

2024 Victorian Transmission Plan Guidelines

September 2024



VicGrid 

VICTORIA
State
Government



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Acknowledgment of Traditional Owners

We acknowledge and respect Victoria's Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partnering and meaningfully engaging with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.



Acronyms

Term	Definition
AEMO	Australian Energy Market Operator
CER	Consumer energy resources
EV	Electric vehicles
GW	Gigawatt (one million kilowatts)
GWh	Gigawatt hour (one million kilowatt hours)
IAP2	International Association of Public Participation
IASR	Inputs, Assumptions and Scenarios Report
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
NEM	National Electricity Market
NER	National Electricity Rules
NEVA	National Electricity (Victoria) Act 2005
PSS/E	Power system simulation for engineering
PV	Photovoltaic solar

Term	Definition
RAP	Registered Aboriginal Parties
REZ	Renewable energy zone
RRN	Regional reference node
TW	Terawatt (one billion kilowatts)
TWh	Terawatt hour (one billion kilowatt hours)
VAPR	Victorian Annual Planning Report
VCR	Value of Customer Reliability
VEU	Victorian Energy Upgrades
VPP	Virtual Power Plant
VRET	Victorian Renewable Energy Targets
VTIF	Victorian Transmission Investment Framework
VTP	Victorian Transmission Plan
WACC	Weighted average cost of capital

Executive summary

This document forms the guidelines for how VicGrid will produce the 2025 Victorian Transmission Plan. These guidelines will be updated over time and used for future Victorian Transmission Plans.

What is the Victorian Transmission Plan?

Victoria's energy system is changing. Coal-fired power stations are becoming unreliable and retiring. We urgently need to change our power grid to carry energy from new renewable sources across the state to Victorian homes, businesses, hospitals, schools and other vital services.

VicGrid is the Victorian Government agency responsible for planning and developing new infrastructure to transport energy generated by renewables to the electricity grid. We are developing and implementing a new statewide approach for how we plan for renewable energy and transmission infrastructure. This new approach includes delivering a long-term strategic plan for renewable energy infrastructure and transmission development in Victoria – the Victorian Transmission Plan (VTP). The VTP will ensure we build the right amount of energy infrastructure in the right places at the right time. And ensure we are not building more than Victoria needs – so we can maximise the benefits of the transition to renewables, while minimising the impacts to communities and minimising costs to energy users.

Through the development of the VTP, we will identify proposed renewable energy zones (REZs). REZs will be areas of the state with abundant renewable energy resources, such as wind and/or sun, that are appropriate for development from a land use and environment perspective. These REZs will help us coordinate investment in renewable energy generation with transmission network upgrades. Through the VTP and REZ development process, we can provide greater certainty to communities and developers and ensure projects align with Victoria's infrastructure and environmental planning objectives.

We will produce a VTP in 2025, 2027 and then every 4 years following. Each will outline how much new renewable energy is needed, the best place to generate that energy and the transmission infrastructure needed to transport it over a 25-year period. Each VTP will include recommended timings for implementation and actionable transmission projects to be developed over the first 10 years of each 25-year view.

What's different about the first VTP?

The first VTP, to be published in mid-2025, will take a 15-year view of transmission and renewable energy zone development in Victoria – we refer to this as the 2025 VTP. The second plan, to be published in 2027, will take a 25-year view, as will subsequent plans published every 4 years.

The 2025 VTP is being developed with a 15-year view to enable a timely and smooth transition from coal-fired generation by ensuring Victoria has sufficient renewable energy and connecting transmission in place.

The approach and methodology are designed to allow for continual refinement over time. Working in partnership with First Peoples and collaborating with landholders, communities and industry stakeholders will be critical to enhancing the methodology.

We will consult on any proposed changes to our approach prior to developing future VTPs.

What areas are we considering for renewable energy generation in the 2025 VTP?

We have undertaken a bespoke strategic land use assessment tailored to the needs of the 2025 VTP. This assessment has identified the parts of Victoria to study further for potential future renewable energy and transmission development. Through the development of the 2025 VTP, we will narrow down the study area to identify proposed REZs.

The strategic land use assessment is a new process to support electricity system planning in Victoria. It recognises important values many Victorians place on our land and landscape, covering culture and heritage, livelihoods, ecosystems and biodiversity, food and fibre, recreation, strategic minerals and many others. Impacts on these need to be minimised, alongside energy system considerations like keeping the cost of energy low and attracting renewable energy investment to locations where it is most productive.

The strategic land use assessment develops maps of Victoria using data from many sources, survey information and community feedback. The maps identify areas to protect and avoid and areas that are more suitable to host renewable energy. This helps guide the engineering and design work needed to plan our state's future power system.

The study area (shown in Figure 1) is the result of the statewide assessment. It shows the parts of Victoria that have potential to host a REZ, which would coordinate new energy system infrastructure, such as wind and solar generation, as well as supporting transmission lines. The analysis does not make recommendations about specific locations or projects.

The study area for the 2025 VTP is the resulting combination of areas that offer high opportunities for renewable energy development (such as where wind and solar resources are strong) and lower overall constraints (which reflect the potential impact or disturbance from development) across Victoria. Within the study area, we have identified three categories of land (tiers 1-3) that we will use to prioritise our investigations for areas of Victoria that could host renewable energy zones and transmission. Further land use assessment work will be done to

assess options for any transmission projects that may be needed. This will focus on using tiers 1-3, but could traverse lower preference areas where it can't be avoided.

Ultimately only a portion of the study area will be needed to host new energy infrastructure. For planning, it is helpful to start with a broader area. We will then work through options by partnering with First Peoples and consulting with landholders, communities and industry as we undertake additional analysis.

How will we narrow down the study area to REZs?

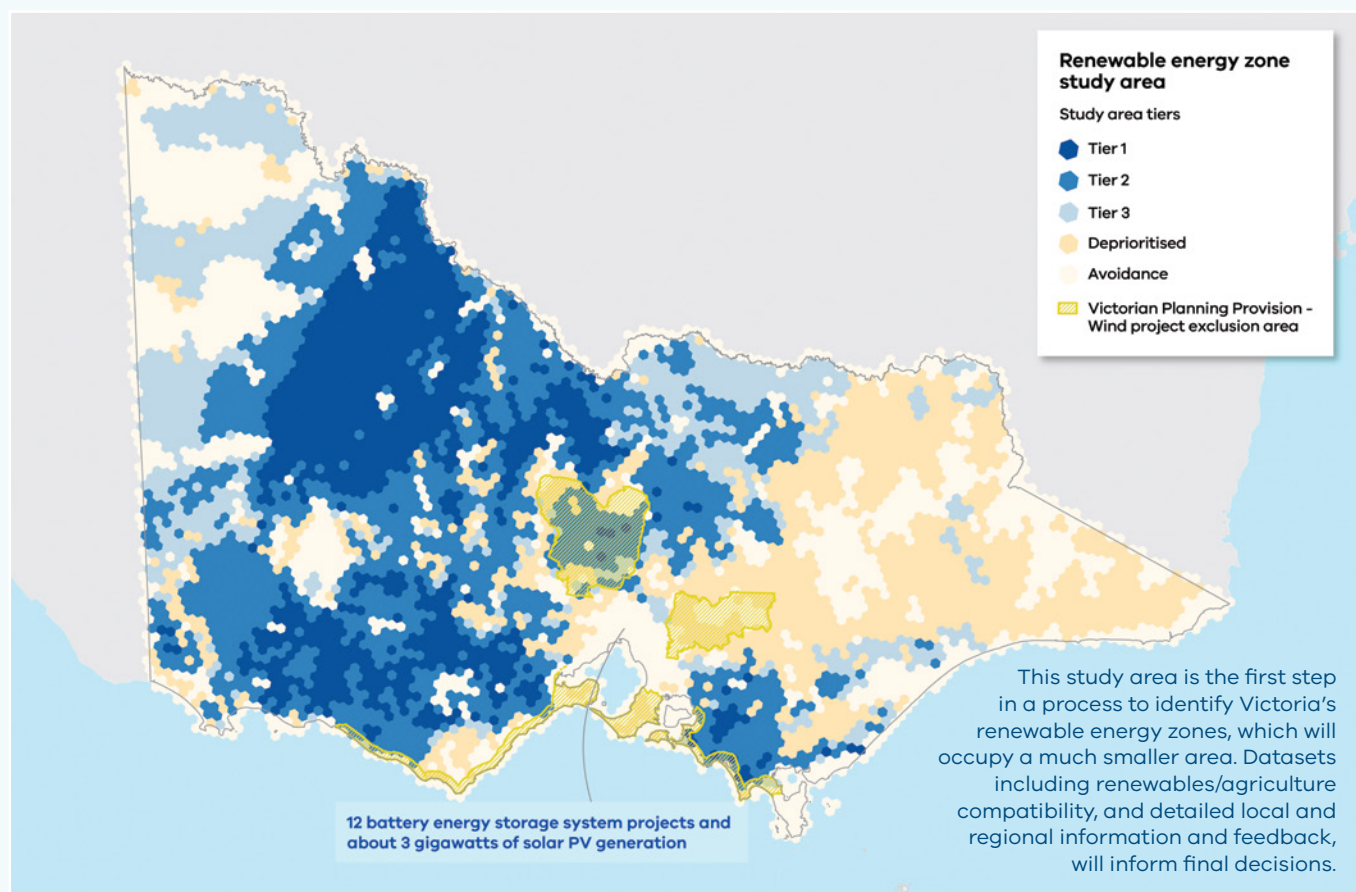
As part of developing the 2025 VTP, we will narrow down the study area to identify smaller areas for further investigation. We will use industry-standard, best-practice energy market modelling and a multi-criteria analysis to help identify these more granular areas. Energy market modelling will be used to identify the most suitable locations to host generation within the study area from an economic or 'least cost' point of view. A multi-criteria analysis will consider this least-cost outcome, alongside other important factors relating to land use, community feedback, regional development, and developer and generator interest to identify smaller areas for further investigation.

Refining areas for investigation is a dynamic process that aims to actively incorporate feedback received through ongoing engagement with communities and industry stakeholders. An important part of this process includes working closely with communities, First Peoples and industry to minimise impacts on agricultural land, communities, water systems and biodiversity.

Doesn't Victoria already have REZs?

As part of the Australian Energy Market Operator's nationwide planning, it has identified REZs across the national energy market, including 6 in Victoria. These are different to the REZs discussed in this document. The REZs that will ultimately be declared by the Victorian Minister for Energy following the final 2025 VTP are more refined areas that will be prioritised for renewable energy development in the coming 10 years.

Figure 1: Geographic areas considered for the 2025 VTP



A more detailed map of the renewable energy zone study area, including key geographic features and towns, is available on Engage Victoria at engage.vic.gov.au/victransmissionplan.

What do the tiers on the map mean?



Tier 1 **Most suitable for investigation**

We will prioritise these areas to investigate for future renewable energy zones, based on the combination of high opportunities and low constraints for wind and solar.



Tier 2 **Suitable for investigation**

These areas are suitable for investigation based on the combination of moderate-high opportunities and low-moderate constraints. Some of these are close to key locations where wind and solar can connect to the network.



Tier 3 **Available for investigation**

These areas are available for investigation. This tier contains a mix of areas. Some have moderate opportunities and constraints, and others have higher opportunities and lower constraints but are a significant distance from available 500kV transmission lines.



Deprioritised area

These areas contain a combination of lower opportunities and higher constraints. We are not prioritising the investigation of these areas for the 2025 VTP.



Avoidance area

Avoidance areas highlight early areas to protect and avoid where there are significant sensitive land use and landscape value.

The Victorian Planning Provisions include specific prohibitions for permits to develop wind energy facilities in certain circumstances and locations, which include specific designated locations with high landscape or environmental value. These prohibition areas were introduced into the Victorian Planning Provisions in 2012 and are shown in the study area. They include the Yarra Valley and Dandenong Ranges, Mornington and Bellarine Peninsulas, Macedon and McHarg Ranges, and land within 5km of the Great Ocean Road, Bass Coast and the coast east of Warrnambool. Solar facilities are not subject to the same prohibitions in these locations.

How will VicGrid develop the 2025 VTP?

To successfully transition to renewable energy, we need to ensure we have the right transmission infrastructure in the right places without ‘over-investing’ in the network. To do this, the 2025 VTP will:

- 1. Identify areas for investigation:** Using energy market modelling, we will identify the most suitable places to explore renewable energy generation projects within the broader study area.
- 2. Determine the desired generation capacity:** For each area being investigated we will identify how much wind or solar energy can be produced, what energy storage capacity would be appropriate, and when that generation and storage capacity should be brought online.
- 3. Identify what upgrades the transmission network needs:** We need to assess what additional or upgraded transmission infrastructure is needed to support the generation capacity that will be connecting. This includes assessing the capacity of current infrastructure to accommodate additional renewable energy generation.
- 4. Propose a sequence of transmission network improvements:** We will start to determine the right mix of energy generation and transmission projects that will deliver the greatest economic benefits to Victoria. We will identify and assess potential project combinations. We will then prepare a draft ‘optimal pathway’, which will be a combination of projects that is robust to future uncertainties and that minimises the risk of both under-investment (not being prepared) and over-investment (building more than is necessary). VicGrid will consult with communities and industry on these as part of the draft 2025 VTP.
- 5. Finalise what projects need to be delivered in the next 10 years:** Following community and industry feedback on the draft optimal pathway, we will identify the transmission projects needed over the next 10 years. Following publication of the final 2025 VTP, detailed design processes will commence to refine these transmission projects, which will involve further, more in-depth and targeted engagement with First Peoples, landholders, communities and industry.



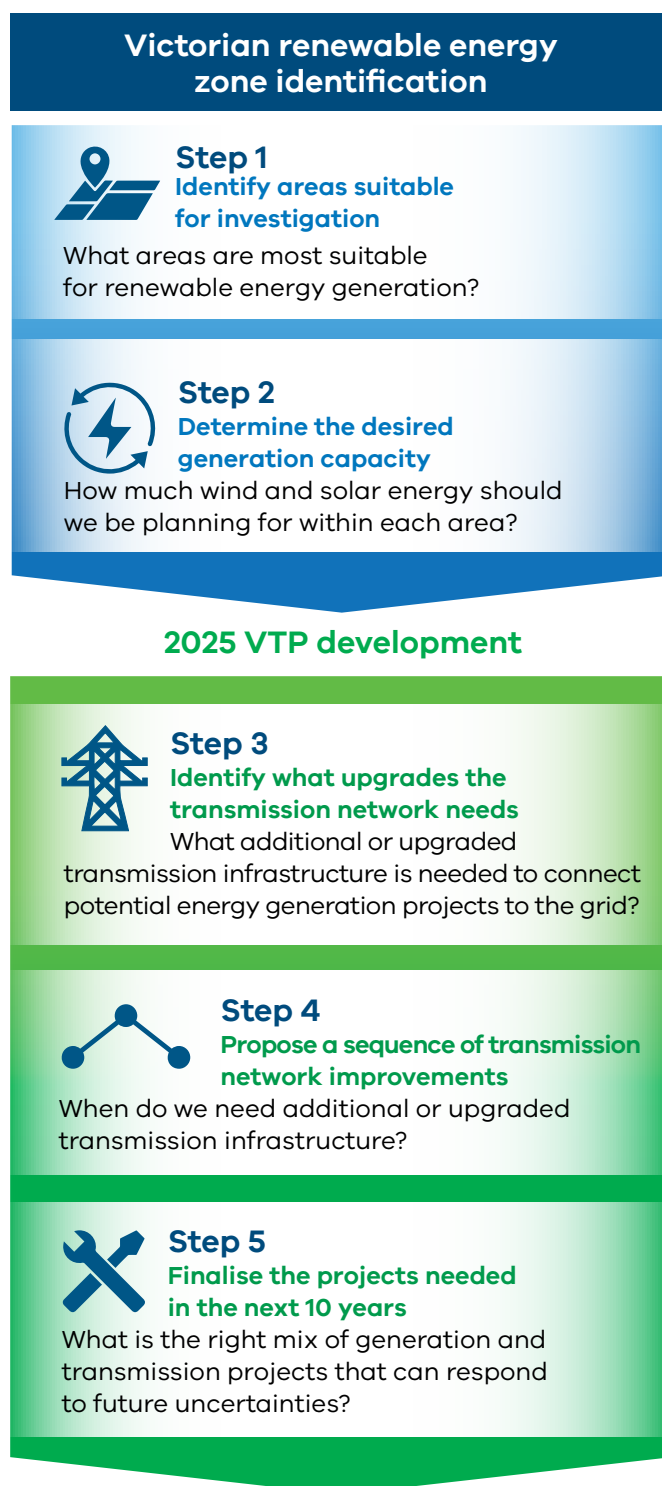
Scenarios

We will use scenarios to help us determine how much renewable energy is needed and when to support the energy transition over the next 25 years. The scenarios take into account the Victorian Government's energy policies, and assumptions about energy demand, the adoption of consumer energy resources (such as solar panels, batteries and electric vehicles) and the closure of existing power stations. VicGrid has developed 3 scenarios to inform the 2025 VTP that illustrate different variables that could affect how the energy market transitions. Steps 2 to 4 of the development process happen under each scenario.

Throughout each step in the development of the 2025 VTP, decisions will be guided by the policy drivers of ensuring an affordable, reliable, safe and secure transition to net zero emissions that increases community understanding and support, and encourages investment.

Figure 2 summarises the VTP development process.

Figure 2: The 2025 VTP development process





Partnering with First Peoples to develop the 2025 VTP

We are committed to working in partnership with First Peoples as distinct rights holders to Country and Sea Country. They are our partners who have rights that must be upheld as laid out under the *Charter of Human Rights and Responsibilities Act 2006* (Vic), the *Traditional Owner Settlement Act 2010* (Vic), *Aboriginal Heritage Act 2006* (Vic) and *Native Title Act 1993* (Cth). We acknowledge First Peoples have legal rights and cultural responsibilities that will be recognised and supported.

VicGrid is committed to the Pupangarli Marnmarnepu 'Owning Our Future' Aboriginal Self-Determination Reform Strategy and intends to work in partnership with First Peoples in the regions to identify key considerations and concerns, and benefits and opportunities that may be of interest.

We are seeking to partner with Traditional Owner groups to enable First Peoples to play an active role in the development of the 2025 VTP in line with self-determination principles, and to minimise impacts to Country from future renewable energy zone and transmission projects.

We are committed to supporting and empowering Traditional Owner groups to assist in mapping and assessments. Feedback from First Peoples and Traditional Owners on renewable energy and transmission development will be vital in the VTP development process, so we can understand and protect local knowledge and values.

This feedback will be used to inform the VTP and the areas that will co-exist with future renewable energy generation and transmission infrastructure.

Engaging with communities and industry to develop the 2025 VTP

We are committed to implementing a new way of planning energy infrastructure that gives landholders, communities and First Peoples a real voice. The development of the 2025 VTP will demonstrate our commitment to partnering with First Peoples and delivering place-based engagement with landholders and local communities. The new framework will incorporate early, deeper and ongoing community engagement throughout the planning of and investment in transmission projects.

The development of the 2025 VTP will provide an opportunity to meaningfully engage with landholders, local communities and industry to refine the proposed REZs to help maximise the collective benefits and minimise negative impacts.

We will also work with the energy industry to explore other critical factors we need to consider, and seek to understand how we can effectively work with developers to incorporate local insights and values in the detailed design of future transmission projects.

Incorporating industry and community views in the design of our approach means we can make better decisions that minimise negative impacts and maximise benefits for regional communities.



How community and industry feedback helped shape the 2024 VTP Guidelines

Between 22 July and 25 August 2024, we invited feedback on the draft VTP Guidelines alongside consultation on the study area. Engagement opportunities included:

- in-person community drop-in sessions and events
- online community and industry webinars
- briefings with Victoria's Registered Aboriginal Parties
- briefings with peak bodies, local governments and other key stakeholders
- feedback forms
- submissions.

We received almost 800 feedback form responses and more than 170 submissions, and held conversations with more than 350 community members during drop-in sessions.

Communities provided input into the strategic land use assessment to identify the study area through the Renewable Energy Planning Survey and interactive map, which was open from 17 November 2023 to 16 February 2024.

We understand there are areas of significance and sensitivity to communities within the study area relating to cultural, environmental and land use values like agriculture and resources. We will work through these issues by partnering with First Peoples and consulting with landholders, communities and industry as we undertake additional analysis to refine the broad study area into proposed REZs. This will ensure we develop in the most appropriate locations across the state.

We will also be working with the energy industry to consider industry priorities in identifying proposed REZs and seeking further information regarding the potential location and volume of new generation and storage that can be expected in Victoria in the coming years.

1. What is the Victorian Transmission Plan?

Victoria is undergoing a transition to renewable energy. As our ageing and increasingly unreliable coal-fired power stations retire and are replaced by renewables, our electricity grid needs to evolve. New transmission infrastructure will be critical to moving high volumes of energy from the new areas where it is generated, to homes and businesses.

The Victorian Government has developed the Victorian Transmission Investment Framework (VTIF) – a new regulatory framework released in July 2023 with a comprehensive set of reforms to support the state’s energy transition – and has established VicGrid to implement it.

As part of the reforms, we are changing the way energy infrastructure is planned and delivered in Victoria. We are putting in place a long-term strategic plan – the Victorian Transmission Plan (VTP) – to ensure we have the right infrastructure in the right place at the right time to support the energy transition.

1.1 Background to the VTIF

The VTIF is an integrated approach for planning and delivering electricity transmission infrastructure on a coordinated basis that will support development of renewable energy zones (REZs) across the state. REZs will be established in areas most appropriate for renewable energy development.

The new framework is designed to strengthen community engagement throughout the process of identifying REZs and to foster a strong investment environment for renewable energy infrastructure. It aims to drive timely coordination of investment in transmission, generation and storage infrastructure across Victoria’s REZs, tailored to Victoria’s energy needs.

The Victorian Government, through VicGrid, has new roles and responsibilities under the new framework, including new functions for undertaking transmission infrastructure planning, coordinating end-to-end engagement, and administering community benefits arrangements in Victoria.

Underpinning these functions is a new Victorian transmission planning objective (Figure 3), as set out in amendments to the *National Electricity (Victoria) Act 2005 (the Act)* passed in May 2024. The new objective incorporates environmental objectives and the state’s needs in response to the energy transition, and will guide how transmission planning and investment decisions are made in Victoria.

Figure 3: Victorian transmission planning objective

Victorian transmission planning objective

The Victorian transmission planning objective is, in relation to Victoria–

- a.** to promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity with respect to–
 - i. price, quality, safety and reliability and security of supply of electricity; and
 - ii. the reliability, safety and security of the national electricity system; and
- b.** the delivery of transmission services consistent with a least-regrets development pathway; and
- c.** the achievement of targets set by Victorian legislation–
 - i. for reducing Victoria’s greenhouse gas emissions; or
 - ii. that are likely to contribute to reducing Victoria’s greenhouse gas emissions.

1.2 The 2025 Victorian Transmission Plan

The 2025 Victorian Transmission Plan (VTP) will be a plan for Victoria's REZs and future transmission, enabling important decisions to be made about where new transmission infrastructure will be located. The 2025 VTP will set out a list of required transmission projects needed to enable REZ development, and recommended timings for implementation.

Under the Act, we are required to publish the 2025 VTP by 31 July 2025. The 2025 VTP will consider a 15-year time horizon, rather than the 25 years that will be required in subsequent plans, to focus on a smooth transition from coal-fired generation by ensuring that Victoria has sufficient renewable energy and connecting transmission in place.

1.2.1 Timing and sequencing of future transmission planning

The second VTP will be published by 31 July 2027 and then every 4 years, allowing for a balance between providing certainty for communities and investors in renewable energy, and flexibility for the plan to respond to evolving circumstances. Additionally, updating the plan this frequently will allow for the strategic integration of renewable energy sources as they are commissioned, reflecting the state's commitment to a sustainable and environmentally responsible energy policy.

The Act stipulates the following requirements for the publication of Victorian Transmission Plans:

- the first plan must be published no later than 31 July 2025;
- the second plan must be published no later than 31 July 2027; and
- a subsequent plan must be published no later than 31 July in the fourth calendar year following the publication of the previous plan.

The Act allows us to review and update the VTP within the 4-year cycle if there has been a material change to the key assumptions and forecasts underlying the plan. This provides the flexibility to react to changed circumstances.

This planning cycle allows for integration with existing planning documents produced by the Australian Energy Market Operator (AEMO), including the:

- **Integrated System Plan (ISP)** – a national plan with a 20-year development outlook, published every 2 years.
- **Victorian Annual Planning Report (VAPR)** – published annually in October, with a 10-year outlook that identifies upgrades needed to the Victorian transmission network to meet reliability and security requirements.

The sequencing of the ISPs and future VTPs allows them to inform one another. This helps to ensure consistency between national and Victorian transmission development, which remains critical for planning transmission developments across the national interconnected system. These timings are shown in Figure 4.

Figure 4: AEMO ISP and VTP future timing

AEMO ISP	2025 VTP	AEMO ISP	2027 VTP	AEMO ISP		AEMO ISP	2031 VTP	AEMO ISP		AEMO ISP	2035 VTP
2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035

Onwards →

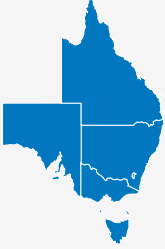


The VAPR studies will be used to inform technical specifications for projects identified in the 2025 VTP and improve and refine subsequent versions.

The relationship between these transmission planning documents, as well as the Distribution Annual Planning Reports used by distributors to plan the lower-voltage distribution system, are shown in Figure 5.

The 2025 VTP will also give regard to other national and state planning documents, including the Electricity Statement of Opportunities, Gas Statement of Opportunities and the Victorian Gas Planning Report.

Figure 5: Relationship between electricity network planning documents in Victoria

Entity	AEMO	VicGrid	AEMO	AusNet, Citipower, Jemena, Powercor, United Energy
Document	Integrated System Plan	Victorian Transmission Plan	Victorian Annual Planning Report ¹	Distribution Annual Planning Reports
Coverage				
Scope	 National Electricity Market	 REZ identification and associated transmission	 Existing transmission network and other projects	 Existing distribution network and other projects
Time horizon	20 years and beyond	15/25 years	10+ years	5+ years

¹ The Victorian Transmission Investment Framework reforms propose that the responsibility for planning Victoria's declared shared network, and all of AEMO's associated declared network functions will be transferred to VicGrid from AEMO. The proposed draft legislation to enable this transfer is expected to be introduced to the Victorian Parliament next year for consideration and, subject to approval, is intended to come into effect in mid-2025.



1.3 The Victorian Transmission Plan Guidelines

The Act requires us to prepare and publish a set of guidelines called the Victorian Transmission Plan Guidelines. The Act sets out a series of objectives and requirements of the guidelines (in s.57(1)). Table 1 outlines the objectives and requirements and where we have addressed each in this document.

Table 1: VTP Guidelines document structure

Guidelines section	Legislative objectives and requirements included
Section 2 What areas are being investigated for renewable energy zones?	Include key inputs, sensitivities, methodologies and assumptions that will be considered as part of the making of the Victorian transmission plan, including the geographical area that will be analysed in the plan.
Section 3 How will VicGrid develop the 2025 VTP?	- Include key inputs, sensitivities, methodologies and assumptions that will be considered as part of the making of the Victorian transmission plan, including the geographical area that will be analysed in the plan. - Specify a transmission planning standard that will provide for certain detailed aspects of the Victorian transmission plan.
Section 4 What are the future scenarios that VicGrid will consider?	- Define a set of plausible, high-impact scenarios that establish the electricity system's 25-year investment needs consistent with Victorian energy policy objectives and market outlook. - Include key inputs, sensitivities, methodologies and assumptions that will be considered as part of the making of the Victorian transmission plan, including the geographical area that will be analysed in the plan.
Section 5 Partnering with First Peoples	Describe how the CEO of VicGrid will consult stakeholders in the preparation of the Victorian transmission plan.
Section 6 How will VicGrid consult with communities and industry to develop the plan?	Describe how the CEO of VicGrid will consult stakeholders in the preparation of the Victorian transmission plan.

1.4 Other policy reforms supporting the state's energy transition

Some of the other key policy reforms that we are delivering under the VTIF to support the state's energy transition include:

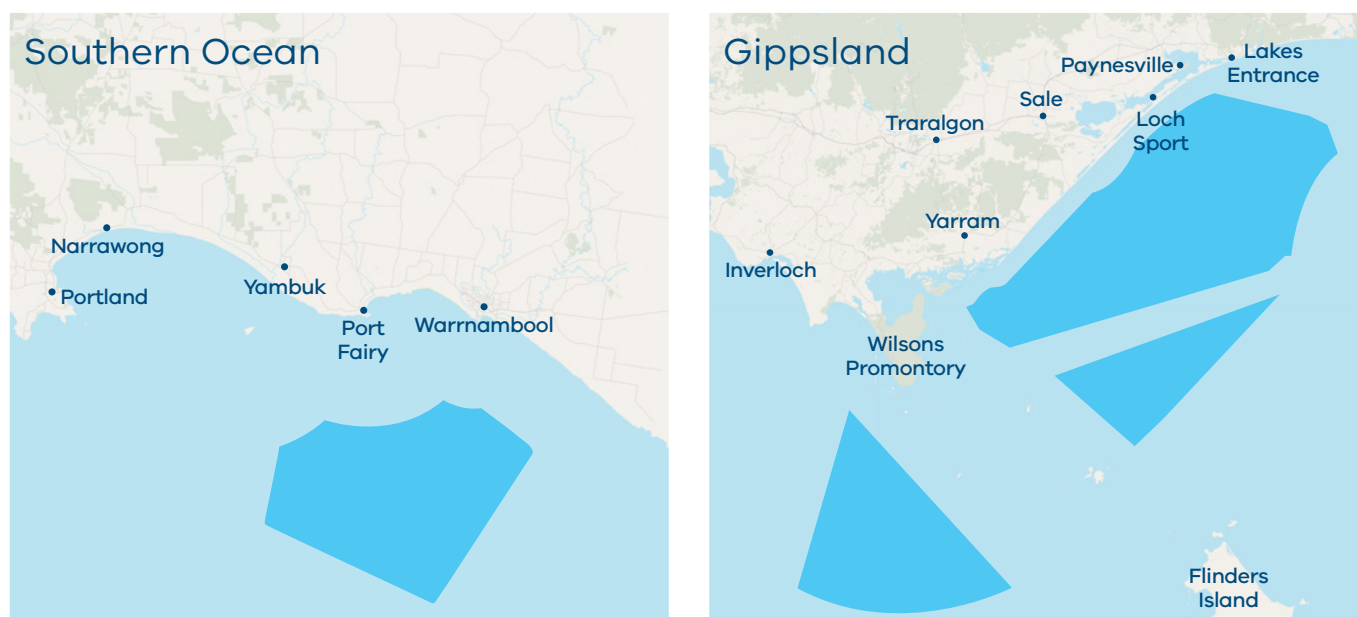
- **New Victorian network access arrangements:** The existing open access regime under the National Electricity Rules allows renewable energy generators to connect to the grid at almost any location. In some cases, a generator's location means it is not adding usable new energy to the grid or is impacting other generators already connected. The new Victorian Access Regime will improve investor certainty and support the timely coordination of investment in transmission, generation and storage infrastructure. We will be consulting on the implementation of the new access arrangements and connections reform.
- **A new procurement framework:** All of us pay for energy infrastructure through our power bills, so it is important that we make sure we are getting value for money. That is why VicGrid is putting in place a fit-for-purpose procurement framework for the delivery of major transmission projects identified in the VTP. This new framework will be developed through consultation and be in place in time for the 2025 VTP.
- **A new approach to community benefits:** The Victorian Government is committed to ensuring positive outcomes for communities that host new infrastructure as part of the energy transition. That is why VicGrid is putting in place new arrangements to support landholders, neighbours, First Peoples and communities as part of the Renewable Energy Zone Community Benefits Plan. The draft plan introduces new REZ Community Energy Funds that will see energy developers contribute to funds to benefit regional communities. Decisions on investments from the funds will be made in consultation with local and regional communities in each area. We consulted with community and industry from May to June 2024 to develop the details of this new approach, and the final plan is expected to be released in late 2024. We are also partnering with First Peoples to co-design models of dedicated benefits for Traditional Owners.



1.5 What about the renewable areas and projects declared by the Australian Government?

To date, the Australian Government has declared 2 offshore wind areas off the coast of Victoria. The first area near Gippsland was declared in December 2022. The second area in the Southern Ocean near Warrnambool was declared in March 2024. Both areas are shown in Figure 6.

Figure 6: Commonwealth declared offshore wind areas in Victoria



These areas (along with any future offshore wind areas) will be critical in enabling Victoria to meet our renewable energy target of 95% by 2035, including a legislated target of at least 2 gigawatts of offshore generation by 2032. VicGrid is already leading a program to coordinate transmission infrastructure development for these areas.

The 2025 VTP will outline and give regard to offshore and onshore generation and transmission projects defined and committed to before the 2025 VTP

process. We would expect the future pipeline of energy transmission projects to be generally planned through the subsequent VTPs (including through its interactions with the ISP and VAPR) noting that planning activities related to offshore projects will be undertaken in consultation with the Commonwealth. This will ensure new projects meet the expectations of Victorians as reflected by our new planning process including partnering with First Peoples and engaging with landholders, communities and industry.

² www.dcceew.gov.au/energy/renewable/offshore-wind/areas

³ www.energy.vic.gov.au/renewable-energy/vicgrid/offshore-wind-transmission



2. What geographical areas are being investigated?

The 2025 Victorian Transmission Plan (VTP) will consider a broad geographic area for further investigation in planning for our shift to renewable energy. Through the development of the 2025 VTP, we will narrow down this broad geographical area using a tiered study area to identify proposed renewable energy zones (REZs).

Doesn't Victoria already have renewable energy zones?

As part of the Australian Energy Market Operator's (AEMO's) nationwide planning, it has identified REZs across the national energy market, including 6 in Victoria. These areas have been based largely on desktop studies considering a mix of resource potential, technical, and other engineering considerations. These are different to the REZs discussed in this document.

The REZs discussed in the Victorian transmission planning process will ultimately be declared by the Victorian Minister for Energy following the final 2025 VTP as areas that will be prioritised for renewable energy development in the coming 10 years. The declared REZs will reflect more precise geographical areas refined through a process that includes partnering with First Peoples and engaging with landholders, communities and industry.

As discussed in section 1.3, AEMO's Integrated System Plan will subsequently give regard to the declared REZs.

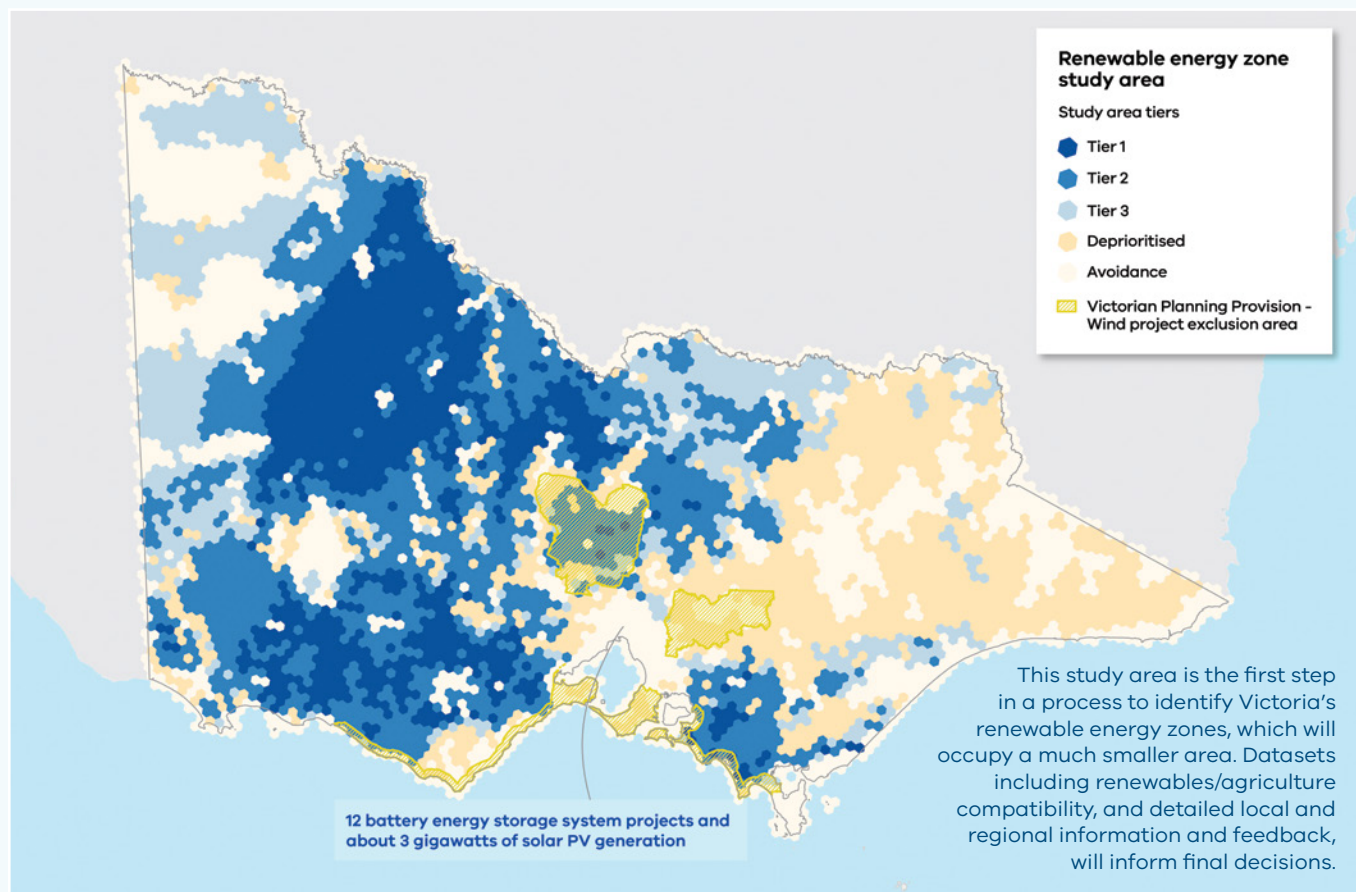
2.1 What is the renewable energy zone study area?

The study area, as shown in Figure 7, shows the parts of Victoria that have the potential to host new energy generation, storage and transmission infrastructure. It also identifies areas we should avoid. The blue areas represent the parts of the study area that we will consider in more detail as we work through how much wind, solar, storage and transmission we will need, where and when. Ultimately, only a portion of these areas will be needed to host our energy system. The land eventually proposed for REZs will need to protect significant areas and sites, minimise negative impacts on land, communities, water and biodiversity, and keep the total cost of infrastructure low to keep power bills down.

Within the study area, we have identified three areas (tiers 1-3) that we will use to prioritise our investigations.

Figure 7 illustrates these tiers and other tiers and area types.

Figure 7: Geographic areas considered for the 2025 VTP



A more detailed map of the renewable energy zone study area, including key geographic features and towns, is available on Engage Victoria at engage.vic.gov.au/victransmissionplan.

What do the tiers on the map mean?



Tier 1 **Most suitable for investigation**

We will prioritise these areas to investigate for future renewable energy zones, based on the combination of high opportunities and low constraints for wind and solar.



Tier 2 **Suitable for investigation**

These areas are suitable for investigation based on the combination of moderate-high opportunities and low-moderate constraints. Some of these are close to key locations where wind and solar can connect to the network.



Tier 3 **Available for investigation**

These areas are available for investigation. This tier contains a mix of areas. Some have moderate opportunities and constraints, and others have higher opportunities and lower constraints but are a significant distance from available 500kV transmission lines.



Deprioritised area

These areas contain a combination of lower opportunities and higher constraints. We are not prioritising the investigation of these areas for the 2025 VTP.



Avoidance area

Avoidance areas highlight early areas to protect and avoid where there are significant sensitive land use and landscape value.

The Victorian Planning Provisions include specific prohibitions for permits to develop wind energy facilities in certain circumstances and locations, which include specific designated locations with high landscape or environmental value. These prohibition areas were introduced into the Victorian Planning Provisions in 2012 and are shown in the study area. They include the Yarra Valley and Dandenong Ranges, Mornington and Bellarine Peninsulas, Macedon and McHarg Ranges, and land within 5 km of the Great Ocean Road, Bass Coast and the coast east of Warrnambool. Solar facilities are not subject to the same prohibitions in these locations.



2.2 How did we determine the study area?

We determined the study area through a statewide strategic land use assessment. This assessment is a new land use planning process that we introduced into Victorian transmission planning arrangements under the Victorian Transmission Investment Framework (VTIF) reforms.

The strategic land use assessment uses a spatial multi-criteria analysis methodology alongside a geographic information system (GIS) mapping tool. The approach helps us understand existing land uses and landscape features across the state from several, and sometimes competing, perspectives, including environment, cultural heritage, social, land use and engineering.

The strategic land use assessment helps us to proactively and strategically identify suitable locations for renewable energy development. Importantly, it also helps early in the planning process to highlight areas to protect and avoid where there are significant and sensitive land use or landscape values, such as national parks, wetlands and world heritage sites.

Through this integrated approach, we can identify relative land use and landscape constraints, areas for renewable energy development that minimise overall negative impacts, and features that provide investment opportunities.

The statewide strategic land use assessment considered feedback received through community engagement. We invited Victorians to identify areas and landscapes important to them as part of a renewable energy planning survey and interactive map from 17 November 2023 to 16 February 2024.

The data has been analysed to identify statewide and regional themes. Across Victoria, respondents indicated that protecting Victoria's natural environment and ecosystems was the most important factor to consider when choosing areas for renewable energy development, followed by minimising land use conflicts.

The survey results highlighted the significance communities place on protecting Victoria's natural environment, parks, water systems (rivers and lakes), and biodiversity. Minimising impacts on agricultural land and farming communities was also highlighted as a key concern.

This statewide information, alongside more targeted regional and community-specific data and feedback, will be used to help narrow the study area into proposed REZs as we develop the 2025 VTP.

Section 6 provides more details about how VicGrid will consult with communities and industry to develop the 2025 VTP.

The strategic land use assessment approach is consistent with approaches used internationally and nationally, as well as for other types of major infrastructure delivery. We will draw on the data and outputs from the assessment through the development of the 2025 VTP, and continue to refine our approach over time.

[See Appendix A for further details on the strategic land use assessment methodology and results.](#)



2.3 How will the study area evolve as part of the 2025 VTP?

As part of the 2025 VTP development, we will undertake further investigations to refine the study area to a collection of areas most suitable for energy generation (candidate areas). We will prioritise our investigations using the tier system described in Figure 7.

The following points summarise the levels of refinement through the 2025 VTP development:

- **Study area:** Broad geographical area that shows the parts of Victoria that have the potential to host a REZ.
- **Candidate areas:** More refined areas within the study area that are assessed as being most suitable for renewable energy generation through energy market modelling and community and industry consultation.
- **Draft proposed REZs:** The priority candidate areas that we propose for renewable energy generation development in the coming 15 years. These will be presented in the draft 2025 VTP.
- **Proposed REZs:** The priority candidate areas that we finalise following industry and community consultation. These will be presented in the final 2025 VTP and, over time, may be declared by the Minister for Energy as REZs.

Following the final 2025 VTP, the Minister can commence the REZ declaration process. The Minister will consider the proposed REZs that require development within 10 years. The REZ declaration process will include:

- **Draft REZs:** Each draft REZ that requires development will be specified in a draft Order prepared by the Minister for consultation.
- **REZs:** Each declared REZ will be included in formal Orders made by the Minister.

Figure 8 illustrates this process. Section 3 provides more detail on each step involved in the refinement process as part of the 2025 VTP. Figure 9 describes the REZ declaration process.

The study area is a starting point for further and more detailed analysis as we look to identify smaller areas for investigation and prioritisation for REZs. As we undertake this process, we will consider regional characteristics and constraints in more detail, such as cultural values and impacts on agricultural land and irrigation districts.

It does not lock in development in any region or prevent individual projects, including other technologies, that might be appropriate outside the study area, such as pumped hydro storage.

All proposed projects (both within and outside REZ areas) will continue to be assessed case by case, and will be subject to relevant planning and environmental approvals in Victoria. However, the declared REZs will provide benefits for communities and energy developers by improving coordination of infrastructure projects to minimise social and environmental impacts. Victoria's new network access arrangements seek to coordinate generation into REZs to provide more certainty to communities and investors.

Generators seeking to connect to the transmission network from outside a REZ will be subject to a grid impact assessment to ensure those projects do not negatively impact investment in REZs. This framework is designed to preserve the integrity of the REZ as the most appropriate location for coordinated development.

Figure 8: The evolution of the REZ study area through the 2025 VTP and REZ declaration process



Figure 9: REZ declaration process

There is a statutory process for each REZ to be declared. This process requires that the Minister make a declaration in a formal order (Order). The Order will also include:

- a map that includes the boundaries for the REZ to be declared
- the preferred transmission corridor within and outside of the REZ boundary
- the intended hosting capacity of the REZ
- engagement requirements and expectations of project proponents during project development.

As part of this process, a draft of the Order showing the proposed REZ will be placed on a public website for a minimum of 6 weeks, enabling the community to provide any comments and submissions. The Minister must consider any submissions when determining whether the REZ should be declared under an Order.

The Minister must have regard to the Victorian transmission planning objective and the current VTP when deciding to declare a REZ.

The Minister will publish each Order in the Government Gazette, together with the Minister's reasons for making a REZ Order. The Minister will also publish a summary of submissions received to the draft Order.

This process may commence following the release of the final 2025 VTP.

3. How will VicGrid develop the 2025 Victorian Transmission Plan?

The objective of the 2025 Victorian Transmission Plan (VTP) is to ensure we have the right infrastructure in the right place at the right time to support the energy transition.

We will start by identifying what renewable energy generation and storage projects are needed, when they are needed and where they should be built. Based on this, we will identify what transmission infrastructure is needed, and when it should be developed, to ensure we have enough capacity without 'over-investing' in the network, to keep costs down for energy consumers.

3.1 The process guiding development of the 2025 VTP

To identify what transmission infrastructure projects will be needed, and when, to meet Victoria's energy needs over the next 15 years, the 2025 VTP will:

1. Identify candidate areas for renewable energy zones; and
2. Identify the transmission network developments required to enable the development of those candidate areas.

We will assess candidate areas and transmission network needs across a range of scenarios to ensure they are as robust as possible. The scenarios consider the Victorian Government's energy policies, energy demand, the adoption of consumer energy resources (such as solar panels, batteries and electric vehicles) and the closure of existing power stations. The scenarios considered in the 2025 VTP are discussed further in Section 4.

At each stage of development, decisions are guided by these policy drivers, which underpin the Victorian Transmission Investment Framework (VTIF) and are set out in the *National Electricity (Victoria) Act 2005* (the Act):

- to promote efficient investment in electricity services
- the delivery of transmission services consistent with a least-regrets development pathway; and
- the achievement of targets for reducing Victoria's greenhouse gas emissions.

3.2 Five steps of development

Developing the 2025 VTP will be a 5-step process designed to answer these questions:

1. What areas are most suitable for renewable energy generation?
2. How much wind or solar energy should we be planning for within each candidate area?
3. What additional or upgraded transmission infrastructure is needed to connect potential energy generation projects to the grid?

4. When do we need additional or upgraded transmission infrastructure?

5. What is the right mix of generation and transmission projects that is robust across all scenarios?

Table 2 describes the 5 steps of development and Figure 10 provides an illustration of the process.

See Appendix B and Figure 10 for further details about the methodology.

Table 2: Summary of the 5 steps of developing the 2025 VTP (continues on next page)

Key analytical steps	Description
 Step 1 Identifying areas for investigation	Identifying areas for investigation for renewable energy generation is a 2-part process: 1. A broad study area (shown in Section 2) has been identified using a strategic land use assessment. The assessment took into account existing land uses and landscape features across the state from several, and sometimes competing, perspectives, including environment, cultural heritage, social, land use and engineering. The assessment identified areas that we should avoid considering due to land use and landscape constraints, areas that we should investigate further for renewable energy development, and features that provide investment opportunities. 2. The study area will be narrowed to areas for investigation. To do this, we will: – Undertake energy market modelling (see Figure 11) to identify smaller areas within the study area that are most suitable to host generation from an economic standpoint (referred to as a least-cost generation mix); and – Conduct a network planning review to assess the feasibility of connecting the areas to the transmission network.
 Step 2 Developing the generation resource plans and candidate areas	Under each scenario we will develop generation resource plans, which will include: • which technologies to build (including storage) • how much capacity to build • when this capacity should be built • the location of the new generation build. To incorporate broader qualitative factors in addition to the least-cost generation outcome, the location of the new generation build will consider a spatial multi-criteria analysis. This will provide valuable information on whether certain areas should be reprioritised based on the factors considered. The multi-criteria analysis will consider the following: • Community preferences relating to the development of renewable energy generation and transmission infrastructure across Victoria; • Land use, through detailed land-use information from the strategic land use assessment; • Generator/developer interest, including information obtained from a survey for developers of generation and storage projects; and • Regional development indicators to assess the comparative strengths of Victoria's regions in relation to REZ development, and how hosting a REZ could support other regional development opportunities. Alongside the results of the multi-criteria analysis, we will consider the size and location of in-service and committed generation projects. This will ensure the overall level of development in a region is considered when determining the most appropriate locations for siting future generation across the State. The revised generation locations will then form an input to a subsequent iteration of energy market modelling. Refining areas for investigation to candidate areas is a dynamic process that aims to actively incorporate feedback from communities, First Peoples and industry. Just a subset of these candidate areas will be required to deliver Victoria's energy needs over the 15-year development time horizon.

Table 2: Summary of the 5 steps of developing the 2025 VTP (continues from previous page)

Key analytical steps	Description
 Step 3 Identifying candidate transmission pathways	Having determined the generation resource plan for each system scenario, we will undertake network planning and power systems analysis to identify the transmission projects required to support this generation and augment the capacity of the existing grid. To achieve this, the capacity of the existing transmission network will be assessed against the maximum additional generation identified in Step 2. Where constraints are identified, transmission network planning will be undertaken to identify feasible project options. The technical feasibility of these transmission project options will be assessed through power systems analysis (see Figure 12). By considering a series of potential project options across the 15-year modelling horizon, a set of candidate transmission pathways will be developed for each system scenario. These pathways identify the potential transmission projects we will need, and when they will be needed, to maintain secure operation of the power system, meet supply requirements and deliver reliable power to Victorian homes and businesses.
 Step 4 Assessing candidate transmission pathways	To determine the right mix of generation and transmission projects that is robust across all 3 scenarios, we will use 4 tools to assess the candidate transmission pathways: • Further energy market modelling across all scenarios to optimise the outcomes under each candidate pathway. • Cost-benefit analysis for each scenario to compare the costs and benefits of the candidate transmission pathways, taking into account capital and operating costs for both generation and transmission, as well as benefits from reduced carbon emissions and improved system reliability. • Robustness analysis – also known as a least-regret analysis – to identify the pathway that minimises the net cost across all scenarios and is least sensitive to future uncertainties. This forms the draft optimal pathway. • Power system analysis to confirm the technical feasibility of the draft optimal pathway. The draft optimal pathway will be published in the draft 2025 VTP for consultation. A second phase of statewide strategic land use assessment analysis will also be undertaken to identify areas of interest for the next 10 years of transmission projects identified in the optimal pathway.
 Step 5 Developing the final optimal pathway	Relevant feedback received during consultation on the draft 2025 VTP will be used to confirm the final optimal pathway. The final optimal pathway will outline the transmission infrastructure projects required to enable REZ development over the next 15 years.

Figure 10: The 5 steps of 2025 VTP development



Figure 11: What is energy market modelling?

What is energy market modelling?

Energy market modelling is a method used to simulate and forecast how energy markets will behave in response to future changes. We will use energy market modelling software called PLEXOS that is widely used in industry. It helps to analyse how different factors such as energy demand, consumer energy resource uptake, government policies and generator capital and operating costs can influence the supply and demand of energy, and consequently the types and capacity of energy generation development in the future. This type of modelling is crucial for understanding the future dynamics of the energy market and provides insights that assist stakeholders including policymakers, energy companies, and investors in strategic decision-making. Through such models, we can forecast the impact of different transmission options on the future developer investment and operational decisions. We will use energy market modelling to produce the generation sector costs used in the cost-benefit analysis.

Figure 12: What is power system modelling?

What is power system modelling?

Power system modelling is a specialised approach used to represent the intricate workings of electrical power systems through computer simulations. The method allows us to create a digital twin of a power system, which includes generation, transmission lines, substations, and end-users of electricity at an appropriate aggregation level. By employing these models, we can predict how the system will behave under different conditions, assess reliability, plan upgrades, and integrate renewable energy sources. This process is crucial for ensuring that the power grid remains stable and efficient, minimising outages, and adapting to the evolving energy demands of Victoria. To do this, we will use a power system simulation for engineering (PSS/E) model, which is an advanced tool widely used within the industry for this purpose.

3.3 What is a transmission planning standard, and what will Victoria adopt for VTPs?

A key part of the methodology for any transmission planning exercise is the transmission planning standard that is applied. A standard includes a set of criteria that determines the transmission capacity that should be provided under a given set of inputs and assumptions. A standard should aim to ensure the development and maintenance of an electricity transmission system that is reliable, efficient and economical over the long term.

3.3.1 Types of transmission planning standards

In broad terms, transmission planning standards can be deterministic or probabilistic.

A deterministic standard defines a specific technical outcome that needs to be considered when designing a power system. Often this is a requirement to provide a level of redundancy –

or extra infrastructure needed, to be ready to safeguard the network in the event of an equipment failure. Applying a deterministic transmission planning standard involves evaluating outcomes of a predetermined set of contingencies (such as equipment failures and other events that affect supply or demand) without considering the likelihood they will occur.

In contrast, a probabilistic assessment considers both the impact of a contingency event and the probability of its occurrence. The amount of transmission capacity provided under a probabilistic approach will depend on an economic cost-benefit assessment comparing the costs of transmission infrastructure with the costs that would be incurred in the absence of that infrastructure.

In the context of REZs, a deterministic planning standard might be easier to administer and would be expected to provide more certainty to investors about the level of generation curtailment that might be experienced by a generator. Curtailment is when the output of certain generators is limited because the transmission network, or parts of it, reaches a technical limit. However, it could also be likely to lead to a higher level of capital expenditure and higher costs for electricity consumers.

A weakness of the deterministic approach is that it does not consider the likelihood and consequences of failures in the transmission system and the variable pattern of renewable generation supply, consumer demand, weather and other variables affecting supply and demand. Probabilistic planning considers all these factors and tries to determine how much money should be spent, and when, to secure energy supply for consumers.

While probabilistic planning is more complicated to plan and administer, in general it offers greater benefits to energy consumers and host communities, including lower costs and less infrastructure. In addition, there is a long track record of using probabilistic planning for transmission network planning in Victoria.

3.3.2 Application to the VTP

For the reasons noted above, we have determined that transmission planning within REZs should be undertaken on a probabilistic, economic basis, consistent with the probabilistic transmission planning standard used up to now across the rest of the transmission system in Victoria.

The probabilistic cost-benefit assessment used in developing the 2025 VTP reflects this approach by:

- identifying scenarios and considering the probabilities of those scenarios;
- assessing options for transmission projects and candidate transmission pathways on an economic basis for each scenario; and
- selecting the optimal pathway on an economic basis using the least-regret analysis relating to the probability of each scenario.

Through the VTP, this probabilistic, economic planning approach will be used to drive anticipatory investment in transmission. This contrasts with the traditional approach employed in the National Electricity Market (NEM), where transmission investment followed or was reactive to generation investment – either through generator-funded assets to connect to the shared network or through the application of a Regulatory Investment Test for Transmission (RIT-T) by a transmission planner – to alleviate congestion once a generating plant was committed or built.

In contrast, under the VTP, transmission investment will lead generation investment on a proactive basis. The plan effectively anticipates where, how much and when generation and storage capacity connects to the system. It considers the value of the resource in the area to the total system and the relative costs of providing those resources with the necessary transmission (subject to land use constraints, etc).

The plan will then proactively provide for investment in transmission capacity to the level of the transmission standard. The cost-benefit analysis and robustness analysis that form part of the methodology allows for this anticipatory transmission investment to be made as cost-effective and robust as possible. We are taking a long-term view and developing a pathway that progressively upgrades the system to deliver that anticipatory capacity. Project proponents are then able to direct their interest to areas where transmission capacity will be provided.

The transmission planning standard will be applied to transmission projects within REZs considered part of the shared network. Other transmission infrastructure will be planned as part of connection arrangements. Connection arrangements are an important part of the VTIF reforms. These arrangements will be developed to allow for the needs of specific projects within REZs and provide greater certainty to developers.

See Appendix C for further details on transmission planning standards and VicGrid's preferred approach.



4. What are the future scenarios that VicGrid will consider?

We will use scenarios to help us determine how much renewable energy is needed and when to support the energy transition over the next 25 years.

The scenarios take into account the Victorian Government's energy policies, energy demand including the adoption of consumer energy resources (such as solar panels, batteries and electric vehicles), and the closure of existing power stations.

The 3 scenarios that will help shape the 2025 Victorian Transmission Plan (VTP) have been designed to support a broad range of plausible future states and uncertainties.

4.1 What is the purpose of scenarios in the 2025 VTP?

As part of the 2024 amendments made to the *National Electricity (Victoria) Act 2005* (the Act), VTP scenarios are required to be high-impact, plausible and establish the electricity system's 25-year investment needs consistent with Victorian energy policy objectives and market outlook. The Act also specifies that, in preparing a VTP, VicGrid should have regard, among other things, to the risks associated with under-investment and over-investment. VicGrid is required to manage these risks by considering a range of scenarios and developing a VTP that is robust to future uncertainties.

We are developing 3 scenarios that will help us determine the electricity system investment needs for the coming 25 years. All 3 of the scenarios are aligned with the Australian Energy Market Operator's (AEMO's) 2024 Integrated System Plan (ISP) scenarios and adapted to meet Victoria's needs, in line with the Victorian Transmission Investment Framework (VTIF). Where appropriate, aligning with AEMO's ISP scenarios supports consistency of assumptions with national planning bodies, avoids duplication, and acknowledges the thorough analysis and stakeholder management processes that informed the national scenarios.

The scenarios do not represent our view on how the energy transition will occur, nor are they an endorsement of one scenario over another. There are many plausible and different possible futures characterised by uncertainty. Scenarios are an important tool for planning and managing future risks and uncertainty to support robustness analysis.

Appendix D provides further details on the inputs and assumptions that will be used in the development of the 2025 VTP.

4.2 What scenarios will be used in the 2025 VTP?

The 3 scenarios for the 2025 VTP are detailed below.

Scenario 1



If Victoria experiences a step-change in energy transition

This scenario considers a potential future where the evolution of the Victorian energy sector evolves in line with AEMO's national step-change trends. The 2024 ISP defines this scenario as reflecting a pace of transition that supports Australia's contribution to limit global temperature rise to less than 2°C, with consumer energy resources modelled to contribute strongly to the transition.

This scenario explores what may need to occur if Victoria's energy transition goes according to plan and Victoria's renewable energy targets, offshore wind targets and storage targets are met.

Scenario 2



If Victoria experiences growth in green industries at scale

This scenario considers a potential future where new energy-intensive industries are established in regional and central Victoria at scale, such as data centres, hydrogen production and green aluminium.

Demand in this scenario is based on AEMO's national green energy export trends forecast, which models a rapid decarbonisation pathway and the development of low emission energy exports.

Scenario 3



If there are delays in building new energy infrastructure across the National Electricity Market

This scenario considers a potential future where there may be delays of up to 1 year in delivering new energy infrastructure. This could include delays to Western Renewables Link, Victoria to New South Wales Interconnector West, Marinus Link and offshore wind generation. There is also reduced growth in coordinated consumer energy resources in Victoria.

Reflecting broad challenges across the National Electricity Market (NEM), other NEM-Government policies and targets are generally delayed.

Table 3: Summary of key factors considered in each scenario

Parameters	Scenario 1 If Victoria experiences a step-change in energy transition	Scenario 2 If Victoria experiences growth in green industries at scale	Scenario 3 If there are delays in building new energy infrastructure across the National Electricity Market
Demand			
AEMO's demand scenario	AEMO's step-change	AEMO's green energy exports	AEMO's step-change
2050 operational demand (TWh) ⁴	73.7	110.3	73.7
Consumer energy resources uptake (batteries, solar panels and electric vehicles)	High	Higher	High
Consumer engagement such as virtual power plants (VPP) and distributed solar photovoltaics (DSP) uptake	High (VPP) and Moderate (DSP)	Higher	Low (VPP) and Moderate (DSP)
Energy efficiency	Moderate	Higher	Moderate
Hydrogen use	Med-low production for domestic use, minimal export	High production for domestic and export use	Med-low production for domestic use, minimal export
Other key factors			
Victorian Renewable Energy Targets (2025, 2030 and 2035)	Achieved	Achieved	Achieved
Storage targets (2030 and 2035)	Achieved	Achieved	Achieved
Offshore wind targets	Achieved	Achieved	Achieved, delayed up to 1 year: 2 GW by 2033, 4 GW by 2036 and 9 GW by 2041
Gas constraints	As per AEMO's 2024 ISP	As per AEMO's 2024 ISP	As per AEMO's 2024 ISP
Interconnection	As per announcements / AEMO's ISP	As per AEMO's ISP	Western Renewables Link, Victoria to NSW Interconnector West and Marinus Link (ML) Stage 1 delayed, no ML Stage 2
NEM coal closure	As per announcements / Victorian Renewable Energy Target	As per announcements / Victorian Renewable Energy Target	As per announcements / Victorian Renewable Energy Target
Non-VIC government policies	Aligned with announcements	Aligned with announcements	Delayed due to various challenges associated with the energy transition

⁴ Data retrieved from AEMO | Electricity Forecasting Data Portal as of June 2024

Source: VicGrid and AEMO IASR 2023

4.2.1 Summary of the key factors considered under each scenario

The scenarios encompass high-impact and plausible changes in factors such as electricity demand, interconnection with other jurisdictions, and government energy policies.

The Act requires VicGrid to consider future uncertainties across a range of scenarios. All 3 scenarios see the achievement of Victorian Government targets, including the delivery of offshore wind targets. One scenario (scenario 3) considers what may happen if there was a delay of up to 1 year in delivering new energy infrastructure across the NEM to ensure the VTP is robust to risks.

The Victorian Government is committed to developing Australia's first offshore wind industry, on time, as legislated. In line with these commitments, VicGrid continues to plan and develop new transmission infrastructure to link offshore wind with the network.

Key factors and their treatment in each scenario are outlined in Table 3. The table also includes some of the underlying factors that AEMO incorporates into overall demand, and how these vary across the scenarios.

4.2.2 Scenario 1 – Victoria experiences a step-change in energy transition

This scenario considers a potential future if demand is aligned with the forecast of AEMO's step-change scenario, and includes inputs and assumptions that are consistent with the achievement of state government targets across the National Electricity Market (NEM). By aligning with AEMO's step-change scenario, scenario 1 is based on well-understood and consulted-on inputs and assumptions. At a national level, AEMO's expert panel considers its step-change scenario to be the most likely scenario.

Scenario 1 explores transmission needs if Victoria's – and the NEM's – energy transition goes according to plan. It includes the continuation of policy settings and government targets, an energy transition that is well under way, and strong economy-wide transitioning towards electricity as our primary energy source (also referred to as electrification) - driven at the state level through the Gas Substitution Roadmap and the Zero Emissions Vehicle Roadmap.

The scenario considers a potential future if there is moderate growth in the global and domestic economy, increased consumer appetite for consumer energy resources (such as solar panels, batteries and electric vehicles), and also some limited hydrogen production. Under scenario 1, annual operational demand for electricity in Victoria is expected to reach 44.5 Terawatt-hours (TWh) in 2030 and rise to 73.7 TWh by 2050.

Scenario 1 assumes that other states' energy policies and targets are achieved as announced. Interconnection with other regions is assumed to be delivered on time and in line with the 2024 ISP. This includes assuming the Victoria to New South Wales Interconnector West is delivered by 2029, Marinus Link Stage 1 and Marinus Link Stage 2 by 2030 and 2032 respectively. Across the NEM, coal generation is assumed to retire in line with announced retirement dates and the achievement of the Victorian Renewable Energy Target of 95% by 2035.

Appendix D provides additional detail on the inputs and parameters assumed for scenario 1.

4.2.3 Scenario 2 – Victoria experiences growth in green industries at scale

This scenario considers a potential future if demand is aligned with AEMO's highest demand scenario – green energy exports scenario.

Under this scenario there may be a rapid transformation, including high rates of transition to electricity as the primary energy source, and the establishment of new sources of demand across Victoria, including the potential for data centres or a regionally based hydrogen industry in Victoria, supported with generation from Victoria's developing offshore wind industry.

The Victorian Government has a policy for regional economic development as part of the energy transition, and this scenario seeks to model the energy sector evolving in line with these policies. Additional regional industries resulting in increased demand could result from industry development, hydrogen and derivative production, or data centres, with production envisaged to occur in regional areas. Hydrogen production in other NEM jurisdictions in this scenario is assumed to occur in line with AEMO's step-change scenario trends, to reduce the impact of extremely high energy demand in other states on Victoria.

In comparison to scenario 1, scenario 2 assumes a future where there may be higher economic growth, higher uptake of consumer energy resources, higher energy efficiency, faster technological cost reductions, higher hydrogen production and higher overall electricity consumption. There may be a high degree of electrification and energy efficiency investments across many sectors. This scenario sees annual operational demand in Victoria reaching 59.9 TWh in 2030 and 110.3 TWh in 2050.

Similar to scenario 1, scenario 2 sees Victorian Government targets achieved, and other NEM state government targets are assumed to be achieved in line with announcements. Coal-fired power stations are assumed to retire in line with announced retirement dates and the achievement of the Victorian Renewable Energy Target of 95% by 2035.

Appendix D provides additional detail on the inputs and parameters assumed for scenario 2.

4.2.4 Scenario 3 – If there are delays in building new energy infrastructure across the National Electricity Market

This scenario considers a potential future where there may be delays of up to 1 year in delivering new energy infrastructure. This could include delays to Western Renewables Link, Victoria to New South Wales Interconnector West, Marinus Link and offshore wind generation. If this scenario occurred, build-out of offshore wind generation would see the first 2 GW by 2033, 4 GW by 2036, and 9 GW by 2041.

This scenario is aligned with the demand scenario in AEMO's step-change demand, however this scenario will consider what would need to occur if there is reduced growth of coordination of consumer energy resources than currently assumed in AEMO ISP step-change scenario.

Similar to scenario 1, scenario 3 sees other Victorian Government targets achieved and coal-fired power stations are assumed to retire in line with announced retirement dates and the achievement of the Victorian Renewable Energy Target of 95% by 2035.

However other NEM-Government policies and targets are assumed to be delayed, due to challenges associated with the energy transition.

Appendix D provides additional detail on the inputs and parameters assumed for scenario 3.

4.3 Sensitivity analysis

VicGrid can use sensitivity analysis to ensure the robustness of results generated by the methodology to inform the optimal development pathway.

Sensitivity analysis involves examining how one change to a variable affects the analysis results to identify any significant differences in transmission outcomes we need to account for.

Sensitivity analysis is often used to complement a scenario-based planning approach. AEMO has adopted sensitivity analysis in its ISP development.

The following sensitivities may be considered in the development of the 2025 VTP:

- Potential timing delays in transmission and interconnection, as well as delays in the commissioning of Snowy Hydro 2.0.
- Potential changes in the location of Victorian energy demand, which may be tested by shifting demand between central Melbourne and regional Victoria.
- Potential changes in timing of coal-fired power station retirements – including early or delayed closure.
- Potential timing delays in the achievement of offshore wind targets.
- The impact of lower take-up and coordination of consumer energy resources (such as solar panels, batteries and electric vehicles), which may be tested by varying the aggregate generation provided by consumer energy resources.

4.4 What inputs and assumptions will be used in the 2025 VTP?

Many of the decision-making tools used in the 2025 VTP development process rely on inputs and assumptions, such as those relating to forecast demand and generation, the types of new generation and storage technology and the government policies that are modelled.

Modelling energy sector outcomes, and planning for them, is a complex process. As an example, AEMO categorises key inputs and assumptions for its ISP across 13 categories. Despite this complexity, AEMO's modelling and assumptions have been well consulted on and are generally well understood. Accordingly, VicGrid has aimed to align with AEMO's inputs and assumptions, adapted for Victorian policy and energy market outlook, wherever possible.

The energy market modelling, multi-criteria analysis and economic appraisal will use the inputs and assumptions primarily identified by AEMO. This includes inputs and assumptions relating to energy demand, costs of existing and new electricity generation, renewable energy availability and resources, types of new generation and storage, and the discount factor used in the cost-benefit analysis. The power systems analysis will use the inputs and assumptions associated with engineering standards and the National Electricity Rules.

One important input into the energy market modelling and power systems analysis used to

develop the 2025 VTP is the assumption regarding the transmission projects that will be considered as committed (and will proceed).

As outlined in Appendix D, existing and in-progress transmission projects outlined in AEMO's 2024 ISP and the Victorian Annual Planning Report, including the Western Renewables Link, Victoria to New South Wales Interconnector West, and Marinus Link (Stage 2 varies by scenario) are assumed to be delivered and will be included as inputs into the VTP methodology.

There are also a range of transmission projects at varying stages of planning, being progressed by VicGrid as the 2025 VTP is being developed. These projects may be supported by an Order under section 16Y of the Act and included as an input into the 2025 VTP. For example, this could include the transmission currently being developed to support the first 2 GW of offshore wind that will connect to Victoria within the first 10 years of the planning period (with some variation in timing across scenarios).

Between the release of the 2024 VTP Guidelines and the development of the 2025 VTP there may be other projects that will need to be progressed. These projects will also be treated as an input into the 2025 VTP where possible.

See Appendix D for further details on all inputs and assumptions.

What are the future scenarios
that VicGrid will consider?





5. Partnering with First Peoples

Historically, Traditional Owners and First Peoples' communities have not had a seat at the table in the formation of the state's energy infrastructure and technology development. Country, Sea Country, and communities have been negatively impacted and disempowered by a lack of a voice in these vital infrastructure projects.

5.1 Our commitment to partnership

We are committed to working in partnership with First Peoples as distinct rights holders to Country and Sea Country. They are our partners who have rights that must be upheld as laid out under the *Charter of Human Rights and Responsibilities Act 2006* (Vic), the *Traditional Owner Settlement Act 2010* (Vic), *Aboriginal Heritage Act 2006* (Vic) and *Native Title Act 1993* (Cth). We acknowledge First Peoples have legal rights and cultural responsibilities that will be recognised and supported.

As part of our commitment to partner with Victoria's First Peoples and Traditional Owners, it is important to identify and address key expectations and concerns that align to their rights and cultural responsibilities.

VicGrid is committed to the Pupangarli Marnmarnepu 'Owning Our Future' Aboriginal Self-Determination Reform Strategy and intends to work in partnership with First Peoples in the regions to identify key considerations and concerns, and benefits and opportunities that may be of interest.

True partnerships with Traditional Owners, founded on the principles of self-determination, provide the basis for a just energy transition, supporting the protection of Country, maintaining spiritual and cultural heritage and practices, and acknowledging broader aspirations if First Peoples are impacted by new critical energy infrastructure.

5.2 First Peoples and the Victorian Transmission Plan

VicGrid is seeking to partner with Traditional Owner groups to enable First Peoples to play an active role in the development of the Victorian Transmission Plan (VTP) and to minimise impacts to Country from future renewable energy zone and transmission projects.

Cultural heritage and cultural values are key considerations in the development of the VTP. Historical and Aboriginal cultural heritage values have been included within the strategic land use assessment.

The first phase of the strategic land use assessment includes only publicly available datasets for Aboriginal and Historical cultural heritage. As such, the data relating to Aboriginal cultural heritage is limited and does not capture all known heritage values.

VicGrid is working to establish relationships with all Registered Aboriginal Parties (RAPs) as well as the Victorian Aboriginal Heritage Council to work collaboratively and supplement the publicly available data throughout the lifecycle of the 2025 VTP and subsequent VTPs, with the objective of enabling the model to progressively include relevant tangible and intangible Aboriginal cultural values and to help avoid places of cultural significance.



5.3 The role of the strategic land use assessment and cultural heritage

This is the first time VicGrid has undertaken a strategic land use assessment and we recognise the need to evolve the assessment, model and method over time.

The cultural heritage component of the assessment is not a predictive model for the identification of Aboriginal or historical cultural heritage values. It simply reflects the known values, and is limited by the available data. Some parts of Victoria have not undergone detailed heritage assessments, and the lack of data simply reflects the lack of assessment, not a lack of heritage values.

VicGrid is committed to supporting and empowering RAPs to assist in mapping and assessments. This could include through providing funding and other capacity-building support to RAPs, so

they can resource and run their own renewable energy engagement programs aligned with self-determination principles.

The strategic land use assessment does not replace regulatory requirements. *The Aboriginal Heritage Act 2006* (Vic) and the *Heritage Act 2017* (Vic), along with other relevant state and Commonwealth legislation, still applies to any future works.

Feedback from First Peoples and Traditional Owners on renewable energy and transmission development will be vital in this process, so we can understand and protect local knowledge and values.

This feedback will be used to inform the VTP and the areas that will co-exist with future renewable energy generation and transmission infrastructure.



6. How will VicGrid consult with communities and industry to develop the plan?

Community and industry engagement will be critical to the successful delivery of the 2025 Victorian Transmission Plan (VTP) and the development of renewable energy zones (REZs) in the coming decades.

Meaningful engagement with communities and industry will support us in planning and developing renewable energy generation and transmission in a way that minimises negative impacts and maximises the collective benefits.

We know that previous transmission planning processes have not adequately incorporated community, land use and environmental values as well as local benefits. We are committed to listening to and considering all feedback, balanced against the technical and financial requirements of planning future transmission infrastructure projects.

6.1 Engagement model

VicGrid will apply the Victorian Government's Public Engagement Framework 2021-2025, which provides principles, a how-to guide and measures for engagement evaluation. It aims to strengthen meaningful engagement practices in Victoria. The Public Engagement Framework aligns with the values and principles set out by the International Association of Public Participation (IAP2). The Framework embodies 6 engagement principles that provide an overarching framework for guiding engagement:

- **Meaningful:** The process of public engagement is genuine and informs the final decisions.
- **Inclusive:** The engagement is respectful, inclusive and accessible.
- **Transparent:** The engagement is clear and open about what the public can and cannot influence.
- **Informed:** The engagement provides relevant and timely information to the public.
- **Accountable:** The engagement is high quality and responsive to the public.
- **Valuable:** The engagement creates value for the community and government. This can include social, economic and environmental values.

6.2 Our approach to place-based community engagement

The Victorian Transmission Investment Framework (VTIF) sets out our approach to incorporating early, deeper and ongoing community engagement from a place-based perspective throughout planning and investing in transmission projects. Our goal is to ensure regions and communities have the agency and opportunity to meaningfully participate in the planning and development of REZs and the benefits of the energy transition. To achieve this, there are 6 underlying objectives for VicGrid's community engagement model:

- To raise community awareness and understanding of REZs and why large-scale transmission is critical to the energy transition.
- To facilitate community input into key stages of the planning and investment lifecycle for transmission projects, including through the strategic land use assessment and consultation on the draft 2025 VTP.
- To enable First Peoples to be resourced with the capacity and capability to participate in REZ discussions and make decisions.
- To support the delivery of community benefits to ensure impacted host communities and First Peoples directly benefit.
- To foster government-industry-community partnerships to unlock regional development opportunities in line with local aspirations and build local adaptive capacities.
- To facilitate a cross-sectoral and multi-level governance response to issues and provide an escalation point for resolving issues throughout the end-to-end planning and development process.

We will seek to deliver on these objectives across a range of activities relating to various policy reforms and the 2025 VTP. As the projects identified in the final 2025 VTP are implemented, communities will have further opportunities to participate in place-based engagement to inform transmission corridor refinement and project design.

6.3 Industry engagement

Industry plays a crucial role in the transmission planning process. Industry stakeholders include developers of generation and storage projects, transmission owners and operators, existing generators and retailers, market and regulatory bodies, construction companies, investors and all businesses involved in the supply chain for new transmission infrastructure.

VicGrid recognises that engaging with industry will be critical, and we are committed to ensuring industry perspectives, expertise and knowledge help shape the 2025 VTP. We recognise that engagement is important to improve investor and developer confidence that transmission infrastructure will be developed in the places, and in the timeframes, that support new renewable energy and storage connection in Victoria.

This will accelerate the deployment of renewable energy, which has been shown to drive down wholesale electricity prices and reduce costs for consumers, and will position Victoria to meet our renewable energy targets and net-zero emissions by 2045.

6.4 Key engagement opportunities

Engagement on the Victorian transmission planning process began in November 2023 with the Renewable Energy Planning Survey (which was open from 17 November 2023 to 16 February 2024). Findings from this survey have informed the identification of the study area and will continue to support the development of the 2025 VTP, alongside additional engagement.

The following sections summarise the key engagement opportunities for the 2024 VTP Guidelines and the 2025 VTP.

Figure 13 illustrates the engagement opportunities and where engagement outputs will support the development of the 2024 VTP Guidelines, the 2025 VTP and REZ declaration.

6.4.1 Consultation on the draft VTP Guidelines and candidate area refinement approach (July-August 2024)

Between 22 July and 25 August 2024, we invited feedback on the draft VTP Guidelines. Engagement opportunities included:

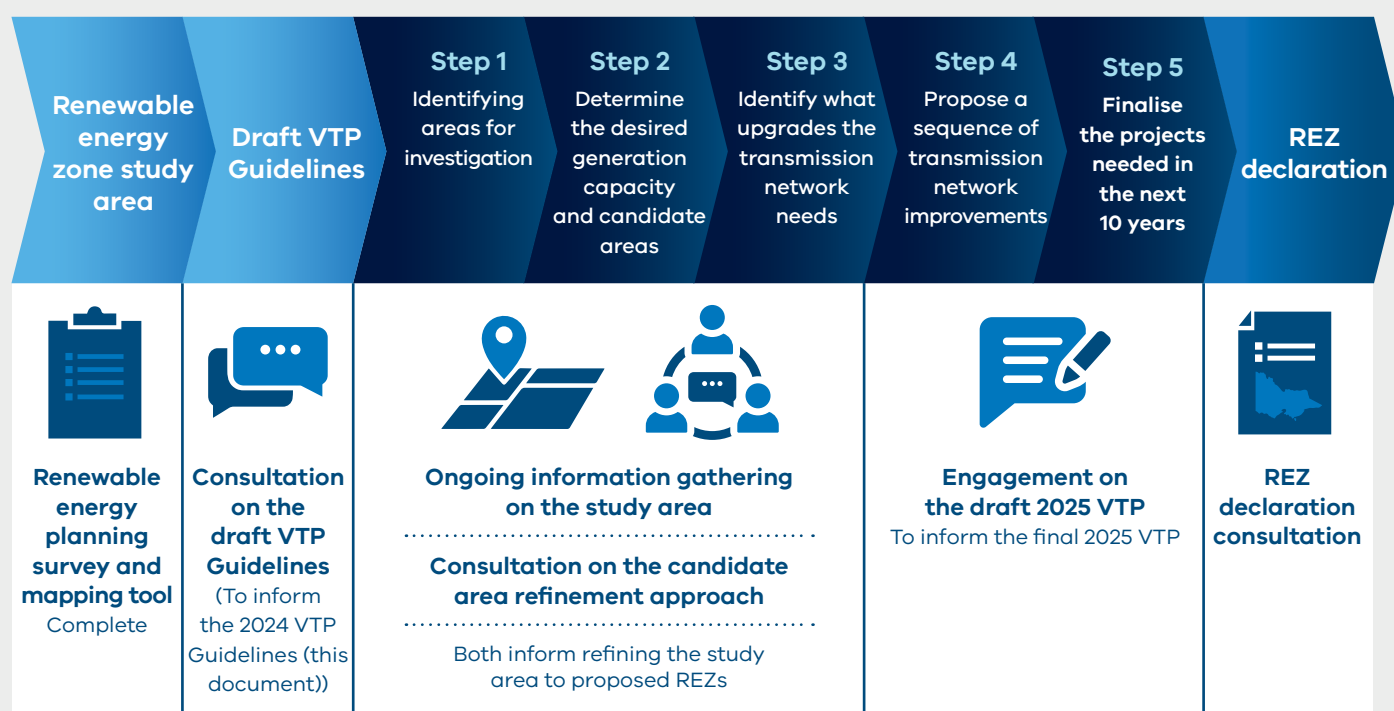
- in-person community drop-in sessions and events
- online community and industry webinars
- briefings with peak bodies, local governments and other key stakeholders
- briefings with Victoria's Registered Aboriginal Parties
- feedback forms
- submissions.

Alongside inviting feedback on the draft VTP Guidelines, we sought feedback from the community on guiding principles that will help shape the method we will use to refine the study area to candidate areas.

We also sought information from developers on the potential location and volume of any planned generation and storage projects. This information will be an input into the candidate area refinement approach.

The engagement outcomes of the draft VTP Guidelines are detailed in the Interim Engagement Report - What We Heard.

Figure 13: Community and industry engagement over the 2025 VTP and REZ declaration process



6.4.2 Ongoing information gathering on the study area (July–September 2024)

We invited feedback on the REZ study area as part of the draft VTP Guidelines consultation. Feedback on the study area was open until 30 September 2024. This feedback helps inform which areas of Victoria we should be protecting and other factors that could influence the placement of energy generation and transmission infrastructure within the study area.

Findings from this consultation will be published in a combined final engagement report with the feedback we received on the draft VTP Guidelines.

The final engagement report will be made available on Engage Victoria at engage.vic.gov.au/vicgrid.

Engage Victoria is the Victorian Government’s online consultation platform.

6.4.3 Feedback on the draft 2025 VTP (early 2025)

We will publish a draft 2025 VTP which will set out VicGrid’s proposed approach to the first Victorian Transmission Plan. The draft will include:

- proposed REZs and transmission infrastructure projects to meet Victoria’s energy needs over the next 15 years, including where and when they will be developed
- areas of interest for those transmission projects needed in the next 10 years to enable development of proposed REZs
- how partnerships with First Peoples and engagement with communities and industry have shaped the draft plan
- further opportunities for First Peoples, communities and industry to provide feedback to shape the final 2025 VTP.

We will seek feedback on the draft VTP, to ensure that communities and industry have the opportunity to input into the plan. Further details on the activities and opportunities to learn about the draft and

provide feedback will be published on Engage Victoria at engage.vic.gov.au/vicgrid.

We will publish the final 2025 VTP by no later than 31 July 2025. We will report back on what we heard and how community and industry engagement has informed the final plan.

6.4.4 REZ declaration consultation (following the 2025 VTP release)

Following the final 2025 VTP, the Minister can commence the REZ declaration process. The Minister will consider the proposed REZs that require development within 10 years.

There will be the opportunity for further engagement with communities and industry prior to a REZ being declared. The Minister must invite submissions for a period of no less than 6 weeks on the renewable energy zone declaration Order that sets out the boundaries of the REZ, its hosting capacity and the preferred transmission corridor. The Order must also set out engagement requirements and expectations of project proponents during project development within the REZ.



How community and industry feedback helped shape the 2024 VTP Guidelines

Between 22 July and 25 August 2024, we invited feedback on the draft VTP Guidelines alongside consultation on the study area. Engagement opportunities included:

- in-person community drop-in sessions and events
- online community and industry webinars
- briefings with Victoria's Registered Aboriginal Parties
- briefings with peak bodies, local governments and other key stakeholders
- feedback forms
- submissions.

We received almost 800 feedback form responses and more than 170 submissions, and held conversations with more than 350 community members during drop-in sessions.

Communities provided input into the strategic land use assessment to identify the study area through the Renewable Energy Planning Survey and interactive map, which was open from 17 November 2023 to 16 February 2024.

We understand there are areas of significance and sensitivity to communities within the study area relating to cultural, environmental and land use values like agriculture and resources. We will work through these issues by partnering with First Peoples and consulting with landholders, communities and industry as we undertake additional analysis to refine the broad study area into proposed REZs. This will ensure we develop in the most appropriate locations across the state.

We will also be working with the energy industry to consider industry priorities in identifying proposed REZs and seeking further information regarding the potential location and volume of new generation and storage that can be expected in Victoria in the coming years.

Appendix information and link

Appendix A: Strategic land use assessment
engage.vic.gov.au/download/document/36743

Appendix B: Victorian Transmission
Plan methodology
engage.vic.gov.au/download/document/36744

Appendix C: Transmission planning standard
engage.vic.gov.au/download/document/36745

Appendix D: Inputs, assumptions
and scenarios
engage.vic.gov.au/download/document/36746



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