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Updated RIT-T cost-benefit assessment for the Eyre Peninsula

Prepared as part of ElectraNet's Contingent Project Application

12 May 2020

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Contents

1. Introduction	5
2. Updated assumptions since the PACR	7
3. Results of the updated cost-benefit assessment	10
3.1 Headline results	10
3.2 Sensitivity results	10
4. Conclusion	15

Figures

Figure 1 – Preferred option for the Eyre Peninsula, ‘Option 4D’	5
Figure 2 – Estimated net market benefits, December 2022 energisation and SA-NSW interconnector	10
Figure 3 – Estimated net market benefits, no SA-NSW interconnector	11
Figure 4 – Estimated net market benefits, assumed energisation in June 2023	12
Figure 5 – Estimated net market benefits, assumed energisation in June 2023 and with 2020’s wholesale market benefits excluded	13
Figure 6 – Estimated net market benefits, extended generator support at Port Lincoln	14

Tables

Table 1 – Updated capital cost estimates for options 1, 2, 4B and 4D (\$m, 2017-18).....	8
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1. Introduction

During 2017 and 2018, ElectraNet undertook a Regulatory Investment Test for Transmission (RIT-T) that explored options for providing a reliable electricity supply to the Eyre Peninsula most efficiently in the future, including ‘future proofing’ to accommodate potential mining and renewable energy developments.¹

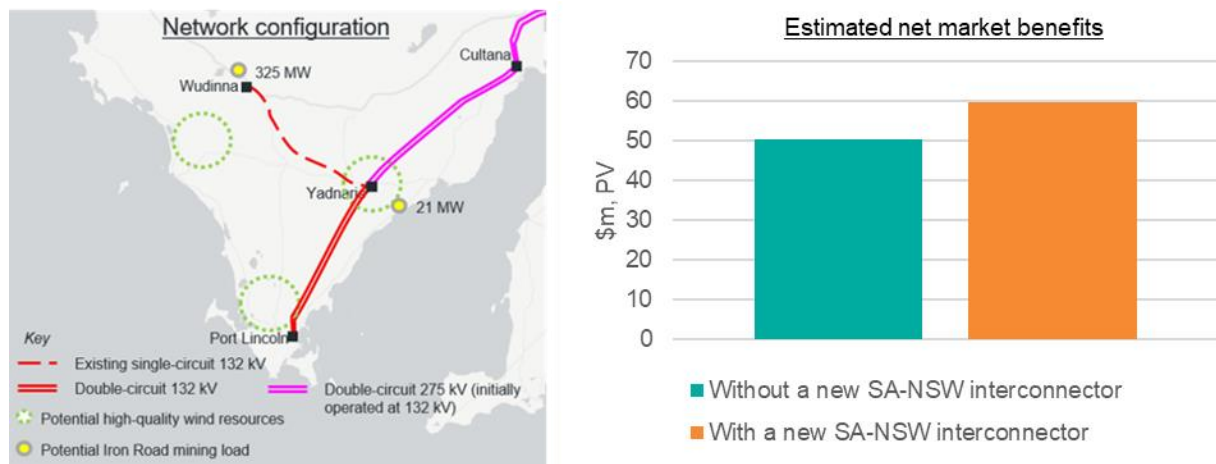
This process concluded in October 2018 with publication of the Project Assessment Conclusions Report (PACR), which found that the most efficient way to provide a reliable supply to the Eyre Peninsula is:

- a new double-circuit line from Cultana to Yadnarie that is initially energised at 132 kV, but which has the option to be energised at 275 kV if required in the future; and
- a new 132 kV double-circuit line from Yadnarie to Port Lincoln.

This preferred upgrade option (‘Option 4D’) was found to deliver net market benefits of between \$50 million and \$59 million compared to a ‘business as usual’ base case, depending on whether a new SA-NSW interconnector is assumed to be constructed.

The route of Option 4D and the net benefits estimated in the PACR are illustrated in Figure 1 below.

Figure 1 – Preferred option for the Eyre Peninsula, ‘Option 4D’



Source: ElectraNet, *Eyre Peninsula Electricity Supply Options PACR*, 18 October 2018, p. 4.

The PACR assessment assumed a ‘business as usual’ base case that involves reconductoring sections of the existing transmission line and establishing a new backup generation network support arrangement at Port Lincoln. This ‘base option’ was referred to as ‘Option 1’ in the PACR.

¹ For more detail on this RIT-T, including all consultation documents and material released, please see: <https://www.electranet.com.au/projects/eyre-peninsula-electricity-supply-options/>

The PACR calculations were undertaken at the time using an estimated upfront capital cost of \$240 million for Option 4D, plus \$40 million if the Cultana to Yadnarie line is upgraded to 275 kV and \$20 million for future replacement of Yadnarie substation in 2037 (if required).^{2,3}

In April 2019, the AER determined that Option 4D satisfies the requirements of the RIT-T.⁴

ElectraNet has now progressed the procurement and contracting for the preferred option, which has resulted in refined capital cost estimates from those used in the PACR assessment. The capital costs have also been revised to account for a range of other factors, including updated geotechnical information, liaising with landholders and Traditional Owners and, more recently, the expected impact of COVID-19.

This document has been prepared to summarise the relevant changes in assumptions since the PACR was published and update the cost-benefit assessment accordingly. In particular, the updated cost-benefit assessment looks at:

- whether Option 4D is still expected to deliver positive net benefits (ie, relative to Option 1); and
- whether Option 4D is still the top-ranked option (ie, compared to the other options).

These two investigations test whether Option 4D is expected to still be the 'preferred option' if the RIT-T had taken into account the most recent assumptions.⁵

This document is structured as follows:

- section 2 outlines the updated assumptions since the PACR was released;
- section 3 presents the results of the updated cost-benefit assessment, taking account of these changed assumptions; and
- section 4 summarises the conclusions of the updated assessment.

HoustonKemp has been retained to update the cost-benefit assessment, including the real option value modelling, to account for these changes. No further wholesale market modelling has been undertaken as part of this update as the key inputs and assumptions to this analysis have not changed materially.

While the updated assessment in this document focusses on the case where a new SA-NSW interconnector is assumed to be in-place, it also presents the results for the case without a new interconnector. We note that the assumptions to be used for the 2020 ISP, which were consulted on by the Australian Energy Market Operator (AEMO) during early 2019 and published in August 2019, include a SA-NSW interconnector (commissioned in 2023) in all scenarios. In addition, on 24 January 2020, the Australian Energy Regulator (AER) approved ElectraNet's RIT-T application for the SA-NSW interconnector (now known as Project EnergyConnect).⁶

² Unless otherwise stated, all dollars in this document are presented in \$2017-18.

³ The existing Yadnarie substation is expected to be replaced based on condition in 2037 if it has not previously been upgraded to a 275/132 kV substation at some stage. See: ElectraNet, *Eyre Peninsula Electricity Supply Options PACR*, 18 October 2018, pp. 8-9.

⁴ <https://www.aer.gov.au/communication/aer-releases-determination-on-electranet%E2%80%99s-preferred-option-for-eyre-peninsula-transmission-network-investment>

⁵ The preferred option is defined as the option that maximises net market benefits under the RIT-T framework.

⁶ <https://www.aer.gov.au/news-release/aer-approves-south-australia-%E2%80%93-nsw-interconnector-regulatory-investment-test>

2. Updated assumptions since the PACR

There have been a number of developments since the PACR was released in October 2018 that are relevant to the assumptions relied upon at the time for the cost-benefit assessment. Specifically:

- the capital cost estimates and the expenditure profiles have been refined following contracting and procurement undertaken since the PACR;
- network support costs at Port Lincoln are now known with a greater degree of certainty since a contract has been entered into with Engie; and
- a later delivery timeframe than the original target date of December 2021 is now more likely (which has been informed by the contracting and procurement process undertaken since the PACR was released). For the purposes of this analysis, an extension in the delivery timeframe of twelve to eighteen months has been modelled.

Table 1 below summarises the latest capital cost estimates for the base case option ('Option 1')⁷, Option 2, Option 4B and Option 4D.⁸ The percentage increase in capital costs for each component from what was assumed in the PACR is shown in parentheses.

While the preferred option's contracting and procurement process has led to higher costs for Option 4D, ElectraNet has also updated the costs of Option 1, Option 2 and Option 4B based on the same market pricing information from this procurement process to ensure a consistent estimating framework. The Option 4D procurement process has provided a better understanding of the access requirements and increased cost implications that would also apply to the other options, for example:

- the construction allowance costs for temporary line works that would be required;
- land access and approval costs, such as native vegetation offset payments and Traditional Owner monitoring for the temporary and new structures; and
- increased risk allowances to align with COVID-19 risk mitigation.

The assessment in this document does not update the modelling for Option 2B, Option 4A, Option 4C or options involving transmission lines from Cultana to Port Lincoln via Yadnarie and Wudinna (ie, Option 3, Option 3B, Option 5A, Option 5B and Option 5C) since they all were found in the PACR to be inferior to Option 2, Option 4B and Option 4D.⁹

⁷ As set out in section 9.1 of the PACR, a 'business as usual' base case was adopted for this RIT-T as a 'do nothing' alternative would result in significant unserved energy to the Eyre Peninsula, which is an unacceptable and unrealistic outcome, and therefore not an appropriate basis for comparison. The 'business as usual' base case reflects the investment the AER included in its final revenue decision for ElectraNet for the 2018-19 to 2022-23 regulatory control period (ie, Option 1 where the existing line is reconducted and network support is continued at Port Lincoln to meet ETC requirements).

⁸ While the preferred option's contracting and procurement process has led to higher costs for Option 4D, ElectraNet has also updated the costs of Option 1, Option 2 and Option 4B in light of the procurement process to ensure a consistent estimating framework.

⁹ Specifically, Option 2B was found in the PACR to provide lower net market benefits than Option 2 and, similarly, Option 4A and Option 4C were found to provide materially lower net market benefits than Option 4B and Option 4D. Options involving transmission lines from Cultana to Port Lincoln via Yadnarie and Wudinna (ie, Option 3, Option 3B, Option 5A, Option 5B and Option 5C) were all found to have significant negative net market benefits in the PACR.

Table 1 – Updated capital cost estimates for options 1, 2, 4B and 4D (\$m, 2017-18)

Option	Item	Substation cost	Line cost	Total cost	Iron Road connection cost
<u>Option 1 ('business as usual' base case)</u>	Initial capex	-	94 (17%)	94 (17%)	217 (7%)
Continue network support at Port Lincoln and reconductor sections of the existing 132 kV single-circuit line	Reconductoring capex	-	97 (7%)	97 (7%)	-
	Future substation capex	29 (16%)	-	29 (16%)	-
<u>Option 2</u>	Initial capex	21 (7%)	259 (25%)	281 (24%)	217 (7%)
A double-circuit 132 kV line following a Cultana to Yadnarie and Yadnarie to Port Lincoln route, each circuit rated to about 240 MVA	Future substation capex	29 (53%)	-	29 (53%)	-
		70 (16%)	272 (24%)	342 (22%)	151 (4%)
<u>Option 4B</u>	Initial capex	70 (16%)	272 (24%)	342 (22%)	151 (4%)
Double-circuit 275 kV between Cultana and Yadnarie, each circuit rated to about 600 MVA, and double-circuit 132 kV between Yadnarie and Port Lincoln, each rated to about 240 MVA					
<u>Option 4D</u>	Initial capex	21 (8%)	273 (24%)	294 (23%)	151 (4%)
Double-circuit line from Cultana to Yadnarie initially energised at 132 kV with a rating of about 300 MVA, with the option to be energised at 275 kV with a rating of about 600 MVA if required in the future, and a double-circuit line from Yadnarie to Port Lincoln rated to about 240 MVA	Upgrade capex	64 (59%)	-	64 (59%)	-
	Future substation capex (if required)	29 (53%)	-	29 (53%)	-

Note: Totals may not add due to rounding
Source: ElectraNet

The procurement and contracting process has also resulted in a more developed capital expenditure profile for the line work components. Specifically, while the PACR assumed a generic, relatively even spread of capital costs over the construction period, this updated assessment now assumes that most of the upfront capital costs for lines are incurred in the last few years of the capital build.

The costs of providing network support at Port Lincoln under the base case are also now known with more certainty than at the time the PACR was published on account of ElectraNet having subsequently entered into a contract with Engie. The updated network support costs are equal to \$9.1 million per annum (in \$2019-

20), which is approximately the same as assumed in the PACR when taking account of inflation (\$8.8 million per annum (in \$2017-18) for the preferred option).

The final set of assumptions updated since the PACR relate to the commissioning timeframe of the options. Specifically, an updated project construction timeframe involving a later delivery date than the target date of December 2021 assumed in the PACR has been modelled based on updated project delivery information, including the impacts of COVID-19. The analysis in this report focusses on the assumption of a twelve-month delay (ie, energisation by December 2022) and also assesses the effects of an eighteen-month delay (ie, energisation by June 2023).



3. Results of the updated cost-benefit assessment

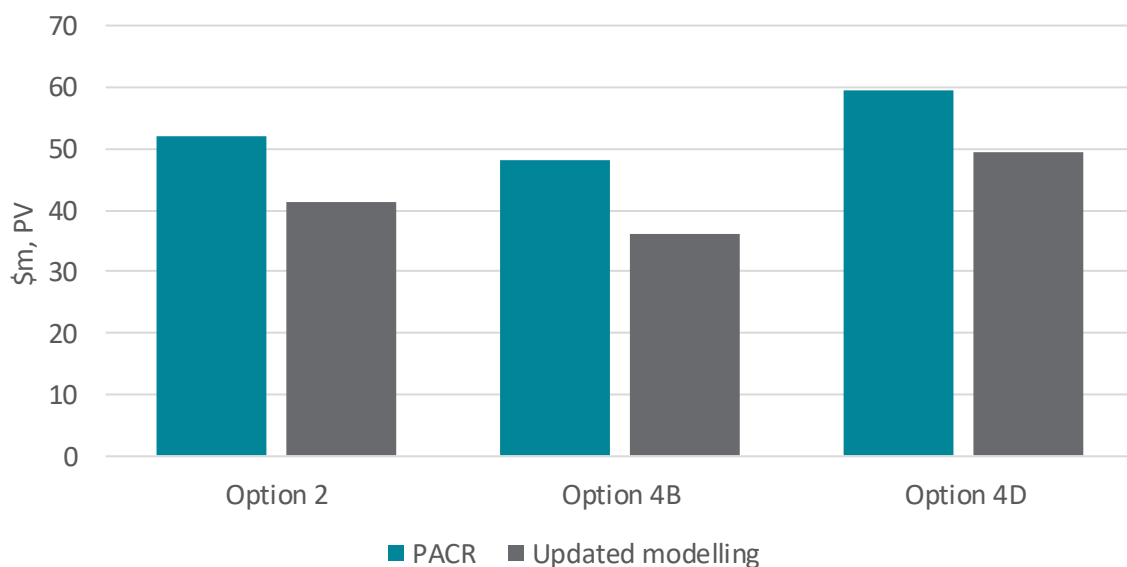
This section presents the updated ‘headline’ cost-benefit assessment results, as well a number of sensitivity and threshold tests that stress test these results.

3.1 Headline results

While the updated assumptions result in slightly reduced estimated net market benefits for each option compared to what was estimated in the PACR, Option 4D is still found to have strongly positive net market benefits and remains the top-ranked option by a considerable margin.

Figure 2 below shows that Option 4D delivers net market benefits of approximately \$49 million and remains the top-ranked option under an energisation date of December 2022 and with a SA-NSW interconnector. Under these assumptions, Option 4D is found to deliver approximately 20 per cent greater estimated net benefits than the second-ranked option (Option 2).

Figure 2 – Estimated net market benefits, December 2022 energisation and SA-NSW interconnector



3.2 Sensitivity results

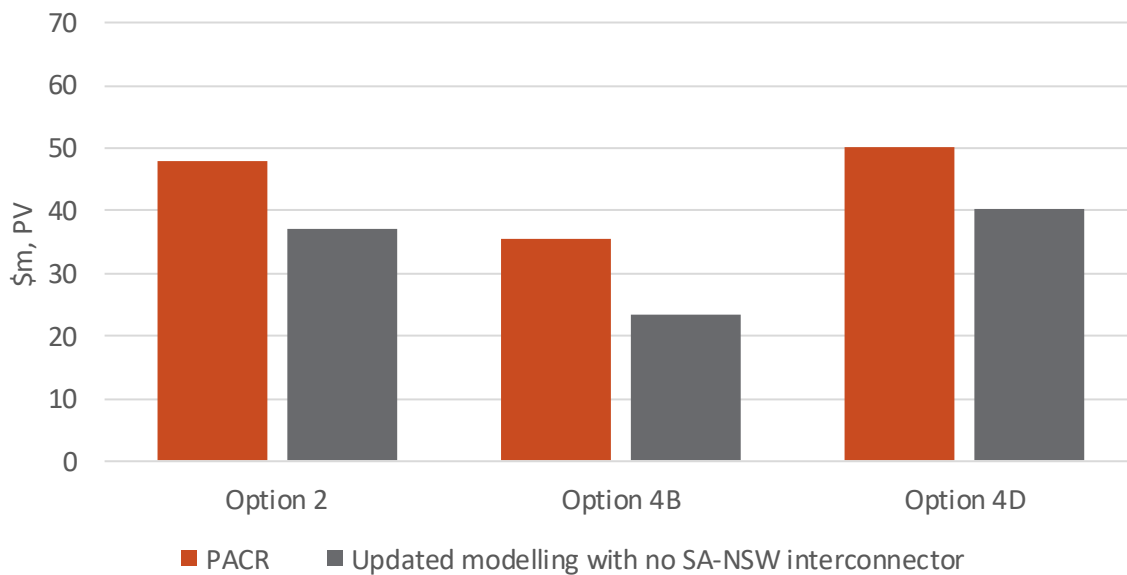
The sub-sections below summarise the results of a range of sensitivity and threshold tests undertaken to further stress test the updated headline results above.

3.2.1 No new SA-NSW interconnector

Figure 3 below shows that Option 4D delivers net market benefits of approximately \$40 million and remains the top-ranked option with no SA-NSW interconnector assumed.

Under these assumptions, Option 4D is found to deliver approximately 8 per cent greater estimated net benefits than the second-ranked option (Option 2).

Figure 3 – Estimated net market benefits, no SA-NSW interconnector



3.2.2 Delayed project delivery

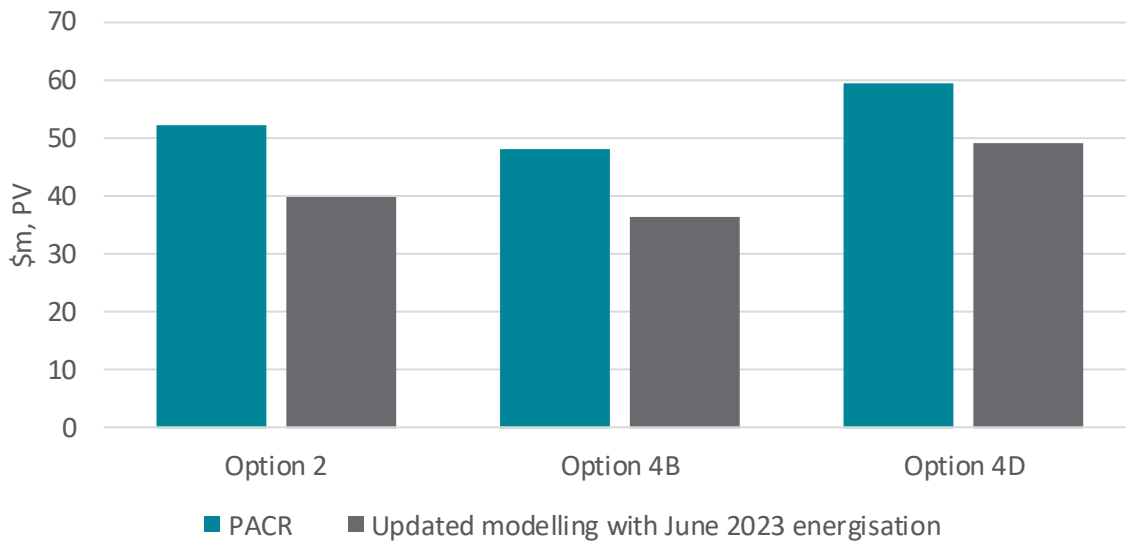
We have investigated the effects of assuming an eighteen-month delay in project delivery from the original target date of December 2021 (ie, an energisation date of June 2023).

ElectraNet’s system studies find that, if commissioning occurs beyond the end of 2022, then a further \$3 million 5 MW load bank will be required in 2022 at Port Lincoln for system security. The cost of this load bank has been included in this sensitivity.

Under this assumption, estimated net market benefits for Options 2 and 4D are found to be slightly lower than a December 2022 energisation date, and slightly higher for Option 4B. Option 4D continues to have strongly positive net market benefits and remains the top-ranked option.

Figure 4 below shows that Option 4D delivers net market benefits of approximately \$49 million and remains the top-ranked option under an energisation date of June 2023. Under these assumptions, Option 4D is found to deliver approximately 24 per cent greater estimated net benefits than the second-ranked option (Option 2).

Figure 4 – Estimated net market benefits, assumed energisation in June 2023

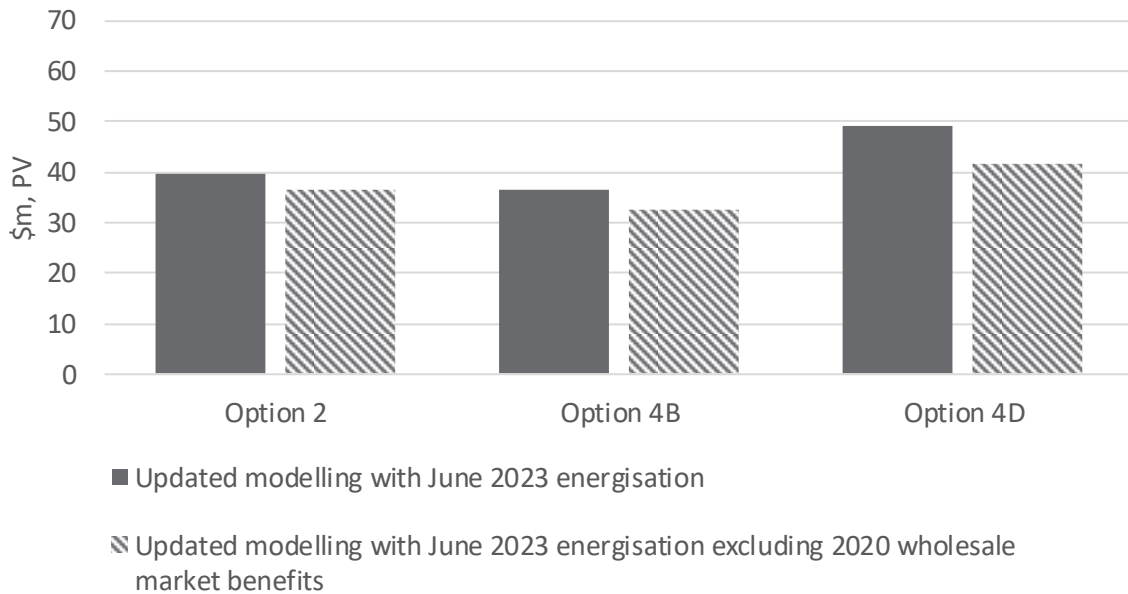


We note that no further wholesale market modelling has been undertaken as part of this update and, rather, the wholesale market benefits have been assumed to be equal to those in the PACR (in both timing and magnitude). While the wholesale market benefits for a June 2023 project delivery are expected to be lower when compared to earlier energisation dates, we do not consider this to be material as the wholesale market would continue to be affected ahead of the option being commissioned (ie, through expectations). Moreover, we do not consider it would affect the ultimate ranking of the credible options.

For example, the first year of modelled wholesale market benefits (2020) are estimated to vary by between \$3 million and \$7 million (in PV terms) across the options, which makes up around eight to 18 per cent of the total estimated wholesale market benefits (in PV terms).

As a stress test, if the first year of wholesale market benefits are completely removed for each option, Option 4D is still found to be the top-ranked option with positive net market benefits and delivers approximately 14 per cent greater estimated net benefits than the second-ranked option (Option 2). The results of this test are illustrated in Figure 5 below.

Figure 5 – Estimated net market benefits, assumed energisation in June 2023 and with 2020's wholesale market benefits excluded



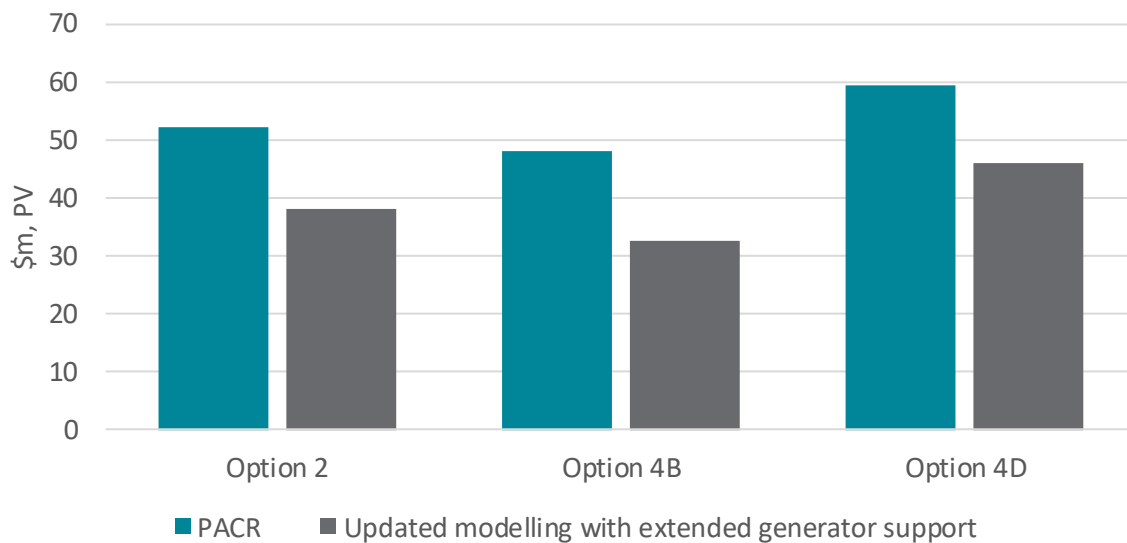
3.2.3 Extended generator support at Port Lincoln

While the headline results assume that the generator support arrangements at Port Lincoln cease at the time of project completion, we have also investigated a sensitivity where the generator support arrangement is required to be extended for up to six months beyond the date of project completion. This allows for any potential establishment issues/delays during project commissioning.

While under this assumption estimated net market benefits for each option are slightly lower than the headline estimates (due to the six months of additional generator support costs), Option 4D is still found to have strongly positive net market benefits and remains the top-ranked option.

Figure 4 below shows that Option 4D delivers net market benefits of approximately \$46 million and remains the top-ranked option when generator support costs are assumed to be extended six months beyond the commissioning date. Under these assumptions, Option 4D is found to deliver approximately 21 per cent greater estimated net benefits than the second-ranked option (Option 2).

Figure 6 – Estimated net market benefits, extended generator support at Port Lincoln



3.2.4 Capital cost threshold testing

We have also undertaken threshold testing on the capital costs of the options.

The analysis finds that current capital cost estimates (for all options)¹⁰ would have to increase by 59 per cent for Option 4D to no longer be the preferred option. If capital costs were to increase by more than 59 per cent, Option 1 would be preferred.

We note that this threshold analysis has been undertaken on the updated capital costs and so the percentages above reflect additional increases (ie, on top of those since the PACR).

3.2.5 Estimated wholesale market benefit threshold testing

We have also undertaken threshold analysis on the wholesale market benefits of the options. Options 4B and 4D generate materially higher estimated wholesale market benefits compared to Option 2.

The analysis finds that if wholesale market benefits decreased to zero, Option 4D would still have positive net market benefits as a result of the avoided costs of the reconductoring and network support that would otherwise be required under the base case. It also finds that wholesale market benefits would have to reduce by 75 per cent before Option 4D would no longer be the top-ranked option (Option 2 would become preferred).

¹⁰ This threshold test increases the capital costs of all options at the same time since the drivers behind capital costs are expected to be the same across options.

4. Conclusion

The updated modelling incorporates a number of key developments since the PACR was released in October 2018 that are relevant to the assumptions relied upon at the time for the cost-benefit assessment. Specifically:

- the capital cost estimates and the expenditure profiles have been refined and updated following contracting and procurement undertaken since the PACR;
- network support costs at Port Lincoln are now known with a greater degree of certainty since a contract has been entered into with Engie; and
- a later delivery timeframe than the original target date of December 2021 is now more likely (which has been informed by the contracting and procurement process undertaken since the PACR was released and impacts of COVID-19). For the purposes of this analysis, an extension in this delivery timeframe of twelve to eighteen months has been modelled.

The updated modelling finds that the preferred upgrade option in the PACR (Option 4D) remains the top-ranked option and continues to have strongly positive net market benefits under the revised inputs and under a range of sensitivity tests.

In particular, Option 4D remains the top-ranked option and has positive net market benefits if:

- the proposed SA-NSW interconnector is built (as well if it is not);
- the project is delivered in a later timeframe of December 2022 or June 2023;
- the Port Lincoln generator support arrangements are extended six months beyond commissioning;
- capital costs increase further by up to 59 per cent; and
- estimated wholesale market benefits fall by up to 75 per cent.

Overall, we consider that the PACR finding that Option 4D is the preferred option remains unchanged in light of these updated assumptions.





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