REGIONAL VICTORIAN THERMAL CAPACITY UPGRADE RIT-T - STAGE 3

PUBLISHED: **JUNE 2014**

IMPORTANT NOTICE

Purpose

The purpose of this document is to provide information about AEMO's assessment of further options to address transmission network limitations in regional Victoria, as at the date of publication.

AEMO publishes this document in accordance with clause 5.16.4 of the National Electricity Rules. This publication is based on information available to AEMO as at 14 March 2014 although AEMO has endeavoured to incorporate more recent information where practical.

Disclaimer

AEMO has made every effort to ensure that quality of the information in this document but cannot guarantee that information, forecasts and assumptions are accurate, complete or appropriate for your circumstances. This document does not include all of the information that an investor, participant or potential participant in the National Electricity Market might require, and does not amount to a recommendation of any investment.

Anyone proposing to use the information in this document (including information and reports from third parties) should independently verify and check its accuracy, completeness and suitability for purpose, and obtain independent and specific advice from appropriate experts.

Accordingly, to the maximum extent permitted by law, AEMO and its officers, employees and consultants involved in the preparation of this document:

- make no representation or warranty, express or implied, as to the currency, accuracy, reliability or completeness of the information in this document; and
- are not liable (whether by reason of negligence or otherwise) for any statements, opinions, information or other matters contained in or derived from this document, or any omissions from it, or in respect of a person's use of the information in this document.

EXECUTIVE SUMMARY

AEMO is the jurisdictional planning body responsible for planning and directing augmentations to the Victorian declared shared network (DSN).

AEMO has prepared this document as an update to the Project Assessment Conclusion Report (PACR) for the Regional Victorian Thermal Capacity Upgrade[1]. This PACR update represents AEMO's PACR conclusions for stage 3, in accordance with clause 5.16.4(t) of the National Electricity Rules.

Key Findings

Based on the current information available to AEMO:

- The option that provides the highest net market benefit is to re-conductor the Ballarat – Bendigo 220 kV line, with a weighted net market benefit of $96.4 million (in present value terms) assuming the implementation year is 2018-19[2]. The estimated cost of this option includes a capital investment of $42 million and an annual operation and maintenance (O&M) cost of 2% of the capital investment.
- The option that provides the second highest net market benefit is a staged local generation network support option (up to 120MW in firm capacity) at Bendigo. The weighted net market benefit of this non-network option is $92.6 million (in present value terms) based on the following stages: 30 MW in 2016-17 to 50 MW in 2018-19, 80 MW in 2021-22, 100 MW in 2023-24 and 120MW in 2026-27[3]. The estimated cost of this option is $76,300 per MW per annum (availability fee only).

Next Steps and Preferred Option

Given the small difference in net market benefits between the above two options and in light of the uncertainties in key assumptions for assessing these options including project costs and lead times, AEMO will seek:

- firm quotes on the staged non-network option through a competitive tender process; and
- a firm quote from SP AusNet (on the network option, as it is not contestable).

Once this further information is available, AEMO will proceed with the option (from the two identified above) that delivers the highest net market benefit based on the firm quotes. This represents the preferred investment option for Stage 3.

[1] AEMO. April 2012. Regional Victorian Thermal Capacity – Ballarat Supply – Project Specification Consultation Report. Available: http://www.aemo.com.au/Electricity/Planning/Regulatory-Investment-Tests-for-Transmission/Regional-Victorian-Thermal-Capacity-Upgrade. Viewed: 04 June 2014.

[2] The lead time advised by SP AusNet is 30 months for this network option. This implementation year was assumed considering the challenges which may be associated with building stage 2 and stage 3 in parallel. AEMO will seek a firm quote from SP AusNet including confirmation on project cost and lead time.

[3] The timing of the stages may vary with cost estimates.

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

This document updates the Project Assessment Conclusion Report (PACR) and represents a further stage in the Regulatory Investment Test for Transmission (RIT-T) for the Regional Victorian Thermal Capacity Upgrade.

In April 2012, AEMO published a Project Specification Consultation Report (PSCR) identifying a need to address the Moorabool – Ballarat No.1 220 kV line loading limitation[4] and in August 2012 AEMO published another PSCR identifying a need to address the Ballarat–Bendigo 220 kV line loading limitation.[5]

AEMO consolidated these assessments and published a Project Assessment Draft Report (PADR) in March 2013 and the PACR in October 2013.

The preferred option identified in the PACR was to split the required investment into three stages:

1) Stage 1: install a wind monitoring facility on the Ballarat – Bendigo 220 kV line in 2015–16;
2) Stage 2: install the third Moorabool – Ballarat 220 kV circuit in 2017–18; and
3) Stage 3: up-rate the Ballarat – Bendigo 220 kV line to a maximum operating temperature of 82ºC by 2019–20.

Prior to the publication of the PACR, AEMO received proposals from several service providers on possible non-network solutions, such as demand management and embedded generation to minimise the potential Unserved Energy (USE). At the time, AEMO discussed these proposals with the proponents but it had insufficient information to consider these to be credible options.

As a result, AEMO proposed in the PACR to commit to Stages 1 and 2 of the preferred option. AEMO recommended that Stage 3 be placed on hold, and that the need and timing for this stage be further assessed against the proposals received from non-network service providers.

After the publication of the PACR, SP AusNet advised that the cost estimate and lead time for re-conductoring the existing Ballarat – Bendigo 220 kV line with a high temperature conductor, one of the options considered in the PACR, can be reduced with a new type of conductor. This proposal is also being considered as part of this assessment.

This document:

1) Describes the identified need for Stage 3 that AEMO is seeking to address.
2) Describes the options for stage 3 that were not included in the PACR.
3) Provides the results of the net present value (NPV) analysis of net market benefits for each credible option.
4) Recommends the next steps in reaching a preferred option.

In this further assessment, it is assumed that Stage 1 and Stage 2 will be implemented according to the schedule published in the PACR.

Further details can be obtained from:

Niluksha Akurugoda
Manager Victorian Planning, AEMO
(03) 9609 8401
niluksha.akurugoda@aemo.com.au

---

[4] AEMO. April 2012. Regional Victorian Thermal Capacity – Ballarat Supply – Project Specification Consultation Report. Available: **http://www.aemo.com.au/Electricity/Planning/Regulatory-Investment-Tests-for-Transmission/Regional-Victorian-Thermal-Capacity-Upgrade**. Viewed: 04 June 2014.

[5] AEMO. August 2012. Regional Victorian Thermal Capacity – Bendigo Supply – Project Specification Consultation Report. Available: http://www.aemo.com.au/Electricity/Planning/Regulatory-Investment-Tests-for-Transmission/Regional-Victorian-Thermal-Capacity-Upgrade. Viewed: 04 June 2014.

2 SHARED NETWORK PLANNING CRITERIA AND METHODOLOGY

2.1 Shared network planning criteria

The shared network planning criteria used for this assessment are the same as those articulated in the PACR.

2.2 Key assumptions

Key assumptions used in calculating Unserved Energy (USE) include:

- Maximum Demand (MD) forecasts from AEMO's 2013 National Electricity Foresting report (NEFR[6]) and AEMO's 2013 Victorian Terminal Station Demand Forecasts (TSDF[7]), and demand traces developed using 2009-10 as the reference year[8].
- Wind generation using 2009-10 as the reference year.
- Line ratings for the Ballarat – Bendigo 220 kV line based on the following assumptions:
  - Short-term 15-minute line ratings at various ambient temperatures according to temperature traces developed for 10% Probability of Exceedence (POE) and 50% POE peak demand conditions.
  - 0.6 meter/second (m/s) effective wind-speed before wind monitoring equipment is installed and 1.0 m/s after installation of wind monitoring equipment.
  - The 15-minute line ratings for 40ºC and 45ºC are shown in Table 1.

Table 1 –15-minute ratings (MVA) of the Ballarat – Bendigo 220 kV line

Temp (ºC)	1 meter/second wind speed	0.6 meter/second wind speed
40	313	262
45	281	234

- Line rating for the Moorabool - Ballarat No.1 220 kV line:
  - Short-term 15-minute line ratings at various ambient temperatures according to temperature traces developed for 10% POE and 50% POE conditions.
  - 1 m/s effective wind-speed (equipped with wind monitoring facility). It is found that for maximum demand days, 99% of the time the effective wind-speed is between 1.0m/s to 1.35m/s.

Key assumptions used for the economic analysis include:

- A base Vale of Customer Reliability (VCR) of $62,320/MWh, with sensitivities of ± 20%.
- A base discount rate of 10% with sensitivities of 6% and 12%.
- An asset life expectancy of network option and contract duration for non-network option of 40 years
- A weighting of 30% and 70% for 10% POE forecast and 50% POE forecast, respectively.

AEMO has undertaken market modelling from 2014–15 to 2027–28. To calculate the end-effect associated with the life of the assets beyond 2027–28, the market benefits calculated for the final year have been held constant and applied for the remaining years.

[6] AEMO. June 2013. 2013 National Electricity Forecasting Report. **http://www.aemo.com.au/Electricity/Planning/Forecasting**. Viewed: 05 June 2014.
[7] AEMO. September, 2013. Victorian Terminal Station Demand Forecasts 2013. **http://www.aemo.com.au/Electricity/Planning/Related-Information/Forecasting-Victoria**. Viewed: 05 June 2014.
[8] 2009-10 has been considered as the reference year to be consistent with AEMO's planning assumptions (AEMO. June 2013. **http://www.aemo.com.au/Electricity/Planning/Related-Information/2013-Planning-Assumptions**. Viewed: 05 June 2014.)

In determining limitation costs, only costs due to USE are considered. The costs due to generation re-dispatch are not expected to affect the conclusions of the assessment.

2.3 Changes from the PACR

Key changes in assumptions from the PACR include the following:

- Demand forecasts have been updated with the 2013 NEFR and 2013 TSDF forecasts.
- Generation assumptions have been updated.
- Short-term ratings of the relevant transmission lines have been updated.
- Riverland thermal capacity, which will affect Murraylink import capacity to Victoria during summer, has been updated as advised by ElectraNet.
- The VCR has been escalated by the Consumer Price Index (CPI).

3 SCENARIOS FOR THIS ASSESSMENT

Four scenarios, representing a combination of two demand forecasts (2013 TSDF summer MD and 2013 NEFR medium economic growth) and two new generation locations (220 kV location and 500 kV location) are considered in this assessment for the calculation of gross market benefits of each of the credible options. For each demand forecast, 10% and 50% POE summer MD are included. See Table 2 for details of the four scenarios.

Table 2 – Scenarios assessed

Drivers	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Connection Point (CP) demand traces	TSDF Summer MD	TSDF Summer MD	NEFR Summer Medium Growth	NEFR Summer Medium Growth
Regional Victoria new generation connection point	220 kV	500 kV	220 kV	500 kV
Weighting	25%	25%	25%	25%

Of particular note:

- Scenario 1 assumes demand will grow in line with the forecasts in the 2013 TSDF. This scenario assumes a base supply development scenario with a number of new renewable generation projects connected to the 220 kV network in regional Victorian, which is the result of the 2013 NTNDP expansion plan based on AEMO's 2013 planning assumptions[9].
- Scenario 2 assumes an alternative generation development scenario where new generation will be connected to the 500 kV network in Victoria's south-west corridor. All other assumptions are the same as Scenario 1.
- Scenario 3 reflects the same parameters as Scenario 1, except for the use of demand forecast based on the 2013 NEFR, which is lower than the 2013 TSDF used for Scenario 1.
- Scenario 4 reflects the same parameters as Scenario 2, except for the use of demand forecast based on the 2013 NEFR, which is lower than the 2013 TSDF used for Scenario 1.

Other scenarios that have been considered, but not included for further assessment include:

- A demand forecast lower than TSDF summer MD but higher than NEFR Medium summer MD.
- A generation expansion plan based on the zero carbon price scenario, which replaces some renewable generation in the core carbon price scenario with other types of generation.
- A low wind scenario assuming outputs from wind farms will be only 6.5% of the installed capacity during the annual peak periods.

These scenarios are all covered by the four scenarios given in Table 2.

[9] AEMO. June 2013. New Entry Generation Data. http://www.aemo.com.au/Electricity/Planning/Related-Information/2013-Planning-Assumptions. Viewed: 04 June 2014.

4 IDENTIFIED NEED FOR STAGE 3

4.1 Description of identified need

The geographical regional Victorian transmission network is shown in Figure 1.

Figure 1 – Regional Victorian Corridor Transmission Network

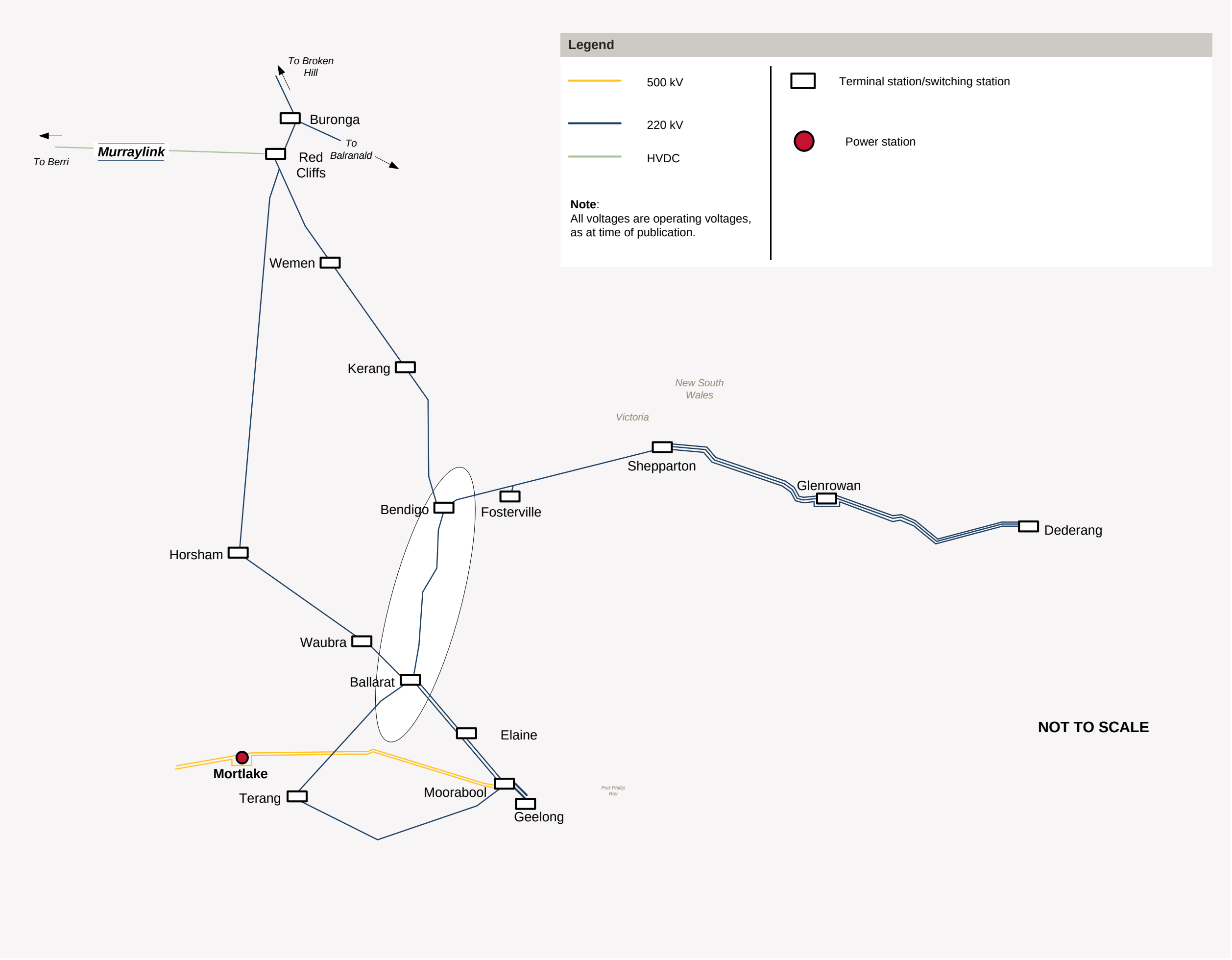
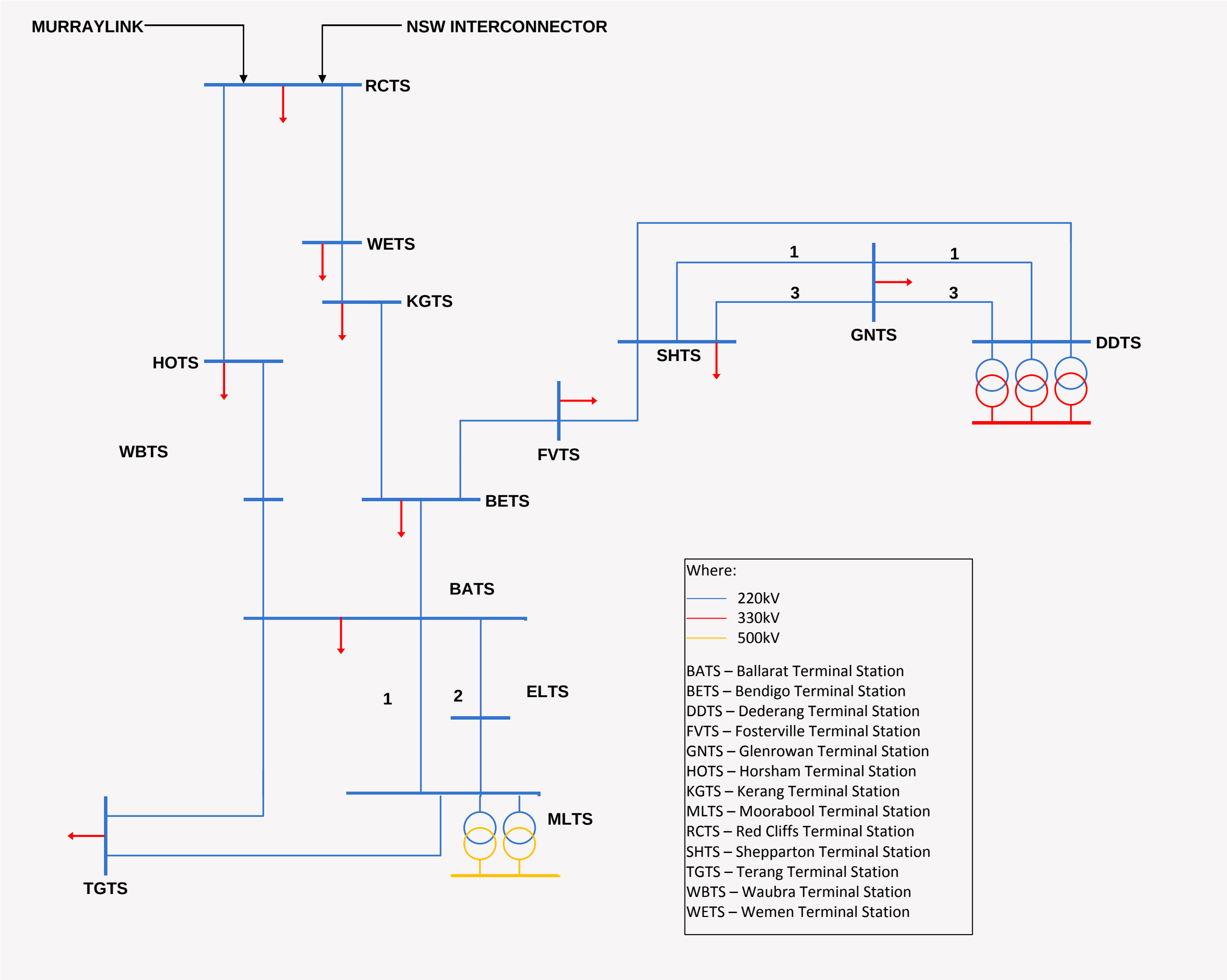


Figure 2 presents an electrical representation of the terminal stations that are affected by the forecast network limitations on the Ballarat – Bendigo 220 kV line and the Moorabool – Ballarat No.1 220 kV line.

Figure 2 – Schematic Representation of Terminal Stations affected by the Forecast Network Limitations



The Ballarat - Bendigo 220kV line and the Moorabool - Ballarat 220kV lines form one of the key supply routes into regional Victoria and the Riverland region of South Australia (via the Murraylink HVDC interconnector at Red Cliffs Terminal Station).

The Regional Victorian transmission network supplies load at the Ballarat, Bendigo, Fosterville, Glenrowan, Horsham, Kerang, Red Cliffs, Shepparton and Wemen Terminal Stations and is supplied from:

- The 220kV system via two 500/220kV transformers at Moorabool Terminal Station;
- The 220kV system via three 330/220kV transformers at Dederang Terminal Station;
- The NSW–VIC interconnector at the Red Cliffs Terminal Station; and
- The Murraylink interconnector.

At present, the most critical limitations (the main limitations) are the Ballarat – Moorabool 220kV line and the Ballarat – Bendigo 220kV line and this RIT-T is focused on identifying the preferred solution to address these two critical limitations.

The two Moorabool – Ballarat 220kV lines are constructed on individual towers. The Moorabool – Ballarat No.1 220kV line is strung on a single circuit tower line and is designed to a maximum conductor operating temperature of 65ºC. The Moorabool – Ballarat No.2 220kV line is strung on one side of a double circuit tower line and is designed to a maximum operating temperature of 82ºC.

Dynamic wind monitoring facilities are installed on the Moorabool – Ballarat 220kV lines, which enable dynamic adjustment of the lines' rating based on ambient temperature and effective wind speed. AEMO has deduced that an effective wind speed of 1.0m/s is most appropriate for the Moorabool – Ballarat 220kV lines at times of coincident peak demand and high ambient temperature periods.

The Ballarat – Bendigo 220kV line is designed to a maximum conductor operating temperature of 65ºC. Wind monitoring facilities are not installed on this line, however, ambient temperature is monitored to enable dynamic adjustment of the line's rating.

Five-minute and 15-minute ratings based on the circuit's pre-contingent loading level and ambient temperature are also available for these two lines.[10]

With the installation of wind monitoring facilities on the Ballarat – Bendigo 220kV line in 2015-16 (Stage 1) and the installation of a third circuit on the existing double circuit towers of the Ballarat – Moorabool No. 2 220kV line in 2017/18 (Stage 2), the two main limitations are significantly relieved, particularly for the next few years, however, due to forecast demand growth in regional Victoria, the expected impact of the Ballarat – Bendigo 220kV line loading limitations on the electricity supply will increase over the years.

There are other constraints in the area, including the Bendigo – Kerang – Wemen 220 kV lines and the Bendigo – Fosterville – Shepparton – Glenrowan – Dederang 220 kV lines. At present, these limitations are shadowed by the two main limitations. Once the main limitations are alleviated following the implementation of Stage 1 and Stage 2, however, the impact of these other limitations will become more pronounced. The impact of these other limitations has been taken into account in identifying a preferred solution for Stage 3.

[10] An automatic load shedding scheme was commissioned in 2012 to manage constraints on the Ballarat–Bendigo 220kV line. Once this scheme is armed, the line can be operated to 5-minute rating and customer load will be disconnected automatically after a contingency to prevent loading the line above its thermal capability.

4.2 Expected impact of limitation without stage 3

The expected market impact of the 'Do Nothing option', which assumes Stage 1 and Stage 2 are implemented, is presented in Table 3. Note that the "maximum load at risk" is defined as the highest load at risk out of all scenarios considered, and the 'maximum energy at risk' is the highest energy at risk of all scenarios considered (Refer to Section 3 for a description of scenarios considered and assessed). The 'expected unserved energy' is defined as the weighted (equal across all scenarios) unserved energy. The scenarios are described in Table 2. The 'limitation cost' is calculated as the expected USE multiplied by 'the VCR.

Table 3 – Forecast market impact under the 'Do Nothing' Option

Year	Load at risk (MW)	Energy at risk (MWh)	Expected unserved energy (MWh)	Limitation cost ($ million)
2014-15	176	903	289	18.0
2015-16	207	985	329	20.5
2016-17	238	1,150	209	13.0
2017-18	128	610	138	8.6
2018-19	137	712	175	10.9
2019-20	159	880	157	9.8
2020-21	166	967	188	11.7
2021-22	186	1,228	231	14.4
2022-23	192	1,410	258	16.1
2023-24	208	1,617	291	18.1
2024-25	222	1,626	311	19.4
2025-26	237	1,929	363	22.6
2026-27	252	2,624	471	29.3

As shown in Table 3, the limitation costs in 2017-18 after the implementation of Stage 1 and Stage 2, are still high enough to require consideration of Stage 3. Refer to Section 5 for the credible options for Stage 3 and their associated costs.

5 OPTIONS CONSIDERED FOR STAGE 3

Table 4 lists the estimated capital costs of all potential options.

The options listed include the preferred option for Stage 3 as identified in the PACR, and a number of new options not previously considered.

Table 4 – List of potential options and the associated Capital Costs ($M)

Options		Descriptions	Cost Estimates
1	Uprating BATS - BETS 220 kV line	A network option to uprate the existing BATS – BETS 220 kV line to 82ºC.	$77 million (±30%),plus 2% O&M
2	Re-conductoring BATS – BETS 220 kV line	A network option to re-conductor the existing BATS – BETS 220 kV line with high temperature ACCR[11] conductor (or equivalent).	$42 million (±30%), plus 2% O&M
3 3a. 3b. 3c. 3d.	Embedded generation at Bendigo • 80 MW • 100 MW • 120 MW • Incremental	A non-network option. AEMO contracts with a non-network service provider for network support via embedded generation installed at Bendigo. • With a fixed capacity of 80MW • With a fixed capacity of 100 MW • With a fixed capacity of 120 MW • With incremental capacities, starting from 30 MW, to 50MW, 80MW, 100MW and 120MW to maximise network market benefit.	$76,300 per MW pa (±30%), for a term of 20 years or more
4	Demand side participation	A non-network option. AEMO contracts non-network service provider for network support via 5-20MW demand site participation.	Approx. $200-250k per MW pa for up to 20MW

Options 1 and 2 are 'Network options', whereas Options 3 and 4 are 'Non-network options'.

Network Option 1 has not been further assessed as it has either the same or less gross market benefit (due to lower ratings), but a much higher cost than Network Option 2.

Non-network Option 4 has not been further assessed as it will not provide comparable net market benefits to the other options due to its low capacity.

Therefore, the options to be assessed further are:

- Network Option 2: re-conductoring the existing Ballarat – Bendigo line with a high temperature conductor
- Non-network Option 3a: installation of a fixed capacity of 80 MW embedded generation at Bendigo
- Non-network Option 3b: installation of a fixed capacity of 100 MW embedded generation at Bendigo
- Non-network Option 3c: installation of a fixed capacity of 120 MW embedded generation at Bendigo
- Non-network Option 3d: incremental installation of embedded generation, 30MW, 50MW, 80MW, 100MW and 120MW, at Bendigo

[11] Aluminium Conductor Composite Reinforced.

6 DETAILED OPTION ASSESSMENT

6.1 Base case analysis

This section summarises the results of the NPV analysis of net market benefits for each option using the base assumptions for discount rate, VCR and option costs. Sensitivity analysis on the base results is presented in Section 6.2.

Table 5 summarises the net market benefit in NPV terms for each option assessed. The net market benefit is the gross market benefit, weighted across Scenarios 1-4 (as set out in Table 2), minus the costs of each option, all in present value terms.

Table 5 also shows the corresponding ranking of each option. The options are ranked from 1 to 5 in order of descending net market benefit.

Table 5 – Net market benefits for each option assessed (PV, $M)

Option	Project cost	Weighted gross market benefit	Net market benefit	Ranking under RIT-T
Option 2	34.3	130.6	96.4	1
Option 3a	44.8	129.1	84.2	4
Option 3b	56.1	140.9	84.9	3
Option 3c	61.0	143.4	82.4	5
Option 3d	50.2	142.7	92.6	2

Table 5 shows that all of the options assessed have positive net market benefits in the form of large reductions in expected USE. As a consequence, all are ranked higher than the Do Nothing Option.

The assessment shows that Network Option 2 has the highest net market benefits, followed by Non-network Option 3d.

Table 6 provides more detailed results for these two options for closer comparison. Also provided in Table 6 is the limitation cost for the Do Noting option. The limitation costs and gross market benefits are weighted values with equal weightings across Scenarios 1-4 given in Table 2.

With Non-Network option 3d, the capacity of the embedded generation to be installed at Bendigo will be incrementally increased in the years when a net market benefit can be achieved, that is, where the increase in gross market benefit is more than the increase in cost due to a capacity increase so that the achievable net market benefit will be maximised. The cells highlighted in yellow in Table 6 indicate the year with a capacity increase, that is, 30 MW in 2016-17, increased to 50MW in 2018-19, 80 MW in 2021-22, 100MW in 2024-25 and 120MW in 2026-27.

Table 6 – Weighted annualised results and a comparison of Options 2 and 3d

	Do nothing	Non-network Option 3d (from 2016/17)				Network Option 2 (from 2018/19)			
Year	Limitation cost ($M)	Remaining Limitation cost ($M)	Gross Market Benefits ($M)	Option cost ($M)	Net Market Benefits ($M)	Remaining Limitation cost ($M)	Gross Market Benefits ($M)	Option cost ($M)	Net Market Benefits ($M)
2014-15	18.0	18.0	0.0	0.00	0.0	18.0	0.0	0.00	0.0
2015-16	20.5	20.5	0.0	0.00	0.0	20.5	0.0	0.00	0.0
2016-17	13.0	8.9	4.2	2.29	1.9	13.0	0.0	0.00	0.0
2017-18	8.6	3.1	5.5	2.29	3.2	8.6	0.0	0.00	0.0
2018-19	10.9	2.2	8.7	**3.82**	4.9	0.3	10.6	5.13	5.5
2019-20	9.8	2.8	7.0	3.82	3.2	0.5	9.3	5.13	4.2
2020-21	11.7	3.7	8.0	3.82	4.2	0.8	10.9	5.13	5.8
2021-22	14.4	2.0	12.3	**6.10**	6.2	1.1	13.3	5.13	8.1
2022-23	16.1	2.6	13.5	6.10	7.4	1.6	14.5	5.13	9.3
2023-24	18.1	2.9	15.2	6.10	9.1	2.3	15.9	5.13	10.7
2024-25	19.4	2.1	17.3	**7.63**	9.7	3.1	16.2	5.13	11.1
2025-26	22.6	2.9	19.7	7.63	12.1	4.0	18.6	5.13	13.4
2026-27	29.3	2.3	27.0	**9.16**	17.9	5.1	24.3	5.13	19.1
2027-28	34.3	3.0	31.3	9.16	22.1	6.6	27.7	5.13	22.6
Residual			**320**	**94**	**226**		**288**	**53**	**234**
NPV			**142.7**	**50.2**	**92.6**		**130.6**	**34.3**	**96.4**

6.2 Sensitivity analysis

Table 5 presents the net market benefit of each option assessed against a set of base assumptions, including discount rate, VCR and options costs. Due to uncertainties in making those key assumptions, AEMO has also performed a series of sensitivity studies on the base results presented. The sensitivity analysis allows for changes in:

- Discount rate applied;
- VCR; and
- Option costs.

Table 7 presents the NPV of the net market benefit from each option assessed relative to the Do Nothing option under each of the sensitivities considered. It shows the sensitivities of net market benefit of each option assessed to the discount rate, option cost and value of customer reliability.

Table 7 – Net present value of net market benefits (PV, $M)

Sensitivity	Discount Rate		Cost		VCR			
	6%	12%	+30%	-30%	+5%/-5%[12]	+15%/0%[13]	+20%	-20%
Network option 2	**196.6**	**70.8**	**87.1**	105.7	94.8	**91.7**	**122.5**	**70.2**
Non-network option 3a	172.1	61.8	70.8	97.7	86.5	84.2	110.0	58.4
Non-network option 3b	176.6	61.6	68.1	101.7	87.7	84.9	113.1	56.7
Non-network option 3c	175.3	59.1	64.1	100.7	85.5	82.4	111.1	53.7
Non-network option 3d	186.5	68.4	77.5	**107.6**	**95.1**	**92.6**	121.1	64.0

The relative ranking of these options may also be dependent on the scenario weightings adopted. Therefore, AEMO has considered different weightings taking into consideration the likelihood of:

- Demand levels.
- New generation locations/levels.

Table 8 shows the net market benefit in NPV terms of each option assessed under the base and alternative scenario weightings.

Table 8 – Net market benefits under different scenario weightings (PV, $M)

Description	Net Market Benefit ($Million)					Scenario Weighting			
	Option 2	Option 3a	Option 3b	Option 3c	Option 3d	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Under base scenario weightings	**96.4**	84.2	84.9	82.4	92.6	25.0%	25.0%	25.0%	25.0%
Higher 220 kV new generation	**71.6**	60.4	58.7	55.1	66.1	30.0%	20.0%	30.0%	20.0%
Lower 220 kV new generation	**121.2**	108.1	111.1	109.7	119.0	20.0%	30.0%	20.0%	30.0%
Higher demand forecast	**109.3**	96.9	99.0	96.9	106.9	30.0%	30.0%	20.0%	20.0%
Lower demand forecast	**83.4**	71.5	70.7	67.9	78.2	20.0%	20.0%	30.0%	30.0%

Table 7 and Table 8 indicate:

[12] Network option 2 increased by 5% and Non-network options reduced by 5%.

[13] Network option 2 increased by 15% and no change to Non-network options.

- The option with the highest net market benefits (highlighted yellow) is always either Network option 2 or Non-network option 3d for all sensitivities assessed.
- Network option 2 has the highest network market benefits under most of the sensitivities assessed, however, Non-network option 2 can deliver higher net market benefits than Network option 2 under certain conditions.
- The differences in net market benefit between the two top-ranked options is small under all sensitivities assessed, ranging from 0.3 million to 10.1 million (or 0.3% to 11.6%).

6.3 Selection of the preferred option and next steps

The base case analysis results shown in Section 6.1 indicate that Network option 2 has the highest net market benefit, followed by Non-network option 3d as a close second. The sensitivity analysis results shown in Section 6.2 indicate that Network option 2 would rank no.1 under most sensitivities assessed, however Non-network option 3d would deliver higher benefits under some sensitivities.

Given the small difference in net market benefits between Network option 2 and Non-Network option 3d, and in light of the uncertainties in key assumptions for assessing these options, including project costs and lead times, AEMO will seek:

- firm quotes on non-network options through a competitive tender process; and
- a firm quote from SP AusNet (on the network option, as it is not contestable).

Once this further information is available, AEMO will proceed with the option (from the two identified above) that delivers the highest net market benefit based on the firm quotes. This represents the preferred investment option for Stage3.

