted in a sample of 56 bonds for the Second Period.

Compared with the First Period, the sample size of bonds is slightly larger. Although four bonds from the First Period have been excluded because they no longer meet the benchmark sample criteria, six new bonds that meet the benchmark sample criteria have been issued in the intervening period.

The ERA's 'Bond Yield Approach' required the application of three separate calculation methodologies to estimate a DRP. These are the:

- Gaussian Kernel methodology (GS);
- Nelson-Siegel methodology (NS); and
- Nelson-Siegel Svensson methodology (NSS).

⁴ A 10 year BBB yield of 4.70% was estimated. When applied to a CGS yield of 2.70%, we estimate a DRP of 2.00%

⁵ ERA, *Rate of Return Guidelines - Meeting the requirements of the National Gas Rules*, 16 December 2013

⁶ <https://www.erawa.com.au/cproot/14362/2/Market%20Procedure%20-%20Maximum%20Reserve%20Capacity%20Price.pdf>



The DRP values estimated by applying GS, NS and NSS methodologies are averaged to estimate the final DRP. We observed that each methodology produced similar DRP values, shown in Tables 1 and 2, albeit the range was narrower for the First Period.

Table 1 – Summary of DRP estimates using the ERA’s ‘Bond Yield Approach’, restricted to bonds with a BBB credit rating – 20 business days to 17 November 2017 (basis points)

Methodology	DRP	Average DRP	Difference
Gaussian Kernel	187	180	7
Nelson-Siegel	168		-12
Nelson-Siegel Svensson	184		4

Source: PwC’s analysis applying the ERA’s ‘Bond Yield Approach’, Bloomberg

A DRP of 180 basis points for the Second Period is 20 basis points lower than that estimated for the First Period, and lower than the DRP PwC estimated for the 2017 BRCP.⁷ This is consistent with the overall downward trend in the DRP for 10 year BBB bonds. As shown below in Figure 1, the estimated DRP for 10 year BBB bonds published by the RBA has been following a downward trajectory over the months between the averaging period of the 2017 BRCP, the First Period and the Second Period.

Table 2 – Summary of DRP estimates using the ERA’s ‘Bond Yield Approach’, restricted to bonds with a BBB credit rating – 20 business days to 22 September 2017 (basis points)

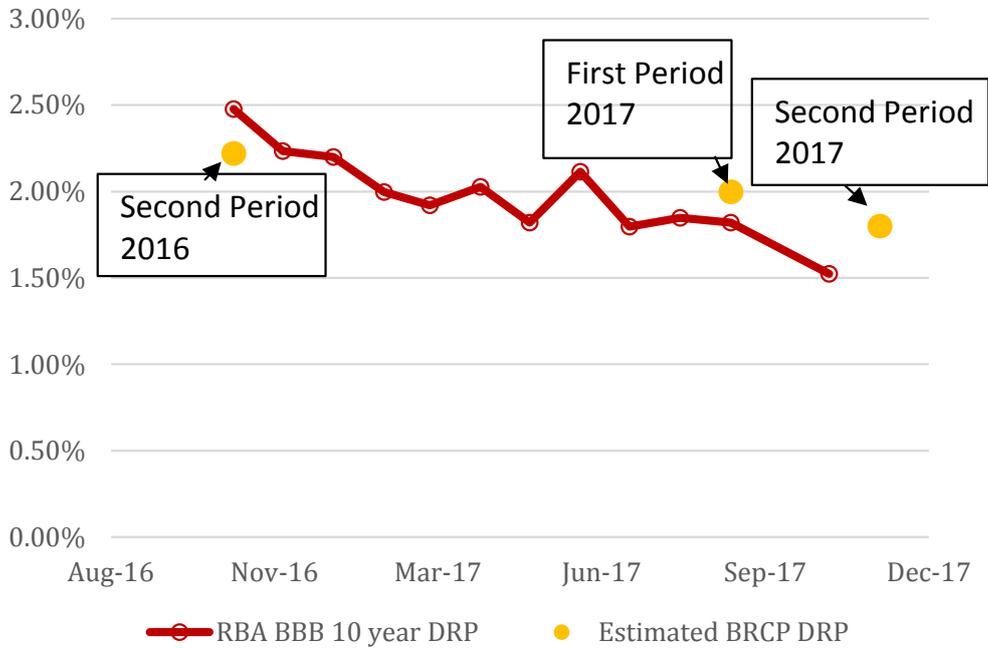
Methodology	DRP	Average DRP	Difference
Gaussian Kernel	202	200	2
Nelson-Siegel	195		-5
Nelson-Siegel Svensson	205		5

Source: PwC’s analysis applying the ERA’s ‘Bond Yield Approach’, Bloomberg

⁷ The DRP for the 2017 BRCP was 222 basis points.



Figure 1 - Comparison of RBA BBB 10 year DRP with BRCP DRP over the last year



Source: PwC’s analysis applying the ERA’s ‘Bond Yield Approach’, Bloomberg, RBA

If you wish to discuss further the derivation of these estimates, please do not hesitate to call me on the number provided below.

Yours sincerely,

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Appendix A – ERA’s ‘Bond Yield Approach’

The ERA changed its ‘Bond Yield Approach’ in 2016 following its Final Decision on Proposed Revisions to the Access Arrangement for the Goldfields Gas Pipeline (Goldfields Decision).⁸ Compared with the previous ‘Bond Yield Approach’ there are three major differences:

- Bond criteria - Bonds issued in foreign currencies are now accepted in the sample, but those issued by financial institutions or which are inflation-linked are now excluded.
- Estimation methodology – Estimating the DRP now follows a more extensive process. Instead of taking a simple weighted average of each bond’s DRP, the Gaussian Kernel methodology, Nelson-Siegel methodology, and Nelson-Siegel Svensson methodology are applied to estimate three individual 10 year DRPs, which are then averaged to estimate the final DRP.
- Risk free rate – Interest rate swap yields are used as the risk free rate, instead of Commonwealth Government Security yields.

A detailed exposition of the precise process of the ‘Bond Yield Approach’ is provided in the Goldfields Decision.⁹ We have provided the results of applying the bond criteria in Table 3, though only restricted to bonds with an S&P rating of BBB.¹⁰

Table 3 – Debt risk premium key statistics for 20 business days to 17 November 2017

Issuer Name	S&P Rating	Currency	Issuance size (\$m AUD)	Maturity	Term to maturity	Average yield (Semi-Annual)
Amcor Finance USA Inc	BBB	USD	787	28/04/2026	8.49	4.32%
Amcor Finance USA Inc	BBB	USD	787	28/04/2026	8.49	4.28%
Amcor Ltd/Australia	BBB	EUR	373	22/03/2023	5.39	3.40%
APT Pipelines Ltd	BBB	USD	1,396	23/03/2025	7.39	4.07%
APT Pipelines Ltd	BBB	EUR	974	22/03/2022	4.39	3.21%

⁸ See Final Decision on Proposed Revisions to the Access Arrangement for the Goldfields Gas Pipeline (pages 565-592) - <https://www.erawa.com.au/cproot/14401/2/GGP%20-%20GGT%20-%20AA3%20-%20Amended%20Final%20Decision%20-PUBLIC%20VERSION.PDF>

⁹ See Final Decision on Proposed Revisions to the Access Arrangement for the Goldfields Gas Pipeline (pages 565-592) - <https://www.erawa.com.au/cproot/14401/2/GGP%20-%20GGT%20-%20AA3%20-%20Amended%20Final%20Decision%20-PUBLIC%20VERSION.PDF>

¹⁰ We identified that Bloomberg’s bond consolidation function, in identifying the benchmark sample of bonds, were inappropriately removing bonds that appeared to be duplicates. For those bonds, while the features are the same, they are issued in different financial markets. Given they are in effect separate debt securities, we have included those in our benchmark bond sample.



Issuer Name	S&P Rating	Currency	Issuance size (\$m AUD)	Maturity	Term to maturity	Average yield (Semi-Annual)
APT Pipelines Ltd	BBB	USD	1,114	15/07/2027	9.70	4.46%
APT Pipelines Ltd	BBB	EUR	905	22/03/2027	9.39	4.26%
APT Pipelines Ltd	BBB	GBP	1,154	22/03/2030	12.39	5.08%
APT Pipelines Ltd	BBB	USD	731	11/10/2022	4.94	3.51%
APT Pipelines Ltd	BBB	GBP	536	26/11/2024	7.06	4.27%
APT Pipelines Ltd	BBB	AUD	200	20/10/2023	5.96	3.61%
APT Pipelines Ltd	BBB	AUD	300	22/07/2020	2.72	3.00%
APT Pipelines Ltd	BBB	USD	381	23/03/2035	17.39	5.37%
APT Pipelines Ltd	BBB	USD	1,114	15/07/2027	9.70	4.48%
APT Pipelines Ltd	BBB	USD	731	11/10/2022	4.94	3.65%
APT Pipelines Ltd	BBB	USD	1,396	23/03/2025	7.39	3.97%
APT Pipelines Ltd	BBB	USD	381	23/03/2035	17.39	4.06%
AusNet Services Holdings Pty Ltd	BBB	USD	490	17/03/2076	58.37	3.73%
Boral Finance Pty Ltd	BBB	USD	586	1/11/2022	4.99	3.36%
Boral Finance Pty Ltd	BBB	USD	651	1/05/2028	10.49	4.32%
Boral Finance Pty Ltd	BBB	USD	586	1/11/2022	4.99	4.32%
Boral Finance Pty Ltd	BBB	USD	651	1/05/2028	10.49	4.22%
Brisbane Airport Corp Pty Ltd	BBB	AUD	350	21/10/2020	2.97	3.09%
CIMIC Finance USA Pty Ltd	BBB	USD	479	13/11/2022	5.03	4.21%
CIMIC Finance USA Pty Ltd	BBB	USD	131	21/07/2020	2.72	3.69%
CIMIC Finance USA Pty Ltd	BBB	USD	479	13/11/2022	5.03	4.22%



Issuer Name	S&P Rating	Currency	Issuance size (\$m AUD)	Maturity	Term to maturity	Average yield (Semi-Annual)
DBNGP Finance Co Pty Ltd	BBB	AUD	100	1/10/2020	2.91	3.29%
DBNGP Finance Co Pty Ltd	BBB	AUD	125	28/09/2023	5.90	3.86%
Incitec Pivot Finance LLC	BBB	USD	503	3/08/2027	9.75	4.52%
Incitec Pivot Finance LLC	BBB	USD	873	10/12/2019	2.10	2.85%
Incitec Pivot Finance LLC	BBB	USD	873	10/12/2019	2.10	3.05%
Newcastle Coal Infrastructure Group Pty Ltd	BBB	USD	638	29/09/2027	9.91	4.93%
Newcastle Coal Infrastructure Group Pty Ltd	BBB	USD	638	29/09/2027	9.91	4.62%
Perth Airport Pty Ltd	BBB	AUD	400	25/03/2021	3.39	3.27%
Perth Airport Pty Ltd	BBB	AUD	150	23/07/2020	2.72	3.04%
QPH Finance Co Pty Ltd	BBB	AUD	250	7/06/2023	5.59	3.53%
QPH Finance Co Pty Ltd	BBB	AUD	200	7/07/2021	3.68	3.19%
QPH Finance Co Pty Ltd	BBB	AUD	300	29/07/2020	2.74	2.93%
Sydney Airport Finance Co Pty Ltd	BBB	EUR	1,041	23/04/2024	6.47	3.65%
Sydney Airport Finance Co Pty Ltd	BBB	USD	1,180	28/04/2026	8.49	4.05%
Sydney Airport Finance Co Pty Ltd	BBB	USD	633	30/04/2025	7.49	3.91%
Sydney Airport Finance Co Pty Ltd	BBB	USD	509	22/02/2021	3.30	3.06%
Sydney Airport Finance Co Pty Ltd	BBB	USD	804	22/03/2023	5.39	3.51%
Sydney Airport Finance Co Pty Ltd	BBB	AUD	750	11/10/2022	4.94	3.67%
Sydney Airport Finance Co Pty Ltd	BBB	AUD	200	20/11/2021	4.05	3.41%
Sydney Airport Finance Co Pty Ltd	BBB	USD	1,180	28/04/2026	8.49	4.19%



Issuer Name	S&P Rating	Currency	Issuance size (\$m AUD)	Maturity	Term to maturity	Average yield (Semi-Annual)
Sydney Airport Finance Co Pty Ltd	BBB	USD	633	30/04/2025	7.49	3.93%
Sydney Airport Finance Co Pty Ltd	BBB	USD	804	22/03/2023	5.39	3.53%
Sydney Airport Finance Co Pty Ltd	BBB	USD	509	22/02/2021	3.30	3.12%
Transurban Queensland Finance Pty Ltd	BBB	AUD	200	12/10/2023	5.94	3.74%
Transurban Queensland Finance Pty Ltd	BBB	AUD	200	16/12/2024	7.12	4.00%
Transurban Queensland Finance Pty Ltd	BBB	AUD	250	8/12/2021	4.10	3.41%
Woolworths Ltd	BBB	USD	784	22/09/2020	2.89	2.99%
Woolworths Ltd	BBB	USD	527	12/04/2021	3.44	3.21%
Woolworths Ltd	BBB	USD	784	22/09/2020	2.89	3.00%
Woolworths Ltd	BBB	USD	527	12/04/2021	3.44	3.39%

Source: PwC's analysis of the ERA's 'Bond Yield Approach', Bloomberg