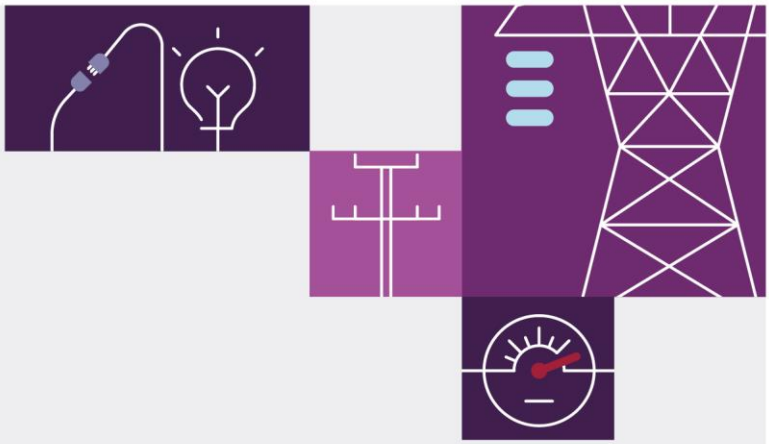
AEMO
AUSTRALIAN ENERGY MARKET OPERATOR
Victorian Planning

Transgrid

# VNI West Project Assessment Conclusions Report Volume 2: Additional Consultation Report Submissions

May 2023

Regulatory Investment Test for Transmission



# Important notice

## Purpose

The Project Assessment Conclusions Report has been prepared to meet the requirements of clauses 5.16A.4(i) – (l) of the National Electricity Rules to the extent applicable having regard to the orders issued by the Victorian Minister for Energy and Resources under the *National Electricity (Victoria) Act 2005* (NEVA) pursuant to section 16Y of the NEVA on 20 February 2023 and 27 May 2023. The Project Assessment Conclusions Report has also been prepared pursuant to AEMO's functions under clause 4.4 of the NEVA Order of 27 May 2023.

## Disclaimer

This document or the information in it may be subsequently updated or amended.

This document does not constitute legal or business advice and should not be relied on as a substitute for obtaining detailed advice about the National Electricity Law, the National Electricity Rules or any other applicable laws, procedures or policies or investment or business decisions. The Australian Energy Market Operator Limited (AEMO) and NSW Electricity Networks Operations Pty Limited as trustee for NSW Electricity Networks Operations Trust trading as Transgrid (Transgrid have made every reasonable effort to ensure the quality of the information in this document but cannot guarantee its accuracy or completeness.

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Modelling work performed as part of preparing this document inherently requires assumptions about future behaviours and market interactions, which may result in forecasts that deviate from future conditions. There will usually be differences between estimated and actual results, because events and circumstances frequently do not occur as expected, and those differences may be material.

## Locations

Descriptions and visual representations of geographic locations in this document are indicative only. Locations will be determined after the conclusion of the RIT-T process, as required during detailed design, route assessment, planning and community engagement phase.

## Copyright



AEMO and Transgrid acknowledge the many First Nations that host Australia's electricity grids and pay respect to Elders past, present and emerging. We respect the Indigenous history of the lands in which we currently and plan to operate, being conscious of the landscape-scale impacts of the energy transition. We wish to emphasise the importance of early and continued engagement, working closely with Traditional Owners, as the grid seeks to expand.

# Contents

# Tables



# Figures

# 1 Introduction

AVP and Transgrid released a Consultation Report in February 2023 (Additional Consultation Report) which focused on the multi-criteria analysis (MCA) of additional options on the Victorian side and an updated net present value (NPV) assessment (reflecting feedback received in submissions). The Additional Consultation Report also provided responses to issues raised in the submissions received to the Project Assessment Draft Report (PADR).

AVP and Transgrid held a series of webinars and deep dives to engage with stakeholders on the Additional Consultation Report and published responses to the questions raised in those sessions[1]. Over 500 submissions were received on the Additional Consultation Report.

This report, the Project Assessment Conclusions Report (PACR): Volume 2, has been prepared to summarise all the points raised in the Additional Consultation Report submissions and explain how they have been taken into account in finalising the PACR. It also outlines engagement activities undertaken by AVP and Transgrid to date.

Consideration of the issues raised by stakeholders in relation to both the PADR and the Additional Consultation Report has played a pivotal role in the finalisation of the PACR.

Since mid-2022, AVP and Transgrid have been actively engaging with stakeholders and communities to capture feedback on the PADR, including through publishing the Additional Consultation Report in February 2023. The Additional Consultation Report provided broader consultation to that required under the regulatory investment test for transmission (RIT-T) process. The Additional Consultation Report presented a number of alternate network options on the Victorian-side of VNI West, together with the results of the MCA conducted on those options to determine delivery risks that could impact the ability to accelerate the project. The report also updated the RIT-T NPV analysis, reflecting feedback received on the PADR, and was accompanied by a standalone report summarising and responding to PADR submissions.

In the Additional Consultation Report, feedback was sought on:

- The outcomes of the assessment undertaken in the report;
- The feasibility of Option 5 (the proposed preferred option); and
- Whether the MCA has captured the salient environmental, social and engineering factors which may impact on the timely development of the project.

[1] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-consultation-report-deep-dive-session-qa.pdf?la=en and https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-consultation-report-webinars-summary-qa.pdf?la=en.

Of the 534 submissions received, approximately 96% originated from Victoria or are related to Victorian components of the project. As such, the majority of responses provided in this report are specific to the Victorian components assessed in the Additional Consultation Report.

AVP and Transgrid are grateful for the feedback received and for the open and ongoing dialogue with stakeholders and communities. Genuine and positive engagement is essential for project success, and we thank those stakeholder and community members for their contribution to the RIT-T process.

In response to points raised in consultation, minor updates have been made to the assessment since the Additional Consultation Report in response to points raised in consultation, in particular in relation to costs and the environmental, social and engineering matters of relevance.

Three key changes that have been incorporated into this PACR in response to submissions received relate to:

- Exploring a variant of Option 5 that is electrically similar, but with a different Murray River crossing point and higher hosting limits for renewable generation in the Murray River Renewable Energy Zone (REZ) (V2) – Option 5A.
- Exploring opportunities for VNI West (either option) to harness more renewable generation.
- Updating cost estimates to reflect latest market and labour trends as identified in AEMO's 2023 Transmission Cost Database, and the Victorian Government's recently announced additional landholder payments[2].

In addition, the impact on net market benefits if power flow controllers prove not to be technically feasible for Option 5, or if a more westerly route around Kerang is needed under Option 5A, has been considered through sensitivity analysis. Individual landholders and community members have also provided very detailed and valuable information that will be of great assistance in any process to narrow the identified area of interest to a corridor.

Consultation with potentially impacted landholders will now intensify. For those landholders within the corridor who may potentially host the infrastructure, a landholder liaison will be assigned to better understand how the land is used today, how impacts on that land-use can be minimised both during construction and in the long term, and what compensation would be appropriate.

## 1.1 Submissions to the PADR

Submissions to the PADR closed on 9 September 2022. In total, 26 submissions[3] were received, 22 of which have been published on AEMO's website (four submitters requested confidentiality)[4]. The Additional Consultation Report[5] analysis considered the issues raised in the submissions to the PADR, and also had regard to the February 2023 *National Electricity (Victoria) Act 2005* (NEVA) Order. This Additional Consultation Report assessed alternate options to the proposed preferred option in the PADR to expedite the development and delivery of the project and provided updated net market benefit modelling in response to feedback received.

AVP and Transgrid also published a summary of the points raised in PADR submissions and how these points have been taken into account, alongside the Additional Consultation Report. This summary was published in

[2] See https://www.premier.vic.gov.au/sites/default/files/2023-02/230224-Landholder-Payments-For-A-Farier-Renwables-Transition.pdf.

[3] Two submissions were received from one party (Energy Grid Alliance), which have been counted as one submission for this purpose.

[4] See https://aemo.com.au/initiatives/major-programs/vni-west/stakeholder-consultation.

[5] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-consultation-report---options-assessment.pdf?la=en.

response to stakeholder requests, to enable them to understand ahead of the PACR how their feedback had been reflected in the PACR assessment. This summary of PADR submissions and AVP and Transgrid's responses have not been repeated here (to avoid duplication of materials), but interested stakeholders are encouraged to review this submission summary report[6].

The remainder of this report focuses on issues raised in response to the Additional Consultation Report, and the stakeholder engagement supporting that report.

## 1.2 Wholesale market modelling

Many responses in this document refer to modelling methodology, inputs and forecast generation and capacity outlooks and gross market benefit outcomes based on market modelling conducted by EY in accordance with the CBA Guidelines for each of the credible options and scenarios selected by Transgrid and AVP. While EY took instruction from Transgrid as its client, assumptions and input data sources were independently selected by both Transgrid and AVP as joint RIT-T proponents in accordance with the CBA Guidelines.

The wholesale market modelling methodology applied to assess gross market benefits in this PACR is the same as that presented in the Additional Consultation Report and is similar to the approach used in the 2022 *Integrated System Plan* (ISP). The methodology is outlined briefly in Appendix 7 of Volume 1. The market modelling report accompanying the Additional Consultation Report provides additional detail on these modelling studies, as well as the key modelling assumptions and approach adopted more generally.

Input assumptions for the PACR modelling are the same as those described in the Additional Consultation Report market modelling report except for changes to the input assumptions listed in Table 5 of Volume 1. This report should be read in conjunction with Volume 1 and the market modelling report accompanying the Additional Consultation Report to understand the full context of input assumptions and methodology for the assessment of gross market benefits. The assessment of costs and calculation of net economic benefits and preferred option was conducted by AVP and Transgrid using the forecast gross market benefits and other inputs.

[6] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-padr-submissions.pdf?la=en.

# 2 Community and stakeholder engagement

AVP and Transgrid recognise the importance of (and are committed to) early and ongoing engagement with regional communities, Traditional Owners, and landholders to understand the social impacts associated with building this linear infrastructure.

We have engaged with a range of key stakeholders on the PADR and Additional Consultation Report, and more broadly on the project, seeking to ensure the rationale for, and benefits of the project are understood, and to seek early stakeholder input on potential social and cultural considerations.

Stakeholder feedback has been used to inform the updated assessment and findings presented in Volume 1 of this PACR. Feedback on social and environmental concerns that could not be considered as part of the RIT-T process have been retained for use in the route selection and planning phases of the project which are in the early stages of development.

The assessment identified a preferred network option that would connect EnergyConnect (New South Wales) and WRL (Victoria). The preferred network option, however, is not a route selection process that defines the location of infrastructure. The development of a project route alignment and the location of terminal stations will be determined through a rigorous route and site selection process that values and requires extensive community consultation and engagement. For landholders potentially asked to host this infrastructure, dedicated landholder liaisons will be assigned to work closely with the landholder to minimise impacts, including during construction, and to agree on appropriate compensation where necessary. AVP and Transgrid recognise the importance of (and are committed to) early and ongoing engagement with regional communities, Traditional Owners, and landholders to understand the social impacts associated with building this linear infrastructure. The final route and associated infrastructure would be subject to the requirements of relevant planning and environmental approval processes.

## 2.1 Feedback received on engagement to date

Many submissions highlighted that consultation with potentially impacted communities and landholders was insufficient in both length and quality. Notes of concern included:

- As the preferred option has changed, potentially impacted communities were not aware of the project until February 2023.
- The six-week consultation period did not provide sufficient time for potentially impacted stakeholders to make an informed submission.
- The level of information provided was not sufficient to make informed submissions.
- The information provided was not easily understood by communities and potentially impacted landowners.
- The quality of engagement prior to the NEVA order was below best practice, specifically regarding timeframes for engagement.

### Response

AVP and Transgrid are dedicated to continuously improving our engagement practices. In planning our engagement for VNI West, we have been guided by the following points, identified as crucial in the development of community and stakeholder engagement plans for the VNI West project:

- A commitment to early engagement, listening to and communicating with stakeholders with honesty and integrity to understand their views and concerns, and ensuring the project team is equipped to have these conversations.
- Clearly communicating (in a timely way) the engagement process and opportunities to stakeholders including landholders and communities – including how and when to provide feedback, and how their feedback will be used.
- Ensuring all interested stakeholders and communities can easily access project information through a variety of channels including websites, email and other physical and digital platforms, and that any information can be easily understood.
- Providing ample notice of consultation or engagement opportunities, and ensuring educational materials are available to help increase energy literacy, to facilitate meaningful participation.
- Correcting misunderstandings to help alleviate undue anxiety.
- Using learnings from early engagement processes to inform future engagement preferences.

AVP and Transgrid would like to acknowledge the challenges and frustrations faced by communities who may be impacted by the VNI West project. We understand the prospect of hosting transmission can cause significant stress for community members and landholders, and this level of stress may be heightened during the early stages of the project due to the level of uncertainty.

At this early stage in the project, many items of concern for community members are unknown, for example the exact location of the infrastructure, specific details on compensation for landowners, opportunities for broader community benefits and certainty of restrictions within easements. We appreciate the level of anxiety due to these uncertainties and aim to work closely with impacted stakeholders to begin answering these questions in a timely and respectful manner.

AVP and Transgrid have been listening to the level of criticism and feedback from communities regarding the engagement process to date and aim to continually improve our engagement and consultation process as the project moves forward. We greatly appreciate that community members have taken the time to engage with us and provide detailed feedback and look forward to building strong relationships within these communities in the future.

## 2.2 Approach to community and stakeholder engagement

Community and landholders provide critical input to the planning and delivery of major transmission infrastructure projects. AVP and Transgrid acknowledge that, while the community is generally supportive of renewables and a transition away from coal at lowest cost for all consumers, stakeholders who live closer to where transmission lines and associated infrastructure may be constructed are likely to have different perspectives or concerns about the potential impacts and may not feel that the broader state-wide benefits outweigh the local impacts. We understand the prospect of hosting this infrastructure has caused stress and anxiety within potentially impacted

communities. We are currently finalising options for providing professional health and well-being support for impacted individuals and will provide more information on this soon.

In the meantime, we encourage anyone experiencing challenges to their own, a friend or a family member's mental health and wellbeing to contact one of the independent support providers listed below for free and confidential advice:

- Beyond Blue – https://www.beyondblue.org.au and 1300 22 4636.
- LifeLine – https://www.lifeline.org.au/ and 13 11 14.

AVP and Transgrid are committed to early and ongoing engagement working with local communities to understand how they want to be engaged. Our goal is to work with local communities to build trust and positive relationships, and to understand community values as they relate to project infrastructure, so that we can best minimise the social, environmental and cultural impacts of our projects and operations.

We also seek to ensure perspectives are acknowledged and appropriately considered and responded to in a respectful, fair and equitable way. This will enable people living and working nearby to have the opportunity to participate in shaping an outcome that is socially acceptable for regional communities while meeting consumer needs.

Our approach to community and stakeholder engagement is based on the values of trust, integrity, empathy and transparency and guided by the International Association of Public Participation (IAP2) *Spectrum of Public Participation* – an internationally recognised tool for planning public participation in major projects. These values are fundamental to building understanding and the foundation for support.

## Industry guidance

Our approach also takes into consideration guidance from industry, including:

- The Clean Energy Council's *Community Engagement Guidelines for Building Powerlines*[7].
- The Energy Charter's *Better Practice Landholder and Community Engagement Guide*.
- The Australian Energy Regulator's (AER's) *Guidance Note: Regulation of actionable ISP projects*[8].

Based on this guidance, there is a clear expectation for transmission network service providers (TNSPs) to carry out high quality, early engagement with local community and consumer representatives, which may result in:

- Improved stakeholder and community understanding of the project's costs and risks.
- Opportunities for the project solution to be designed with input from the local communities impacted by the proposed major transmission project.
- TNSPs having a better understanding of community concerns about route selection, which in turn would help manage the associated risks.
- Opportunities for the TNSP to address and manage concerns raised by stakeholders.

[7] December 2018, at https://www.cleanenergycouncil.org.au/advocacy-initiatives/community-engagement/community-engagement-guidelines-for-building-powerlines-for-renewable-energy-developments.

[8] 2021, at https://www.aer.gov.au/system/files/AER%20-%20Final%20Guidance%20note%20-%20Regulation%20of%20actionable%20ISP%20projects%20-%20March%202021%20-%20FINAL%20FOR%20PUBLICATION%2812129318.1%29.pdf.

The project will also draw on the relevant recommendations contained in the Australian Energy Infrastructure Commissioner's 2021 Annual Report[9] (and subsequent reports) in helping guide the project's approach to the implementation of landholder community relations programs.

### 2.2.1 Early engagement

As part of AVP and Transgrid's commitment to engage stakeholders from the very early stages of project development, we engaged with a range of stakeholders before the publication of the PACR – including consumer groups and community representatives – to provide information about the project and encourage participation in the VNI West RIT-T process. In the past, engagement with communities and landholders typically did not occur until after the RIT-T was finalised and the business case for the project was confirmed. Community engagement has occurred much earlier for VNI West, to raise project awareness and gather valuable input that may influence project design and costs and help minimise impacts.

The specific objectives of this early engagement were to:

- Help stakeholders understand the need for, and benefits of, VNI West and the steps involved in project development.
- Develop stakeholder engagement by seeking early feedback and guidance on the proposed engagement approach.
- Deepen the project team's timely knowledge and understanding of the VNI West project area, in particular environmental, community and local industry considerations, through early engagement with representative groups.
- Promote meaningful and timely stakeholder input into the project's cost-benefit (RIT-T) assessment while gaining an understanding of key stakeholder issues that may not sit within the RIT-T framework.

This early engagement with key stakeholders in Victoria and New South Wales will continue to be informed by meetings and briefings with MPs and local councils, Traditional Owner representatives, consumer and advisory forums, stakeholder roundtables, community events and webinars, to determine corridor optimisation and ultimate route selection.

While the RIT-T is a technical and economic cost benefit test focused on delivering net market benefits, AVP and Transgrid welcomed stakeholder feedback on any project-related matters to deepen understanding of the project areas and identify engagement opportunities moving forward.

Feedback from early engagement activities, as well as input received via submissions during the consultation period, were used to help inform this PACR. AVP and Transgrid recognise the desire and right of stakeholders to provide insights and perspectives on the project, irrespective of the RIT-T scope. Such matters, including environmental, land use, safety, amenity, social, cultural and community matters, will be discussed with more certainty through consultation on route selection, project development and planning approvals.

With this PACR now published, project planning and development activity will commence, as a project justified through the RIT-T process. This will include an extensive engagement program as part of the route determination process.

[9] At https://www.aeic.gov.au/sites/default/files/documents/2022-07/aeic-2021-Annual-Report.pdf.

A new company called Transmission Company Victoria (TCV) will undertake the planning and engagement work in Victoria in this next stage. As AVP is the Victorian planner and will not physically construct or own the transmission lines, it established TCV to make sure that commitments made in the early stages are captured and honoured across the life of the project. TCV will provide early project updates and will work with the community on this important transmission line.

### 2.2.2 Traditional Owner engagement

TCV and Transgrid are committed to building strong relationships with Traditional Owner representative groups to identify and understand potential project opportunities or constraints. We have sought to contact all potentially impacted Traditional Owner groups and we greatly appreciate the time that Traditional Owners have taken to engage with the project team. We look forward to continuing to build strong relationships to inform the project as it progresses.

The next phase of Traditional Owner consultations will focus on developing our understanding of each group's Country to help ensure the proposed alignment is sympathetic to both tangible and intangible cultural heritage. This will involve further consultation as the route is further refined.

### 2.2.3 Next steps

TCV and Transgrid are committed to ongoing consultation and engagement throughout project development and delivery. The focus of engagement activity in 2023 will be on a methodology that narrows a broad project study area down to a study corridor and then a proposed route. The route refinement process will also assist in beginning engagement to facilitate environmental and cultural surveys. This would include:

- Regionally focused engagement with communities, Traditional Owners, and stakeholders, to understand inherent values, opportunities and constraints as inputs to a corridor definition process.
- Establishing Community Reference Group/s, to collaborate with the project teams, providing local information and insights to further develop and refine the study corridor.
- Undertaking direct engagement with potentially affected landholders, with dedicated landholder liaisons, to identify the best route alignment and optimise the route based on localised property constraints.
- Engaging with landholders to agree on access arrangements that minimise disruption prior to commencing field studies to inform the environmental assessment.

More detail on the consultation and engagement activities will be provided – through direct correspondence and a broad regional communications program – detailing how and when stakeholders, communities and landholders can input into the route selection and refinement process.

## 2.3 Land access, easements and compensation

This section provides a high-level outline of:

- How land access, both during early land investigations and during construction and operation of the electricity infrastructure, will be approached.
- How the associated land access and easement compensation valuation and payments will proceed.

## Land access

To proceed with the project, project-related due diligence activities will need to be undertaken throughout the proposed route corridor. These activities may include undertaking surveys for cultural heritage, environmental matters such as flora or fauna investigations, field surveys and general site investigations. The purpose of these activities is to:

- Identify potential impacts associated with the construction and operation of the VNI West project.
- Identify constraints and opportunities identified from these surveys and investigations that will help inform and refine route options within the investigation corridor.
- Identify the ability to avoid, minimise or offset potential impacts to the VNI West project.

TCV's and Transgrid's preferred approach to gaining access to properties for these activities will be through voluntary land access agreements whereby consent to access landholder property is obtained.

Each land access agreement will outline certain land access requirements in relation to the particular parcel of land, outline minimum work standards on site, identification of effective complaint handling and dispute resolution procedures, outlining details around access protocols, biosecurity requirements and consideration of various site-specific requirements a landholder may have. The agreement will also outline initial compensation payments payable in respect of these initial diligence activities.

Landholders do not have to enter into a land access agreement – the process is voluntary.

If voluntary agreement cannot be reached, electricity companies have compulsory access powers under section 93 of the *Electricity Industry Act 2000* (Vic) in Victoria and section 54 of the *Electricity Supply Act 1995* (NSW) in New South Wales.

If these statutory powers are used for access, TCV and Transgrid will continue to meet the relevant regulatory requirements that are applicable for such access.

Landholders in Victoria should note that the Essential Services Commission recently developed the 'Electricity Transmission Company Land Access Statement of Expectations'[10] (SoE). This SoE is an interim measure, pending the development of a broader enforceable Code of Practice for land access, expected in 2023, and it:

- Seeks to achieve a balance between the statutory right to access private lands and the rights of those affected by that exercise of that power.
- Strives to promote effective engagement between landholders and electricity transmission companies, facilitating land access that is fair and transparent which takes into account the interests of landholders.
- Applies to all electricity transmission companies undertaking major greenfield projects in Victoria, such as VNI West.
- Does not relate to decisions regarding the route of transmission projects or decisions about whether to proceed with these projects.

TCV and Transgrid will work with landholders as part of this process and detailed design of VNI West to identify opportunities to minimise impacts on existing land use where possible.

[10] See https://www.esc.vic.gov.au/electricity-and-gas/inquiries-studies-and-reviews/electricity-transmission-company-land-access-statement-expectations.

## Easements

If transmission infrastructure needs to be located on land, TCV and Transgrid may look to secure an easement over that land. Transmission corridor easements typically range from 70-100 metres wide for 500 kilovolt (kV) transmission lines. The easement width and location help ensure public safety and provide access to infrastructure to maintain a reliable transmission network.

### Option for Easement agreements

The strong preference of both TCV and Transgrid is to secure the required easements by entering into voluntary Option for Easement agreements with landholders.

An Option for Easement is a legally binding agreement (in the form of a deed) between the parties that grants one party the right to acquire an interest from the landholder on agreed terms (including what compensation and payments are payable) within a set period of time. The landholder continues to have ownership and use of the easement land, subject to the easement terms.

Prior to entering into an Option for Easement, landholders will receive an Option for Easement proposal which will have been informed by the relevant due diligence site investigations outlined above, discussions with landholders, and through the easement compensation process outlined below.

### Easement compensation

A qualified valuer would undertake all compensation valuations, ensuring that the compensation process is undertaken fairly and considers all the impacts the easement may have on the property. Landholders will have opportunities to discuss the determined impacts with the valuer, as well as to obtain independent legal and valuation advice, to assist in the determination of the compensation payable.

Where negotiated agreement cannot be reached, the required easement may be compulsorily acquired with the amount of compensation received by the landholder. A landholder will still be able to provide evidence of loss in this process to inform the compensation payable.

Whether the easement is acquired through a voluntary agreement or by compulsory acquisition, the principles of compensation from the relevant legislation will be followed:

- In New South Wales, Transgrid is required to comply with the *Land Acquisition (Just Terms Compensation) Act* 1991.
- In Victoria, compliance with the *Electricity Industry Act 2000* (Vic), *Land Acquisition and Compensation Act 1986* (Vic) and *Valuation of Land Act 1960* (Vic) is required.

In addition to these compensation principles, both the New South Wales Government and Victorian Government offer payments to landholders who host transmission infrastructure[11].

### Information packs

Information packs are currently being developed to walk landholders through how compensation will work (in addition to land access and easements). This information will be available on the VNI West website prior to landholder discussions commencing.

[11] See https://www.energyco.nsw.gov.au/community/strategic-benefit-payments-scheme and https://www.energy.vic.gov.au/renewable-energy/transmission-and-grid-upgrades.

### Easement permitted use

A common concern of landholders, aside from compensation, is what activities will be permitted in the easement area. While there are some restrictions on the use of the land within an easement for overhead transmission lines, there are numerous permitted activities (some with conditions) which may be included in the easement terms, such as grazing and agriculture, irrigation equipment (for example, centre pivot), fencing, construction, vehicles and water storage dams. Activities such as aerial crop spraying would not be permitted.

This is something that TCV and Transgrid will work through with landholders to help them understand their rights and obligations in the easement areas, once a corridor has been selected. There will also be opportunities for landholders to influence route design (for example, height of towers, movement of towers outside of irrigation areas, and micro-siting along boundary fences) to minimise impacts on land.

## 2.4 Benefits sharing

The current RIT-T process is relatively limited in its ability to explore benefit sharing options. TCV and Transgrid are supportive of the current efforts being undertaken by a number of bodies to find new ways to better share the benefits of projects such as VNI West with the communities that they impact. We recognise that there are opportunities for co-existence that enable better outcomes for local communities by understanding their needs and working collaboratively with them to minimise impacts and seek mutual value opportunities.

TCV and Transgrid recognise the importance of identifying and sharing benefits within impacted communities hosting transmission. As the project progresses through the planning process, opportunities to identify community benefits sharing will be identified and designed in collaboration with key stakeholders and community members. We are committed to working with local communities and landholders to identify existing and new opportunities for benefit sharing that are positive, rewarding and beneficial for landholders and communities. This will form an important part of the ongoing engagement with stakeholder reference groups, communities and landholders as we seek local input and discussion on these opportunities.

Through the proposed Victorian Transmission Investment Framework (VTIF) currently under consideration[12], VicGrid is aiming to deliver social and economic benefits in ways that are fair, meaningful and participatory. This includes '*opportunities for earlier and deeper engagement with local communities to help better manage impacts and to make the most of regional development opportunities for host communities*'[13]. Although VNI West will not be delivered under the VTIF, TCV will work with VicGrid to explore ways for the principles detailed in the framework to be incorporated into the various phases of the project where possible.

In New South Wales, Transgrid will extend its Community Investment and Benefits program as well as looking for innovative ways to create economic and social benefits to local communities.

In Victoria, TCV will engage with local stakeholders to develop community benefit initiatives which meet local needs and deliver long-lasting benefits in the region. This will include support for existing programs in the project area along with new opportunities identified through stakeholder consultation.

TCV and Transgrid also support the Energy Charter's '*Better practice social licence guideline*' which provides guidance to mitigate negative impacts and prioritise shared value through the energy transition.

[12] Public consultation closed on 15 August 2022 and VicGrid is currently considering feedback to inform a final decision on VTIF; see https://engage.vic.gov.au/victorian-transmission-investment-framework.

[13] See https://engage.vic.gov.au/victorian-transmission-investment-framework.

# 3 Additional Consultation Report engagement

The following section outlines consultation undertaken between 23 February and 5 April 2023 in relation to the Additional Consultation Report, including dates, tools and methods used, and method of distribution and/or promotion.

## 3.1 Engagement promotion

Consultation with key stakeholders was promoted through direct contact, such as emails or phone calls, with relevant representatives. Broader community consultation and webinars were promoted through newspaper advertising, social media and media releases (including a ministerial media release). AVP also made direct contact with each Victorian local government area (LGA) potentially impacted by Option 5 to request assistance in the promotion of engagement.

**Figure 1 Additional Consultation Report engagement promotion**


Engagement opportunities were advertised in the following newspapers between 24 February to 16 March 2023.

| | | |
|---|---|---|
| Bendigo Advertiser | Koondrook & Barham Bridge | The Land |
| Deniliquin Pastoral Times | Maryborough Advertiser | The Loddon Herald |
| Echuca Riverine Herald | North Central News (St Arnaud) | The Weekly Times |
| Finely Southern Riverina News | Stawell Times | |
| Kerang Gannawarra Times | Stock and Land | |

## 3.2 Engagement materials

To support engagement on the Additional Consultation Report, AVP and Transgrid developed the materials in Table 1 and Figure 2.

**Table 1 Community consultation materials**

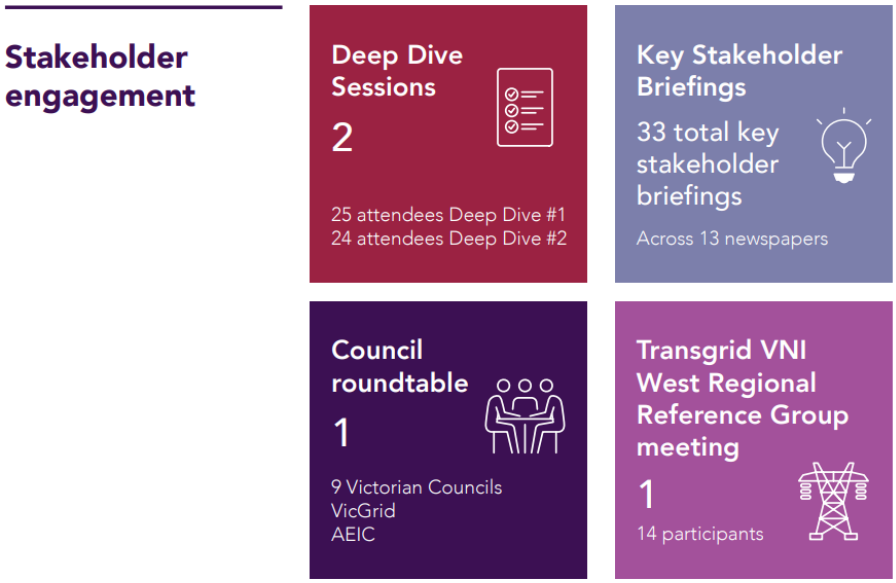
| Item | Location |
|---|---|
| **Project Update 6** | https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/project-update-6.pdf?la=en&hash=F88E8C0420774331165F07DDCFA8808B |
| **Consultation Report Summary** | https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/consultation-report-summary_230224_web.pdf?la=en&hash=77A756C82B774FCAD7AFE1D999DB75A9 |
| **Webinar Q&A** | https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-consultation-report-webinars-summary-qa.pdf?la=en |
| **Deep dive Q&A** | https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-consultation-report-deep-dive-session-qa.pdf?la=en |
| **Community drop in materials: contact cards, maps, banners** | N/A |
| **Fast Facts** | |
| **Transmission lines** | https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/useful-links/fast-facts---transmission-lines.pdf?la=en |
| **Terminal stations** | https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/useful-links/fast-facts---terminal-stations.pdf?la=en |
| **Key roles** | https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/useful-links/fast-facts---key-roles-and-organisations.pdf?la=en |
| **Farming and transmission** | https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/useful-links/fast-facts---farming-and-transmission.pdf?la=en |
| **Benefits of Option 5** | https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/useful-links/fact-sheets_benefits-of-option-5.pdf?la=en |

**Figure 2 Community consultation materials**

## 3.3 Key stakeholder engagement

Key stakeholder engagement played a critical role in seeking feedback on the Consultation Report. Figure 3 presents an overview of key stakeholder consultation.

**Figure 3 Key stakeholder engagement overview**




The following key stakeholders were engaged for briefings in person or online over the course of engagement.

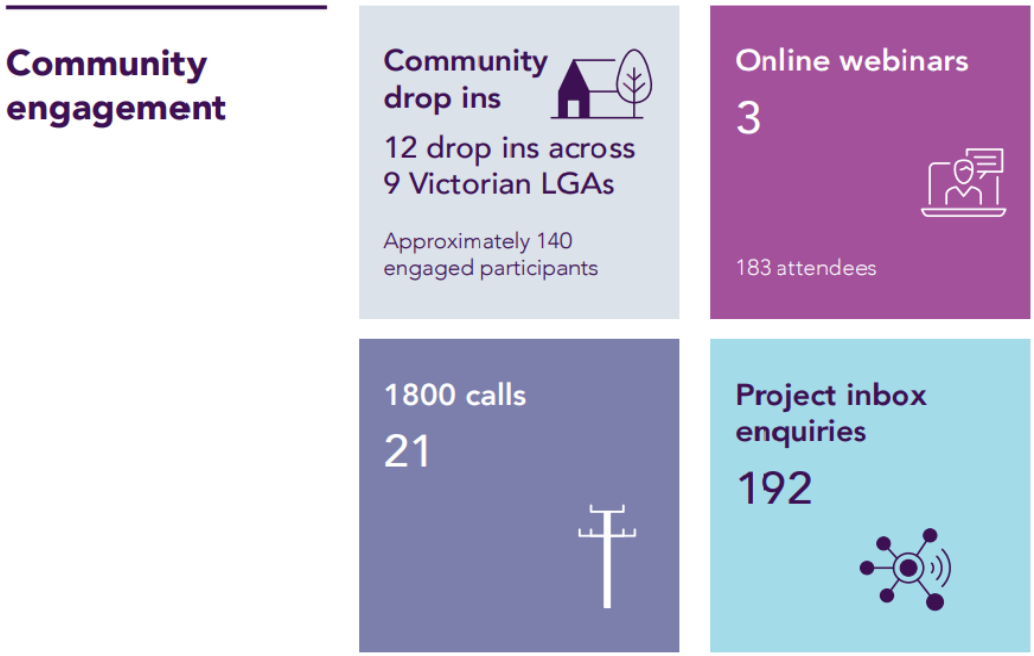
| | | |
|---|---|---|
| Acciona | Hepburn Shire Council | NSW Minister for Skills and Training, and Science, Innovation and Technology |
| Australian Energy Infrastructure & Commissioner (AEIC) | Loddon Shire Council | Pyrenees Shire Council |
| Australian Energy Regulator | Mt Alexander Shire Council | Re-Alliance |
| Bendigo Shire Council | Murray Group of Councils | Regional Development Australia – Murray |
| Buloke Shire Council | Murray Irrigation | Ricegrowers Association of Australia |
| Campaspe Shire Council | Murray River Council | State Member for Albury |
| Central Goldfield Shire Council | Murrumbidgee Council | VicGrid |
| Edward River Council | Nexa Advisory | Victorian Farmers Federation |
| Environment Victoria | Northern Grampians Shire Council | Western Murray Land Improvement Group |
| Forestry Corporation of NSW | NSW Department of Planning and Environment | Yanco Creek and Tributaries Advisory Council Inc |
| Ganawarra Shire Council | NSW Farmers Association | |
| GNET | NSW Local Land Services | |

## 3.4 Community engagement

Engagement with potentially impacted communities was undertaken to raise project awareness and promote opportunities to provide feedback. Figure 4 presents an overview of community consultation activities and reach.

As part of the webinar and deep dive sessions AVP and Transgrid held in relation to the Additional Consultation Report, a number of questions were raised by stakeholders, both prior to, during and following the sessions. A summary of the questions and responses has been published[14].

**Figure 4 ACR community engagement overview**




## 3.5 Traditional Owner engagement

AVP and Transgrid have initiated contact with the following Traditional Owner representative groups during the consultation period, and commenced early engagement where possible.

- Barapa Land and Water Council
- Barengi Gadjin Aboriginal Corporation
- Dja Dja Wurrung (Djarra)
- Eastern Maar
- Yorta Yorta
- Deniliquin Local Aboriginal Land Council
- Cummeragunja Local Aboriginal Land Council
- Yarkuwa Indigenous Knowledge Centre Aboriginal Corporation
- Moama Local Aboriginal Land Council.

[14] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-consultation-report-deep-dive-session-qa.pdf?la=en and https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-consultation-report-webinars-summary-qa.pdf?la=en.

## 3.6 Overview of submissions to the Additional Consultation Report

Submissions to the Additional Consultation Report closed on 5 April 2023[15] and, in total, 533 submissions were received, 519 of which have been published on AEMO's website (14 submitters requested confidentiality).[16] A large number of submissions (491) were received from concerned landowners and other community members. The remainder were received from other interested stakeholders, including councils, community organisations, environmental groups or consumer representatives.

Table 2 summarises the 40 non-confidential organisational submitters to the Additional Consultation Report.

**Table 2 Public submissions to the Additional Consultation Report**

| | |
|---|---|
| AusNet Services | Loddon Shire Council |
| Australian Energy Infrastructure Commissioner (AEIC) | Moorabool Shire Council |
| BirdLife Australia | MP for Ballarat, Catherine King |
| Bush Heritage Australia | Murray River Group of Councils |
| Central Victorian Greenhouse Alliance | Mysia Recreation Reserve |
| Charlton Forum Inc | Northern Grampians Shire Council |
| Charlton Neighbourhood House | Pyrenees Shire Council |
| City of Greater Bendigo | Queensland Energy Users Network |
| Clean Energy Investor Group | RWE Renewables |
| Coonoer Bridge Community Group | Save Our Surrounds |
| Donald Charlton Parish Council | Snowy Hydro |
| Energy Grid Alliance | The Wallaloo and Gre Gre District Alliance Group |
| Energy Users Association of Australia | Trust For Nature |
| ENGIE | VHM |
| Goulburn-Murray Water | Victorian Farmers Federation |
| Hepburn Shire Council | Virya Energy |
| Jacobs | Wimmera Development Association |

The focus of engagement for the Additional Consultation Report was on:

- The outcomes of the assessment undertaken in the report;
- The feasibility of Option 5 (the proposed preferred option); and
- Whether the MCA captured the salient environmental, social and engineering factors which may impact on the timely development of the project.

The issues raised in submissions to the Additional Consultation Report in relation to these three areas, with responses, are discussed in Section 4.

Stakeholder comments on the Additional Consultation Report also raised a number of other topics, including:

- Social and land use considerations (Section 5).

[15] A small number of submitters requested, and were granted, an extension to the submission date to 19 April 2023.

[16] See https://aemo.com.au/initiatives/major-programs/victoria-to-new-south-wales-interconnector-west-regulatory-investment-test-for-transmission/stakeholder-consultation.

- Concerns around under-estimation of project costs (Section 6).
- Querying the project need, benefits, and impacts (Section 7).
- Other matters (Section 8):
  - Interactions with other National Electricity Market (NEM) projects.
  - Alignment with government policies and legislation.
  - Concerns around process, transparency accountability and engagement.
  - Undergrounding.

Stakeholders also raised important issues relating to visual amenity, land access and values, bushfire risks, flood risks and continued community engagement. Although many of these issues sit outside the RIT-T process, AVP and Transgrid are committed to addressing these issues with stakeholders as information becomes available, as part of the further engagement activities following the PACR.

Approximately 96% of submissions received originated from Victoria or relate to Victorian components of the project. The responses provided in this report reflect the origin and scope of submissions received and therefore the majority of responses provided are specific to the Victorian components of the project.

# 4 Matters under consultation

Through the Additional Consultation Report, AVP and Transgrid were seeking feedback on:

- The outcomes of the assessment undertaken in that report;
- The feasibility of Option 5; and
- Whether the MCA captured the salient environmental, social and engineering factors which may impact on the timely development of the project .

This feedback is discussed below, along with how this feedback has been taken into account in recommending the preferred option.

## 4.1 The outcomes of the assessment undertaken in this report

AVP and Transgrid greatly value the time and effort invested in the 533 submissions received from landholders and organisations providing their views on the outcome of the assessment presented in the Additional Consultation Report.

It is acknowledged that the proposal has engendered significant concern for some individuals and communities potentially affected by the broad Option 5 area of interest, in particular the regions surrounding St Arnaud, and that there are strong calls for further consultation, detailed impact assessment and clarity around how VNI West could affect agricultural operations.

We also note the level of organisational support for Option 5 and for the positive intent shown in the inclusion of social, environmental and land-use considerations in the Additional Consultation Report through the application of the MCA.

This section outlines the feedback received on Option 5 and how feedback has influenced the selection of Option 5A as the preferred option.

### 4.1.1 Mixed support for Option 5

#### Summary of feedback

| Item of feedback | Submitters |
|---|---|
| Many organisations noted support for Option 5. Items of support included:<br>• Ensuring 500 kV capacity along the whole route.<br>• The application of the MCA to mitigate impacts to social, cultural and environmental constraints.<br>• Option 5's ability to mitigate impacts to landholders by passing through properties of larger land size, thereby enabling greater flexibility for transmission and generation infrastructure to be located in a way to avoid or minimise impacts to landholders' existing operations and land use.<br>• Option 5 is expected to intersect fewer environmental and culturally sensitive areas.<br>Some stakeholders noted cautious support on the premise of further route refinement and more detailed engagement. | Wimmera Development Association*<br>Snowy Hydro<br>CVGA<br>Pyrenees Shire Council<br>Catherine King<br>Hepburn Shire Council<br>AusNet<br>RWE Renewables |

| Item of feedback | Submitters |
|---|---|
| Many submissions provided support for the ability of Option 5 to unlock renewable generation in Western Victoria.<br>Wimmera Development Association noted that existing capacity constraints in Victoria's energy grid mean that Victoria's transition to renewable energy is being constricted and increasing transmission grid capacity into the WSM region is the only way to realise the maximum potential benefit from renewable energy generation. | Wimmera Development Association<br>RWE Renewables<br>AusNet |
| Many submissions from individuals noted opposition to Option 5 specifically, particularly due to impacts to farmland, cultural heritage and community members 'ways of life'. | Numerous community and landowner submissions<br>Murray River Group of Councils |
| Some submitters argued that Option 3A provides more net market value:<br>• On a $/MW renewable generation basis, or<br>• Because costs of Option 5 are underestimated (see Section 6 for response to this). | VPEC and Bartlett |

* The Wimmera Development Association submission included 15 accompanying letters of support from industry, businesses and communities in the Wimmera Southern Mallee region.

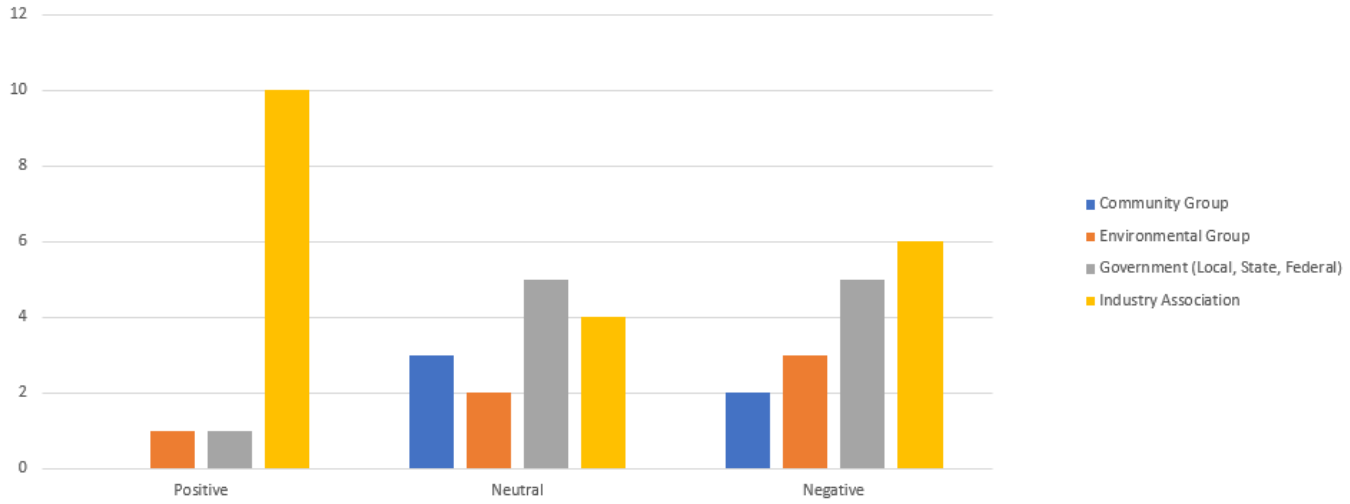
## Feedback insights and analysis

Submissions to the Additional Consultation Report highlighted different levels of support or opposition between submissions from organisations and individuals. Please note this data does include analysis of confidential submissions (14 in total). Confidential submissions have been taken into account and summarised to the extent possible while still protecting the confidentiality of the submission.

### Organisations

The reception to Option 5 by organisations, including community and environmental groups, government agencies, industry associations, and energy market participants was quite balanced, with a little over half either neutral or supportive of the option.

**Figure 5 Organisational support for Option 5**




Supportive commentary from organisations was focused on:

- The westerly expansion of the 500 kV network and associated support for renewable energy development in the central western regions of Victoria.

  - Wimmera Development Association noted that existing capacity constraints in Victoria's energy grid mean that Victoria's transition to renewable energy is being constricted and increasing transmission grid capacity into the Wimmera Southern Mallee region is the only way to realise the maximum potential benefit from renewable energy generation.
- The application of the MCA to incorporate social, cultural and environmental considerations into the assessment.
- The avoidance of social and land use impacts near Ballarat resulting from a proposed terminal station at Mount Prospect.
- Option 5's ability to mitigate impacts to landholders by passing through properties of larger land size, thereby enabling greater flexibility for transmission and generation infrastructure to be located in a way to avoid or minimise impacts to landholders' existing operations and land use.
- Option 5's ability to intersect fewer environmental and culturally sensitive areas.

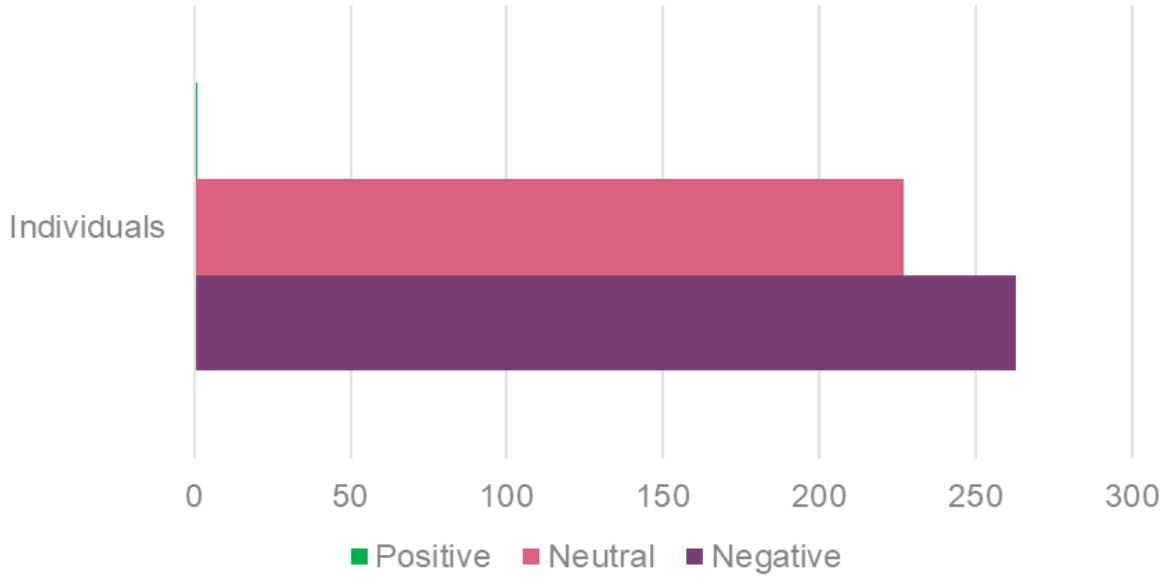
Non-supportive commentary from organisations was focused on:

- Disruption to agricultural operations and economic impacts from lost productivity (see Section 5).
- Concerns around cost estimation (see Section 6).
- The need for the project (see Section 7).
- Reduced support for renewable energy development in northwest Victoria, particularly the Murray River REZ.
- Limitations in the MCA methodology.
- Concerns around the proposed Murray River crossing location near Echuca.

### Individuals

The response to Option 5 in submissions by individuals, predominantly landholders affected by the area of interest and the Western Renewables Link project, was almost entirely neutral or negative with little support provided.

**Figure 6 Individuals' support for Option 5**

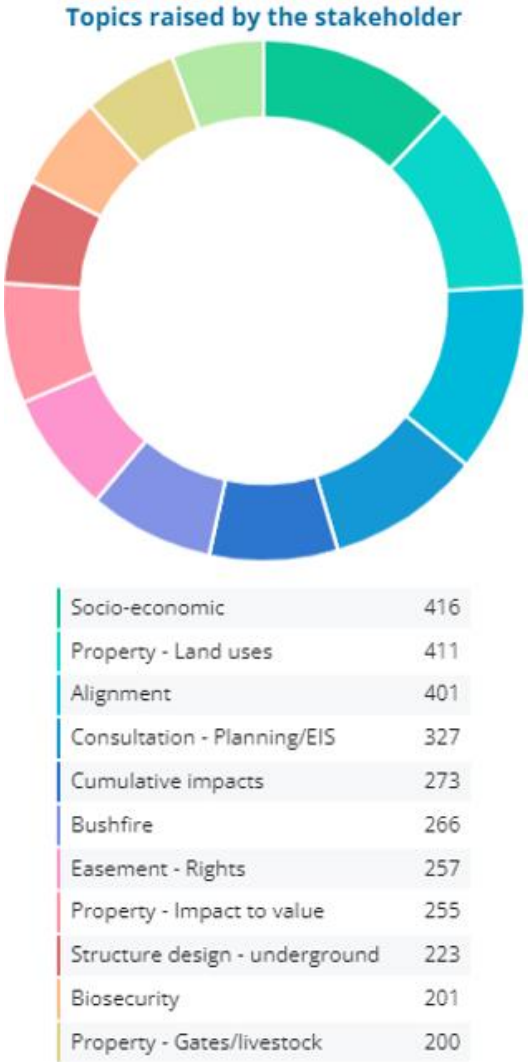


The one individual supportive of Option 5 indicated support for VNI West and a preference for Option 5 in comparison to other options.

Non-supportive commentary was focused on:

- Disruption to agricultural operations and economic impacts from lost productivity (see Section 5.1).
- The potential route alignment of Option 5.
- Concerns around the time available for consultation.
- Bushfire risk (see Section 5.2).
- A preference for locating the transmission lines underground (see Section 8.5).

**Figure 7 Primary concerns raised in individual submissions opposed to Option 5**




Note: Over 1,400 additional submissions were made that raised other concerns outside of these primary themes.

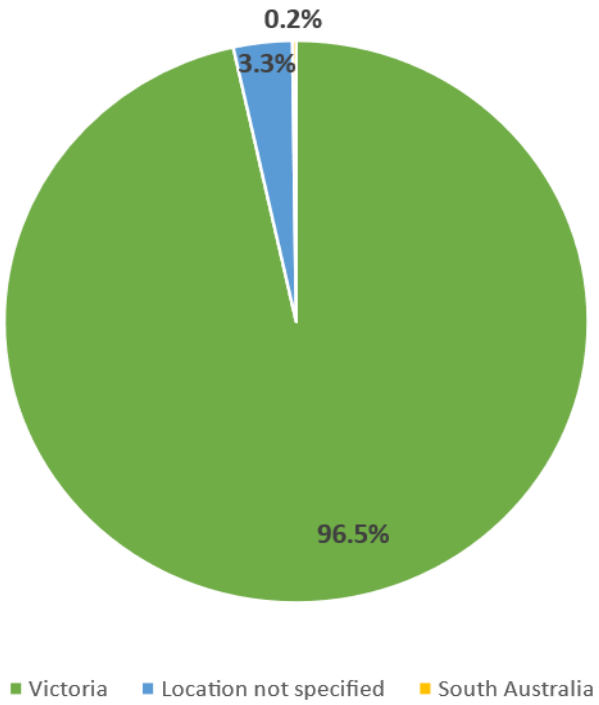
While Option 5 attracted significant criticism and opposition in individual submissions, it is worth noting that only four submissions, including two submissions from individuals, were supportive of Option 1, and only two

submissions, including one submission from an individual, were supportive of Option 3A. In parallel, 13 submissions stated support for Option 5, including 12 organisations.

Just over 50% (274) of submissions called for the project to be undergrounded. The majority of these submissions stemmed from individual landholders in the agricultural regions around St Arnaud, Gre Gre, and Charlton, and between Ballarat and Sydenham at the eastern end of the WRL route. These submissions typically advocated for new lines to be installed underground alongside transport or infrastructure corridors.

Figure 8 summarises the location of submissions. Please see Appendix A1 for a breakdown of individual submissions by location.

**Figure 8 Location of individual submissions**




## Response

AVP and Transgrid appreciate there was a mixed response to Option 5. To address feedback raised from submissions, we have explored an alternative to Option 5 (Option 5A) that is electrically similar, but with an alternate Murray River crossing point that avoids Echuca and higher hosting limits for renewable generation in the Murray River REZ (V2).

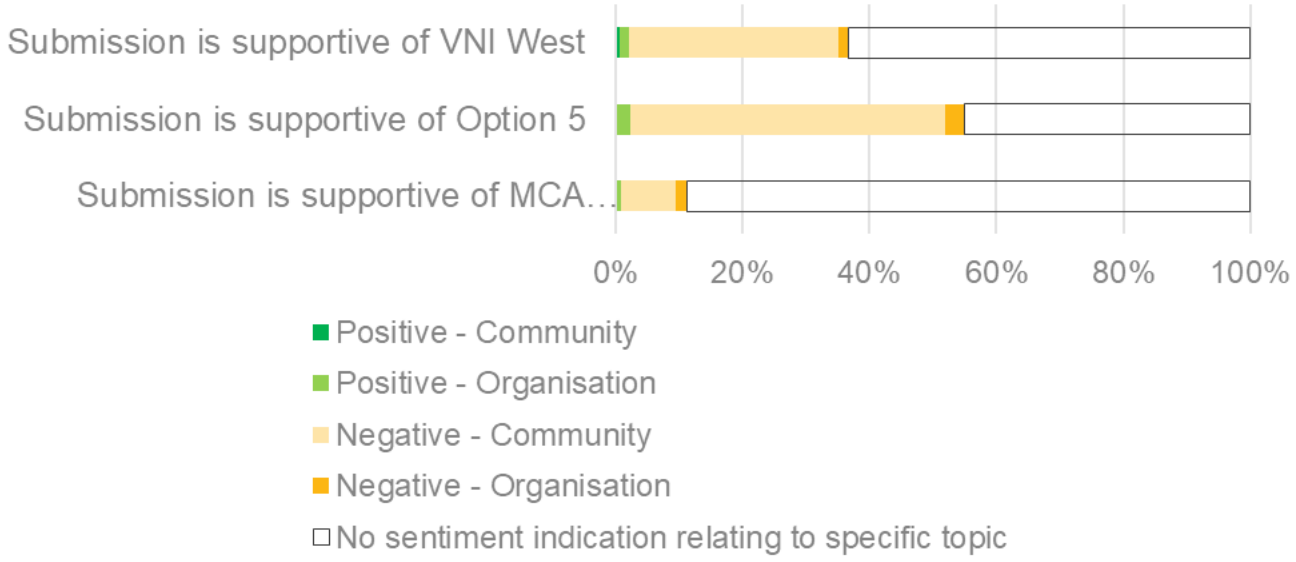
Please refer to PACR: Volume 1 for the outcomes of this assessment.

In preparing this PACR, AVP and Transgrid aimed to consider feedback provided in submissions to the extent feasible, to ensure a balanced outcome that delivers the greatest net market benefit while minimising impacts on communities where possible. We greatly appreciate the efforts of individuals and groups in responding to the Additional Consultation Report and will continue engaging within communities as the project progresses to identify opportunities to minimise impact and produce shared benefits.

### 4.1.2 Critique of MCA method and criteria

The MCA (prepared for the Victorian side only) received positive support from multiple organisations and individuals in giving greater consideration to social, cultural and environmental factors which may influence timely project delivery. However, submissions also critiqued the MCA findings.

**Figure 9 Support of MCA, Option 5 and VNI West**




## Summary of feedback

| Item of feedback | Submitters |
|---|---|
| Support for undertaking an MCA and consideration of social, cultural and environmental factors which may influence timely project delivery. | CVGA<br>AusNet |
| The MCA findings are flawed. In particular:<br>• A desktop study cannot accurately ascertain the social constraints, and this should be informed by broad engagement.<br>• The MCA did not consider impacts to agricultural outputs due to impacts to productive farmland.<br>• Impacts to the mental health of communities were not considered as a social constraint.<br>• Option 5 has been met with community opposition since its announcement, which calls into question the accuracy of the findings of the MCA as to whether the option will provide greater social license.<br>• The MCA did not provide a justification for the ratings provided.<br>• Economic factors should be given less weighting to appropriately consider social, cultural and environmental factors in the decision-making process.<br>• The economic assessment should take wider regional economic growth plans and regional development strategic directions into consideration.<br>• Modelling should account for the true land value impacts on landholders and communities.<br>• No modelling has been undertaken on the impact on agriculture or tourism for the areas impacted by transmission infrastructure, nor modelling disclosing the carbon footprint of both the WRL and VNI-West projects. | Numerous community and landowner submissions<br>Murray River Group of Councils<br>EGA<br>Moorabool Shire Council<br>Murray River Group of Councils<br>Virya Energy |

## Response

It must be stressed that the intention of the work done to date was to compare the options, based on desktop assessment only, to support the selection of the preferred option in the PACR, to progress to further investigation. Due to the desktop nature of the analysis to date, the area of interest as described in the Additional Consultation Report, with a width of up to approximately 30 kilometres, would be used as the starting point for further engagement and route identification and refinement. This will provide flexibility to select an alignment that can avoid issues and constraints that have been identified through Additional Consultation Report submissions and which are identified in the course of future site investigations and stakeholder engagement.

As part of the future route determination exercise, which would follow the completion of the RIT-T process, the area of interest would then undergo more focused assessments, surveys and discussions with landowners and communities to further investigate environmental, cultural and social constraints and opportunities. This will allow the reduction of this area of interest to an 'investigation or study corridor'.

Having this investigation corridor will potentially allow for activities such as, but not limited to:

- Meetings with potentially affected landholders, Traditional Owner groups, conservation bodies, local communities, and federal, state and local government agencies and councils.
- Testing of ongoing investigation findings.
- Identification of further local level constraints and opportunities in the investigation corridor, allowing for refining as appropriate (includes the potential for infield visits and survey).
- Input from targeted meetings and specialist studies to further refine and identify suitable options in the investigation corridor.

The aim is to identify a route for the project which recognises and takes account of the community, social and environmental impacts within the investigation corridor.

To reiterate, the analysis undertaken to date is based on available desktop information only and initial representations from individuals and groups. The analysis represents a point in time, is subject to change, and has not been informed by any field investigations, detailed community or landholder engagement, or the specific requirements of any planning and environmental approval processes relevant at the time. Further detailed studies assessing the potential environmental and social impacts will form part of the relevant planning and environmental approvals.

This PACR does not identify a preferred route, and the analysis performed to date has been undertaken on a best endeavours basis to be satisfied that the preferred option is feasible, and to inform the NEVA Order and NPV assessment of the preferred option. For example, the updated Option 5A area of interest indicates that the route on the New South Wales side might be longer than previously estimated, and this has been factored into the cost for this option.

### Desktop study

As noted in a number of submissions, the MCA was undertaken using desktop information only. Given the geographic area in which the seven Additional Consultation Report options could be sited, it was not feasible to undertake field-based assessments for this entire area. The MCA was used in the Additional Consultation Report to assist in the selection of a preferred option for the Victorian components by determining and ranking the complexity of the social, environmental and technical constraints for each option. Following the selection of a

preferred network option, the area of interest for that option would then be refined to a narrow corridor, less than several hundred metres in width, based on further desktop assessment and engagement with stakeholders with field-based assessments undertaken to select and refine an alignment. Engagement and analysis to inform an MCA for the New South Wales side of the project is underway and will be progressed in the coming months. A more granular MCA for the Victorian side will now also be developed now that the area of interest is known.

### Agricultural impacts

As per Table 13 and Figure 25 of the Additional Consultation Report, the agricultural potential of land was considered in the identification of an indicative alignment for each option as well as the ranking of these options within the MCA process. Data for agricultural potential of land was drawn from the Land Systems of Victoria, January 2000 Edition 3 report.

### Mental health impacts

While not specifically referenced within the MCA, we appreciate the prospect of hosting transmission infrastructure has caused impacts to the health and wellbeing of some impacted members of the community. The MCA aimed to minimise potential impacts to communities by including a series of criteria relating to social land use impacts, such as amenity, number of parcels affected, and the agricultural potential of land.

To undertake a robust and objective MCA process, a number of relevant criteria needed to be identified with metrics attached to these so that options could be ranked against each other. Weightings also needed to be assigned to criteria so an overall score can be determined for each option. While achieving greater social licence is important in the efficient delivery of a project, it is not something that can be assessed in detail prior to the selection of a preferred option and the refinement of the design with input from external stakeholders such as directly affected landholders.

However, noting these limitations of a desktop MCA, stakeholder feedback on community sentiment has also been considered in recommending a preferred option to the Victorian Minister.

### Option 5 has been met with community opposition

AVP and Transgrid appreciate that the prospect of hosting transmission infrastructure can cause stress and anxiety in communities. Our aim is to minimise impacts where feasible to lessen the concerns of landholders and communities potentially impacted by the project. We note that VNI West has been met with community opposition in parts of Victoria, however, many submissions were not opposed to Option 5 specifically, rather, community members expressed concerns about the impacts of transmission infrastructure in general. As mentioned in Section 4.1.1, it is worth noting that only four submissions, including two submissions from individuals, were supportive of Option 1, and only two submissions, including one submission from an individual, were supportive of Option 3A. In parallel, 13 submissions stated support for Option 5, including 12 organisations.

In summary, while Option 5 has been met with opposition, we expect we would have seen the same or more opposition should any of the other options have been proposed as the preferred. It was for that reason that an MCA approach was developed, so the selection criteria was as objective as possible, and the reasoning for preferencing one option over another was made clear.

As highlighted throughout this section, we understand that the MCA analysis for the Victorian side, presented in this PACR, is based primarily on desktop studies and will require further refinement from detailed discussions with landowners, communities and Traditional Owners. The purpose of the MCA was to consider social, cultural and

environmental impacts earlier in the process to assist in the selection of a preferred option for the Victorian components which is expected to cause less impacts to communities, thereby facilitating timely delivery.

### The MCA did not provide a justification for the ratings

As mentioned in the Additional Consultation Report, each criterion was weighted, based on expert judgement and relevant experience preparing submissions for planning and environment approvals, and a weighted score was determined to rank the options. These weightings were published so stakeholders could see how the weighted score was determined. Please see Section 4 of the Additional Consultation Report for more detail on the MCA methodology[17].

### Weighting of economic impacts

The current RIT-T framework has not previously allowed AVP and Transgrid to consider other elements outside of technical feasibility and net economic benefits when assessing alternative investment options, unless these can be defensibly quantified in the cost benefit analysis. The February 2023 NEVA Order allowed AVP to consider a broader range of factors to identify the preferred option most likely to facilitate accelerated project delivery. However, the February 2023 NEVA Order still required AVP to prepare and publish a PACR for VNI West with Transgrid. The February 2023 Order did not change obligations to follow future environmental and planning approval processes. It also only impacted the Victorian portion of VNI West and did not apply to the New South Wales portion.

In light of this, the proponents landed on a 70% weighting towards the economic net benefit objective, because the project still needs to deliver on net benefits for consumers as a key element of the RIT-T. AVP ran a sensitivity analysis where the weighting percentages were changed. Even bringing that weighting down to zero, Option 5 still remained first-ranked due to its strong performance across all other objectives. As Option 5A, the preferred option in this PACR, scores very similarly to Option 5 on the MCA, it is reasonable to assume that this option would also have outperformed the other options considered in the Additional Consultation Report under similar sensitivity testing of weightings.

The benefits criterion in the MCA was deliberately aligned with the RIT-T net market benefit definition to avoid confusion and for ease of comparison. Other criteria included in the MCA were selected due to their likelihood to influence the timely delivery of VNI West. The economic impacts that accrue to parties other than those who produce, consume and transport electricity in the market are required to be treated as externalities and excluded from the determination of net economic benefits under the RIT-T. They were also not considered likely to materially impact speed of project delivery. Consideration of wider regional economic growth plans and regional development strategic directions were therefore not included in the MCA as they were considered outside the scope of both the RIT-T and the NEVA process. They will be considered in the context of route refinement and regional benefits sharing as the project moves further into early works activities.

### True land value impacts

The RIT-T methodology excludes externalities from the determination of net economic benefits, but the MCA methodology adopted attempts to take important social, environmental and land use considerations into account early in the planning process.

[17] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-consultation-report---options-assessment.pdf?la=en.

Impacts to land use will be considered in the easement compensation payable to owners of the properties that the transmission infrastructure is to traverse.

### Consideration of carbon footprint

The Australian Energy Market Commission (AEMC) recently noted, as part of its draft report for Stage 3 of the Transmission Planning and Investment review, that it will continue to monitor developments with respect to climate legislation and the commitment to include an emissions objective in the national electricity objective (NEO) to ensure that emissions abatement continues to be appropriately factored into transmission planning in the future.

The AEMC stated that, depending on the form of the emissions objective and how it is applied in practice, it may be appropriate for emissions abatement to be explicitly valued in the ISP/RIT-T, even if there is no legislative mechanism that sets a formal price on emissions[18]. AVP and Transgrid note that any such change in the future is not relevant to this current RIT-T, so the carbon footprint of the options considered has not been explicitly modelled at this stage.

## 4.1.3 Support for consideration of additional options

Submissions noted support for the consideration of additional options, including re-analysis of the New South Wales route and routes closer to Kerang, and reconsideration of passing between Gunbower and Echuca.

### Summary of feedback

| Item of feedback | Submitters |
|---|---|
| **The New South Wales route should be reconsidered**<br>Submissions suggested that the proposed location of the crossing point from Victoria into New South Wales should be reconsidered, as Option 5 has changed the proposed route.<br>Submissions noted AVP and Transgrid should consider options:<br>• Downstream of New South Wales state forests, in a more sparsely populated and low value area.<br>• More direct and cheaper routes.<br>• Optimisation of the northern route so that it partly shares its corridor with EnergyConnect.<br>• An alternative connection to EnergyConnect at a point further west than Dinawan, or constructing an additional line which connects in further west than Dinawan (for example, akin to the additional Kerang-Red Cliffs line labelled "Expansion A" in the PSCR, but perhaps connecting at a point between Buronga and Dinawan). ENGIE noted this should be considered so that:<br>1. Any alternative northern pathway of VNI West could be significantly shortened due to a more direct connection to EnergyConnect to the north-west of Kerang.<br>2. Any alternative northern pathway of VNI West could partly share its corridor with EnergyConnect or any additional line could partly share its corridor with the northern part of the VNI-West route.<br>3. The clustering of potential projects in and around the vicinity of the Dinawan end of the South West REZ could utilise a more feasible connection alternative to EnergyConnect.<br>4. The capacity of the 330 kV EnergyConnect line between Buronga and Dinawan does not (absent of further augmentation) form a hard constraint on nearby project development, likely in the order of 800 MW, even if a future upgrade of HumeLink or Dinawan to Wagga was later progressed.<br>5. There is a limited need to undertake further upgrades or augmentation of REZ capacity now, or in the near future, to account for the failure to capture additional transmission capacity west of Dinawan. | ENGIE |
| **Routes closer to Kerang should be considered**<br>The level of development proposed in Kerang should be considered and the VNI West transmission line needs to be closer to Kerang to better service the Murray River REZ and provide further scope for commercial energy developments. For example, there are opportunities for route refinement between Charlton, Boort and Kerang, and to consider a new northern river crossing, to address local environmental concerns and to maximise current and future transmission capacity for wind and solar in the Murray River REZ. | VHM<br>CVGA<br>Murray River Group of Councils |

[18] AEMC, *Transmission Planning and Investment – Stage 3*, Draft Report, 21 September 2022, p. 63

| Item of feedback | Submitters |
|---|---|
| The Murray River Group of Councils submission noted that a route running near Kerang, and crossing the river north of Kerang, had existing social license due to the understanding that it would unlock transmission capacity and allow for increased investment in renewable energy generation in the region.<br>Virya Energy stated that the line should be extended to Kerang to support the projects currently under development. | Virya Energy |
| **Opposition was noted particularly between Gunbower and Echuca, with some stakeholders noting Option 5 would lead to project delays**<br>Submitters highlighted concerns of the broader visual amenity, biodiversity and land-use impacts of the proposed preferred option, including:<br>• Vegetation removal.<br>– Impacts to wildlife corridors.<br>– Impacts on carbon offsets to reduce greenhouse gas emissions.<br>• Impacts to wetlands.<br>• Impacts to tourism, particularly due to visual amenity concerns.<br>• Impacts to threatened species, particularly threatened birds and their habitats, including the Plains-wanderer.<br>– BirdLife recommended that scientifically rigorous and comprehensive bird surveys and ground truthing of habitats are undertaken, designed and overseen by an independent panel of scientists.<br>– Effects on various wildlife, including Patho Plains-wanderers, Wedge Tail eagles, kangaroos and black wallabies should be minimised. | Numerous community and landowner submissions<br>EUAA<br>Murray River Group of Councils<br>Birdlife Australia<br>Trust for Nature<br>AusNet |

## Response

The route selection process is carried out over the following project phases:

1. Identification of the project need.
2. Identification of feasible technical options and determination of the project solution that may meet this need within a broad geographical area of interest.
3. Systematically and progressively refining the area of interest to a preferred corridor or site.
4. Systematically and progressively refining the corridor to a single preferred route.
5. Narrowing the preferred route as part of the relevant environmental approvals process.
6. Identifying the easement area of a transmission line for the preferred route or refining the boundary of a site.

Generally, the shortest route between two substations is the most beneficial and least-cost to consumer option. However, considerations such as environmental constraints (for example, RAMSAR wetlands), current land use (such as airports, intensive agriculture, and heavily populated areas), heritage, existing infrastructure, bush fire risk, and flood zones also impact the route design.

The New South Wales EnergyConnect project west of Dinawan substation is not considered as a credible option for the VNI West project, due to the following reasons:

- The Buronga to Dinawan section, west of Dinawan, was designed to operate at 330 kV with a line rating of 800 megavolt-amperes (MVA) only, thus this section of EnergyConnect transmission lines will be congested if VNI West directly connected to the Buronga to Dinawan section without building new 500 kV transmission lines.
- Upgrading the Buronga to Dinawan section is likely to be an expensive option, including building a double-circuit 500 kV transmission line from Dinawan in parallel with EnergyConnect and a 500/330 kV substation to connect VNI West to the new line. Power system modelling demonstrated that a farther west connection to EnergyConnect will increase transmission line impedances and reduce the VNI transfer limit, which will subsequently reduce the attained net market benefits.

- There are currently no plans for further transmission expansion, such as extending the 500 kV network to Redcliffs.

While connecting into EnergyConnect further west than Dinawan is not considered credible, further work by both Transgrid and AVP in response to feedback has identified that an alternate river crossing north of Kerang would be feasible and could alleviate many of the environmental concerns raised in submissions.

This has given rise to Option 5A, the preferred option in this PACR, and AVP and Transgrid thank stakeholders for helping refine the area of interest based on local knowledge. Please refer to Section 7.3.1 of this PACR: Volume 1 for further detail.

### 4.1.4 Considerations for route refinement, environmental and planning approvals

Submissions were made relating to the use of public land and existing easements, and raised concerns about the impact on cultural heritage.

#### Summary of feedback

| Item of feedback | Submitters |
|---|---|
| **Routes through public land should be considered**<br>Several submissions highlighted the corridor should be along existing easements or public land, to reduce disruptions to farmers. | Numerous community and landowner submissions |
| **Concerns about the impact on cultural heritage**<br>This included information from landowners on specific items of cultural importance located in the area of interest and highlighting that consultation with Traditional Owners will identify a number of culturally sensitive areas and potential secret or sacred object locations which must not be disturbed. | Catherine King<br>Murray River Group of Councils<br>Numerous community and landowner submissions |

#### Response

AVP and Transgrid recognise the importance of (and are committed to) early and ongoing engagement with communities, Traditional Owners and landholders to deepen our understanding of the impacts associated with building and operating this critical infrastructure. A range of key stakeholders have been engaged throughout the development of the project, to ensure the rationale for, and benefits of, the project are clearly understood, and to seek early stakeholder input on potential social, cultural and environmental considerations in identifying the preferred option.

The RIT-T has identified a preferred option that would connect EnergyConnect (New South Wales) and WRL (Victoria). Importantly, identifying the preferred option is not the process that defines the location of the infrastructure. The development of a project route alignment and the location of terminal stations will be determined through a rigorous route and site selection process that values and requires extensive consultation and engagement with landholders and Traditional Owners. This is not possible until the area of interest is refined, and the potentially impacted landholders identified.

As the project progresses from the current broad area of interest to corridor identification and then route selection, there will be ongoing consultation and engagement with key regional stakeholders and potentially impacted communities and landowners to hear and understand the local issues, and provide opportunities for input and feedback to inform and influence the decision-making.

As part of this process, routes along public land or in existing easements will be considered. AVP and Transgrid aim to site the infrastructure on public land or existing easements where possible, however, this is dependent on compatibility with current and future planned land uses.

The final route and associated infrastructure would be subject to the requirements of relevant planning and environmental approval processes in both Victoria and New South Wales.

The MCA included a desktop analysis of known sites of Aboriginal significance within Victoria. As a part of the engagement process, the team will consult with all potentially impacted Traditional Owner groups to confirm and amend the outcomes of a more detailed MCA to be undertaken to help narrow the area of interest down to a corridor, as well as learn of any other sacred sites or culturally significant places of importance which should be considered. The engagement will also consider how VNI West may be able to provide positive outcomes and opportunities for Traditional Owner groups.

As the project progresses, Cultural Heritage Management Plans will be prepared in accordance with the requirements of the relevant laws to investigate the potential impacts to Aboriginal cultural heritage and identify how heritage can be best protected. This will be done together with Traditional Owner Groups, Registered Aboriginal Parties and First Peoples – State Relations.

## 4.2 The feasibility of Option 5

Feedback was sought on the feasibility of Option 5. In response, submitters raised questions regarding:

- Insufficient renewable generation harness capability
- Power system concerns.

### 4.2.1 Renewable generation capacity limiting development

Submissions were made relating to the renewable generation capacity of Option 5 in the Western Victoria REZ and the Murray River REZ.

#### Summary of feedback

| Item of feedback | Submitters |
|---|---|
| Virya Energy suggested that Option 5 would not allow for renewable energy investment in the Murray River REZ. Virya Energy further stated that the opportunity for transfer of electricity from Victorian to New South Wales markets via VNI West has been significantly overstated.<br>The Murray River Group of Councils noted concern that Option 5 fails to enhance generation in Murray River REZ and will constrain development of renewable electricity generation in the Murray River REZ, particularly given the proposed developments in the Murray River REZ. | Murray River Group of Councils<br>CVGA<br>Loddon Shire Council<br>Virya Energy<br>AusNet |
| AusNet noted that the generation capacity of Option 5 is conservative.<br>Modelling and engineering optimisations could be undertaken to deliver an uplift total hosting capacity of Option 5 within both V2 and V3, as minor network topology adjustments could address heavy loading that occurs on the existing Kerang-Bendigo 220 kV Line and uplift capacity of Option 5 within V2, and Option 5 provides optionality to unlock additional the hosting capacity of V3 when needed (rather than make a higher capital investment upfront as in Option 3A). | AusNet |
| Jacobs raised concerns that suggested improvements in REZ transfer capacities appear to ignore existing curtailments arising from the limited capacity of the RCTS-KMTS-MRTS-HOTS 220 kV line and the RCTS-WETS-KGTS 220 kV line. It was suggested that these curtailments should be taken into consideration and the REZ transfer capacities be updated accordingly. | Jacobs |

## Response

### Renewable generation transfer capacity of Option 5 and conservative estimation

AVP and Transgrid note that in the Additional Consultation Report, Option 5 combined with WRL offers an additional 3.6 gigawatts (GW) of transmission capacity to connect renewable generation in Victoria. That is comparable with Option 1, which was the proposed preferred option in the PADR.

Based on the feedback received, AVP has undertaken further power system studies to better optimise the REZ transmission limits in the area and have identified a slightly higher V2 REZ limit of 1,075 MW (compared to 850 MW in the Additional Consultation Report) for Option 5. The same power system model refinements have been applied to determine the REZ transmission limits for Option 5A. This has been reflected in the wholesale market modelling undertaken for this PACR.

Option 5A, a new variant of Option 5 and the preferred option in this PACR, harnesses even more renewable generation, particularly in the Murray River REZ. Refer to PACR: Volume 1 for more detail in relation to the latest REZ transmission limits.

AVP and Transgrid welcome any additional solutions/recommendations to further uplift the REZ hosting capacity of Option 5A.

As briefly mentioned in the Additional Consultation Report, and as suggested here, additional minor modifications to the existing network have been identified as potential lower-cost investments for further investigation to harness more renewable generation in the Western Victoria and Murray River REZs under Option 5. Further detail on potential minor modifications is presented in the PACR: Volume 1, which, for example, includes things like additional power flow control or control scheme solutions to further boost the REZ capacities.

### Existing curtailments

AVP and Transgrid are required to be agnostic in terms of generation location, unless power system security is at risk or government policies target development in a particular REZ. The power system modelling performed by AVP and Transgrid modelled a mix of future generation at both the Murray River V2 REZ and the Western Victoria V3 REZ. The REZ transmission limits presented take this into account by allowing for simultaneous generation from both REZs. Depending on the generation type, there will be diversity in both geographic location as well as technology that will allow for generation from both REZs.

Further, while the conductors may be rated at around 3 GW (and possibly higher), due to constraints in the existing parallel transmission network it will not be possible to output 3 GW from the Western Victoria V3 REZ, which is why the transmission limit for this specific REZ is less than this, and similarly why the Murray River V2 REZ is able to generate simultaneously.

AVP and Transgrid also note the REZ transfer capacities published are inclusive of any capacity improvements to existing generators within the REZs that currently experience curtailment.

## 4.2.2 Power system concerns

Submissions raised concerns that future power system requirements were not being accurately addressed.

## Summary of feedback

| Item of feedback | Submitters |
|---|---|
| **Series compensation**<br>• Stakeholders requested that AVP and Transgrid advise which options require series compensation and provide the cost estimates for this (as a separate item to modular power flow controllers).<br>• Stakeholders commented that no sub-synchronous resonance studies appear to have been undertaken to prove the practicality of proposed series compensation for Option 5, and concerns were raised that series compensation for Option 5 adds additional risk. | Jacobs<br>EGA<br>VEPC/Bartlett |
| The Bartlett/ Mountain submission expressed that VNI West will require installation of 400 megavolt-amperes reactive (MVar) of FACTS devices as well as new 220 kV transmission lines to Bendigo. | VEPC/Bartlett |
| Some submitters were concerned that like for like comparisons of future power system needs were not being made:<br>• The Option 5 cost savings associated with not needing Bendigo Terminal Station (or other network augmentation) are overstated, as the Terminal Station will be needed in future anyway.<br>• The Option 1 costs include Bendigo 500/220 kV Terminal Station (and spur line), but Option 5 does not. This creates a significant bias in favour of Option 5. | Loddon Shire Council<br>VEPC/Bartlett<br>Virya Energy<br>Jacobs |

## Response

### Series compensation

Series compensation has only been included in Option 5 in the Additional Consultation Report, (and now also in Option 5A and the Option 5A westerly sensitivity in this PACR) to manage the increased loading on the Kerang–Bendigo 220 kV line as a result of not connecting VNI West via Bendigo. Any other option that does not connect via Bendigo will experience this issue, which will reduce the REZ and transfer capacity, and associated benefits, compared to an equivalent option that does connect via Bendigo.

The exact quantity of series compensation will be determined through detailed analysis post-PACR, however an allowance of $75 million has been included for installing compensation equipment within the new greenfield terminal station near Kerang, with site costs included separately in the terminal station estimate.

Sub-synchronous resonance studies are underway by expert industry consultants to confirm the feasibility of installing the series compensation at its currently proposed location. Screening studies completed to date indicate there is a very low risk of issues with resonance with both existing and new generators, due to the mesh-like network of the Western Victorian transmission grid once VNI West is in place. The topology of the network once VNI West is completed means that there is a very low chance (after multiple, concurrent contingency events have occurred) that generators would be connected in a radial configuration relative to the series compensation, which is the configuration of highest concern for resonance issues. Further, there are relatively simple mitigations that can be put in place to limit resonance issues, should they be encountered in further studies.

In addition to this, alternate compensation options to series capacitors will also be investigated as part of the next stage of the project, to ensure the best technical solution is selected for the network.

To further support the practicality of installing series compensation, the existing VNI has had series capacitors successfully in service for decades.

Additionally, a sensitivity has been added to this PACR to test the robustness of Option 5 should the series capacitors be deemed infeasible and dropped from scope prior to implementation, or potentially need to be turned off in future.

### Installation of FACTS devices

In all options, 400 megavolt-amperes reactive (MVAr) of Static VAR Compensation (a FACTS device) has been included at the proposed new terminal station near Kerang to support the voltage on the existing 220 kV network in the north-west of the state. There is no difference between options in this regard.

### Comparing options with and without the new Bendigo terminal station

Some stakeholders raised concerns that a like for like comparison was not being made between Option 5 and the other options, as the cost savings due to not needing a new terminal station near Bendigo were unrealistic. This was on the basis that, in their view, a terminal station near Bendigo was going to be needed sooner or later to support growth in Bendigo anyway. Therefore, at best the cost differences between options should be limited to the "bring forward' cost of the terminal station.

Alternatively, these same stakeholders said that if the Bendigo terminal station was not needed in future to support load growth in Bendigo, then the requirement for Options 1 through 4 to cut-in to Bendigo from the south through the national park was adversely impacting their MCA scoring unnecessarily.

The new terminal station was not needed to service the Bendigo load, and instead was included due to the benefits gained by the connection in terms of relieving constraints in the existing network and boosting REZ limits. This was made possible by Options 1 through 4 having the 500 kV lines route in close proximity to Bendigo.

Option 1 (and through Option 4) do include costs for the new Bendigo terminal station and 220 kV line connection to the existing terminal station, but also included are the realised market benefits of removing constraints in this region of the network, which is reflected in both the net market benefits and also higher REZ transfer limits. Further, Options 1, 3 and 3A have the added benefit of having a new 220 kV network nearby to the existing Waubra Wind Farm, allowing its transfer off of the existing 220 kV network, which removed additional constraints and enables a similar uplift in net benefits and REZ transfer limits.

Options 1 through 4 all require VNI West to pass via a proposed new terminal station to be located near Bendigo. These options include assessment of a new 220 kV double-circuit transmission line that would connect from the new terminal station into the existing Bendigo Terminal Station on the outskirts of the city. The land surrounding the existing Bendigo Terminal Station is highly constrained by residential development and state and national parks. There is an existing 220 kV transmission line easement through the national park that could potentially be utilised for a connection to Bendigo. Undergrounding would not be an option due to space constraints at the existing Bendigo Terminal Station as well as the greatly increased construction disturbance through the national and regional parks. To remain within the existing footprint within the national park, preliminary investigations indicate that the existing 220 kV transmission line may be possible to be rebuilt in its place within the same easement, if permitted. The complexity of navigating social and environmental constraints for options connecting into Bendigo was factored into the MCA scoring for Options 1 to 4.

Regarding the concern that the bias is towards Option 5 because it does not have a terminal station near Bendigo, Option 4 in the Additional Consultation Report does include the cost for this additional terminal station near Bendigo, including a new 220 kV double-circuit transmission line segment that would connect from the new terminal station into the existing Bendigo Terminal Station on the outskirts of the city (replacing the existing line).

As per the analysis of the Additional Consultation Report, Option 4 accounts for both the costs of this Bendigo terminal station and line, as well as the benefits gained from the higher REZ transmission limits (as compared to Option 5 without the Bendigo connection), and is ranked lower than Option 5 for net market benefits.

As Option 5 does not pass near Bendigo, it does not face the same social and environmental constraints, but also does not increase transfer capability between Kerang, Bendigo and Ballarat. As outlined in Section 5.1 of this PACR: Volume 1, AVP will continue to monitor electricity demand and generation growth in the Bendigo area as part of normal electricity supply planning practices and, if due to load growth or generation connections, network limitations emerge in the Bendigo area over the next 10 years, these will be assessed as part of the Victorian Annual Planning Report[19].

## 4.3 Other factors that may impact on the timely development of the project

Some submissions provided feedback on other factors which should be considered in the analysis as they may impact the timely development of the project.

### Summary of feedback

| Item of feedback | Submitters |
|---|---|
| Additional factors should be considered, including:<br>• REZ transfer capacity and interconnection transfer capacity.<br>• A $/MW capacity criterion.<br>• The extent to which each option will open up renewable energy development opportunities for the communities that will host new transmission lines. | Jacobs<br>Virya Energy |
| Community opposition and concern may impact the delivery of VNI West. | Several community and landowner submissions<br>Loddon Shire Council<br>EGA |

### Response

AVP and Transgrid are agnostic to the location of renewable generation connections, provided power system security is maintained. Variations in REZ transfer capacity and interconnection transfer capacity are directly reflected in the net market benefits assessment. While the Victorian Government is committed to developing renewable generation in the state to replace ageing coal-fired generation, a $/MW capacity criterion was not an explicit consideration for AVP to take into account under the NEVA Order.

AVP does, however, note that stakeholders have indicated that opening renewable energy development opportunities for communities that will host new transmission lines is a key element in building social licence which will likely facilitate and expedite the development and delivery of the project. This feedback has therefore influenced AVP's recommendation in this PACR that Option 5A be the preferred option, given that all MCA criteria are similar between Option 5 and Option 5A.

AVP and Transgrid recognise the importance of (and are committed to) early and ongoing engagement with regional communities, Traditional Owners and landholders to understand the social impacts associated with

[19] At https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/victorian-planning/victorian-annual-planning-report.

building this linear infrastructure. We have engaged with a range of key stakeholders on the PADR, Additional Consultation Report and more broadly on the project, to ensure the rationale for, and benefits of, the project are clearly understood, and to seek early stakeholder input on potential social and cultural considerations .

The assessment has identified a preferred network option that would connect EnergyConnect (New South Wales) and WRL (Victoria). The preferred network option, however, is not a route selection process that defines the location of infrastructure.

The development of a project route alignment and the location of terminal stations will be determined through a rigorous route and site selection process that values and requires ongoing extensive community consultation and engagement. As the project progresses from the current broad area of interest to corridor identification and then route selection, there will be targeted consultation and engagement with key regional stakeholders and potentially impacted communities and landowners to hear and understand the local issues and provide opportunities for input and feedback to inform and influence the decision making.

The final route and associated infrastructure would also be subject to the requirements of relevant planning and environmental approval processes.

The economic impacts that accrue to parties other than those who produce, consume and transport electricity in the market are required to be treated as externalities and are excluded from the determination of net economic benefits under the RIT-T. However, the MCA methodology adopted attempts to take important social, environmental and land-use considerations into account as early in the planning process as possible.

Impacts to the land use of properties that the transmission infrastructure is to traverse will be considered in the easement compensation payable to the owners of these properties, subject to the respective land acquisition and compensation legislation and any other applicable government payment schemes in place at that location. For example, the announced New South Wales and Victorian landholder payment schemes will benefit private landowners.

# 5 Social and land use considerations

Stakeholders have raised a range of important issues relating to transmission lines and infrastructure on and near properties. These include:

- Agricultural activities and transmission line co-existence.
- Firefighting and transmission lines.
- Health and safety concerns.

Although detailed assessment and specific information on these issues sits outside the RIT-T process, these issues are being considered, even at this early stage of the project. Some aspects of these issues, where relevant to the NEVA Order assessment, were considered as part of the MCA assessment to differentiate between otherwise equally ranked network options in Victoria.

The final route has not been determined at this early stage of the project. As the project moves from the current broad area of interest to corridor identification and then route identification, there will be extensive engagement with potentially impacted stakeholders and landowners providing more detailed information as it is developed, with feedback and input sought at all stages of the process to inform decision-making.

During the Additional Consultation Report consultation, in response to feedback, AVP and Transgrid have provided additional information through factsheets and guides to relevant materials through their websites to help stakeholders gain more understanding on the coexistence of farming and transmission infrastructure, as well as bushfires and health and safety issues.

AVP and Transgrid are committed to engaging with potentially impacted stakeholders, communities and landholders on these important issues as the project progresses. The information and insights that have been gathered throughout this consultation will be further considered and built upon as the project progresses through the next phases of development.

Transgrid and AVP received 493 submissions from concerned landowners and other community members and noted the following key concerns.

## 5.1 The interaction between agricultural activities and transmission

### Summary of feedback

| Item of feedback | Submitters |
|---|---|
| **Easement use and compensation**<br>Submitters raised broad concerns about farming and livelihoods being impacted by the preferred option, typically related to a lack of information, loss of income, inability to operate farming equipment and a decrease in land values.<br>Submitters requested AVP provide clear information to landholders about the impact transmission lines will have on their rights, particularly any limitations on farming operations.<br>Concerns were raised regarding loss of productivity through:<br>• Inability to use tractors and machinery under power lines.<br>• Inability to irrigate under power lines.<br>• Inability to use emerging technologies such as drones and autonomous vehicles, including queries on insurance considerations.<br>• Division of paddocks. | Numerous community and landowner submissions<br>Loddon Shire Council<br>Victorian Farmers Federation |

| Item of feedback | Submitters |
|---|---|
| • Financial implications of securing work permits.<br>• Decreased land value and loss of future productive capacity.<br>**Land access**<br>Submissions also raised concerns with a range of potential impacts from property and land access such as:<br>• Not providing notice of entry.<br>• Not informing landholders what chemicals have been used on site causing issues with vendor declarations.<br>• Spread of weeds.<br>• Failure to close gates.<br>• Damage to crops.<br>• Materials left on site causing damage to machinery.<br>• Impacts to soil due to heavy machinery use. | |

## Response

### Easement use and compensation

Please refer to Section 2.3.

In New South Wales, Transgrid's Easement Guidelines[20] should be used as a point of reference for agricultural activities which can take place in easements.

AVP is currently developing materials specific to the Victorian component of VNI West for landowners and communities; in the meantime, AusNet's Landholder guide[21] may be used as a point of reference (pages 24 and 25 provide an overview of activity permissions in 500 kV transmission line easements).

### Land access

AVP and Transgrid understand that these concerns stem from landowner experiences on other infrastructure projects. Our preference is to enter into voluntary land access agreements to carry out any preliminary field work including environmental surveys.

Landholder liaison officers will work with individual landholders to determine appropriate access processes for their property, including biosecurity, gate management, timing, livestock or crop awareness and points of access, and, prior to access, will enter into an agreement containing all these details.

When Transgrid or AVP enters the landowner's property, it will comply with the consent to enter conditions including limiting disruption as far as possible and repairing any damage that might inadvertently be caused.

If voluntary agreement cannot be reached, then there may be statutory powers available to be used. Transmission companies have compulsory access powers under section 93 of the *Electricity Industry Act 2000* (Vic) and section 54 of the *Electricity Supply Act 1995* (NSW).

[20] At https://www.transgrid.com.au/media/3tkdd5lr/easement-guidelines.pdf.

[21] At https://www.westernrenewableslink.com.au/assets/resources/Landholder-guide-Land-access-easements-and-compensation-June-2022.pdf.

## 5.2 Bushfire and weather risks

### Summary of feedback

| Item of feedback | Submitters |
|---|---|
| **Submissions highlighted concerns about bushfire and weather risk**<br>Submissions noted:<br>• A concern that firefighters cannot operate necessary equipment under or near lines, including high pressure hoses and aerial equipment (helicopters).<br>• Transmission lines can fall over in bad weather and cause fires.<br>• The recommendations from the Bushfire Royal Commission are for all power lines to be underground.<br>• The cost of the Cressy collapse of $25.04 million was passed onto energy consumers.<br>• Cost impact of increased bushfire risk, particularly in the Wombat State Forecast.<br>• Option 5 passes through highly impacted flood lands. | Numerous community and landowner submissions<br>Northern Grampian Shire Council<br>Snowy Hydro<br>Bruce Mountain and Simon Bartlett |

### Response

Fire and weather risks are considered through the design, construction and operational phases of a high voltage transmission project.

During the design phase of a transmission infrastructure project, towers and terminal stations are designed:

- To ensure ongoing vegetation clearance around infrastructure can be maintained.
- To address and withstand (in accordance with relevant design principles) weather conditions in the area where the infrastructure is being constructed.
- By implementing a Safety in Design process to review the risks associated with construction and operation of the assets.

During the construction phase of a project, various measures are put in place to manage and mitigate fire risks. These include:

- Preparing relevant safety management plans (including safety management and fire safety management plans) to identify construction risks and appropriate controls.
- Implementing a hot work procedure to minimise or eliminate hot work during fire danger periods or on total fire ban days.
- Providing appropriate training to staff on the management and prevention of fire triggers in construction.
- Liaising with local Metropolitan Fire Service (MFS)/ Country Fire Service (CFS) units during construction and high-risk days.

Once constructed, the relevant entity that owns and operates the transmission infrastructure is responsible for ensuring they comply with relevant laws that relate to vegetation management and the maintenance and operation of the assets. To ensure compliance, the relevant entity will conduct various activities to mitigate fire and weather risks, including:

- Conducting specific routine and planned maintenance tasks to transmission infrastructure that are designed to identify faults or repairs to the infrastructure.
- Maintaining an asset database to track asset life and identify when routine maintenance tasks are due to be undertaken.

- Conducting an ongoing routine inspection program aimed at minimising bushfire risk through:
  - Ground inspections.
  - Aerial inspections using visual and thermographic techniques and LiDAR imaging.
  - Detection of any vegetation encroachments.
- Monitoring weather situations in the operation of the electricity network.

Further to the activities outlined above:

- Local councils and shires conduct their own vegetation management practices on some public areas like nature strips, parks and alongside roads.
- Various legislative obligations exist in both New South Wales and Victoria in relation to recommended clearances around transmission lines, duties relating to notification, consultation and dispute resolution regarding cutting or removing certain trees and ensuring appropriate management plans are in place. Often, failure to comply with these legislative requirements will incur significant penalties.

The above mitigants during design, construction and operation are not an exhaustive list of actions and strategies to address these concerns.

TNSPs are committed to managing bushfire and weather risks associated with electricity transmission network assets. The Australian Energy Infrastructure Commissioner, in collaboration with Energy Safe Victoria, recently published a guide to bushfires and transmission[22].

## 5.3 Health and safety

### Summary of feedback

| Item of feedback | Submitters |
|---|---|
| Several submissions raised concerns about the mental health effects of VNI West, with consideration to the anxiety caused for landholders and farmers before and after construction.<br>This item of feedback was often tied into the recent Victorian study, the National Farmer Wellbeing Report. | Numerous community and landowner submissions<br>The Wallaloo and Gre Gre District Alliance Group, Birdlife Australia |
| Submissions raised concerns about cancer and health risks from transmission lines, particularly due to electromagnetic field (EMF) impacts. | Numerous community and landowner submissions |

### Response

Electromagnetic fields occur anywhere there is an electric charge, which means any time an electrical current moves through a wire, an electromagnetic field will be present. In the case of power lines, the higher the voltage, the higher the electromagnetic field.

Electromagnetic fields generated from electricity power lines and household appliances (such as computers, televisions, microwave ovens and home WiFi networks) operate at the lower end of the electromagnetic spectrum. At these frequencies, electromagnetic fields are categorised as “non-ionising radiation”; that is, they are not known to damage skin cells. At very high frequencies, electromagnetic fields fall into the “ionising radiation” part of

[22] See https://www.esv.vic.gov.au/about-us/publications/electricity-transmission-lines-bushfire-management-and-community-safety.

the electromagnetic spectrum (think of X-rays or other diagnostic radiation, or sunburn, which can change or damage skin cells).

The national guideline for safe magnetic fields is approximately 2000 milligauss, and the VNI West transmission lines would have an expectation of generally up to about 200 milligauss at the peak of magnetic fields. This is well below what would be expected as a level of concern.

After a multitude of studies on the concerns and potential health impacts on individuals, the Australian Radiological Protection and Nuclear Safety Advisory (ARPANSA) has said there is no scientific evidence to establish that exposure to electromagnetic fields around the home, the office or near power lines causes health effects.

Despite this, a precautionary approach will be applied to managing electromagnetic fields, including targeting minimum setbacks from residences and monitoring power lines for electromagnetic field intensity. A typical design guideline is a setback distance of 300 metres between the transmission line and a residence[23]. In addition to this, we commit to ongoing review of policies in line with the latest expert scientific information.

For further information on electromagnetic fields, the following organisations offer relevant information:

- Energy Networks Australia has an active management program on the issue of electric and magnetic fields at power frequencies (50 Hz) which has been in place for many years. The Energy Networks Australia website[24] provides some useful information on electromagnetic field (EMF)-related issues.
- ARPANSA[25] maintains continual oversight of emerging research into the potential health effects of electromagnetic fields from power lines and other electrical sources to provide accurate and up-to-date advice.
- The World Health Organisation[26] established the International Electromagnetic Fields (EMF) Project in 1996 to assess the scientific evidence of possible adverse health effects from electromagnetic fields.

Around 20% of submissions raised concerns about the mental health effects of VNI West, with consideration to the anxiety caused for landowners and farmers before and after construction.

AVP and Transgrid acknowledge the uncertainty and concern around the VNI West project, particularly for potentially affected landholders and communities. We are currently finalising options on how we can provide professional support for the health and wellbeing of impacted individuals and will provide more information on this in the near future.

We encourage anyone struggling with challenges to their own, a friend or a family member's mental health and wellbeing, to contact one of the independent support providers listed below for free and confidential advice:

- Beyond Blue – https://www.beyondblue.org.au and 1300 22 4636.
- LifeLine – https://www.lifeline.org.au/ and 13 11 14.

[23] Councils have started to implement policies in relation to the minimum setback distances for transmission lines. The adopted distance is 300 metres for 500 kV overhead lines based on recommendations 5.2.9.5 and 5.2.15 of the Australian Energy Infrastructure Commissioner's 2021 Annual Report, which nominates the minimum setback distances listed below between residences and proposed overhead transmission lines. AVP and Transgrid would endeavour to implement these recommendations so far as is reasonably practicable

[24] See https://www.energynetworks.com.au/electric-and-magnetic-fields/.

[25] See https://www.arpansa.gov.au/research-and-expertise/electromagnetic-energy-program/electromagnetic-energy-research.

[26] See https://urldefense.com/v3/__https:/www.who.int/health-topics/electromagnetic-fields*tab=tab_1__;Iw!!HKeyBm8!SZ0m8b-HLDI-3uFBTEg2OTeptXmVLOPw7MYTs7zIPg1teG4TTrLJl6BftT86gWX34DZc-ZHbY5OuS-2da2Rw8eqEITEe$.

# 6 Project costs underestimated

Submissions questioned the accuracy of the cost estimates, pointing to the omission of contingency, and errors in technical assumptions and easement valuations.

In response, cost estimates for the Victorian options have been revised based on feedback and updated information, including significant changes to 500 kV transmission line costs.

AVP and Transgrid developed separate cost estimates with some minor differences in approach and input costs. The per km rates for line costs are not directly comparable due to different scope allowances. All contingency and risk allowances are included. Section 7.1 provides more detail.

## 6.1 Contingency

### Summary of feedback

| Item of feedback | Submitters |
|---|---|
| **Concerns that contingency has been omitted**<br>• Understated 500 kV transmission line costs ($239 million impact): previous WRL costings included a 40% contingency, which has been omitted for VNI West.<br>• Understated WRL uprating cost ($109m impact): 40% contingency has been incorrectly applied. | Bartlett and Mountain |

### Response

While AVP and Transgrid developed their own cost estimates separately, checks have been conducted along the way to ensure a similar approach and input costs are being used. However, there are minor differences in approach that lead to some general/mobilisation costs being accounted for in different cost categories. Further, each option includes different scope allowances on the Victorian side (for example, lower cost spur lines, 220 kV connections), which means the per km rates for line costs are not directly comparable.

Based on this consultation feedback and also updated costing input information received since the Additional Consultation Report, the cost estimates for the Victorian options have further been revised for this PACR, with the most significant change being to the 500 kV transmission line costs. These updates are outlined in detail in Section 2.2.2 of this PACR: Volume 1.

The cost estimates provided in the PADR, Additional Consultation Report and this PACR are inclusive of all contingency and risk allowances. Contingency has not been omitted for VNI West.

The claimed 40% added contingency of the WRL RIT-T costs is a misunderstanding of the structure of the Transmission Cost Database used to estimate the costs of that RIT-T. This claimed WRL 40% contingency has been incorrectly calculated by including adjusted baseline (such as component and labour) costs and indirect costs (for example, mobilisation, management, approvals).

With respect to the WRL uprate incremental costs, these are also inclusive of contingencies, overheads and the claimed missing Waubra works.

## 6.2 Errors in costs

### Summary of feedback

| Item of feedback | Submitters |
|---|---|
| **Concerns that line lengths are incorrectly calculated**<br>• Length of 500 kV lines ($106 million impact): three independent stakeholder estimates of line length do not align with AVPs calculation.<br>• Concerns that all option lengths have been overestimated except Option 5, which has been underestimated.<br>• Cost impact derived from differences in line length estimate and New South Wales $4.08 million/km cost estimate. Concludes Option 3A would then rank highest on NPV. | Bartlett and Mountain |
| **Concerns that cost components are missing**<br>• New 220 kV line (50 km) from new Kerang to existing Kerang appears to be required for all options ($70 million impact)<br>• Understated Victorian substation costs ($192 million impact). Under Option 5, a new substation will be required at Dinawan and two new sub-stations at Kerang, so Victorian substation costs should be around twice New South Wales costs; also no evidence that 40% contingency has been included.<br>• Understated Dinawan to Gugga upgrade cost ($318 million impact): does not include 15 km of EnergyConnect between Dinawan and Wagga, and unlikely that Elecnor will honour the price in the option to uprate EnergyConnect. Have provided an estimate based on public information.<br>• Concerns that cost components of WRL are not fully accounted for across WRL and VNI West RIT-Ts. Submissions noted the cost estimation for VNI West and WRL will increase as:<br>– The project will not start construction for another three years and not be completed for another eight years.<br>– Local opposition to the project will add further costs. | Bartlett and Mountain<br>Ted Woodley |
| **Concerns that easements and easement taxes are understated**<br>• Understated Victorian easements for Option 5 ($100 million impact): New South Wales costs do not include the cost of widening easements; Victorian costs do not include the hosting payment, and anticipate the payments will need to increase in future to align with New South Wales.<br>• Victorian easement tax understated for Option 5 ($35 million present value impact), as land values will be higher for Option 5 than assumed. | Bartlett and Mountain |
| **Concerns that cost estimates for power flow controllers are low ($100 million+ impact)**<br>• Unproven assumption that series compensation can be added to Option 5 (which would affect assumed transfer capacity). No details provided for stakeholders to understand what has been assumed in estimating the cost. | Bartlett and Mountain |
| **Operating costs**<br>• Concerns that operating expenditure (opex) costs have been understated by $102 million a year. Submission suggested that 3% of capital expenditure (capex) should be assumed rather than 1%. Impact of using different opex assumptions is calculated by submitter to be $5.1 billion present value over 50-year asset life. Figures drawn from AER TNSP benchmarking report are used to support this submission.<br>• Requests that a breakdown of operating and maintenance (O&M) costs be provided (which the submitters consider to be a requirement under the NER). | Bartlett and Mountain<br>EGA |
| **Future network investment and costs**<br>• Concerns that additional 500 kV and other augmentations will be required in Victoria next decade as a direct consequence of VNI West and that these will cost at least as much as VNI West but have not been included in the cost benefit assessment.<br>• Concerns that the latest recommended configuration for VNI West does not ease constraints to Melbourne and nor does HumeLink to Sydney, meaning there will be a future proposal for further interconnections between New South Wales and Victoria, and north to Sydney. | Bartlett and Mountain<br>Ted Woodley |

## Response

### Line lengths include lines cutting into Bendigo where relevant

The approximate line length in Victoria is the indicative total length (in kilometres) of lines between EnergyConnect (at Dinawan) and the connection point to WRL. As a route has not yet been determined, a line length has been determined from an indicative corridor within the area of interest and includes both 500 kV and 220 kV lines, where cutting into the existing 220 kV network. In calculating the line length, assumptions are made regarding the likely diversions necessary within each area of interest to avoid land not suitable for transmission development.

Further, all options involving the new substation near Bendigo include two new double-circuit lines connecting into the existing terminal station at Bendigo[27]. These have been included in the overall line length figures for those options.

This results in line length on the Victorian side for Option 5 being lower than for all other options (as fewer diversions are expected to be necessary and no new lines into Bendigo are required). Further work during route selection will refine the line length. It should also be noted that the total system path length between nodes is longer in Option 5 and Option 5A than any other option, which is what impacts on impedances.

### All cost components are included

The current design for all options is to place the new Kerang terminal station along one of the existing 220 kV lines, and as such no new Kerang 220 kV lines are required. Further the project modelling indicated replacement of existing 220 kV lines (that is, the suggested 50 km) is not required for the project.

As per the detailed option description in the Additional Consultation Report appendix, only one new terminal station is proposed in the Kerang area, and no modifications to the existing Kerang Terminal Station are required. Please refer to above responses for how contingencies are included in the costs.

The Dinawan to Gugga upgrade costs are considered appropriate since construction costs are based upon a price received as part of the EnergyConnect Contract. Easement and biodiversity offset costs are similarly consistent with those used on EnergyConnect.

All costs related to the WRL base case and proposed modifications are fully accounted for in their respective RIT-T documentation. The NPV calculations apply a discount rate to future costs, with construction expected to begin in three years and costs allocated to each fiscal year until project completion in 2031. The selected discount rate is described in Section 5.4 of this PACR: Volume 1, and sensitivity analysis confirms the ranking of options remains unchanged with higher discount rates.

### Cost estimates for power flow controllers

For the series compensation included in Options 5 and 5A, the exact quantity of series compensation will be determined through detailed analysis post-PACR, however an allowance of $75 million has been included for installing compensation equipment within the new greenfield terminal station near Kerang, with site costs included separately in the terminal station estimate.

[27] See Additional Consultation Report, p. 75.

### Easements and easement taxes have been reviewed

It is important to note that the Victorian line easement costs included in the NPV assessment vary for each option, with the $/km rate generally decreasing with the options further west due to relatively lower land values there. Land costs are based on independent valuer estimates created from recent land sales in the areas of interest, plus an added contingency.

In terms of transmission line hosting payments, the announced government policies in New South Wales and Victoria are:

- $10,000 per year per km over 20 years in New South Wales.
- $8,000 per year per km over 25 years in Victoria**.**

The Victorian hosting payments are included in the NPV assessment in this PACR (as outlined in Section 2.2.1 of this PACR: Volume 1).

Victorian land taxes for both the terminal station properties and transmission line easements have been estimated for each of the options and included as operating expenditure.

In response to submissions received on the Additional Consultation Report, further advice was obtained on the approach to calculating total taxable value of easements within Victoria with the estimated easement tax updated for this PACR analysis to reflect the advice.

### Operating costs

Submissions called for a breakdown of operation and maintenance costs to be included in the PACR. Other submissions also questioned how landowner compensation would work and in particular, the applicability of the Strategic Benefits Payment System in New South Wales.

It is not a requirement under the RIT-T to provide a breakdown of operating costs, and a more granular breakdown is not available at this stage in the project. National Electricity Rules (NER) clause 5.16.A 4(d) only requires a breakdown between capital and operating costs, that is, a quantification of the costs, including a breakdown of operating and capital expenditure for each option.

Annual routine operating and maintenance costs for transmission assets, excluding land-related and biodiversity offset costs, are assumed to be 1% of capital costs for transmission assets, including early works, substation works, lines works and modular power flow controllers (but excluding land related costs and biodiversity offset costs).

Maintenance costs for Transgrid have a 1% allowance based on typical costs for similar assets. It is unclear why Transgrid's costs are lower than the industry average, but it suggests efficient maintenance practices.

AVP and Transgrid note that the 1% of capital cost value is consistent with that used in the 2021 *Inputs, Assumptions and Scenarios Report* (IASR) (this is the latest final IASR released by AEMO). During consultation on the 2021 IASR, stakeholders questioned the appropriateness of this value and, in response, AEMO reviewed recent revenue determinations, contingent project applications and RIT-Ts, and concluded that 1% was reasonable for ISP purposes as the cost of major projects in the ISP are dominated by transmission lines rather than substations.

It is also noted that the AER will review and approve network expenditure from one revenue period to the next, so only the efficient and prudent project costs are expected to be passed through to consumers[28].

### Future network investment costs

This RIT-T focuses on VNI West as is required under the actional ISP framework. The costs and benefits of any additional augmentations required would be subject to separate RIT-Ts and, unless they are required for reliability corrective actions, would only proceed if the estimated benefits exceed the costs. It is the role of the ISP to provide a whole-of-system plan for development across the entire NEM. Please refer to the 2022 ISP[29] for other network developments that may be required in future.

## 6.3 Clarity of transparency of costs

### Summary of feedback

| Item of feedback | Submitters |
|---|---|
| **Call for greater clarity and transparency in costs**<br>Submissions noted the following concerns:<br>• Whether land compensation will be indexed to CPI.<br>• Whether public liability insurance for affected landowners exists and will be included in project costs.<br>• The capital cost information provided does not include a breakdown per substation or for each line type (220 kV, 330 kV or 500 kV). Additionally, the WRL incremental cost is not split into substation and lines works costs and no indication as to works shared between VNI-West and WRL or VNI-West and EnergyConnect is provided. It is difficult to compare and understand the differences in scope between each option.<br>• No explanation is given why the costs have increased from the ISP.<br>• NEVA order removes transparency of the RIT-T process. Stakeholder comments included: *"The NEVA order removes the ability for transparent oversight and to influence the PACR cost benefit analysis, which reduces confidence that the project will deliver net benefits for consumers."* | Susanne Feeny<br>Jacobs<br>EGA<br>Ted Woodley<br>EUAA |

### Response

#### Land compensation

As outlined in Section 2.5 of this PACR: Volume 1, while the New South Wales Government Strategic Benefits Payment Scheme explicitly indexes its payments to inflation each year, it is not clear at this stage whether the Victorian scheme will also do the same. However, for the purposes of this PACR, it has been assumed that they will, and AVP and Transgrid consider this a conservative assumption (and is consistent with how the New South Wales scheme is to operate).

Land compensation will be paid in accordance with applicable laws in New South Wales and Victoria.

#### Public liability insurance

Public liability insurance exists and landholders will need to liaise with their relevant insurance provider to ascertain the extent of cover under their existing arrangements.

[28] AEMO, 2021 *IASR Consultation Summary Report*, July 2021, p. 88.

[29] See https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en.

### Breakdown per substation

Table 6 in the PACR: Volume 1 provides a detailed breakdown by key costs by category and state for each option assessed. The breakdown of costs in the PACR exceeds the requirements of the RIT-T. That is, early works, substation works, line works, power flow controllers, property/land access/easements and biodiversity offset costs. It also breaks out:

- The WRL uprate cost and line length to provide additional transparency regarding this element, noting that this cost is inclusive of line uprating, additional easement compensation, additional early works costs and modifications to the terminal station scope. These WRL costs are included in each of the total VNI West cost categories.
- EnergyConnect enhanced cost and line length.

### Cost increases since the ISP

Costs were increased since the 2022 ISP as outlined in the July 2022 PADR report and also as similarly described in the Additional Consultation Report. The cost increase applied in the Additional Consultation Report was primarily due to additional contingency being added to account for known project risks. Further, as outlined in this PACR: Volume 1, some categories of costs have been increased in light of observed trends in costs such as underlying materials and labour. For example, the net market benefit assessment in this PACR incorporates updated cost estimates on the Victorian side, reflecting the latest trends identified in AEMO's 2023 Transmission Cost Database.

Appendix A5 of the PACR provides detail on the cost estimation methodology applied.

### NEVA Order and transparency

The NEVA Order does not remove the requirement for consultation. The Victorian Government expects best practice engagement with Traditional Owners, communities, and local councils in the project area. Assessment and planning approvals processes will continue to apply to the project and be informed by engagement. Refer to Section 1.2 of this PACR: Volume 1 for further detail on the scope of the February 2023 NEVA Order.

# 7 Project need and benefits

A lengthy submission from Victorian Energy Policy Centre (VEPC) and Bartlett questioned the project need and assessment. Support for this submission was also noted by EGA and Victoria Farmers Federation. The submission asserted that proposed or possible onshore renewable energy generation developments in the Gippsland region could be transported using existing transmission lines, offsetting the need for VNI West.

The submission primarily relates to Victoria and matters related to the Victorian scope of the VNI West project. AVP has reviewed the submission in detail and found the assertions are essentially based on simple reasoning rather than the detailed modelling which AVP and Transgrid have undertaken. The critique and conclusions outlined in the submission are founded on incorrect premises and an apparent lack of understanding of how the assessment was conducted, and are therefore flawed. This is despite participation by the authors in many of the webinars and briefings conducted by AVP and Transgrid during the consultation on the Additional Consultation Report and explanations of the modelling provided by AVP to the authors (both during webinars and in follow up emails).

AVP and Transgrid maintain that this is not an either/or situation – robust expert modelling in accordance with the CBA Guidelines detailed in multiple iterations of the ISP demonstrates that renewable generation development and associated network infrastructure is needed in both the east and west of Victoria to leverage the benefits of geographic and technical diversity and ensure secure electricity supply to meet growing demand from Victorian consumers at lowest cost.

The claims in the submission are also at odds with the Victorian Government's own modelling for the Victorian electricity sector renewable energy transition[30] – renewable energy and storage targets – which states:

> *The proposed interconnectors with Tasmania and NSW provide clear benefits in reducing the need for firm capacity in Victoria and capacity more generally across the NEM. Thus, they enable meeting the reliability targets at lower cost. The interconnectors also enable sharing of excess (otherwise curtailed) renewable energy generation effectively reducing the cost of meeting abatement targets.*

They are also at odds with investors and developers who have recently highlighted some of the challenges with trying to develop onshore renewable generation in Gippsland:

> "*Although the Latrobe Valley area has significant unused transmission capacity following the closure of the power plant, it is a notoriously difficult location in which to push projects through planning processes and community consultation."* Ratch Australia, May 2023[31]

> *"We've always been of the view that there are wind and solar resources here in Latrobe Valley, but they're not the highest quality. Grid infrastructure helps, but it doesn't necessarily make a project economical. It makes it easier to do and easier to permit and easier to access. And you'd get that goldilocks spot like Engie's got here. But when you start talking about scale and a return on investment [it doesn't stack up]."* Engie, May 2023[32]

There are also several apparent inconsistencies in the submission that are difficult to reconcile. For example, on one hand, the submitters observe "*extreme spillages of renewable energy at REZs along VNI West*" from the 2040s onwards that they claim to be wasteful, while on the other hand they state that uncosted "*massive further*

[30] See victorian-electricity-sector-renewable-energy-transition-energy-market-modelling.pdf.

[31] See https://reneweconomy.com.au/plans-killed-for-70mw-solar-farm-in-coal-heartland/.

[32] See https://reneweconomy.com.au/engie-says-batteries-the-only-game-in-gippsland-as-hazelwood-rehab-stuck-in-limbo/.

*transmission"* is included in the modelling to increase the hosting capacity of these same REZs in that same period. Both these matters cannot be true at the same time – if the claimed additional transmission was included in the modelling, then there would not be the extreme spillage claimed to be occurring. In fact, the modelling forecasts published in the Additional Consultation Report actually demonstrate that neither is true – there are not extreme spillages of renewables along VNI West, and there is no uncosted transmission to alleviate this in the modelling as it does not exist in the first place.

## 7.1 Conclusions drawn on incorrect premises

This section highlights some of the apparent misunderstandings in the submission that may have contributed to the contrary views formed by the submitters, in particular the perceptions that:

- The model limits variable renewable energy (VRE) development in Gippsland due to network constraints.
- The existing 500 kV assets to Latrobe Valley are not well utilised over time.
- There is no value in accessing a geographically diverse range of renewable resources.
- Moderate levels of spill of VRE are implausible in a net zero future.
- Generation build in excess of transmission limits is not possible.
- VNI West will double transmission charges in Victoria.
- VNI West will reduce the power system's resilience to extreme weather events and other potential security threats.

Note that the market modelling outcomes presented in this section are from the Additional Consultation Report modelling outcomes, as this was the basis for the submission claims.

### 7.1.1 New renewable generation is needed in both east and west Victoria

The submission asserted that the project is not required because generation supply options in the Latrobe Valley/Gippsland region can be built instead, and that the RIT-T modelling is artificially constraining this development.

The submission wrongly asserted that transmission limits between the Latrobe Valley and Melbourne are imposed incorrectly and do not account for increases in available transmission capacity as Latrobe Valley coal-fired power stations close. This led to the flawed conclusion that incorrect representation of transmission is what is limiting the development of onshore wind in the Gippsland REZ.

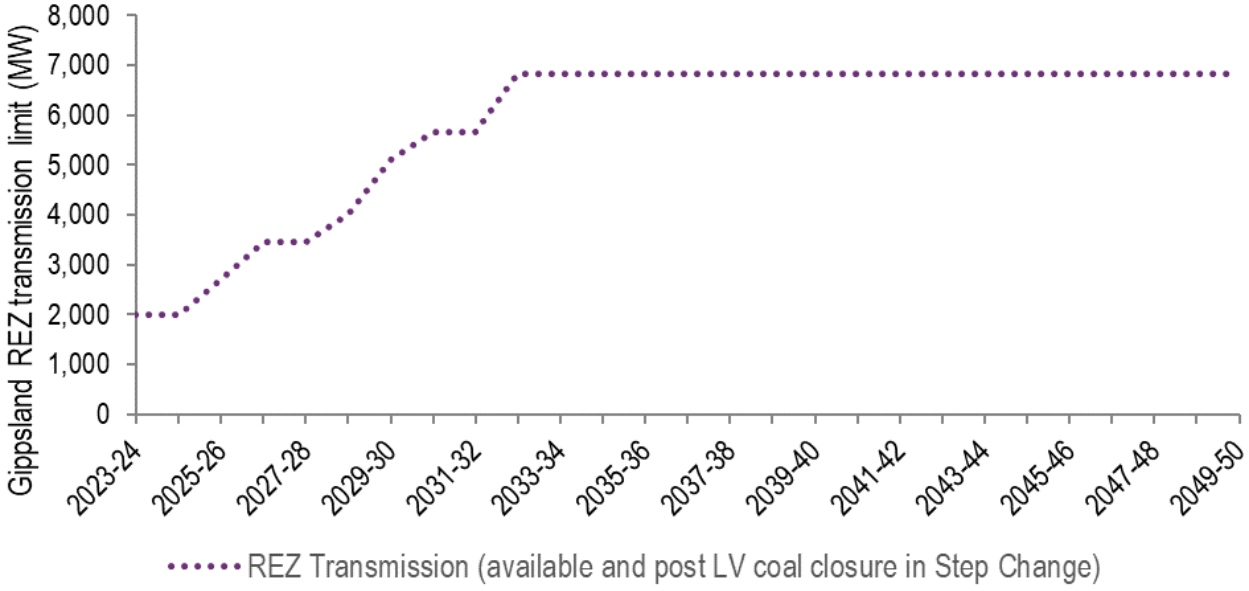
The submission also appears to have misunderstood how REZ transmission limits are implemented[33]. Appendix 9 of the submission incorrectly suggested that transmission limits are implemented as a combined limit on wind and solar capacity installed in each REZ. In fact, the REZ transmission limits constrain the total amount of dispatch of REZ generators in each hour, such that the total amount of capacity built in a REZ can exceed the transmission limit. This is because solar and wind generators do not always operate at full output but at the variable output of

[33] For more information, see slide pack from deep dive submission, presented to consumer groups and VEPC in March 2023, at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-gippsland-rez-presentation.pdf?la=en.

their fuel source (solar irradiance or wind levels). Hence the amount of generation capacity built would typically be more than the transmission limit.

Transmission constraints applied to represent the transmission network limitations out of the Gippsland REZ account for an increase in transmission capacity with closure of Latrobe Valley coal-fired generation. The spare network capacity for the Gippsland REZ today is estimated to be approximately 2,000 MW, and this progressively increases over time as coal-fired generation in Latrobe Valley closes. Once all coal-fired generation has closed in Victoria (assumed to be from 2032 in the *Step Change* scenario based on ISP market modelling), the spare network capacity assumed in the Additional Consultation Report modelling has increased to around 6,800 MW at no cost, as shown in Figure 10. This is obviously contrary to p.10 of the submission, which claimed a blanket 2,000 MW transmission limit was applied.

**Figure 10 Gippsland REZ transmission – available and post Latrobe Valley (LV) coal closure (*Step Change*) - Additional Consultation Report market modelling outcomes**




Further increases in capacity beyond those shown in Figure 10 would require transmission augmentation. This is allowed in the modelling at an additional cost, measured in $m/MW, which has been derived and consulted on as part of the ISP process through assessment of the likely cost and transmission capacity increase from potential line augmentations to locations where there is generator connection interest. The value of the REZ expansion cost applied to the Gippsland REZ is the lowest of the expansion costs applied to any REZ in Victoria, and lower than many other REZs in the NEM. The expansion cost reflects the current cost of building additional transmission capacity and is essentially the equivalent of the 'low cost' additional capacity cost in the submission. The submission claimed this is a steep penalty being applied beyond 2,000 MW. In fact, the cost applied beyond the 2,000 MW is the cost of expanding transmission capacity from the Gippsland REZ, and not a steep penalty as claimed.

Also of relevance, the modelling forecasts that the Gippsland REZ transmission limit is not binding (not a limiting factor). This means that there is sufficient spare capacity on the network to meet the least-cost renewable generation investment in the area, as determined by the model. These generation trajectories were not forced upon the model, but are the outcome of a detailed co-optimisation of generation, storage, and transmission, balancing the cost of building new transmission to access higher quality renewable resources against the cost of

building more, potentially poorer quality, renewable generation capacity in areas where spare transmission capacity may exist (up to the renewable resource limit). In the case of the Gippsland REZ, the resource limit of 2,000 MW binds well before the network limit binds, hence assumptions regarding the network limit and additional expansion costs are not the most significant factors that drive wind farm development in Gippsland. As such, the debate around the appropriateness of network limit and expansion cost assumptions (that have been extensively consulted on through the ISP development) becomes less relevant.

**So, if the network is not the limiting factor, why does the model not use more of the existing spare network capacity?**

Based on our understanding of the limited compatible land available in Gippsland REZ, it is not possible to build sufficient quantities of onshore wind and solar in the Gippsland REZ to maintain reliability in Victoria once coal-fired generation closes.

The VNI West modelling applied a 2,000 MW resource limit for new onshore wind capacity and a 2,500 MW resource limit for solar capacity in the Gippsland REZ, consistent with the 2021 IASR, which has been extensively consulted on. Approximately 10% of the total land area of the Gippsland REZ would be utilised for wind generation if all 2,000 MW of the resource limit were to be developed. This is a relatively high land utilisation, significantly higher than the 5% hard land use limit assumed for other REZs, and could be considered a generous assumption given the social licence factors that may exist at this level of utilisation[34]. The scale of publicly announced onshore wind farm projects for the Gippsland area falls significantly short of the limits applied[35]. Further, anecdotal evidence from a number of prospective developers is that there is limited land available for onshore renewable generation development in the area.

Additionally, the Gippsland REZ land area is approximately one-fifth of that in the Murray River REZ, and a quarter of the land area of the Western Victoria REZ. It is limited by terrain to the north, and the sea to the south. It is reasonable to expect that maximum generation capacity in the Gippsland REZ is therefore lower than at these larger inland REZs, and that it will not be able to substitute the additional generation capacity available from these other REZs.

For the reasons noted above, AVP does not agree with the submission's claim that the assumed limits on onshore renewable generation development in Gippsland are flawed.

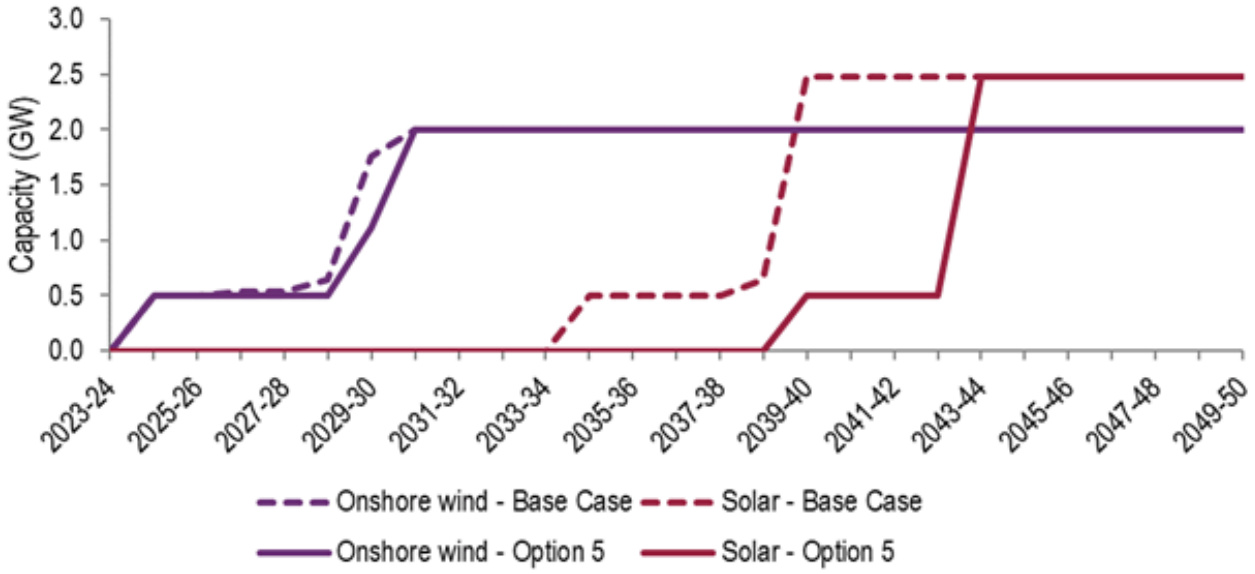
RIT-T modelling outcomes of the Additional Consultation Report market modelling for the forecast build in Gippsland REZ are shown in Figure 11, and show that Gippsland REZ is developed to its fullest within the modelling period; that is, to its assumed resource limits.

The figure clearly shows that, with VNI West included, the development of solar in Gippsland is delayed five years while wind development is very similar to the base case. Overall, AVP and Transgrid disagree with the submission's assertion that this shows that the development of VNI West *"undermines the development of onshore renewable generation in Gippsland and adjacent areas and thus wastes the capacity of Victoria's most valuable electrical transmission infrastructure connecting the Latrobe Valley to Melbourne"* (p. 9).

[34] This discussion focuses on the *Step Change* scenario; higher resource limits were applied for wind and solar in the *Hydrogen Superpower* scenario.

[35] See https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/participate-in-the-market/network-connections/nem-generation-maps.

**Figure 11 Solar and onshore wind build in Gippsland REZ, *Step Change* – Additional Consultation Report market modelling**




The modelling shows that this is the least-cost way to develop renewable generation in Victoria – progressively building renewable generation in a number of REZs simultaneously to maximise the benefits of diversity and match supply with demand growth. As VNI West opens up access to higher quality renewable generation in the Western Victoria and Murray River REZs, renewable development in Victoria is forecast to be distributed across more REZs, and some of the REZs with poorer quality renewable resources are filled more slowly[36]. Of course, this is not to say that developers will time or size their investment to exactly match the RIT-T modelling. In reality, investment decisions are made taking into account a large number of factors, and the open access regime allows them to connect at any time. provided the connection does not impact power system security.

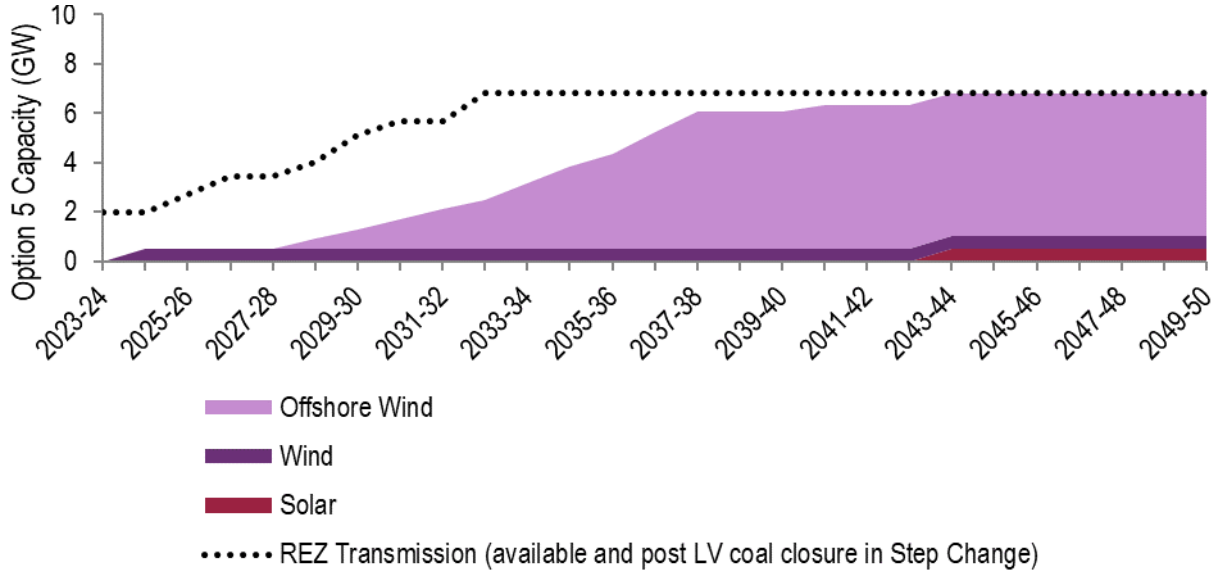
Assuming onshore wind and solar development in Gippsland REZ is limited by competing land uses, the Victorian Government's offshore wind policy, once legislated, will make full use of that capacity to transport electricity from the offshore wind basins through to Melbourne. When output from these offshore wind farms is excess to Victorian consumers' needs, VNI West will then help by exporting surplus generation north to support New South Wales.

The offshore wind sensitivity undertaken as part of the Additional Consultation Report, and again in this PACR, forecasts that the spare transmission capacity made available as coal-fired generation retires in the Latrobe Valley is fully utilised by a combination of both onshore (wind and solar) and offshore wind developments (see Figure 12). VNI West is forecast to continue delivering significant net market benefits under this sensitivity, helping harness additional renewable generation and also provide export opportunities for Victorian generators when output from wind and solar farms is surplus to the state's requirements.

Even if the onshore wind and solar resource limits were underestimated, as suggested by VEPC, the offshore wind sensitivity shows that additional investment is required across Victoria, even once the existing Latrobe Valley network is well utilised, to meet the growing demand not only in Victoria, but also NEM-wide at the lowest cost, and that VNI West is forecast to continue to deliver significant net market benefits in this sensitivity.

[36] Based on solar irradiance, the capacity factor for Murray River solar farms is 27% compared to 20% for Gippsland.

**Figure 12 Renewable build in Gippsland REZ, Option 5, *Step Change*, offshore wind sensitivity – Additional Consultation Report market modelling**




Note: In the base case for this sensitivity, the transmission capacity is also fully utilised and the combined onshore wind, offshore wind and solar capacity forecast to be built in Gippsland exceeds the REZ transmission limit.

It is also noted that the submission suggested that the offshore wind assumptions applied in this sensitivity should have been brought into the central case assumptions (p. 24).

As stated elsewhere, the Victorian Government's offshore wind policy is not yet legislated and does not currently meet the policy commitment criteria for RIT-T purposes. However, had offshore wind been brought into the central case assumptions as suggested, the modelling outcomes would still have shown that the spare capacity on the existing 500 kV assets from the Latrobe Valley to Melbourne would be heavily utilised by the offshore wind, leaving little headroom for the onshore wind and solar generation development in the Gippsland REZ that the submission was advocating for.

**In conclusion, the modelling outcomes forecast that generation from the Gippsland REZ is required as well as generation in Western Victoria and Murray River REZs, and not instead of.**

### 7.1.2 Spill of renewable generation is a feature of a low-cost system

The submission speculated on reasons for what it perceived to be high renewable generation spill observed in the model, and characterised this as "*wastage of hydro-electric, wind and solar renewable energy must be replaced by installing even more renewables and growing production from OCGT located near to Melbourne, mainly."* (p.57)

It incorrectly drew the conclusion that it arises as "*a consequence of a modelling approach that, completely absurdly, is unaware of the spillage of the generation entry that it predicts*" (p. 11). More specifically, VEPC suggested this is due to using a simple five-node PLEXOS modelling approach in a two-phase modelling approach. The view shared was that the REZ development program is determined in a simplified expansion planning phase of the modelling with limited network representation, and therefore has no foresight of the amount of renewable energy spill that might occur hour by hour once the time-sequential modelling with detailed network representation is run.

This is not correct.

As mentioned in the PADR and Additional Consultation Report (and in this PACR), PLEXOS was never employed to implement the analysis for this RIT-T. Nor was a two-phased approach deployed to determine the optimal mix of generation, storage, and transmission investment. This is contrary to the statements on p.12 and p. 57 of the submission. For the detailed market modelling implemented in this analysis, EY used a well-tested commercial model developed in-house that is similarly based on sound economic, mathematical, and engineering principles.

AVP and Transgrid determine that a project of this financial scale deserves commensurate rigour that can only be implemented using detailed large-scale modelling that accounts for many interacting factors and dependencies. To this end, a high degree of granularity is observed in the modelling to ensure that the diversity of all time-varying assumptions – such as demand, rooftop photovoltaics (PV), uncoordinated distributed storage, solar and wind generation – is explicitly accounted for when determining the optimal build mix.

High temporal resolution (hourly) is a critical feature of the modelling. Hourly demand components are split across representative nodes (as discussed in Appendix D of the market modelling report accompanying the Additional Consultation Report[37]). The multi-node modelling approach was developed to capture major substations in Victoria and south New South Wales and explicitly considers line thermal limits, line losses, and stability constraints.

Seasonal and time of day as well as temperature-based ratings are used for the modelled transmission lines.

A DC powerflow, which is an engineering approach to estimating line flow, is also applied to ascertain feasibility of generator dispatch in the market modelling within the technical envelope of the transmission system.

This detailed approach to economic and engineering modelling is contrary to the assertion made in the submission that the model locates all Victoria's load and generation at Melbourne, without awareness of congestion and renewable energy spillages (p.12 and p.57).

When calculating for the cost trade-off between building generation, storage, and transmission infrastructures that meet hourly demand and other policies objectives, the modelling considers relative costs of these assets and technical characteristics of all decision variables in great detail.

A 'decision variable' is the term used for any "decision" that the model is free to make – typically an investment decision, or a dispatch decision. The technical characteristics for a decision variable might be the hourly availability for the wind or solar farm that the model might choose to build, or the transmission line parameters (including reactance and resistance) that would influence the loading on that line during dispatch. AVP and Transgrid note that there are multiple occasions that the submission fails to understand the difference between the model inputs and outcomes.

Modelling at this level of detail on an hourly basis for the next 27 years ensures that the optimal build mix delivers a reliable power system, taking account of the variabilities and uncertainties of weather, but also values diversity between renewable generation sources and correlation with demand. For example, some renewable resources might be more likely to generate when demand for electricity is high, or some wind farms might generate more output at night, when solar farms are clearly not generating.

And because the weather cannot be predicted with certainty many years in advance, multiple weather reference years are used which consider the diversity of weather patterns historically observed (for example, sunny or rainy year, or drought year), and their impacts on wind and solar generation availability as well as demand and hydro inflows. Furthermore, extreme peak demand periods, during hot temperatures, and their impacts on thermal

[37] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/victoria-to-nsw-interconnector-west-vni-west--market-modelling-report-for-additional-options.pdf?la=en.

generator derating as well as transmission line ratings are modelled, with the correlation with wind/solar output driven by that same weather pattern preserved. Capturing these important system features requires modelling at high temporal and spatial resolution as has been done in this RIT-T.

AVP, Transgrid and its consultant EY consider that calculations based on annual averages, as suggested by Appendix D of the submission, are insufficient. While the submission criticises the modelling approach adopted by AVP, Transgrid and EY, it does not appear that the authors have undertaken any detailed modelling using an alternative methodology or approach, or that they have an alternative framework that should be considered.

**AVP and Transgrid acknowledge there is some level of spill of renewable generation in the modelling outcomes. Why does this occur, and is that efficient?**

The short answer is yes, this is efficient and will deliver lower costs to consumers overall. This is because moving wind or solar capacity build to other locations with the objective of reducing spill would increase overall system cost.

What the submission does not accept is that a fair share of this renewable spill is due to renewable generation being surplus to demand requirements at a particular time (economic spill), and not only network congestion.

On the drivers of economic spill:

- Spill can occur due to economic reasons – the spill is an oversupply of available energy relative to demand at certain times. This is well known due to demand varying over the course of each day (the duck curve) and over the course of the year, including due to variations in temperature and humidity. While spilling would seem wasteful, alternatives such as building less generation to avoid economic spill would cause undersupply (shortage) in other times of the year, and building more batteries or pumped hydro energy storage (PHES) to store spilt renewable energy would cost more capital than its marginal benefit. This trade-off between the cost of generation, the cost of shortage, the cost of storage, and the cost of spilt renewable energy determines the level of economic spill. This feature of high renewables systems is seen in other known studies and analysis, such as those from National Grid ESO[38].
- Economic spill is most likely to occur in the middle of the day, when VRE production is highest due to large-scale solar farms being at maximum output and operational demand on the grid is lowest due to distributed PV production. More economic spill also occurs in spring/summer than in winter for similar reasons. As more large-scale solar generation is installed in the power system, this seasonal aspect becomes more prevalent.
- Given the large seasonal changes in wind and solar availability, it would require a disproportionate amount of deep storage to save every megawatt hour (MWh) of energy from VRE over long periods of time. It is cheaper to instead have an amount of wind and solar such that there is regularly excess capacity in some seasons to allow enough capacity in other seasons. In the seasons of excess capacity, there will be economic spill. The lowest-cost combination of wind, solar, storage and transmission investment depends on the relative costs of these technologies and requires consideration of hourly demand, generation availability and transmission network capacity to determine the optimal balance.

On spill due to transmission congestion:

- Congestion does occur and can be part of the least-cost solution – an absence of congestion is a sign of an oversized transmission network, and a high frequency of congestion is a sign of underinvestment in a

[38] National Grid ESO: Future Energy Scenarios, July 2022, at https://www.nationalgrideso.com/document/263951/download.

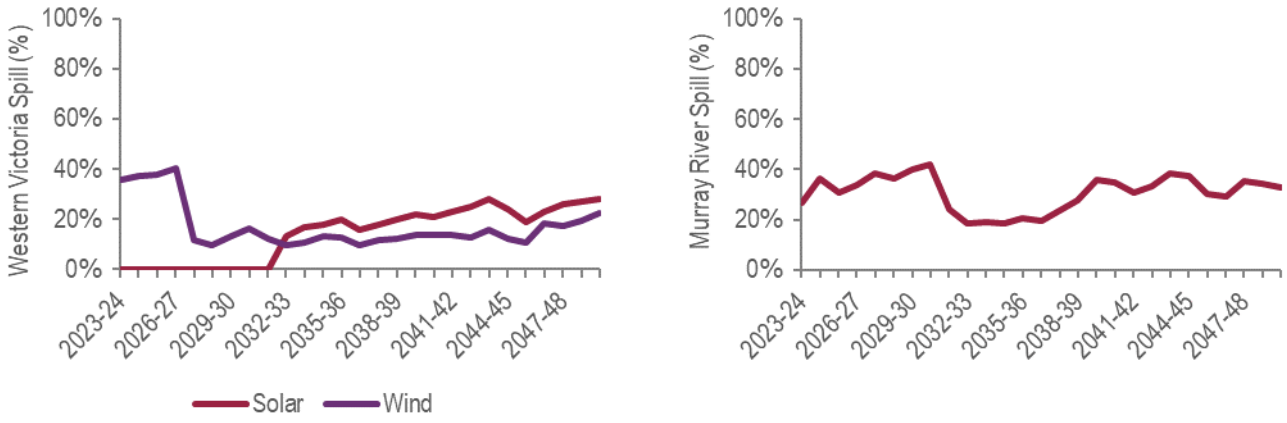
transmission network (or uncoordinated overinvestment of generation in locations with insufficient network capacity).

- Similar to the trade-offs between storage and economic spill already mentioned, the trade-offs between the cost of building further transmission network and the cost of spilling renewable energy during times of network congestion are also considered. The same principle is applied when weighing the cost of development versus the cost of opportunity lost.

The analysis of VNI West forecasts that renewable spill in Western Victoria and Murray River REZs (from Additional Consultation Report market modelling outcomes) significantly decreases after WRL commissioning in 2027 and VNI West commissioning in 2031 (see charts below), although – similar to the NEM-wide trend – the spill is forecast to increase in the 2040s, mainly due to the low carbon emissions volume allowed in that decade. The majority of spill increase in the NEM is forecast to be during the solar operating hours. The combined generation output from the significant growth in distributed PV and build of large-scale solar exceeds assumed NEM system load at times (after consideration of dispatchable pumped/charging load), resulting in some available energy simply not being consumed. While natural to assume that this spill should be soaked up by storage, or flexible loads, there comes a point where, based on CSIRO GenCost 2021-22[39] projections of future capital costs for generation and storage, the incremental value of soaking up the solar does not justify the investment in any more storage. The large-scale solar investment is still a key part of the portfolio of investment in renewable generation, storage and consumer energy resources (such as rooftop PV) required to transition to net zero at least cost, despite this spill.

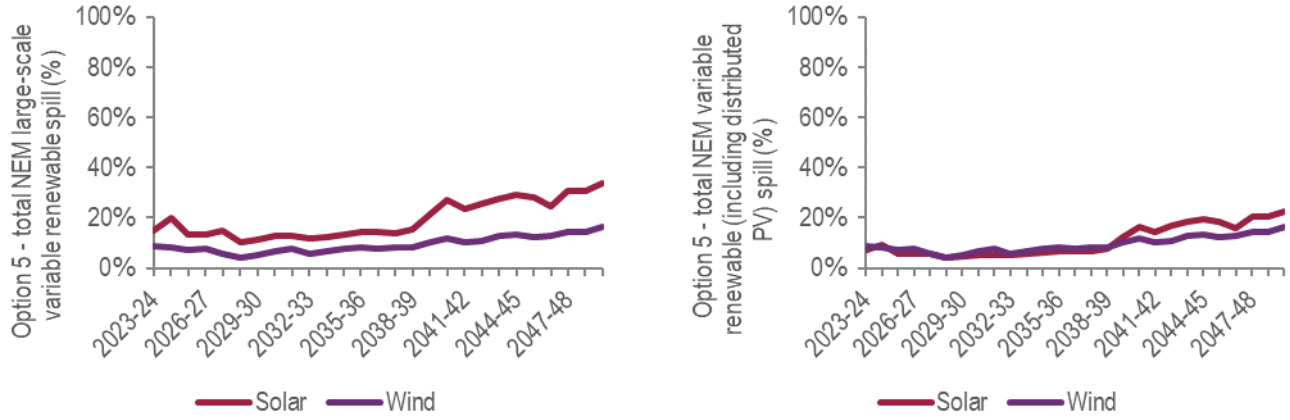
It is noted that the spill amounts shown in Figure 13 and Figure 14 are much lower than the values quoted in the submission. AVP and Transgrid sought clarification from the submitters on how they calculated the spill, and can confirm that the formula they used was correct, but we have not been successful in replicating their energy spill numbers – in particular, the PV spill of 50% in Western Victoria (V2) REZ that is quoted in Table 6 and several other places. The forecast spill presented in EY's market modelling report is calculated hour-by-hour directly from the simulations and represents the amount of available energy that was not able to be consumed in that hour due to either economic reasons or transmission congestion. AVP and Transgrid therefore have confidence in the reported spill outcomes of the EY assessment.

**Figure 13 Spill in Murray River and Western Victoria REZs, *Step Change* scenario, Option 5, Additional Consultation Report**



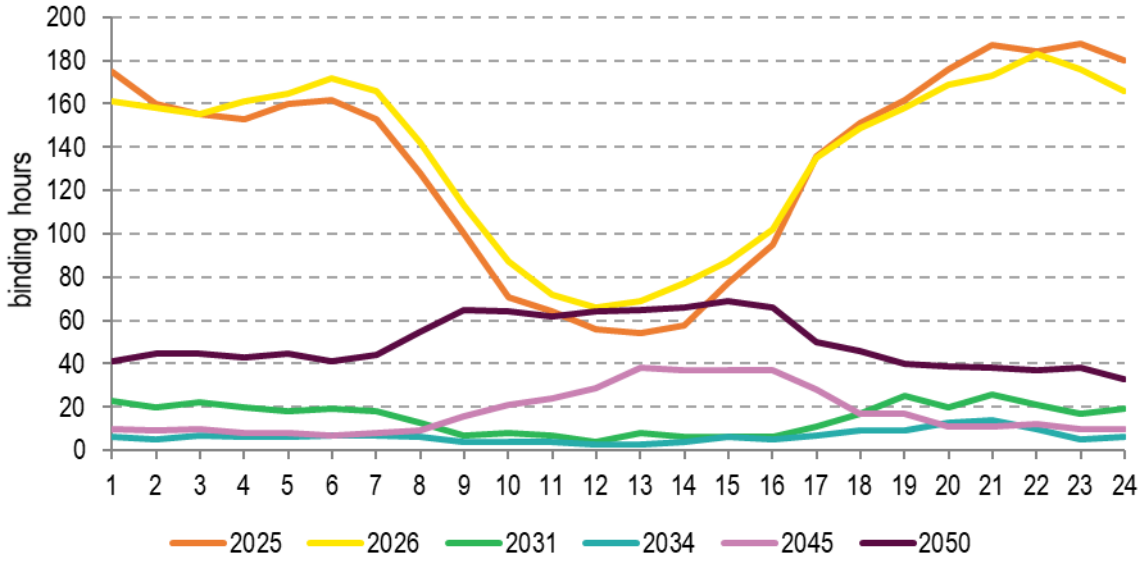

[39] See https://doi.org/10.25919/mb22-c107.

**Figure 14 Average spill NEM-wide, *Step Change* scenario, Option 5, Additional Consultation Report**




The claim that significant congestion is the driver for the extreme spill is not generally correct either. Figure 15 below shows the number of hours that the Western Victoria REZ transmission constraint binds in a few sample years. The constraint is forecast to bind more frequently in early years before WRL and VNI West commissioning (as the network is already congested). Congestion is forecast to reduce in 2030s, before increasing in 2040s, although at much lower percentages than what is seen currently. On the other hand, the spill in the Murray River REZ arises due to a combination of factors, including the seasonality of solar, the lack of resource diversity assumed in that REZ (only solar build is considered, as per the 2021 IASR), network limits and economic factors (further discussion on this is provided later in this section).

**Figure 15 Western Victoria REZ transmission constraint – binding hours by time of day (Option 5, *Step Change*) – Additional Consultation Report market modelling outcomes**




### 7.1.3 Interconnection captures benefits of diversity of generation and load

The submission noted that AVP and Transgrid identified that there were only small differences in the production of renewable energy between the base case and the five options considered in the Additional Consultation Report. However, from that, the erroneous conclusion was drawn that *"it cannot be claimed that WRL-VNI creates any*

*meaningful level of benefit by facilitating the development of renewable electricity in locations where there are better renewable resources"* (p. 53).

This could not be further from the truth.

The modelling forecasts that by harnessing renewable generation from better renewable resources in the western and north-west side of Victoria and other NEM regions, the same amount of renewable energy can be generated using less capacity, thereby reducing the amount of capital investment needed to transition to net zero.

This productivity improvement is evidenced by looking at the breakdown of avoided generation and storage benefits (mainly capital deferral) by technology, as reported in the Additional Consultation Report market modelling results spreadsheets and now in the PACR.

Table 3 shows the forecast share of each category of benefits/and each technology in Option 5 gross market benefits in the *Step Change* scenario in the Additional Consultation Report (that is, the data set on which the submission was based).

The modelling results summarised in this table (based on the Additional Consultation Report Option 5 under the *Step Change* scenario) show that capital cost savings (capex) from establishing VNI West is the dominant source of benefits, accounting for 62% of total gross market benefits across the NEM. Most of these capex savings are from reduction in wind and solar capital investment (58% of total capex benefits and approximately 36% of gross benefits) – building less capacity, while still producing similar levels of renewable energy.

**Table 3 Breakdown of market benefit classes by technology, Option 5 *Step Change* scenario – Additional Consultation Report**

| Gross market benefits (% of total) | Capex | FOM | Fuel | VOM | REZ Transmission Expansion | USE & DSP |
|---|---|---|---|---|---|---|
| ***NEM*** | *62%* | *13%* | *15%* | *0%* | *7%* | *3%* |
| **Black coal** | 0% | 0% | -2% | 0% | 0% | 0% |
| **Brown coal** | 0% | 0% | 0% | 0% | 0% | 0% |
| **CCGT, gas (steam), open-cycle gas turbine (OCGT)/ diesel** | 3% | 0% | 17% | 1% | 0% | 0% |
| **Hydro** | 0% | 0% | 0% | 0% | 0% | 0% |
| **Wind** | 23% | 9% | 0% | 0% | 0% | 0% |
| **Solar PV** | 13% | 1% | 0% | 0% | 0% | 0% |
| **Pumped hydro** | 20% | 2% | 0% | 0% | 0% | 0% |
| **Large-scale battery** | 3% | 1% | 0% | 0% | 0% | 0% |
| **USE & DSP** | 0% | 0% | 0% | 0% | 0% | 3% |
| **REZ Transmission Expansion** | 0% | 0% | 0% | 0% | 7% | 0% |

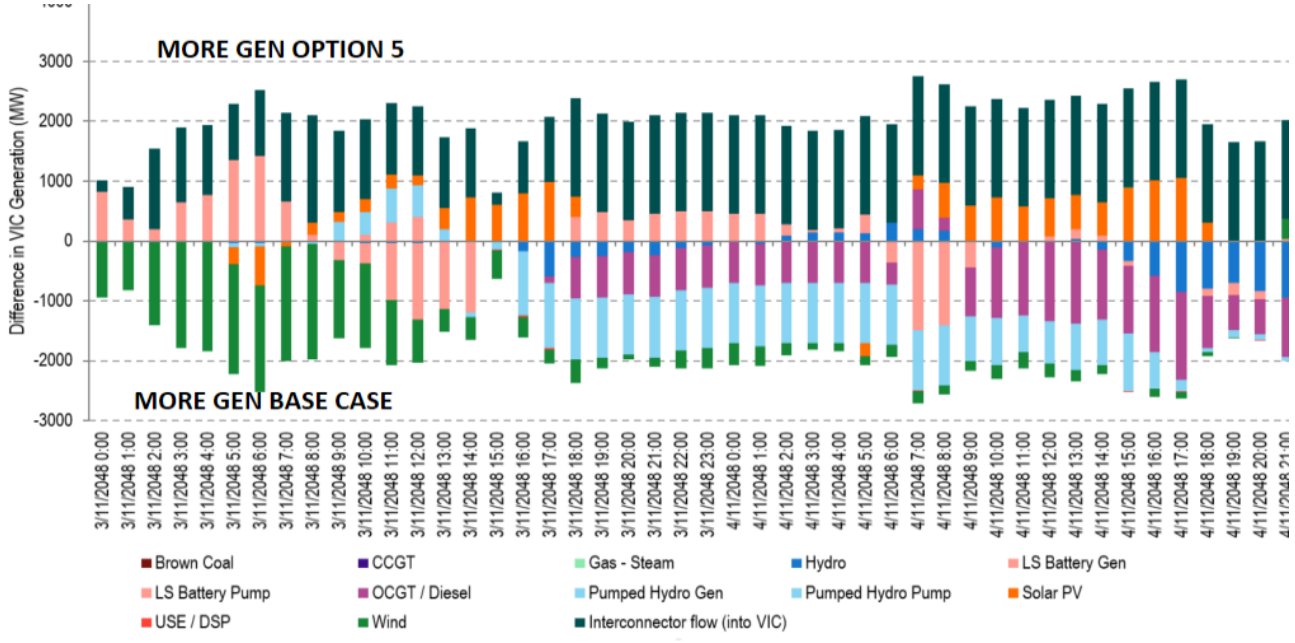
There is also a reduction in capital costs associated with firming capacity such as pumped hydro energy systems (24-hour PHES). Due to the diversity of the renewable energy sources and demand, strengthening the interconnection between New South Wales and Victoria reduces the scale of investment in firming capacity that is

required across the NEM. Approximately 75% of the capital deferral benefits associated with firming capacity (gas, PHES and large-scale batteries) come from PHES, but this only accounts for 32% of total capex benefits, and 20% of total gross benefits. The claim in the submission that "*circa 75% of the total benefit"* was accounted for by avoiding investment in PHES and gas/open-cycle gas turbine (OCGT) in Victoria is clearly inconsistent with these published results.

The sample dispatch forecasts (Option 5 versus base case generation, *Step Change*) in Figure 16 shows that the limited interconnection and REZ transmission capacity in the VNI West corridor in the base case (without VNI West) will require PHES (as well as gas generation) to dispatch for many hours consecutively to ensure demand in Victoria is reliably supplied. In this example, around 1 GW of PHES generates for around 24 hours consecutively, with the upper reservoir going from full to empty. It would then need to pump water from the lower reservoir for a similar amount of time to refill storage. However, with VNI West, the need for investment and generation through these technologies is forecast to reduce as more diversity of generation and resource sharing are allowed with more interconnection to the northern states. Energy imports combined with batteries and additional solar generation are able to cover this low VRE period at lower cost than building and operating more PHES and OCGTs.

As noted in the PACR: Volume 1, Section 2.3, additional small- and large-scale storage is still built in Victoria, to levels commensurate with the Victorian Government's energy storage targets[40], but the scale and depth is less with VNI West, than without.

**Figure 16 A sample period of dispatch in Option 5 vs base case, *Step Change* – Additional Consultation Report market modelling outcomes**




VNI West improves access to better quality, lower-cost generation resources to serve demand across the NEM. In doing this, it captures the benefits of both generation and load diversity. Neither of these are explicit categories of

[40] Under *Step Change* scenario, Option 5A, the model forecasts 3.4 GW of renewable energy storage (including small-scale and large-scale) in Victoria by 2030 (compared to the 2.6 GW target) and 6.2 GW by 2035 (compared to the 6.3 GW target).

market benefits under the RIT-T; these instead result in different patterns of dispatch and capital investment and are therefore key drivers of the capital cost savings (as shown above) and fuel cost savings.

## Generation diversity

The existence of diversity between New South Wales and Victorian renewable energy resources was also dismissed in the submission, and it was described as *"completely fanciful"* that any diversification could materially impact demand for "*super-expensive ultra-long duration storage*" (p. 21).

Contrary to assertions made in the submission, temporal coincidence of renewable energy generation profiles across REZs does not occur all the time for a number of reasons, such as weather events and cloud cover. The broader the geographic range of renewable resources, the lower the temporal coincidence becomes. The actual weather patterns observed in various REZs (and at other locations in the NEM) used to model the wind and solar generation every hour demonstrate this.

Figure 17 below provides a correlation matrix for a sample of the key renewable resource profiles used in the RIT-T analysis. Perfectly correlated profiles have a coefficient of one, uncorrelated profiles have a coefficient of zero, and perfectly anti-correlated profiles have a coefficient of -1. In the model, renewable generation built in the Murray River REZ is solar generation, so the wind profile has not been included on this figure. In its submission, Virya Energy suggested that it has measurements that indicate the wind profiles in the Murray River REZ (V2) and South West New South Wales REZ (N5) are nearly identical as they are in close vicinity, with only relatively flat terrain between the two REZs which results in similar weather conditions concurrently, so it is reasonable to assume that the Murray River correlation to other REZs would be similar to the South West New South Wales REZ.

**Figure 17 Wind and demand correlation**

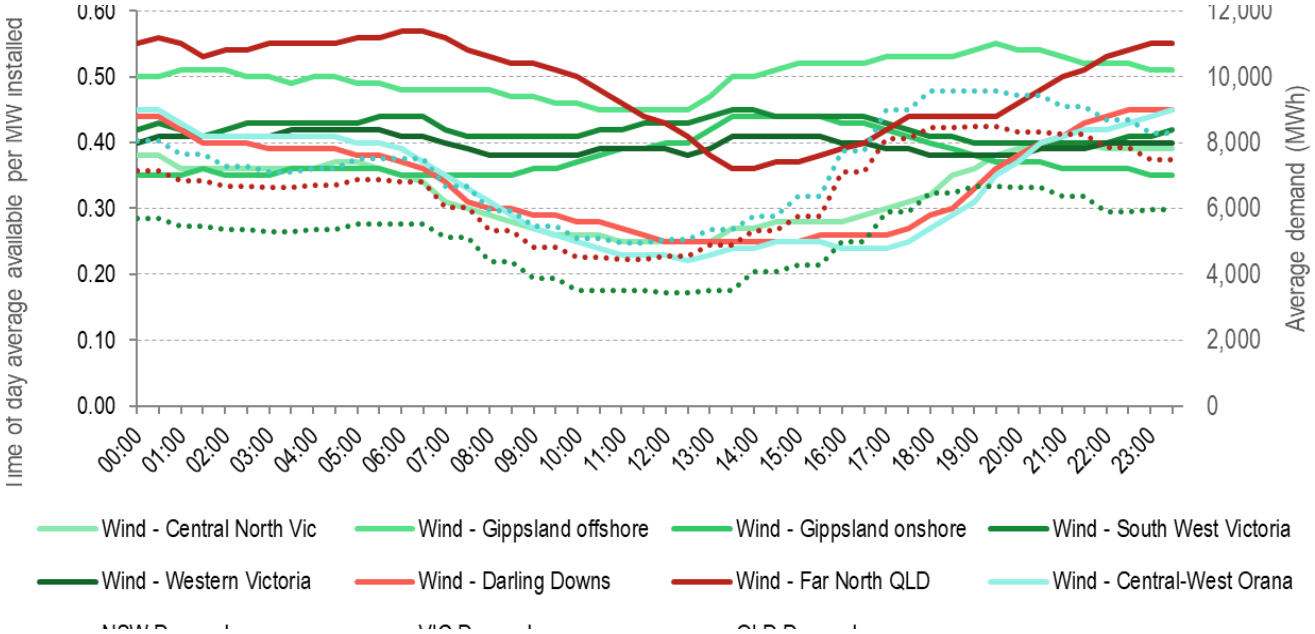
| | Wind - Central North Vic | Wind - Gippsland offshore | Wind - Gippsland onshore | Wind - South West Victoria | Wind - Western Victoria | Wind - Central-West Orana | Wind - New England | Wind - South West NSW | Wind - North Qld Clean Energy Hub | Wind - Darling Downs | Wind - Far North QLD | TAS1 | NSW1 | VIC1 | QLD1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wind - Central North Vic | | 0.39 | 0.43 | 0.42 | 0.6 | 0.39 | 0.24 | 0.79 | -0.07 | 0.16 | -0.14 | 0.15 | 0.11 | 0.16 | 0.11 |
| Wind - Gippsland offshore | | | 0.83 | 0.38 | 0.39 | 0.14 | 0.23 | 0.32 | -0.11 | 0.03 | -0.16 | 0.16 | 0.03 | 0.11 | 0.02 |
| Wind - Gippsland onshore | | | | 0.51 | 0.5 | 0.14 | 0.27 | 0.37 | -0.18 | 0.01 | -0.22 | 0.18 | -0.03 | 0.04 | -0.05 |
| Wind - South West Victoria | | | | | 0.77 | 0.18 | 0.17 | 0.43 | -0.03 | 0.07 | -0.09 | 0.22 | -0.01 | 0.06 | -0.06 |
| Wind - Western Victoria | | | | | | 0.24 | 0.18 | 0.61 | -0.06 | 0.07 | -0.11 | 0.15 | -0.01 | 0.05 | -0.03 |
| Wind - Central-West Orana | | | | | | | 0.32 | 0.46 | 0 | 0.31 | -0.05 | 0.06 | 0.15 | 0.17 | 0.15 |
| Wind - New England | | | | | | | | 0.25 | -0.06 | 0.53 | -0.18 | 0.08 | 0.06 | 0.04 | 0.05 |
| Wind - South West NSW | | | | | | | | | -0.02 | 0.18 | -0.09 | 0.09 | 0.07 | 0.14 | 0.07 |
| Wind - North Qld Clean Energy Hub | | | | | | | | | | 0.18 | 0.81 | 0.02 | 0.11 | 0.15 | 0.05 |
| Wind - Darling Downs | | | | | | | | | | | 0.05 | 0 | 0.17 | 0.14 | 0.18 |
| Wind - Far North QLD | | | | | | | | | | | | 0 | 0.08 | 0.12 | 0.01 |
| TAS1 | | | | | | | | | | | | | 0.58 | 0.66 | 0.4 |
| NSW1 | | | | | | | | | | | | | | 0.79 | 0.81 |
| VIC1 | | | | | | | | | | | | | | | 0.64 |
| QLD1 | | | | | | | | | | | | | | | |

It is evident from Figure 17 that the correlation in wind between Western Victoria and South West New South Wales REZs is 0.61. This is quite strong, but still means that there are a substantial number of periods when the wind is blowing in one REZ but not in another. However, if you move further away, and compare the Gippsland REZ with South West New South Wales REZ, the correlation is only 0.37. Even the correlation in wind between Gippsland REZ and Western Victoria REZ is only 0.5, leaving plenty of room for diversification to occur on an hourly basis.

The actual renewable energy profiles plotted in Figure 18 below, combined with the correlation matrices highlighted above, show that while there is positive correlation between wind and solar resources in Victoria and

New South Wales (as mentioned above), the variability at the hourly level is still sufficient to provide resource diversity, and this diversity is captured in the entire NEM, not only Victoria and New South Wales.

**Figure 18 Time of day profiles of wind and demand**



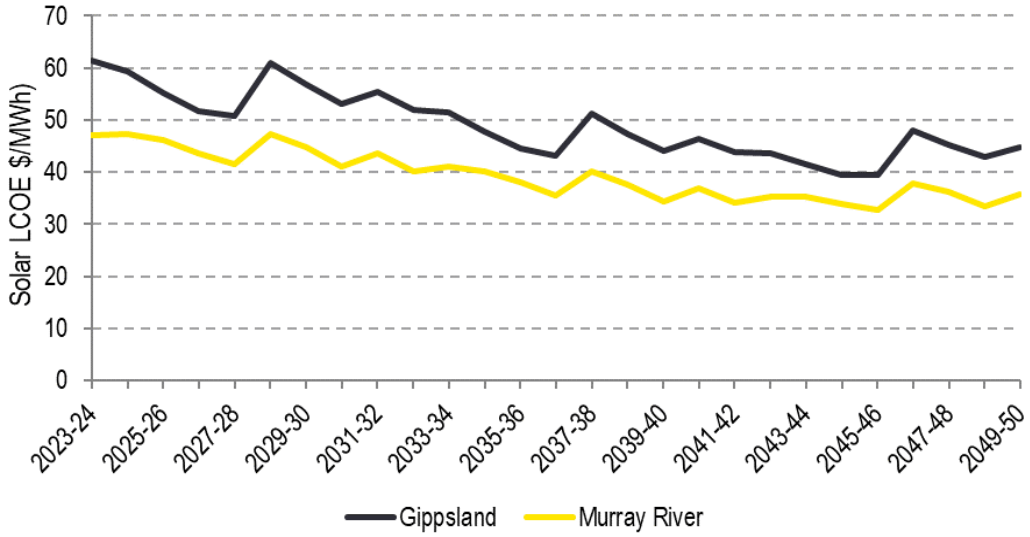

Even for solar farms, which predictably start generating when the sun rises and stop generating when the sun sets, there are differences in the timing of sunrise and cloud cover that lead to correlations between geographically diverse REZs being <1, as shown in Figure 19.

**Figure 19 Solar and demand correlation**

| | Solar - Central North Vic | Solar - Gippsland | Solar - Murray River | Solar - South West Victoria | Solar - Western Victoria | Solar - North Qld Clean Energy Hub | Solar - Darling Downs | Solar - Far North QLD | Solar - Banana | Solar - Isaac | Solar - Central-West Orana | Solar - New England | Solar - Wagga Wagga | Solar - South West NSW | NSW1 | VIC1 | QLD1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Solar - Central North Vic | | 0.87 | 0.92 | 0.84 | 0.90 | 0.78 | 0.82 | 0.74 | 0.80 | 0.78 | 0.87 | 0.83 | 0.92 | 0.94 | -0.66 | -0.76 | -0.59 |
| Solar - Gippsland | | | 0.85 | 0.81 | 0.84 | 0.76 | 0.78 | 0.73 | 0.78 | 0.75 | 0.83 | 0.79 | 0.87 | 0.87 | -0.63 | -0.72 | -0.59 |
| Solar - Murray River | | | | 0.86 | 0.93 | 0.81 | 0.82 | 0.78 | 0.82 | 0.81 | 0.86 | 0.82 | 0.89 | 0.92 | -0.65 | -0.74 | -0.60 |
| Solar - South West Victoria | | | | | 0.89 | 0.74 | 0.75 | 0.71 | 0.75 | 0.73 | 0.78 | 0.75 | 0.83 | 0.83 | -0.58 | -0.71 | -0.53 |
| Solar - Western Victoria | | | | | | 0.77 | 0.79 | 0.73 | 0.79 | 0.77 | 0.82 | 0.79 | 0.86 | 0.89 | -0.62 | -0.74 | -0.56 |
| Solar - North Qld Clean Energy Hub | | | | | | | 0.87 | 0.91 | 0.90 | 0.92 | 0.86 | 0.84 | 0.80 | 0.81 | -0.64 | -0.61 | -0.71 |
| Solar - Darling Downs | | | | | | | | 0.83 | 0.94 | 0.90 | 0.89 | 0.91 | 0.84 | 0.84 | -0.68 | -0.62 | -0.78 |
| Solar - Far North QLD | | | | | | | | | 0.85 | 0.87 | 0.83 | 0.80 | 0.77 | 0.78 | -0.64 | -0.61 | -0.69 |
| Solar - Banana | | | | | | | | | | 0.93 | 0.88 | 0.89 | 0.83 | 0.84 | -0.66 | -0.60 | -0.76 |
| Solar - Isaac | | | | | | | | | | | 0.85 | 0.85 | 0.80 | 0.82 | -0.64 | -0.59 | -0.73 |
| Solar - Central-West Orana | | | | | | | | | | | | 0.93 | 0.91 | 0.91 | -0.73 | -0.66 | -0.68 |
| Solar - New England | | | | | | | | | | | | | 0.87 | 0.86 | -0.72 | -0.62 | -0.71 |
| Solar - Wagga Wagga | | | | | | | | | | | | | | 0.95 | -0.70 | -0.73 | -0.62 |
| Solar - South West NSW | | | | | | | | | | | | | | | -0.70 | -0.74 | -0.63 |
| NSW1 | | | | | | | | | | | | | | | | 0.79 | 0.81 |
| VIC1 | | | | | | | | | | | | | | | | | 0.64 |
| QLD1 | | | | | | | | | | | | | | | | | |

There are also differences in solar irradiance between REZs that mean that, for the same investment dollars, you can get more generation from some locations than others. For example, the levelised costs of energy (LCOE, measured in $/MWh available energy on a rolling reference year basis) for solar in Murray River and Gippsland REZs are shown in Figure 20.

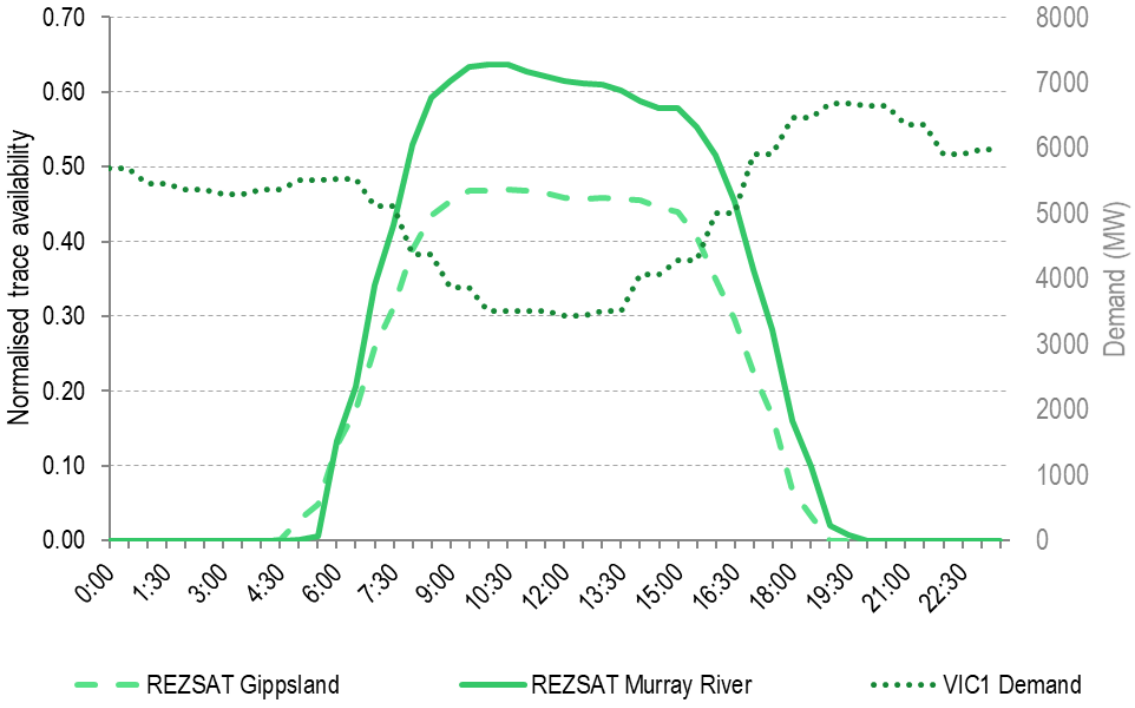
**Figure 20 Levelised cost of energy – comparison between Gippsland and Murray River REZ**




Note: LCOE varies year-to-year due to changes in capital cost and energy available since this depends on the weather year assumed in each forecast year (see Figure 46 of market modelling report accompanying the Additional Consultation Report, at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/victoria-to-nsw-interconnector-west-vni-west--market-modelling-report-for-additional-options.pdf?la=en).

Murray River REZ is favourable for development based on average costs. Furthermore, there is a difference in the daily profile of available energy that favours solar generation from Murray River over Gippsland REZ. This is demonstrated in Figure 21, which shows average daily profiles of available solar generation in the Gippsland and Murray River REZs, as well as Victorian demand, in a sample 2035-36 year. It highlights that Murray River REZ solar generation helps supply the demand in the region in early evening, while Gippsland REZ solar ramps down just before Victorian demand begins to ramp up in the evening.

**Figure 21 Gippsland REZ and Murray River REZ normalised solar generation and Victorian demand on time of day average in 2035-36**



The claim that there are no systematic variations in solar or wind generation between regions of Victoria (p.22) appears to be based on a high-level view of coincidence and not on detailed analysis of similar calibre as that implemented in the VNI West RIT-T.

### Load diversity

Load diversity must also be considered. Even if there was no generation diversity, interconnection can still create capital deferral, fuel cost savings and other market benefits.

This can be demonstrated through example by considering a simple two-region power system, with both regions having a peak load of 1,000 MW. If not interconnected, each region needs to build 1,000 MW of capacity to meet demand (assuming that the capacity is 100% reliable and available at all times). If each region has exactly coincident peak demands, then total capacity for the two regions combined would need to be 2,000 MW and there would be no benefit in building an interconnector between them. If the two regions were not coincident, so that the aggregate peak demand was less than 2,000 MW, then if the two regions were perfectly interconnected, less capacity would be needed.

Of course, this example is overly simplistic. Detailed, high temporal resolution modelling is required to capture this effect across multiple regions with different VRE and load profiles and transmission limits.

The detailed modelling uses nine years of weather patterns (matched to wind and solar production) to inform the overall hourly profile of demand (while considering forecast changes in annual energy, peak demand and Consumer Energy Resources (CER) penetration and orchestration) and the geographic location of demand in the transmission network. The correlation coefficient between demand in Victoria and New South Wales is 0.79.

### Implications for firming capacity

As discussed above, the detailed modelling shows that VNI West takes advantage of the observed diversity between REZs, as well as load diversity, to reduce the need for firming capacity while still maintaining reliability.

This does not mean that there is no investment in firming capacity required across the NEM with VNI West, but it does sufficiently reduce the need for some firming capacity investment in 8-hour BESS, 24-hour PHES and OCGT to justify the investment in VNI West. By 2050, the percentage reduction in total investment needed in firming is relatively small (7% in the *Step Change* scenario with Option 5A). However, in addition to the reduction in total firming capacity needed, deeper storages are replaced with shallower, lower-cost storages, helping deliver benefits to consumers through lower system costs.

## 7.1.4 Further transmission augmentation is not required for Option 5

The submission incorrectly stated that another 220 kV line between Kerang and Bendigo is built in the modelling by 2039-40, or earlier (p. 89) with another 220 kV line between Bendigo and Ballarat possibly in 2042-43 (p. 90). The authors stated that they have drawn that conclusion because 1,600 MW of new renewable generation is built in the Murray River REZ with Option 5, even though the increase in REZ transmission limit for Option 5 in the Additional Consultation Report was 850 MW. They also claimed that it is needed to “keep the lights on” in Bendigo (pp. 14, 27, 30) without any explanation or evidence as to why they consider there to be supply scarcity risks for Bendigo. They estimated that the cost of building such a line would be $350 million, and because this had not been explicitly included in the cost for Option 5, they contended that the RIT-T analysis was biasing against alternatives that were connecting to WRL via Bendigo as well as Kerang.

It is true that in the Option 5 assessment for the Additional Consultation Report, just over 1,600 MW of extra solar capacity is seen in the Murray River REZ by 2050 compared with the capacity in 2024, with just over 500 MW of this capacity built from 2042-43 onwards. It is also correct that the increase in REZ transmission limit for the Murray River REZ was much lower than this, at 850 MW.

However, as explained in this section, this RIT-T ***does not*** allow any further REZ transmission augmentation for the three REZs impacted by VNI West: South West New South Wales REZ (N5), Murray River REZ (V2) and Western Victoria REZ (V3).

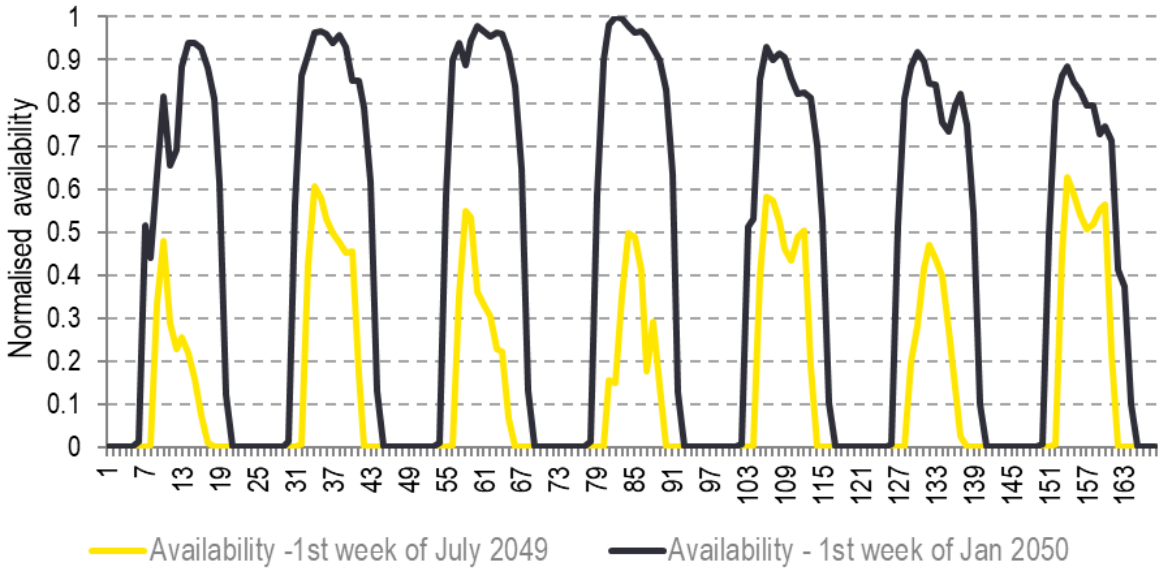
**It is not true that another 220 kV line between Kerang and Bendigo was built in the modelling by 2039-40, or that another line between Bendigo and Ballarat was built in the modelling by 2042-43**.

A large driver for AVP and Transgrid to consider alternate routes in the Additional Consultation Report was in response to concerns raised about building transmission between Bendigo and Ballarat, and the location of the proposed terminal station north of Ballarat. AVP and Transgrid are concerned that such unfounded statements made in the submission will create unnecessary confusion and distress for communities and potentially impacted landholders.

Figure 22 shows the typical summer and winter profile respectively for solar build in this REZ. As shown in the figure, there are many hours where solar output is well below full capacity, and in winter, solar is never likely to generate beyond 60% of its full installed capacity. Therefore, it is possible (and quite frequently observed in both this RIT-T modelling and the ISP modelling) for generation capacity to be built in excess of the REZ transmission limits[41] without being constrained all year round and without the REZ transmission limits being expanded.

The modelling indicates there will be spill in this REZ from 2040 onwards (between 30% and 40% as shown in Figure 13, Section 7.1.2) at times of high solar irradiance, but the modelling forecast that overbuilding solar to fully utilise supply from this REZ in both summer and winter is a lower-cost solution than building less solar and deep seasonal storage to minimise spill.

**Figure 22 Murray River available solar generation – two sample weeks in 2049-50**




[41] This is also observed and noted in the analysis reported in this PACR: Volume 1.

It should be noted that, while the IASR (and therefore the modelling) assumed that only solar would be developed in the Murray River REZ, submissions to the Additional Consultation Report have indicated that there is interest in a sizeable wind farm development in this REZ. If this were to be developed, it would provide some output diversity within this REZ that would change the modelled spill levels currently reported. Further, it should be noted that, for the purpose of this RIT-T, no further network expansion of this REZ was allowed within the planning horizon, beyond the credible options being assessed.

VPEC has questioned whether it would be financially viable for developers to invest in generation that is going to have so much of its output 'wasted' and suggested that this was a highly implausible outcome.

There is no doubt that the power system of the future will be substantially different to the power system of today. The RIT-T market modelling optimises outcomes that deliver the lowest cost to consumers overall and, as such, these are not necessarily the outcomes that would emerge from the current regulatory structure. NEM reform activities, such as the Post 2025 project[42], are being looked at separately by the market bodies to ensure the regulatory and market arrangements are fit to best address the needs of power consumers, today and into the future.

The submission goes further still to list a number of transmission augmentations "*required for Option 5 to expand the hosting capacity of REZs"* (p. 90) and made incorrect inferences that these were included in the Option 5 market modelling:

- Dinawan to Gugga 500 kV line in Option 5 in 2037-38.
- Another 500 kV transmission line by 2041-42 from Sydenham to Ballarat or Bulgana; or a new 220 kV line from Murra Warra to Horsham to Bulgana.
- Another 500 kV transmission from Mortlake to Moorabool to Sydenham.
- An additional 330 kV transmission line by 2039-40 between Dederang and Melbourne.
- New 500 kV transmission line and substation between the Shepparton area and Melbourne by 2045-46.

It would appear these conclusions came from the same incorrect premise that any generation capacity built in excess of the REZ transmission limit requires new transmission augmentation.

**None of these investments are required for Option 5 and therefore are not included in the RIT-T modelling.**

**There are, however, some notional REZ transmission augmentations identified for REZs outside those directly impacted by VNI West.**

Australia is undergoing a once-in-a-generation energy transition, as the NEM transitions to net zero by 2050. As identified in the 2022 ISP, this requires a portfolio of investment in transmission, generation, storage and CER to maintain reliable and secure power supply once coal generation retires. VNI West is one of the actionable ISP projects identified to help in this transition. But further network development in other Victorian REZs (and in other NEM regions) is forecast to be needed in the future to connect more renewable generation to load centres. Noting that the future need and timing of these projects is uncertain, these are identified under various scenarios in the 2022 ISP as Future ISP projects, but also in the Victorian Government's Victorian Renewable Energy Zone's Development Plan[43], in the New South Wales Infrastructure Investment Objectives Report, and in the Queensland Energy and Jobs Plan.

[42] See https://esb-post2025-market-design.aemc.gov.au/.

[43] See Victorian-Renewable-energy-zones-development-plan-directions-paper.pdf.

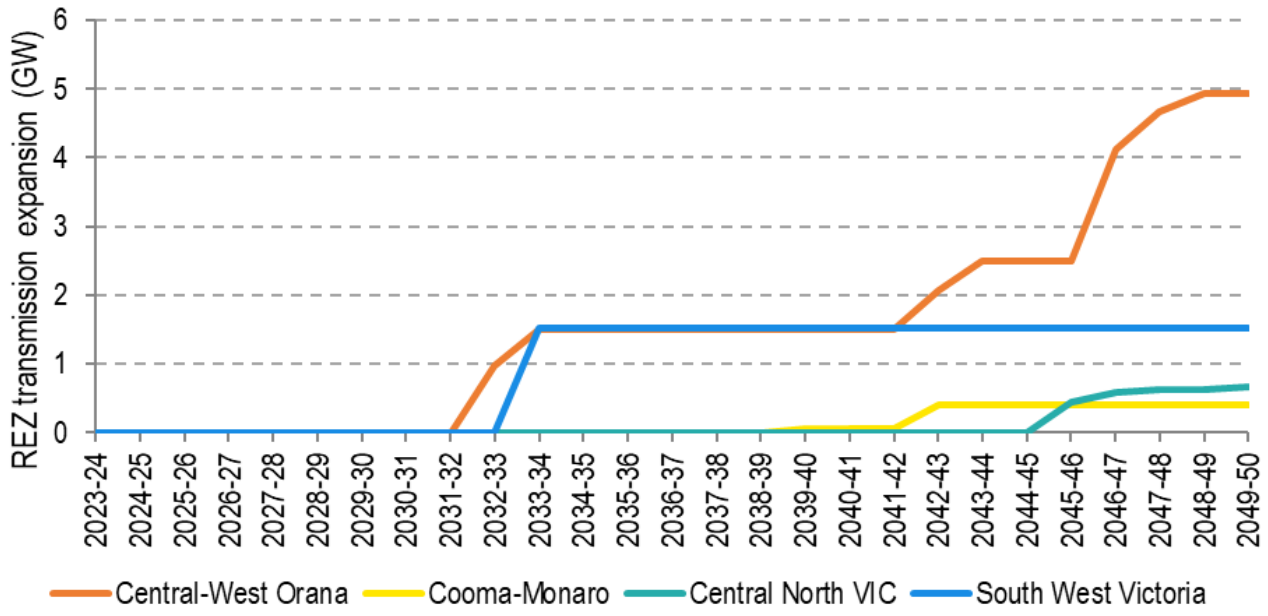
The RIT-T modelling also assesses future network augmentations that may be needed to support this transition at lowest cost, at a high level. This ensures that the benefits of VNI West take into consideration future developments that may also be needed that could influence the current investment and potentially create risks to consumers of over- or under- investment. Specific investments are not identified and assessed, but linear expansion of REZ transmission limits is allowed at additional cost (in all REZs except V2, V3 and N5 that are the focus of this current RIT-T), as a proxy for future projects.

The costs of these future linearised REZ expansions are represented in EYs market modelling results workbooks, worksheet titled “Option 5_REZ Tx cost”, as noted in the submission (p.88). They are calculated by multiplying the $/MW REZ transmission expansion cost for that REZ, by the MW exceedance of the existing REZ transmission limit. Further information is provided in the slide pack prepared for the deep dive session held in March 2023[44].

Network augmentations of the Murray River REZ (V2), Western Victoria REZ (V3) and the South West New South Wales REZ (N5) were not decision variables available to the model in this VNI West RIT-T analysis in the base case or options cases. Well-defined and costed credible options needed to be transparently compared and contrasted to assess how best to meet the VNI West identified need at lowest cost to consumers, and a linear expansion of these REZs over time would not meet this requirement.

The market modelling forecasts that future REZ expansions outside these REZs are forecast to be needed in Victoria and other regions in all cases, though the size and therefore cost calculated in excess of the REZ transmission limit varies. It is outside the scope of this VNI West RIT-T to do the optioneering and cost benefits analysis to determine the specific projects that may best fit the identified future need for each of these other REZs. However, Figure 23 shows the following increases in REZ transmission limits in the RIT-T simulations, highlighting that these future projects may deliver benefits for consumers, consistent with the ISP.

**Figure 23 REZ transmission expansion forecast in the modelling for Victorian and New South Wales – Additional Consultation Report market modelling outcomes for Option 5, *Step Change***




[44] For more information, see slide pack from deep dive submission, presented to consumer groups and VEPC in March 2023 at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-gippsland-rez-presentation.pdf?la=en.

The submission also made the point that all renewables, large-scale battery storage and OCGTs will require 220 kV lines and substations expansions to connect to the transmission network. All generators and storages do need connection assets such as lines and terminal station expansions to connect into the transmission (or distribution) network. Connection costs, sourced from the 2021 IASR workbook, sheet "Connection cost", are modelled for each REZ and other technologies such as OCGT, large-scale battery and PHES (noting that these costs are different in different regions, and also noting the connection costs for PHES are included in the capital costs provided to IASR by Entura).

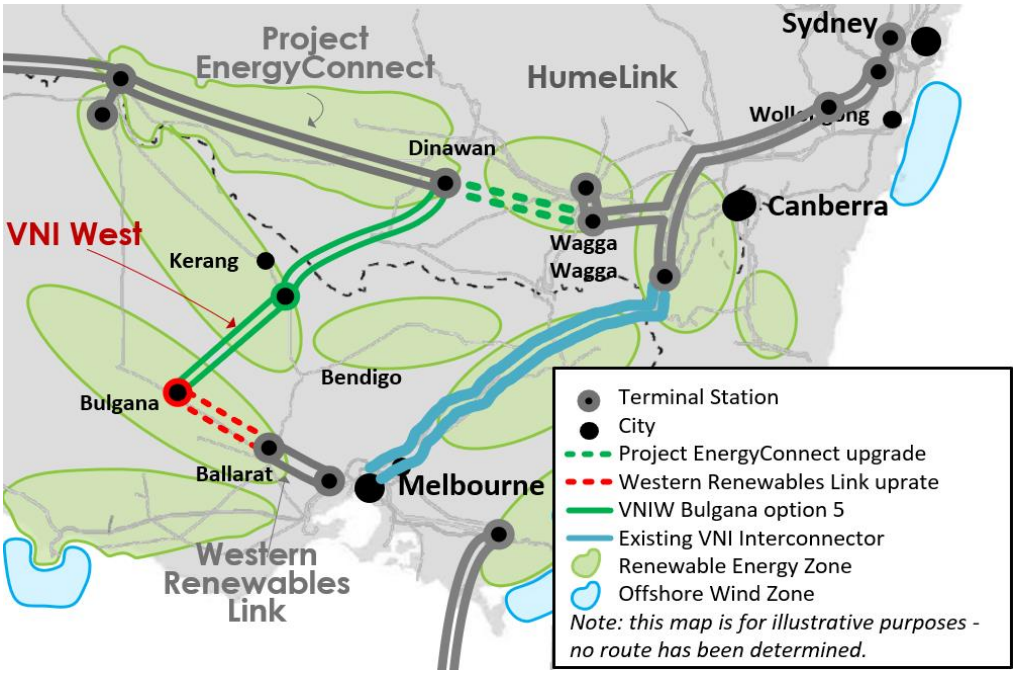
### 7.1.5 Resilience

The submission claimed that the development of VNI West exposes Victorian network to increased risk from natural disasters and terrorism that could hit one of the 1,500 single transmission towers between Sydenham (near Melbourne) and Gugga in New South Wales that make up the entire route, each being a single point of failure: "*An instantaneous and/or prolonged outage of both 500 kV circuits on this transmission line would immediately interrupt Victoria's largest electricity supply, causing a state-wide blackout to Victoria with extensive electricity rationing until the damage is rectified*" (p. 13).

On the contrary, VNI West improves the resilience of the Victorian power system, expanding and improving interconnection between Victoria and New South Wales. As VNI West will be a parallel, diverse, and geographically distant path from the existing VNI between the two states, the likelihood of a single extreme weather event (storm, wind gusts, bushfire, terrorism) impacting the security of both interconnectors is statistically small. Providing diverse paths, such as provided by VNI West, is an established method of improving security of the interconnection between Victoria and New South Wales.

Figure 24 below, while schematic, shows the large geographic separation between the existing VNI, and the approximate location of VNI West Option 5[45].

**Figure 24 Schematic of geographic separation between the existing VNI and VNI West Option 5**




[45] This map is illustrative based on Option 5 in the ACR. Option 5A provides similar geographic separation.

Further, the towers will be designed to the latest Standards and industry practice, which can withstand credible external events, to maintain a secure and reliable power system. The design and specifications of assets will be informed by locational factors and conditions that are expected to occur over the entire asset life, such as expected maximum wind speeds at the line's precise geographic location per Australian Standards, to minimise the risk of asset failure under extreme conditions.

As reported in the Electricity Sector Climate Information (ESCI) Project[46], "*transmission and distribution networks are often exposed to bushfires which can sometimes result in power outages. The outages can be the result of direct physical damage to transmission lines, although this is rare. More often, the outage is due to pre-emptive de-rating or disconnection of supply that is undertaken to avoid the risk of phase-to-phase arcing caused by heat and smoke from nearby bushfires. When designing new transmission lines, designers consider paths that minimise the risks associated with bushfires by avoiding vegetated areas where possible or, if not, then reducing fuel load under lines. They also diversify the risk associated with bushfires by building geographically diverse line paths, aiming to minimise the probability of losing multiple transmission lines to the same event*."

The instantaneous outage of both VNI West 500 kV lines would, under normal conditions, be considered a non-credible contingency. When operating the power system, environmental based abnormal conditions, such as lightning and bushfires, are managed by AEMO in accordance with the NER through the Power System Security Guidelines[47]. This includes reclassifying a non-credible contingency event as a credible contingency event when AEMO determines the existence of abnormal conditions make the occurrence of the relevant non-credible contingency event reasonably possible. The reclassification allows AEMO to manage any specific direct risks to the assets, as well as widespread risks to the power system where the impact to specific assets cannot be quantified.

The interconnected nature of the Victorian network increases the resilience of the power system in the event of a non-credible contingency. For instance, on 31 January 2020, several 500 kV steel transmission towers collapsed on the Moorabool to Mortlake and Moorabool to Haunted Gully transmission lines[48]. These lines were not reclassified at the time, as AEMO was not aware of any abnormal conditions. This event in 2020 is more significant than a comparable non-credible contingency applied to VNI West, yet it did not result in the loss of residential supply in any NEM region.

Importantly, Energy Safe Victoria (ESV) investigated the incident and found that the towers that collapsed were constructed by the SECV between 1980 and 1983. ESV concluded that the cause of the incident was a severe weather event in the area (severe convective downburst). The towers were designed to the standards at that time, which did not consider convective downdraft wind gusts. The latest version of the standard requires designs to consider convective downdraft wind gusts, sometimes referred to as high intensity winds, which are generated by severe thunderstorms.

AEMO agrees that a prolonged outage of VNI West could create supply scarcity risks, just as prolonged outages of large generation assets can create supply scarcity risks, but the probability of this is considered very low.

[46] See https://www.climatechangeinaustralia.gov.au/en/projects/esci/esci-case-studies/case-study-fire-transmission/.

[47] See https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/system-operations/power-system-operation/power-system-operating-procedures.

[48] See https://aemo.com.au/-/media/files/electricity/nem/market_notices_and_events/power_system_incident_reports/2020/final-report-vic-sa-separation-31-jan--2020.pdf.

### 7.1.6 Transmission network charges are not expected to double or triple due to VNI West

Transmission Use of System Charges (TUOS) are the means by which TNSPs (and AEMO, in the case of Victoria) recover the cost of providing share network services and include the cost of building and operating transmission lines. They represent the transmission cost component of electricity bills.

The submission contends that: "*Recovering the capital outlay in WRL-VNI will increase transmission charges in Victoria by at least 70%. The ongoing operation and maintenance charge will increase transmission charges by a further 25%. In round numbers WRL-VNI will therefore double transmission charges in Victoria".*

This PACR demonstrates that investment in VNI West delivers approximately $1.4 billion in net market benefits on a NPV basis. To realise these benefits, it is necessary to invest in transmission and so naturally, TUOS will increase. As there are net benefits to consumers, this is more than offset by the wholesale cost component of electricity bills being lower than would otherwise be the case. AVP and Transgrid have not calculated the impact on TUOS directly but there is no question that an increase in transmission investment will increase TUOS.

In Victoria, TUOS charges for 2023-24 are budgeted to be $650.2 million[49]. In this PACR, VNI West Option 5A is estimated to cost $3.5 billion, with approximately $1.8 billion capex to be spent in Victoria. Using a 5.5% discount rate and assuming a 40-year contract term, this is equivalent to approximately $112 million per year, which is clearly nowhere near the current level of TUOS charges in Victoria. Even after adding operating and maintenance charges, and allowing for a retail margin on pass-through, AVP estimates an increase in the TUOS in the order of 25%, although this will be more than offset by lower wholesale costs to consumers than would otherwise have been charged.

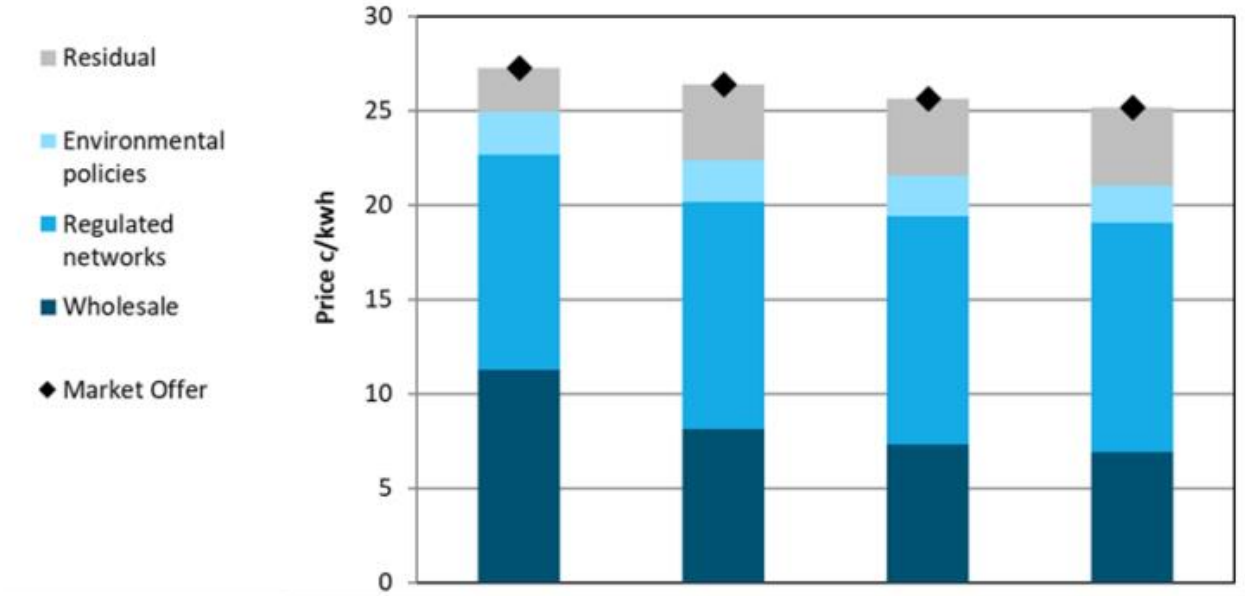
Further, energy consumption under the *Step Change* scenario is forecast to nearly double by 2050 as other sectors electrify in the move towards net zero emissions. As network charges are calculated per MWh consumed, the cost per MWh of this transmission investment will reduce over time.

For context, the AEMC Residential Electricity Price Trends 2021 Report[50] shows that an annual residential bill in Victoria (weighted by customer numbers) in 2021-22 was $1,246, and transmission charges accounted for 6.3% of this bill ($79) as shown in Figure 25 below.

[49] See https://www.aemo.com.au/-/media/files/electricity/nem/participant_information/fees/2023/electricity-transmission-use-of-system-prices-1-july-2023---30-june-2024.pdf?la=en.

[50] See https://www.aemc.gov.au/sites/default/files/2021-11/2021_residential_electricity_price_trends_report.pdf.

**Figure 25 Trends in Victoria supply chain constraints**




| | 2020/21 Base Year | | 2021/22 Current Year | | 2022/23 | | 2023/24 | |
|---|---|---|---|---|---|---|---|---|
| | c/kwh | $/year | c/kwh | $/year | c/kwh | $/year | c/kwh | $/year |
| **Environmental policies** | **2.26** | **$107** | **2.22** | **$105** | **2.15** | **$101** | **2.01** | **$95** |
| LRET - LGC cost | 0.64 | $30 | 0.48 | $23 | 0.35 | $17 | 0.27 | $13 |
| SRES - STC cost | 0.99 | $47 | 1.10 | $52 | 0.97 | $46 | 0.92 | $43 |
| Feed-in Tariff Schemes | 0.37 | $18 | 0.37 | $18 | 0.37 | $18 | 0.38 | $18 |
| VEU | 0.26 | $12 | 0.27 | $13 | 0.45 | $21 | 0.45 | $21 |
| **Regulated networks** | **11.38** | **$538** | **12.03** | **$568** | **12.09** | **$571** | **12.15** | **$574** |
| Transmission | 1.43 | $67 | 1.68 | $79 | 1.68 | $79 | 1.67 | $79 |
| Distribution | 8.66 | $409 | 9.17 | $433 | 9.20 | $435 | 9.23 | $436 |
| ACS Metering | 1.29 | $61 | 1.18 | $56 | 1.21 | $57 | 1.24 | $59 |
| **Wholesale** | **11.26** | **$532** | **8.13** | **$384** | **7.32** | **$346** | **6.89** | **$325** |
| **Residual** | **2.38** | **$112** | **3.99** | **$188** | **4.06** | **$192** | **4.14** | **$196** |
| **Market Offer** | **27.29** | **$1,290** | **26.37** | **$1,246** | **25.62** | **$1,211** | **25.19** | **$1,191** |

Source: AEMC analysis
Note: All figures are exclusive of GST

## 7.2 Concerns raised in relation to market benefits

### Summary of submissions

| Item of feedback | Submitters |
|---|---|
| **Some submitters were questioning why VNI West would delay investment in renewable energy in Victoria**<br>• Why would VNI West result in less wind output before investment and after 2045, and less solar output between 2030 and 2036, compared to the base case?<br>• Is it realistic to assume that the Victorian Government would support less wind and solar projects being built in Victoria prior to 2031, so that replacement projects can be built in New South Wales and Queensland later? | VEPC/Bartlett<br>Ted Woodley |
| **REZ transmission benefits are not legitimate**<br>• Assumed REZ transmission development should not be in the base case. If it is forced in, then there can be no 'REZ transmission saving' benefits. | VEPC/Bartlett |

| Item of feedback | Submitters |
|---|---|
| • Other optimal development path investments should not be in the base case. Also states that VNI West cannot be credited with benefits from deferring other future ISP projects. | |
| Fuel saving benefit is not plausible and should be disallowed (reducing benefits of Option 5 by $800 million present value) | VEPC/Bartlett |
| Terminal value not reasonably established | VEPC/Bartlett |
| Retrofitting coal fired power stations' boilers with steam/nuclear units avoids the need for transmission investment | Larissa Koroznikova and Jim Stewart |
| Other benefits-related questions and comments:<br>• Why does VNI West result in additional coal generation between 2030 and 2039?<br>• How would VNI West vary hydro output, and how could VNI West result in hydro spilling?<br>• Why would the prospect of VNI West being built influence the decisions of developers of Victorian renewable generators and batteries to defer or avoid their construction and then also to decide to relocate those renewable generators interstate many years later in supposedly windier and sunnier locations interstate, particularly in light of the fact that Victorian wind and solar resources are similar/superior?<br>• Why have cumulative gross benefits increased by $1 billion (35%) and net benefits by $600,000 (doubled) since the PADR?<br>• Savings in voluntary load curtailment are overstated<br>• Long duration storage (24-hour PHES) in Victoria in the base case is implausible, and its avoidance with VNI West accounts for circa 75% of the total benefits.<br>• ISP TOOT methodology double-counts benefits from other actionable ISP projects lying along the same development path.<br>• Modelling outcomes require Victorian OCGTs to operate 1,000 hours per year, which is unrealistic (and would have major emissions impacts).<br>• Offshore wind and discount rate sensitivities should form part of the core scenarios. | Ted Woodley<br><br>VEPC/Bartlett |
| **Carbon budgets**<br>One submitter asked why it was necessary to model a carbon budget at all | Ted Woodley |

## Response

### The development of VNI West will delay investment in renewable energy in Victoria

The development of new renewable energy in Victoria does not need to wait for the completion of VNI West. There is sufficient network capacity to cater for around 4 GW of extra renewable energy generation assets before 2031-32 in the *Step Change* scenario (optimal timing for VNI West), see Figure 26.

Contrary to the submission claims, the modelling shows that the investment in renewable capacity in the base case and Option 5 is relatively similar before the VNI West commissioning (see Figure 26). Furthermore, Option 5 is forecast to reduce spill in Victoria (see Figure 27), resulting in a slightly higher yield of renewable energy in Victoria at the time of VNI West commissioning.

**Figure 26 Renewable build in Victoria – *Step Change* scenario - Additional Consultation Report market modelling outcomes**

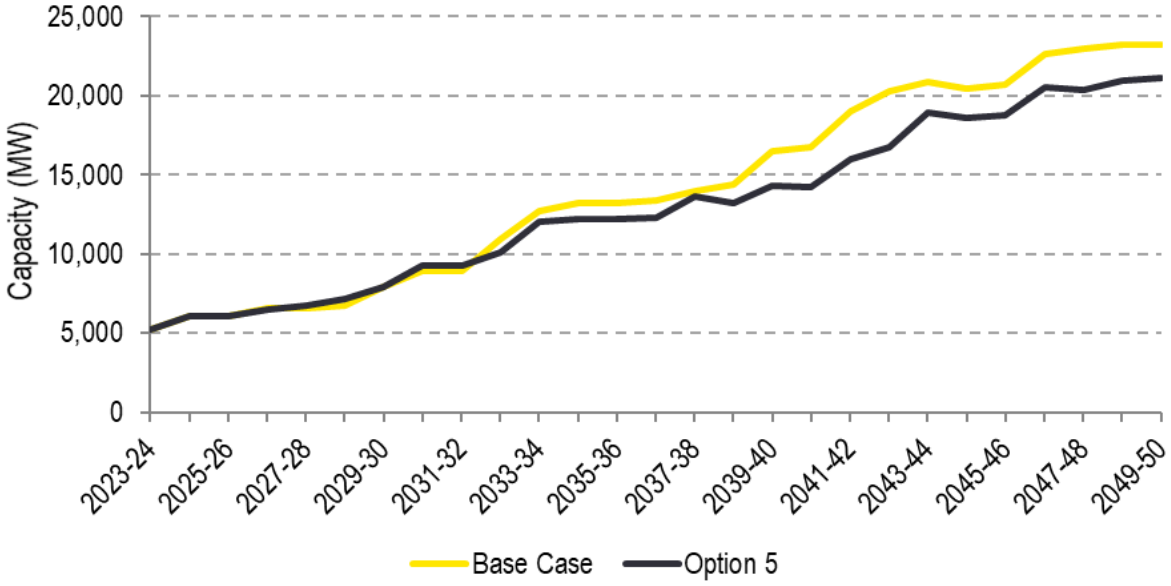
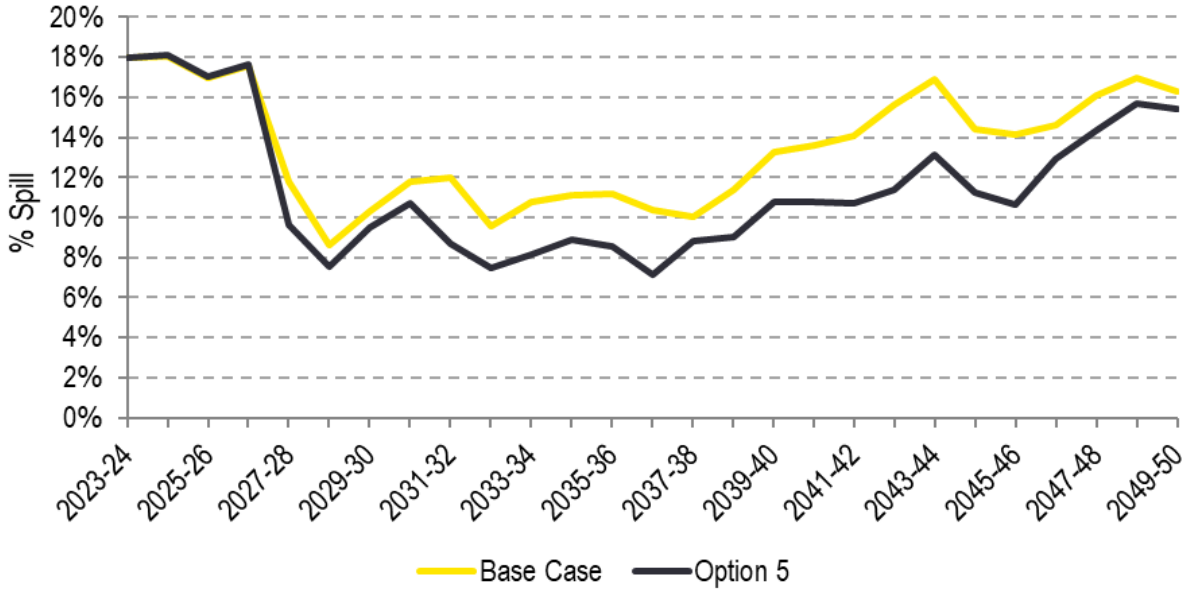



**Figure 27 Large scale renewable spill in Victoria – *Step Change* scenario - Additional Consultation Report market modelling outcomes**




Forecast renewable energy build rates in the 2020s in Victoria under both cases (with VNI West and the base case) are similar to recent historical trends in the *Step Change* scenario – averaging 450 MW/year of additional large-scale wind and solar energy.

While some of the market benefits of VNI West are derived from deferring or avoiding investment in renewable capacity in Victoria (as discussed earlier in this chapter), this is forecast to occur in the longer term – after the commissioning of VNI West. Renewable investment in Victoria with VNI West is forecast to be similar to the base case during the 2020s in the *Step Change* scenario.

In the longer term, VNI West is forecast to result in a lower need for renewable investment and renewable generation in Victoria. However, there is still significant investment in wind and solar in Victoria relative to today, and all the legislated and recently announced renewable energy targets in Victoria are met in VNI West Option 5 (see Appendix A of the market modelling report for the Additional Consultation Report, noting this is also the case in the PACR outcomes). Furthermore, across the NEM as a whole, the level of renewable generation with VNI West is similar to the base case in the longer term.

### REZ transmission benefits are not legitimate

The submission claims that other REZ transmission developments should not be assumed to occur in the base case on the assumption that there can be no 'REZ transmission saving' benefits if REZ transmission development is forced in. The submission further claims that VNI West cannot be credited with benefits from deferring other future ISP projects and therefore these should not be included in the base case.

A similar comment was made by the same submitter in a very late submission to the PADR (received January 2023), that was responded to in the VNI West PADR Submissions[51] response report published in February 2023. Please refer to Section 2.7 of that document for the detailed response provided at that time.

As noted in the previous response, the AER CBA Guidelines for actionable ISP projects require the market modelling to include all committed and ISP actionable network augmentations. This includes EnergyConnect, WRL, HumeLink and Marinus Link.

As for the REZ transmission augmentation, the modelling implemented in the VNI West study assumes that other REZ transmission development is possible in all simulations (base case and VNI West case) to ensure that all benefit and cost comparisons are assessed against a credible future scenario. The analysis implemented in the RIT-T forecasts that, compared to the base case, VNI West reduces the need for some of this investment in REZ transmission and generation development, ultimately reducing the cost of the transition to net zero.

The submission failed to consider that if REZ transmission upgrades are not allowed in either the base case or the options case, the value of VNI West in enabling more interconnection and unlocking transmission for the REZs in the VNI West corridor would increase. Obviously, there will not be REZ transmission savings, but many of the other classes of market benefits would increase, such as capex savings.

### Fuel saving benefit is not plausible and should be disallowed (reducing benefits of Option 5 by $800 million present value (PV))

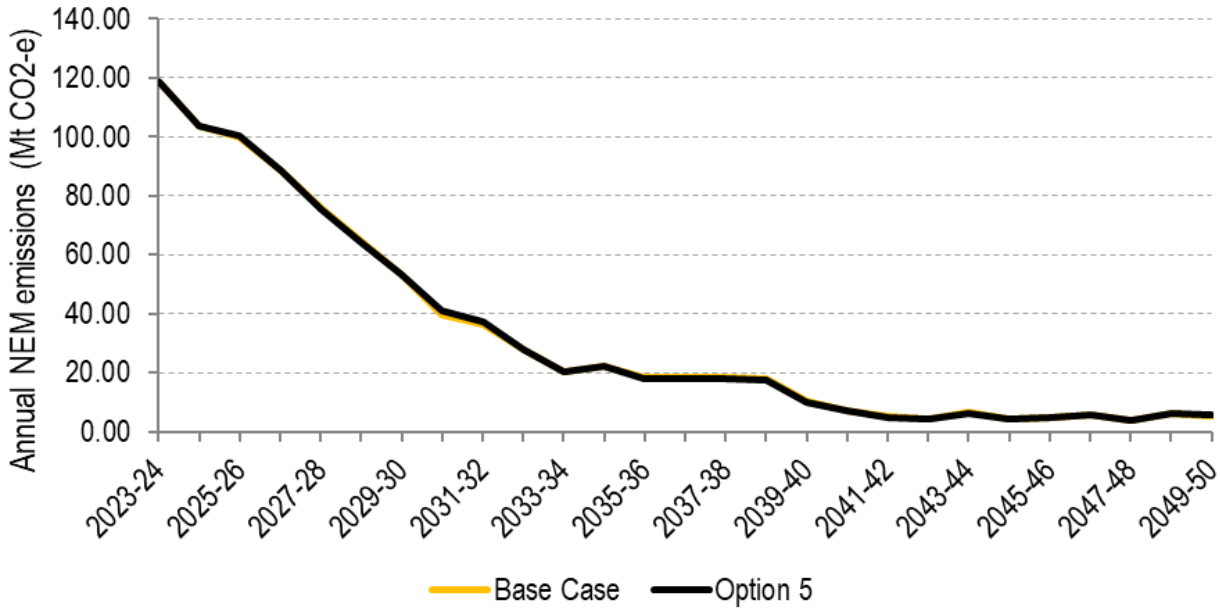
The submission claimed that the spilled renewable energy causes Victorian OCGTs to operate 1,000 hours per year and that that level of operation from OCGT is unrealistic and would have major emissions impacts. It also claimed that allowing efficient expansion of the Gippsland REZ would avoid both of these outcomes.

The cause, impact, and the justification of the renewable energy spill can be found earlier in this chapter and is not repeated here.

Figure 28 below shows the estimate of emission production in both the base case and the VNI West case. It shows that even with the emissions from these OCGTs, the total NEM emissions are well within the scenario's assumed budget allowed for Australian to meet its carbon reduction policies. Although it emits carbon, when used to back up VRE, collective emissions from OCGTs do not breach the carbon budget.

[51] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-padr-submissions.pdf?la=en.

**Figure 28 NEM emissions, *Step Change* scenario – Additional Consultation Report market modelling outcomes**




The submission failed to understand that the modelling is at an hourly resolution, and gas generation is occurring during the times that renewable generation is typically low, while the majority of renewable spill (if not all) occurs during the time gas is not running. The submission also failed to recognise that if gas generation is not allowed in the base case, the NEM demand has to be met with more costly generation (as the model is a least-cost optimisation). This could be building more renewables, which spill more as they are not required in other periods, and/or building renewables in combination with storage to supply the demand. This would simply result in more benefits with VNI West, as it unlocks the interconnection and relevant REZ transmissions. Again, the fuel cost savings would decrease, but at the cost of significantly more benefits in other categories, such as capex savings.

### Terminal value not reasonably established

Section 3.3 of the Additional Consultation Report provides a discussion of the materiality of benefits beyond the assessment period, as well as the use of terminal values, in response to points raised by stakeholders.

The PADR clearly explained that beyond the end of the outlook period, the gross benefit is greater than the annualised cost of the project, hence extending the analysis beyond the outlook period would only make the benefits even larger and further solidify the case for VNI West.

### Sensitivity assumptions should form part of core scenarios

The submission suggested that WRL-VNI West options would have a negative net benefit had higher discount rate combined with offshore wind been modelled in the base case rather than sensitivities.

The development of offshore wind in Victoria requires Federal and Victorian regulatory and legislative changes, and the timing of any legislative package is uncertain.

As outlined in Section 6.4.1 of this PACR: Volume 1, the Victorian Government's offshore wind policy does not yet meet the NER criteria for being sufficiently developed to be included in the base case for the assessment. It is therefore appropriate to treat this policy as a sensitivity.

The adoption of the 5.5% discount rate is consistent with the AER CBA Guidelines. The Draft 2023 IASR proposed a central discount rate of 7.0%, which is an increase from the 5.5% in the 2022 ISP.

The sensitivity analysis presented in Section 6.4.1 of this PACR: Volume 1 captures the impact of changing the discount rate assumption to 7.5% and confirms that the NPV of the options (weighted across all scenarios) remains positive and that the ranking of the options remains unchanged.

Further, Section 6.4 of the PACR: Volume 1 presents the results of a sensitivity that investigates how the results change with higher discount rates, as well as assuming the Victorian Government's offshore wind commitments under the *Step Change* scenario. Option 5 is found to be ranked ahead of Option 3A under both higher assumed discount rates and the Victorian Government's offshore wind commitments. Further, a discount rate of greater than 8.2% would be required for Option 5 to have negative net benefit with the Victorian Government's offshore wind policy assumed to be in place. AVP and Transgrid note that this boundary rate for Option 5 is above the Draft 2023 IASR central discount rate estimate of 7% (but below the higher estimate of 9%).

### Retrofitting coal-fired power stations' boilers with steam/nuclear units avoids the need for transmission investment

One submission noted that the only part of existing coal-fired power stations that produce $CO_2$ gas is the steam boiler, and that the remaining turbines/generators, outgoing electrical substations and transmission lines all are capable of continuing operation if the steam boiler was substituted by a steam supply unit not coal-fired. It was claimed that such a substitution would have substantial economic benefits including continued employment, far less need for new transmission lines, and meeting the critical identified need for large rotating generator sets to supply inertia for grid stability and security. The submitter suggested that upgrading coal-fired boilers to supercritical steam performance would reduce $CO_2$, followed by gas retrofitting the boilers which would halve any $CO_2$ per electrical unit generated, and then finally replacing the boilers with small nuclear reactors which would reduce $CO_2$ output to zero as the government requires by 2050.

These technologies were not considered. They did not feature as options in the ISP 2022 based on technology inclusion principles aligned with the CSIRO GenCost 2021-22 report. They were therefore, consistent with the CBA Guidelines, not adopted for this RIT-T. It is further noted that currently nuclear power in electricity generation is prohibited by Australian laws. There is only one nuclear reactor in Australia and that is used for scientific research.

### Other benefits-related questions and comments

AVP and Transgrid consider that many of these questions have already been answered in the response to the PADR submissions[52]. Please refer to that document for more detailed answers. In brief:

- The cumulative gross and net benefits increased between the PADR and the Additional Consultation Report, due primarily to changes to the carbon budget treatment, extension of the modelling horizon, and treatment of EnergyConnect enhanced. These changes were all in response to feedback received during the PADR consultation.
- The choice of scenarios and assumptions for use in the VNI West RIT-T are set out in the 2022 ISP and the IASR used for that publication. The offshore wind sensitivity is not yet legislated and does not meet the criteria required to include as a scenario. For that reason, it was modelled as a sensitivity rather than forming part of

[52] At https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/vni-west-rit-t/vni-west-padr-submissions.pdf?la=en.

the core scenarios. For that same reason, combinations of offshore wind plus other sensitivities (such as a higher discount rate) were not included as part of the core scenarios. However, the impact of any changes in these inputs will be monitored as the project progresses over time, including through ISP feedback loops.

- The RIT-T modelling includes other major network projects that are included in the 2022 ISP optimal development path in both the counterfactual base case (without VNI West) and the option cases. This means that only the *incremental* costs and benefits of the VNI West options are captured in the modelling, and there is no double-counting of the expected benefits between VNI West and other major projects in the NEM. None of the benefits of the other major network projects, relative to a base case where they are not assumed, have been captured as part of this RIT-T.

Some of the specific questions regarding why VNI West results in additional coal generation between 2030 and 2039, how VNI West varies hydro output and could result in hydro spill, or why it may lead developers to choose to invest in different locations, are difficult to answer in isolation. The modelling, like the NEM itself, is detailed, complex and has a lot of interdependent moving parts. Making a change to one part of that system, such as adding VNI West, can have multiple flow-on impacts and deliver widespread power system benefits as the system re-optimises capacity development and dispatch across the NEM around that change.

In general terms, some explanations are offered below:

- As VNI West increases the transfer capacity between New South Wales and Victoria, it enables resources between both states to be shared more efficiently. At times, this may mean that more of the relatively low-cost existing black coal-fired generation is dispatched and shared with Victoria whereas, without VNI West, Victoria may have needed to rely on gas-fired generation in those periods. However, this only occurs if the model is satisfied that the carbon budgets are still maintained.
- Due to differences in the renewable generation profiles of different REZs (as discussed earlier in this chapter), the development of more renewable generation in South West New South Wales REZ, Murray River REZ and Western Victoria REZ can lead to other REZs being developed as their generation profiles better complement those renewable resources, and the load. That is not to say that developers who have already purchased land and have projects that are well progressed will abandon their projects, but rather that VNI West will provide different investment signals for new developments that are not yet well advanced.
- This can also lead to changes in how often Victoria might be importing from, or exporting to, neighbouring regions. It is quite conceivable that battery storages that were being developed in one state may now be better developed in another to support load or to be closer to the renewable generation source.
- Similarly, the greater sharing of resources between NEM regions will mean that in low demand periods, there is more competition between low marginal cost renewable resources (typically renewables with zero short run marginal costs), and generation spill could occur in different regions (including hydro spill in Tasmania).

On the question of PHES and the plausible foundation for the capital deferral benefit included in the net market benefit analysis, as discussed in Section 7.1.3 of this report, long duration (24 hour) PHES is needed in the base case to help better match renewable generation supply with Victorian demand to maintain reliability for consumers. Strengthening interconnection between Victoria and New South Wales helps do this in a more efficient manner by sharing resources and providing greater access to Snowy 2.0, resulting in avoiding the need for this PHES in Victoria. As shown in Table 3 of this report (also in Section 7.1.3), the capital deferral benefit amounts to 20% of total gross benefits, not the 75% as claimed.

The VEPC submission claimed that:

> *…the assumption that PHES is installed in VIC in the Base Case demands plausible explanation. (p. 57)…*
>
> *…there is no good reason for PHES to have existed in the Base Case in VIC, and by implication the vast bulk of AVP's claimed benefit for WRL-VNI in substituting it in NSW has no plausible foundation. (p.60)…*
>
> *Had the Base Case been correctly modelled by allowing the efficient development of the Gippsland REZ, there would have been no or much smaller spilled renewables and the interconnectors would not have constrained in Option 5 (and even moreso in the Base Case). The model would not have installed PHES in Victoria in the 2040s and the vast bulk of the benefit of WRL-VNI would have disappeared into thin air (p. 60).*

It is important to note that due to the number of interacting factors that must be considered in determining market benefits, when adjustments are made to isolate the specific impacts of alternative assumptions, a re-optimisation of the model is required. Striking the capital deferral benefits of PHES from the total assessed market benefits based on simple qualitative reasoning without quantitative modelling, as suggested on p.23 of the VEPC submission, would not capture the interdependencies of all factors relevant to decision-making. It would also not capture the marginal impact of the changes in the assumption. For example, if PHES was not allowed to be built in Victoria in the base case, the base case (without VNI West) would need to re-simulated under this alternative input assumption to determine how else to firm renewable generation to maintain reliability in Victoria. Removing PHES would result in a more expensive investment and dispatch solution in the base case and likely improve the benefits of VNI West.

On the remaining matters:

- AVP and Transgrid agree with VPEC and Bartlett that voluntary load curtailment is *not* a material benefit in this VNI West RIT-T. Under Option 5 in the Additional Consultation Report, benefits associated with reducing voluntary load curtailment amounted to less than 3.5% of the gross market benefits.
- A carbon budget has been modelled to give effect to Australia's net zero 2050 emissions commitment. This RIT-T relies on the ISP carbon budgets that have been developed through extensive consultation with stakeholders, including climate scientists.

# 8 Other matters raised in submissions

## 8.1 Interaction with other NEM projects

Submissions raised questions about the interaction of VNI West with other NEM projects, including:

- WRL.
- EnergyConnect.
- Snowy 2.0.

### 8.1.1 Interaction with WRL

Submissions relating to WRL questioned the analysis and consideration of connection points, joint analysis of VNI West and WRL, and whether the MCA applied for VNI West could be considered in the WRL project.

#### Summary of submissions

| Item of feedback | Submitters |
|---|---|
| • Alternative WRL connection points were suggested:<br>– "*In Appendix A1 an alternative connection point via Donnybrook instead of a new terminal station north of Ballarat is noted as having been ruled out in the 2020 ISP. No other alternative connection sites for the western renewables link 500 kV appear to have been considered. Alternative connection options could include new Cressy 500 kV terminal station or existing Moorabool 500 kV terminal station*."<br>• VNI West should be modelled with the WRL.<br>• Submissions noted that as any changes to WRL as a result of VNI West are included in the VNI West economic assessment, the projects are interdependent and should be considered holistically as the one integrated project.<br>• Submissions questioned if this interdependency would skew the cost benefit calculations carried out during the RIT-T for the WRL.<br>• MCA should be applied to WRL.<br>• Submissions considered that the NEVA Order should allow for an MCA to be applied to the WRL considering "*WRL no longer requires a point A to B to C route, meaning the route from A (Sydenham) to B (Bulgana) can be completely reassessed*." | Jacobs<br>Moorabool Shire Council |

#### Response

##### Connection points

A number of options for the WRL project were investigated as part of its RIT-T process[53]. These included an option connecting to Moorabool (Option B3), which was found to deliver lower net market benefits than the preferred option connecting to Sydenham (Option C2). As outlined in the *Western Renewables Link project – analysis conducted under the National Electricity Rules* report[54], with Option B3 it is not possible to share the 220 kV lines from Ballarat to Moorabool without reducing the capacity (and market benefits) of VNI West significantly, and therefore VNI West would need to connect into Sydenham Terminal Station. The preferred

[53] See https://aemo.com.au/initiatives/major-programs/western-victorian-regulatory-investment-test-for-transmission.

[54] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/victorian_transmission/2022/aemo--clause-5164z3-analysis--wrl-project--november-2022.pdf.

option, Option C2, delivered market benefits compared to the base case due, in part, to the ability to share the 500 kV components to Sydenham with VNI West, reducing the cost to deliver VNI West compared to the base case without Option C2. Option B3 did not deliver these market benefits because the cost of delivering VNI West was the same with Option B3 included as in the base case (there were no shared components).

The 500 kV network in South West Victoria already has high levels of wind generation connected to it. Connecting WRL/VNI West to this location would likely lead to increased levels of wind generation curtailment in these REZs. This connection location would likely also limit VNI West capacity due to the longer line length between network nodes, reducing power flows and net market benefits. Additional network augmentation would also likely be required to Sydenham, further increasing costs.

#### Joint analysis

Section 2.6 of the February 2023 report on PADR submissions outlines how the interaction with WRL has been modelled, consistent with the RIT-T framework. Section 6.3 of this PACR: Volume 1 presents the results of sensitivity testing that addresses concerns raised that the net market benefits of the two projects combined have not been adequately assessed.

#### MCA application to WRL

The WRL project has completed the RIT-T process and has progressed through the contestable appointment of AusNet Services in December 2019 as the developer of the new infrastructure. AusNet Services will build, own, operate and maintain the new infrastructure[55], and AusNet Services is currently preparing the Environment Effects Statement.

The 2022 ISP considers the WRL as an 'anticipated' project (with a delivery date of July 2026) and includes it in its optimal development path[56]. Refer to Section 3 and Section 8.4 of the PACR: Volume 1 for further detail.

### 8.1.2 EnergyConnect

Submissions requested that the impact of each VNI West option should consider impacts on the EnergyConnect project.

#### Summary of submissions

| Item of feedback | Submitters |
|---|---|
| The impact of each VNI West option should consider impacts on the EnergyConnect project. | Jacobs |

#### Response

AVP and Transgrid note that modelling has been undertaken to consider the impacts on the network. The EnergyConnect project will not be adversely impacted by VNI West.

### 8.1.3 Snowy 2.0

Stakeholders raised concerns relating to Snowy 2.0.

[55] See https://www.westernrenewableslink.com.au/about/.

[56] AEMO, 2022 ISP, June 2022, p. 66.

### Summary of submissions

| Item of feedback | Submitters |
|---|---|
| • VNI West does not enable increased use of Snowy 2.0 or transmission to Melbourne.<br>• Stakeholders questioned if VNI West will provide greater utilisation of Snowy 2.0 as well as allow for Victoria's offshore wind to be exported to New South Wales.<br>• Despite claims that VNI West will unlock the full potential of Snowy 2.0, according to AVP, VNI West makes no perceptible difference to the dispatch of Snowy 2.0.<br>• Unrealistic Snowy 2.0 capacity factors have been assumed.<br>• An assessment that the benefits of offshore wind are not a replacement for Snowy 2.0 firming into Victoria is required.<br>• Snowy 2.0 should be considered as a modelling sensitivity. | Ted Woodley<br>EGA<br>Snow Hydro |

### Response

Snowy 2.0 modelling was discussed in the Additional Consultation Report. Snowy 2.0's capacity factor is not an input assumption. It is a model outcome, which varies depending on the market conditions. The market modelling considered the full detail of the Snowy scheme as well as the transmission network representation in the Snowy area, including thermal and stability limits. Even though the forecast capacity factor of Snowy 2.0 with VNI West is similar to that forecast in the base case in the additional consultation report outcomes, the *hourly* dispatch of Snowy 2.0 differs, as the opportunities for pumping and generating change depending on the market outlook for the base case and VNI West.

The benefits of offshore wind are not within scope of the VNI West RIT-T. However, in the offshore wind sensitivity presented in the Additional Consultation Report, Snowy 2.0 is assumed in the base case and VNI West option cases. AVP and Transgrid observe that the forecast capacity factor of Snowy 2.0 is similar in any given year in the base case and with VNI West with or without offshore wind (although it varies year-to-year through the modelling period horizon, as shown in the Additional Consultation Report). Superficially, offshore wind in Victoria does not erode the utilisation of Snowy 2.0.

AVP and Transgrid have not modelled Snowy 2.0 delay as a sensitivity. VNI West is assumed to be commissioned in 2031 in the *Step Change* scenario. It is expected that delaying Snowy 2.0 for a few years will not impact the benefits of VNI West.

## 8.2 Consistency with government policies and laws

Submissions to the ACR questioned whether the anticipated outcomes of VNI West align with government targets, consider Renewable Energy Zones Development Plan (RDP) works, and adhere to relevant laws.

### Summary of submissions

| Item of feedback | Submitters |
|---|---|
| Submissions noted that to ensure Victoria meets its targets of 65% renewables by 2030 and 95% by 2035, replacement generation must be from renewable sources and from storage capacity.<br>One stakeholder suggested that Option 3a provides a clear advantage in reaching some of the Victorian Governments targets of:<br>• 95% renewables by 2035.<br>• 65% renewables by 2030.<br>• At least 2.6 GW of energy storage capacity by 2030.<br>Another noted there was no commentary included to detail the DEECA Stage 1 RDP works and requested detail on how these projects will impact on the VNI-West options. | Wimmera Development Association<br>Jacobs |

| Item of feedback | Submitters |
|---|---|
| One submitter noted concerns that REZ areas are being accepted as a land use planning documents and that appropriate consideration has not been given to other Acts that impact on the land use, including:<br>• Federal *Environment Protection and Biodiversity Conservation Act, 1999*.<br>• *Aboriginal and Torres Strait Islander Heritage Protection Act, 1984*.<br>• State *Aboriginal Heritage Act, 2006*.<br>• *Catchment & Land Protection Act, 1994* (CaLP Act).<br>• *Country Fire Authority Act 1958*.<br>• *Flora and Fauna Guarantee Act, 1988*.<br>• Victoria's Biodiversity Strategy 1997. | Confidential submission |

### Response

#### Alignment with government targets and policies

Sections 2.1.2 and 4.1 of this PACR: Volume 1 provide commentary on how various government targets and policies have been reflected in the assessment.

#### Interaction with the Victorian Government Renewable Energy Zones Development Plan (RDP) works

While not explicitly commented on in the PADR and Additional Consultation Report, projects such as the RDP Stage 1 works have been considered in the analysis; they have not been explicitly mentioned in the reports as they are not anticipated to have an impact on the modelling results.

#### VNI-West (and Option 5 particularly) are not adhering to relevant laws

AVP considered all relevant legislation in the development of the criteria for the MCA. Following the selection of a preferred option, AVP and Transgrid will comply with all relevant legislation when progressing VNI West.

## 8.3 Process and transparency

Submissions raised concerns and questions regarding ongoing engagement for VNI West and transparency under the planning process, particularly in regard to the NEVA Order.

### 8.3.1 Transparency of the RIT-T process and engagement timeframes

Stakeholders suggested that the opportunity for better social licence for Option 5 should not be taken for granted. Early, ongoing and meaningful community engagement should occur as per the Victorian Government's policy under its Transmission Investment Framework, and people should be meaningfully engaged and informed of issues which may impact on them.

### Summary of submissions

| Item of feedback | Submitters |
|---|---|
| Stakeholders suggested the following elements will be of critical importance:<br>• Ability to provide meaningful information in a timely manner.<br>• Early, transparent and consistent engagement.<br>• Collection of local knowledge. | RWE Renewables<br>Catherine King<br>Loddon Shire Council<br>Murray River Group of Councils<br>Pyrenees Shire Council |

| Item of feedback | Submitters |
|---|---|
| Submissions also noted that the community needs more time to respond to the project. Many submissions highlighted that consultation with potentially impacted communities and landholders was insufficient in both length and quality.<br>Notes of concern included:<br>• As the preferred option has changed, potentially impacted communities were not aware of the project until February 2023.<br>• The six-week consultation period did not provide sufficient time for potentially impacted stakeholders to make an informed submission.<br>• The level of information provided was not sufficient to make informed submissions.<br>• The information provided was not easily understood by communities and potentially impacted landowners. | Victorian Farmers Federation<br>Numerous community and landholder submissions |

## Response

AVP and Transgrid recognise the importance of (and are committed to) early and ongoing engagement with regional communities, Traditional Owners and landholders to understand the social impacts associated with building this linear infrastructure. AVP and Transgrid have engaged with a range of key stakeholders on the PADR and Additional Consultation Report to seek early stakeholder input on potential social and cultural considerations in identifying the preferred network option.

The RIT-T has identified a preferred network option that would connect EnergyConnect (New South Wales) and WRL (Victoria). The preferred network option, however, is not a route selection process that defines the location of infrastructure. The development of a project route alignment and the location of terminal stations will be determined through a rigorous route and site selection process that values and requires ongoing extensive community consultation and engagement.

As the project progresses from the current broad area of interest, through the establishment of Stakeholder Reference Groups, AVP and Transgrid will seek feedback and input from local stakeholders to gain local knowledge and insights to inform the identification and determination of a preferred corridor. The development and selection of the route alignment will involve targeted consultation and engagement with potentially impacted communities and landholders to understand localised property constraints as the route is developed in detail. The final route and associated infrastructure would be subject to the requirements of relevant planning and environmental approval processes.

### 8.3.2 Concern VNI West will not be built at 'least cost'

Submissions noted the NEVA Order may result in both VNI West and WRL projects being built with less regard to cost.

## Summary of submissions

| Item of feedback | Submitters |
|---|---|
| Submissions noted the NEVA Order may result in both VNI West and WRL projects being built at “any cost” rather than at “least cost” and that there is now limited opportunity to engage with the process. | EUAA |

## Response

The February 2023 NEVA Order still requires AEMO to prepare and publish a PACR for VNI West with Transgrid, and it requires AVP to factor additional criteria into the assessment process than those which fall under the RIT-T.

AVP and Transgrid still determined the net market benefits of assessed options. The benefits criteria of the MCA is significantly weighted to ensure a positive net market benefit to consumers.

While understandable that stakeholders would seek to ensure that forecast benefits associated with these infrastructure projects are realised, and that project proponents are held to account to ensure that is the case, AVP and Transgrid are unaware of any retrospective assessment that can reasonably assess whether the modelled sources of market benefit for a RIT-T have been considered to have arisen or not. We note that this would be an extremely complicated exercise given the need to consider the counterfactual, that is, what could have been expected to happen in the absence of the investment.

Moreover, AVP and Transgrid are not convinced that undertaking such an exercise would be helpful, as a multitude of things can change going forward, including things that were not contemplated when preparing the RIT-T and the 2022 ISP (where the RIT-T assumptions are drawn). The purpose of the RIT-T is to make a decision today, in light of the best information and taking into account the uncertainty going forward, that is expected to maximise net market benefits to the NEM.

## 8.4 Accountability

EGA raised concerns surrounding accountability under the RIT-T process.

### Summary of submissions

| Item of feedback | Submitters |
|---|---|
| One stakeholder wanted to understand what mechanisms AVP, Transgrid, AEMO, the AER or AEMC will be implementing to ensure the benefits claimed from future avoidance and/or deferral of investments are being realised and are not eroded by future investments that should have otherwise been avoided or deferred. The stakeholder was concerned that without effective regulation, RIT-T proponents can simply 'assume' enough deferral or avoidance benefits to produce an overall net benefit. | EGA |

### Response

AVP and Transgrid are unaware of AEMO, the AEMC or the AER undertaking a retrospective assessment of whether the modelled sources of market benefit for a RIT-T have been considered to have arisen or not. AVP and Transgrid note that this would be an extremely complicated exercise given the need to consider the counterfactual, that is, what could have been expected to happen in the absence of the investment.

Moreover, AVP and Transgrid are not convinced that undertaking such an exercise would be helpful, as a multitude of things can change going forward, including things that were not contemplated when preparing the RIT-T and the 2022 ISP (where the RIT-T assumptions are drawn). The purpose of the RIT-T is to make a decision today, in light of the best information and taking into account the uncertainty going forward, that is expected to maximise net market benefits to the NEM.

## 8.5 Undergrounding

Many submissions requested the consideration of undergrounding for some or all of VNI West.

### Summary of submissions

| Item of feedback | Submitters |
|---|---|
| Many submissions commented that undergrounding would have a lower impact of flora, fauna, the landscape/visual amenity, reduce bushfire risk, and will achieve greater community support.<br>These submissions often noted that undergrounding may increase cost but would provide equal benefits to minimise impacts to communities.<br>Submissions requested the use of underground technology be considered for sections through the urbanised areas, important agricultural areas, areas of high landscape value and areas of importance for endangered species, including the Plains-wanderer.<br>Many landholder submissions highlighted that decreased agricultural productivity, including inability to operate tractors, drones and airborne pesticide distribution, should be valued in the context of considering undergrounding. | Numerous community and landowner submissions<br>CVGA<br>Hepburn Shire Council<br>Northern Grampians Shire Council<br>Pyrenees Shire Council<br>Trust for Nature |

### Response

AVP and Transgrid acknowledge that undergrounding the transmission lines is a possible solution that could help minimise social and environmental impacts of the project.

Avoiding and/or minimising impact to urbanised areas, important agricultural areas, areas of high landscape value and areas of importance for endangered species are some of the key considerations of the MCA process adopted to select the preferred option that minimises these impacts relative to the other options considered. With this PACR now completed, additional analysis, investigations and further consultation will continue within the currently wide area of interest to further understand the landscape in an effort to avoid/minimise impacting these areas as much as practically possible.

While full undergrounding is considered a cost-prohibitive solution to balancing community and stakeholder expectations, while still meeting the identified need, AVP and Transgrid acknowledge the importance of considering partial undergrounding in exceptional circumstances and are committed to working closely with community and stakeholder groups to consider cost-effective alternatives to undergrounding, such as route diversion, screening, and line tower design, that can help manage the broad and real social and environmental impacts. Where impacts cannot be avoided, or where they may be socially or environmentally unacceptable, undergrounding may further be considered, within its technical limitations. Further details on undergrounding can be found in Appendix A4 of this PACR: Volume 1.

## 8.6 Support for VNI West

Some submissions noted general support for the objectives of VNI West and the identified need for the project.

### Summary of submissions

| Item of feedback | Submitters |
|---|---|
| Submissions noted support of an accelerated delivery timeframe of VNI West, particularly to enable the development of further renewable energy projects and Snowy 2.0.<br>General support for the objectives of VNI West was also noted. | Wimmera Development Association<br>Snowy Hydro<br>AusNet<br>Murray River Group of Councils |

### Response

The support for the VNI West objectives is noted. VNI West will require extensive social and environmental impact assessments to support a rigorous planning and environment approvals process, prior to the commencement of construction, which will take some time to deliver. This process is essential to ensure that any social and environmental impacts are avoided or minimised.

AVP and Transgrid will work closely to identify any opportunities to optimise the timeframe for the delivery of the project. AVP has regard to the NEVA Order in considering opportunities to expediate delivery of VNI West.

## 8.7 Regional benefit sharing and social licence

Submissions raised questions on how the project will consider community benefits sharing and noted that identification of opportunities for shared benefits early on would result in greater social license.

### Summary of submissions

| Item of feedback | Submitters |
|---|---|
| Submissions raised that VNI West should consider how to share benefits with impacted communities, and that affected landowners and local businesses would be more likely to agree to host transmission lines in their communities if those lines will open up opportunities to develop their own renewable energy projects.<br>Submissions noted that the project should be considering the effect on impacted communities early in the process, particularly by considering land uses, local government views and landscape.<br>Submissions also raised questions as to the assumption of social licence for wind and solar at the scale assumed.<br>*'Despite claims that social licence has been considered, EGA note all options assume that developers have the social licence to build wind and solar generation at the scale assumed. As a high-profile whole of system plan about what, when and where generation and transmission infrastructure may be required, the ISP holds the attention of a wide range of stakeholders. Therefore, EGA suggest it is not prudent for AVP to make these broad assumptions, especially when considering the WRL has no social licence and VNI West appears to be not too far behind.'* | Pyrenees Shire Council<br>Catherine King<br>Moorabool Shire Council<br>EGA<br>Other individual submitters |

### Response

AVP and Transgrid recognise the importance of identifying and sharing benefits in impacted communities hosting transmission. As the project progresses through the planning process, specific opportunities to identify community benefits sharing will be identified and designed in collaboration with key stakeholders and community members.

AVP and Transgrid are committed to working with local communities and landholders to identify existing and new opportunities for benefit sharing that are positive, rewarding and beneficial for landholders and communities. This will be an important part of the ongoing consultation and engagement with communities and landholders and will seek input and discussion on opportunities as the project progresses.

The assumed ability for new generation to achieve social license is based on the large number of proposals for projects received by AEMO from generator proponents in the regions. As an example, the Victorian Annual Planning Review[57] shows currently approximately 4,400 MW of generation applications or enquiries in the Western Victoria REZ, and approximately 2,550 MW in the Murray River REZ.

AEMO is not in a position to comment on the community consultation and discussions with landholders undertaken by generation proponents.

[57] See https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/vapr/2022/2022-victorian-annual-planning-report.pdf?la=en.

# A1. Location of submissions from individuals

| Location | Count of submissions |
|---|---|
| St Arnaud | 81 |
| Gre Gre | 45 |
| Marnoo | 35 |
| Charlton | 22 |
| Location not specified | 16 |
| Traynors Lagoon | 15 |
| Sutherland | 13 |
| Darley | 12 |
| Wedderburn | 10 |
| Richmond Plains | 10 |
| Wallaloo East | 9 |
| Yeungroon | 9 |
| Buckrabanyule | 8 |
| Woosang | 7 |
| Wallaloo | 6 |
| Slaty Creek | 6 |
| Boort | 6 |
| Blampied | 5 |
| Newlyn | 5 |
| Mysia | 5 |
| Terrappee | 5 |
| Gunbower | 5 |
| Callawadda | 5 |
| Myrniong | 5 |
| Melbourne | 5 |
| Bolangum | 5 |
| Gordon | 4 |
| Wychitella | 4 |
| Beazleys Bridge | 4 |
| Coonooer Bridge | 4 |
| Donald | 4 |
| Dooboobetic | 4 |
| Bendigo | 3 |
| Mount Prospect | 3 |
| Berrimal | 3 |
| Waubra | 3 |

| Location | Count of submissions |
|---|---|
| **Stawell** | 3 |
| **Colbrook** | 3 |
| **Hepburn** | 3 |
| **Logan** | 3 |
| **Mollongghip** | 3 |
| **Carapooee** | 3 |
| **Ballan** | 3 |
| **Kanya** | 3 |
| **Bacchus Marsh** | 2 |
| **Springbank** | 2 |
| **Nareewillock** | 2 |
| **Avon Plains** | 2 |
| **Marong** | 2 |
| **Wimmera** | 2 |
| **Brunswick** | 2 |
| **Bunding** | 2 |
| **Navarre** | 2 |
| **Barkly** | 2 |
| **Swanwater** | 2 |
| **Loddon Vale** | 2 |
| **Gooroc** | 2 |
| **Flora Hill** | 1 |
| **Beaufort** | 1 |
| **Carlton** | 1 |
| **Coonooer West** | 1 |
| **Smeaton** | 1 |
| **Lexton** | 1 |
| **Toolern Vale** | 1 |
| **Greens Creek** | 1 |
| **Paradise** | 1 |
| **Loddon** | 1 |
| **Rupanyup** | 1 |
| **Chelsea** | 1 |
| **Epsom** | 1 |
| **Cope Cope** | 1 |
| **Winjallok** | 1 |
| **Barnoo** | 1 |
| **Borung** | 1 |
| **Clifton Springs** | 1 |
| **Nine Mile** | 1 |
| **Meering West** | 1 |

| Location | Count of submissions |
|---|---|
| **Penola** | 1 |
| **Creswick** | 1 |
| **Rochester** | 1 |
| **Tourello** | 1 |
| **Durham Ox** | 1 |
| **Invermay** | 1 |
| **Ballarat** | 1 |
| **Gowanford** | 1 |
| **St Kilda** | 1 |
| **Daylesford** | 1 |
| **Glenalbyn** | 1 |
| **Diamond Creek** | 1 |
| **Glendaruel** | 1 |
| **Coimadai** | 1 |
| **Greendale** | 1 |
| **Grays Bridge** | 1 |
| **Boundary Bend** | 1 |
| **Blackburn** | 1 |
| **Moolerr** | 1 |
| **Gowar East** | 1 |
| **Mount Franklin** | 1 |
| **Wimmera Plains** | 1 |
| **Korobeit** | 1 |
| **Wooroonook** | 1 |
| **Kotta** | 1 |
| **Wycheproof** | 1 |
| **Lawloit** | 1 |
| **Leaghur** | 1 |
| **Jeffcott** | 1 |
| **Kalkee** | 1 |
| **Total submissions from individuals** | **491** |