Distribution demand forecast assessment

Review of AusNet Services' 2026-31 regulatory proposal

Australian Energy Regulator

July 2025 – Final report

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1. Executive summary

We've assessed the reasonableness of AusNet's 2026-2031 demand forecasts and provided recommendations for improvements.

Our scope

Baringa Partners (Baringa) was engaged by the Australian Energy Regulator (AER) to review the methodologies and assumptions driving the Victorian distribution network services providers' (DNSPs') demand forecasts for the 2026-2031 distribution determinations to help inform their assessment of capital and operating expenditure (capex and opex) forecasts. Our scope of work focuses on two key elements:

Demand methodology review

- The approach each DNSP has taken to derive their forecasts for maximum demand, minimum demand, customer number and energy consumption. This includes reviewing their approach to technology-induced demand like EVs and block loads such as data centres.

Demand input assumptions review

- Reviewing the source, recency, and adjustments to key input assumptions such as consumer energy resources (CER) uptake and profiles.

Our approach

We undertook a 3-phase approach to assessing the demand forecasts:

1. **Discovery**
   - We developed an overarching understanding of the DNSPs' demand inputs, assumptions and methodologies gained via reviewing the proposals, workshops with each DNSP and an initial set of information requests.
2. **Initial Findings**
   - Using our assessment process and the information gathered in Phase 1 plus further information requests, we identified areas of potential concern that required further assessment, clarification or validation.
3. **Final Report**
   - Following a further set of information requests based on the findings in Phase 2, we've landed on the findings set out in the report.

Assessment process

1. Identify key methodology elements and input assumptions
2. Materiality & reasonableness assessment
3. Aggregate element findings and determine level of concern
4. Directional assessment of forecasts
5. Key recommended changes

Key timeline

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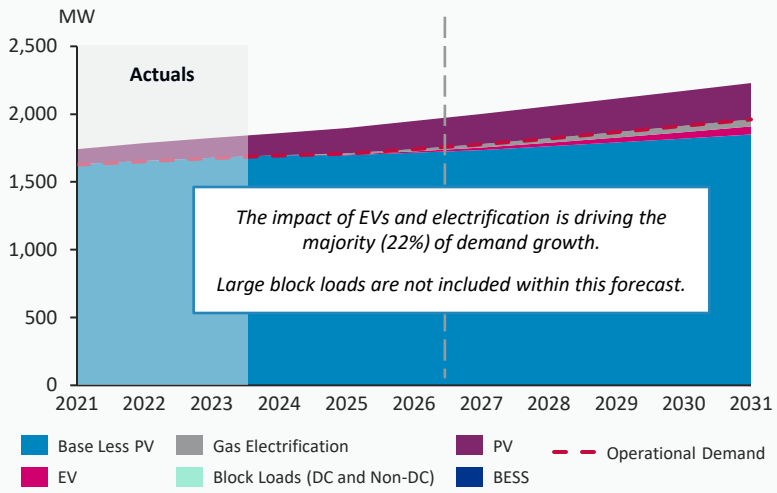
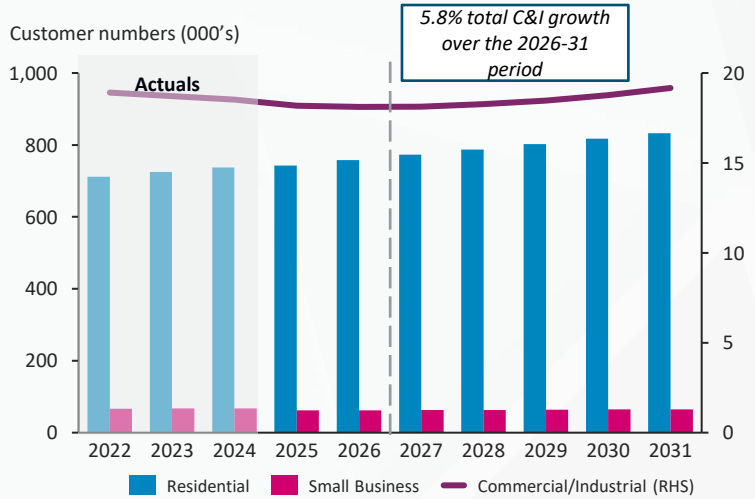
AusNet is forecasting low to medium maximum demand growth at an annual rate of 2% compounding from 2024.

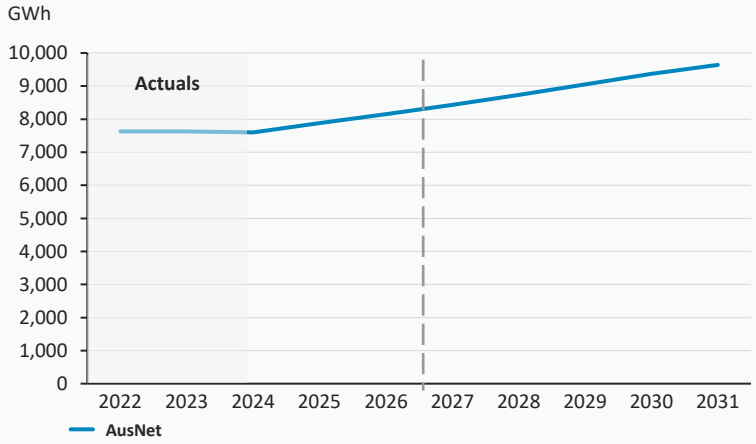
Maximum demand[1]



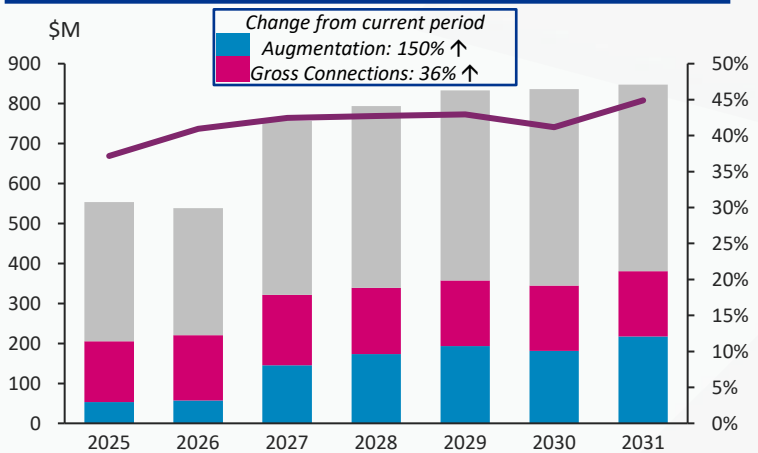
Customer numbers



Energy consumption



Forecast demand-related expenditure[2]



Summary of methodology

Maximum/minimum demand:

- AusNet produces their maximum demand forecasts with an in-house model. This approach is based on a methodology developed at Monash University in 2015, and this has been iterated on internally over the last decade.
- AusNet's process involves training a model on historical data then simulating the future using synthetic weather years and projections of population and CER growth.
- The approach incorporates external data sources and AusNet sources where it is considered most reliable.

Energy consumption:

- Historical data is extracted at a monthly aggregate level. For each tariff component data is converted into a timeseries and the forecast uses a 'Temporal Fusion Transformer' method which incorporates different customer counts by tariff type.

Customer numbers:

- Residential customers are linked to VIF postcode forecasts and non-residential customers in proportion to this. AusNet makes adjustments to the forecasts based on recent customer growth trends.

Notes: (1) This is the summer peaking maximum demand forecast POE50, system-level, coincident; (2) Highlights augmentation and gross connections capex growth as primarily demand driven expenditure, though we acknowledge that not all augmentation is demand driven; (3) We have not produced minimum demand forecast charts for assessment.

AusNet's within-model approach is transparent, but post-model adjustments appear material and require further justification. AusNet also uses outdated AEMO inputs.

Key output	Assessment	Level of concern	Impact
Maximum demand	• We have moderate concerns with AusNet's forecast of maximum demand, and consider the impact of this is that the forecast is likely to be overstated. • AusNet's presentation and description of their in-house methodology is transparent and their data provision has been forthcoming. However, based on our assessment of a selection of augex business cases, they appear to make significant post-model adjustments to max demand which increase demand beyond what's implied by their 'within model' forecasts without sufficient justification. • Further, their methodology could be improved to include energy efficiency and behind-the-meter batteries which would be expected to have a moderate downwards impact on max demand forecasts (but offsetting impacts on min demand forecasts). • AusNet's forecasts also use outdated AEMO inputs – using AEMO's Draft 2024 Forecasting Assumptions Update (Dec 2023), when the Final version (Aug 2024) was available and used by other Victorian DNSPs.	Moderate concern	↗
Minimum demand		Some concern	↗
Customer numbers	• AusNet's customer number forecasts are critically important as their 'unitised' approach to forecasting max/min demand combined their customer number forecasts and a per customer demand forecast. We consider AusNet's approach based on government forecasts for dwelling growth for residential and holding the residential-to-non-residential customer ratio constant is broadly reasonable. • However, as per above, significant post-modelling adjustments require further justification.	Moderate concern	↗
Energy consumption	• AusNet's energy consumption and max/min demand forecasts appears to be based on inconsistent approaches to forecasting customer numbers and incorporating rooftop solar PV. • AusNet's approach excludes energy efficiency (which would bias forecasts up) and block loads (which would bias forecasts down), having somewhat offsetting impacts. Overall impact is overstated or neutral as will depend on extent these factors are offsetting.	Moderate concern	↗ or -

Key:

Level of concern	
Scale	**Rating**
	No or limited concern
	Some concern
	Moderate concern
	Significant concern

Impact on forecast				
Highly Overstated	Overstated	Neutral	Understated	**Highly** Understated
↑	↗	-	↘	↓

Footnote: Expenditure forecast impacts on minimum demand are in reverse. I.e. An overstated maximum demand leads to higher demand-driven augex while an understated minimum demand suggests higher expenditure on CER enablement programs.

Key areas of concern include AEMO scenario use, approach to native demand, spatial disaggregation, and post-modelling adjustments.

	Key theme	AusNet
1	**Model architecture** Integration of internal and external methodologies	In-house model.
2	**Transparency** Clarity on model assumptions and methodologies	Satisfactory for within-model transparency.
3	**AEMO scenarios use** Adoption of latest inputs and assumptions across coherent scenario	Outdated inputs.
4	**Native demand** Approach to demographic and economic driven demand growth	No treatment for energy efficiency.
5	**CER spatial disaggregation** Approach to distributing technology-driven growth at the ZSS/Feeder level	Spatial level penetration follows state-wide trends, which is unlikely to be representative of the network. A bias appears of CER growth toward areas of existing high penetration.
6	**Block load treatment** Approach to large, known load connections	Only committed connections.
7	**Data centres (DC)** Approach to DC connections	Only committed connections (none).
8	**Gas electrification** Approach to the transition away from gas	Electrification impact on energy consumption profile based on an internal study
9	**Post-modelling** Manual adjustment to forecast after the core modelling process	Lack of transparency for when, where, why and how material post-modelling adjustments are based on local knowledge.

Key: *Area of concern*

Our further assessment on locational demand forecasts and AEMO updates reveal that AusNet is likely overstating demand and the related augmentation expenditure.

In addition to assessing AusNet's overall demand methodology, we have also selected and assessed the locational demand forecasts for two material demand-driven augex business cases

Pakenham South Business Case

- We're not able to reconcile the population growth at Clyde North against reliable population estimates. It is unclear how the SA2 data is being used to calculate the connection growth rates at the feeder level within AusNet's forecast.
- Of the 29 combinations of mapped SA2 and feeders for Clyde North, 15 have missing population data in the VIF 2023. Of the 14 combinations with available population data, AusNet's estimate of population growth rate at the feeder exceeds the VIF 2023 figures in 12 cases.
- Decrease in ratio of residential to non-residential customers is aligned with historical trend.
- EV load contribution within the proposed augmentation is greater than AusNet's network-level average.

Wollert Business Case

- Baringa is not able to reconcile the population growth at Kalkallo against reliable population estimates. It is unclear how the SA2 data is being used to calculate the connection growth rates at the feeder level within AusNet's forecast. Of the 11 mapped SA2/feeder pairs for Kalkallo, AusNet's estimate of population growth rate at the feeder exceeds the VIF 2023 figures in 9 cases.
- Increase in ratio of residential to non-residential customers is aligned with historical trend.
- EV load contribution within the proposed augmentation is broadly aligned with AusNet's network-level average

Notes: SA2 are areas comparable to postcodes

Updating demand forecasts

Key data sources (Jan 2025 initial proposal)	**AusNet's plans to update its forecast** (Dec 2025 revised proposal)	**Our assessment**
• December 2023 IASR *CER Uptakes, EV profile*	• February 2025 AEMO IASR update	• AusNet should update their forecast inputs to align to AEMO's ESOO. Noting that AEMO's 2025 IASR is used as inputs for their 2025 ESOO. There is adequate time for AusNet to update to Final IASR 2025 (July 2025) before the revised proposal. • We agree it is reasonable for AusNet to include the most recent historical weather year (2024-25). We not this will likely put upward pressure on maximum demand forecast. • The 2025 GSOO report was released in March 2025 and should be used as updated gas input data.
• Historical Network Data (Up to March 31 2024)	• Historical Network Data (Up to March 31 2025)	

Our recommendations include that AusNet include the latest AEMO updates and reconsider spatial disaggregation techniques on CER growth in its Revised Proposal.

Key recommendations

1

Update use of latest AEMO scenario

AusNet has used the December 2023 version of AEMO's Inputs, Assumptions and Scenarios Report (IASR) for their demand forecast scenario. Throughout the RFI and review process they have stated they will update their forecast to use the February 2025 IASR Update. We consider they should instead use the latest updates based on the July 2025 Final IASR as the most relevant input.

2

Provide transparency for basis of post-modelling adjustments

We recommend that AusNet provide greater transparency and justification for where, when, why and how much they have departed from their model forecasts and have applied post-model adjustments to derive the local demand forecasts used to justify their augex business cases. Different inclusion criteria for block load adjustments at different network levels should ensure no duplication between the baseline trend and new connection adjustment and address any overestimation of demand at the system level.

3

Further consideration and impact of energy efficiency over time

The demand forecast excludes the impact of energy efficiency and the rationale for excluding is unclear. We would expect changes in energy efficiency due to differences in dwelling types and technology advancements. Accounting for energy efficiency gains would moderately constrain future demand growth. We note that AusNet's independent consultant, the CIE, also recommended that AusNet consider energy efficiency impacts.

4

Update approach for spatially disaggregating EV and PV growth

For EV and PV growth, AusNet uses penetration rates that are grown by AEMO statewide uptake profiles. This approach should consider technological limitations at each ZSS or incorporate demographic data for EV and PV. The forecasting outputs have insofar not aligned to this approach.

*BtM BESS could also be included for completeness as it could have a non-negligible impact on max/min demand and be expected to better manage demand against peaks.

2. Regulatory context and our approach

Note: This section is identical across all reports.

DNSPs' expenditure forecasts must reflect a realistic expectation of demand. Demand forecasts impact capex, opex and tariff calculations.

AER expenditure criteria

1. The efficient costs of achieving the capex and opex objectives
2. The costs that a prudent operator would require to achieve the capex and opex objectives
3. A realistic expectation of the **demand forecast**, cost inputs, and other relevant inputs required to achieve the capex and opex objectives

Spatial maximum demand

Drives demand driven augex

- Spatial level maximum demand forecasts input into the calculation of unserved energy at the asset level which drives the net benefit calculation to support augmentation.
- These forecasts are used to identify emerging network limitations and risks that need to be addressed by either network or non-network solutions.
- **Spatial demand forecasts are therefore used as an input to determine the timing and scope of capital expenditure, primarily augmentation capex.**

Minimum demand

Drives CER integration capex and opex

- Minimum demand forecasts help in planning and managing the integration of CER into the network. Minimum demand forecasts highlight challenges regarding power system security and network operating limits particularly during periods of high solar generation.
- The AER may assess the impact of how minimum demand forecasts affect distribution networks as a result of CER uptake and operation. These forecasts will be required to support any CER integration business cases or related expenditure uplift from DNSPs.

Customer numbers

Drives connections capex and opex output growth changes

- Provides data for network planning and expenditure for new connections.
- For assessing connections and customer driven works expenditure, the AER requires information on both forecast customer volumes and costs for several standardised categories of works.
- In addition to driving new connections capex, customer number forecasts are also an input into the opex output growth trend under the AER's base-step-trend approach to forecasting opex.

Energy consumption

Drives tariff calculations

Also impacts opex forecast

- DNSPs forecast energy consumption (GWh) feeds into tariff setting so that tariff rates are set in a manner that reflects the DNSP's revenue cap for that year. Any differences in actual and forecast volume delivered will have a *perceived* impact on consumers. If DNSPs over-forecast consumption in their revenue proposal, this would result in lower *expected* network tariffs. Though the difference in actual and forecast consumption is adjusted for at the annual tariff setting stage.
- Consumption forecasts also feed into opex forecasts.

Source: National Electricity Rules (NER), clauses 6.5.6 (c) and 6.5.7 (c).

Baringa has been engaged to review the Victorian DNSPs' demand forecasts for the 2026-2031 regulatory control period, with a focus on maximum demand.

Baringa's scope focuses on two key elements for demand forecasts

Demand methodology: The approach that DNSPs have taken to demand forecasts, such as how they have incorporated technology-induced demand like EVs, or considered block loads.

Demand assumptions: Inputs, assumptions and drivers of demand forecasts such as the impact of consumer energy resources, energy efficiency, blocks loads and more.

- We are performing a bottom-up qualitative review of the methodologies, inputs and assumptions for Victorian DNSPs' demand forecasts.
- We are considering the reasonableness of the approaches taken by the DNSPs in order to inform the AER's Draft Determinations.
- Our primary focus is on reviewing the methodologies and input assumptions informing maximum demand forecasts, however, we have also considered minimum demand, customer number and energy consumption forecasts.

Baringa's scope excludes forecasts and reviewing expenditure

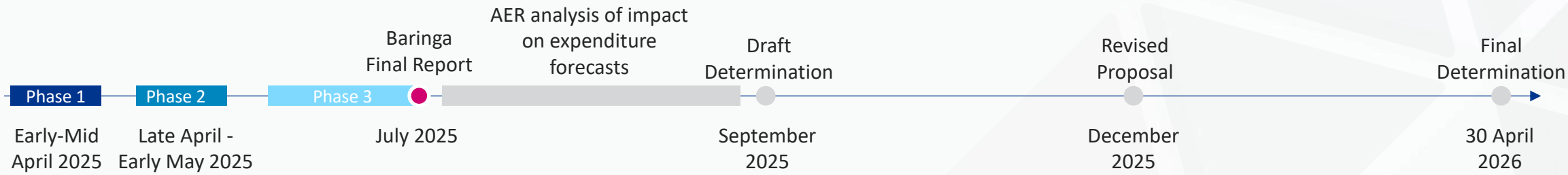
Alternative demand forecasts: Baringa is not performing modelling to prepare alternative forecasts for demand, consumption and customer numbers, as we do not have the ability to directly re-run the DNSPs' back-end models.

Expenditure review: Baringa is not undertaking a review of the expenditure forecasts.

- As we do not have the ability to directly re-run the back-end models used by the DNSPs, this review focuses on a qualitative assessment, rather than preparing alternative forecasts for demand that could be numerically compared against the DNSPs outputs. The exception to this is for data centre load we're we have our own Baringa forecast and have compared that forecast to the DNSPs' as part of our assessment.
- We are focused on the demand forecasts, and in effect their implications for expenditure, rather than reviewing prudency and efficiency of the expenditure forecasts.

We adopted a 3-phase approach to assessing the demand forecasts for each of the Victorian DNSPs. Our findings are outlined in separate reports for each DNSP.

	Key activities	Key outcomes
Phase 1: Discovery	► Undertake documentation review ► Submit first general IRs ► Participate in DNSP on-site sessions ► Submit second targeted IRs	► Broad understanding of the DNSPs inputs, assumptions and methodologies ► View on areas to hone our focus
Phase 2: Initial findings	► Undertake initial evaluation ► Perform initial validations, where feasible ► Draw on our market insights ► Undertake an initial evaluation	► Form an initial view of areas of potential concerns with the approaches taken across the DNSPs ► Identify areas where more clarification or validation is required to make an assessment
Phase 3: Final report	► Submit final clarification IRs ► Perform further validations and refine the evaluation ► Prepare our Draft Reports for AER review and Final Reports for publication	► Greater validation of areas of concerns ► Form a firm view of our concerns with the forecasting approaches taken by the DNSPs, where we have sufficient information



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Our assessment approach involves a rigorous five-step process to test the DNSPs' demand methodology and key input assumptions.

1 Identify key methodology elements and input assumptions

Identification of key methodology elements and input assumptions for review.

2 Materiality & reasonableness assessment

Materiality and reasonableness assessment which leads to level of concern assessment of each element.

3 Aggregate element findings and determine level of concern

Grouping of findings to form overall view on level of concern at max demand, min demand, customer number and energy consumption level.

4 Directional assessment of forecasts

Qualitative assessment on directional impact of our concerns on max demand, min demand, customer number and energy consumption.

5 Key recommended changes

Key methodology and input/assumption areas where we recommend the DNSP improves its demand forecast for Dec 2025 Revised Proposal.

Expected materiality of impact on output × **Reasonableness of approach** = **Level of concern**

Scale	Rating
○	Immaterial
◔	Low materiality
◑	Somewhat material
●	Material

Scale	Rating
●	Reasonable
●	Somewhat reasonable
●	Somewhat unreasonable
●	Unreasonable

Scale	Rating
	No or limited concern
	Some concern
	Moderate concern
	Significant concern

Impact of assumption on demand forecasts

Scale	Rating
↑	Highly overstated
↗	Overstated
-	Neutral
↘	Understated
↓	Highly understated

1 **Recommendation** Description

2 **Recommendation** Description

3 **Recommendation** Description

4 **Recommendation** Description

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Our assessment of the materiality and reasonableness of each key methodology element and input assumption leads to our level of concern rating.

Level of concern		Reasonableness of approach			
Expected materiality of impact on output	**Scale**	●	●	●	●
Scale	**Rating**	**Reasonable**	**Somewhat reasonable**	**Somewhat unreasonable**	**Unreasonable**
○	**Immaterial**	No or limited concern	No or limited concern	Some concern	Some concern
◔	**Low materiality**	No or limited concern	No or limited concern	Moderate concern	Moderate concern
◑	**Somewhat material**	No or limited concern	Some concern	Moderate concern	Significant concern
●	**Material**	No or limited concern	Some concern	Significant concern	Significant concern

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3. Summary of AusNet Services' demand proposal

AusNet produces their maximum demand forecasts using an in-house model that is enhanced using historical data and future scenarios.

Forecasting methodology

- AusNet produces their maximum demand forecasts with an in-house model.
- AusNet's approach is based on a methodology developed at Monash University in 2015, but this has been built on internally for a decade.
- AusNet's process involves training a model on historical data then simulating the future using synthetic weather years and projections of population and CER growth.
- The approach taken by AusNet is clear and intuitive, though we see some areas for improvement.

Transparency of approach

- AusNet has prepared their demand forecasts in-house and provided the greatest transparency in terms of inputs, assumptions and methodology.
- While their methodology is transparent and intuitive, there are areas where we consider it could be improved. For instance, energy efficiency gains over time are not considered, and BtM BESS are excluded from the forecast.
- Post-model adjustments have been applied for maximum demand and energy consumption, though we have a moderate level of concern given the lack of transparency on the reasoning for the manual adjustment.

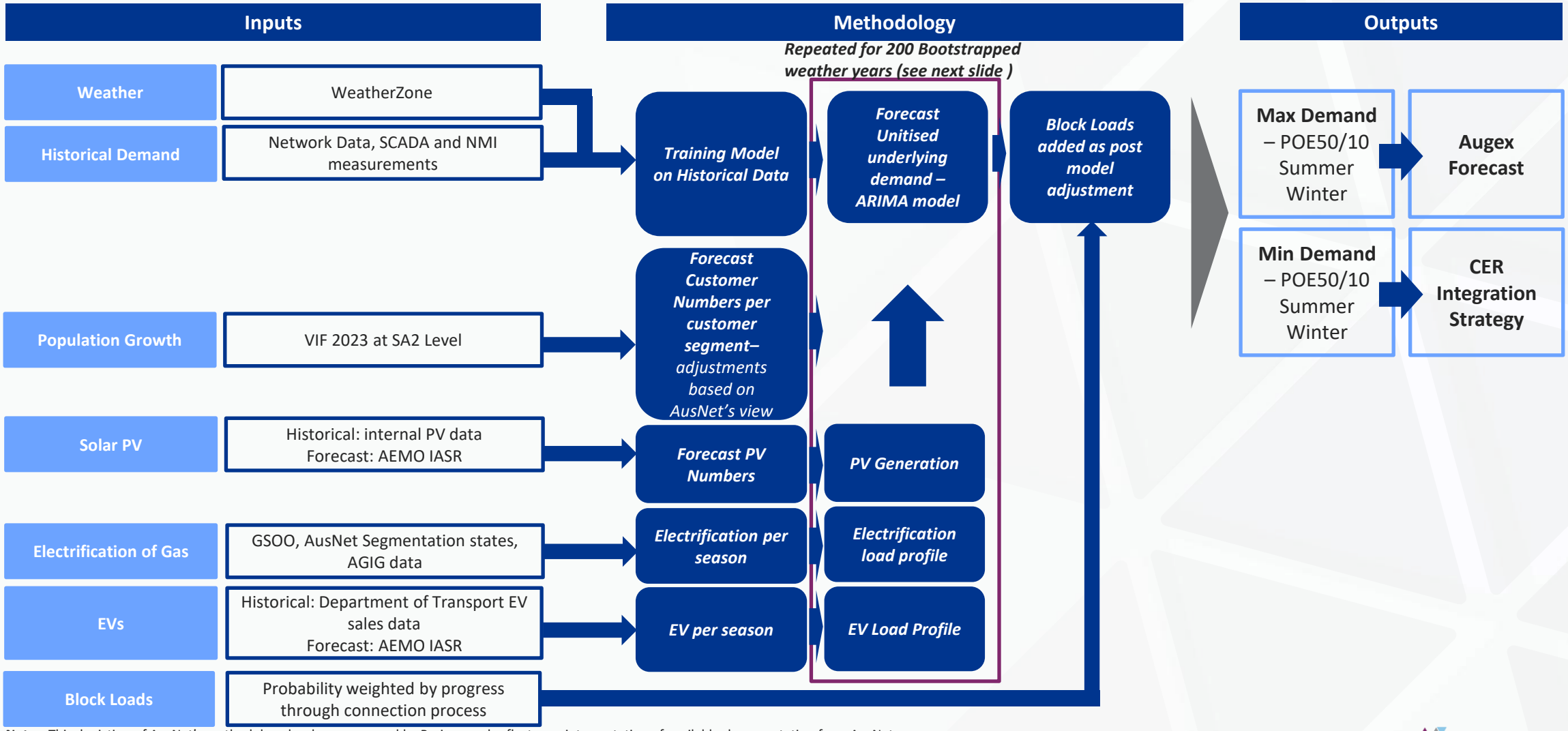
Relative to the current regulatory period, AusNet is proposing a material increase in demand driven capex, including 150% growth in augmentation expenditure.

	2021-2026 period actual/estimate totals		2026-2031 period changes			
	Augmentation	Connections (gross)	Augmentation	Connections	Demand growth (p.a.)	Customer growth (p.a.)
AusNet	$364.0M	$423.2M	150%↑	36%↑	2.0%↑	1.8%↑

- The above table outlines AusNet's augmentation and gross connections (i.e. before capital contributions are considered) capex across current period actuals and new regulatory period forecasts. These two expenditure categories are primarily (but not wholly) demand-driven.
- AusNet has proposed significant increases in demand driven capital expenditure. Total augmentation expenditure is $911.0 million*. This is an increase of 150% in comparison to the current regulatory period. AusNet states that this forecast is driven by a significant increase in demand driven augmentation necessitating a need for network upgrades. While AusNet's forecast system demand growth is modest, the augmentation expenditure is forecast to grow significantly and is the highest among Victorian DNSPs (noting that not all augex is demand-driven). In Section Five, we have assessed AusNet's local demand forecasts underlying two material business cases, being those for Pakenham South and Wollert.
- For connections, $576.5 million is gross connections expenditure, which is an increase of 36%. Customer growth, electrification and new customer such as EV charging infrastructure is driving the increase. AusNet forecasts net connections expenditure of $299.2 million.

***Note**: This figure was initially $909.0M as per the AER Issues paper - AusNet Services electricity distribution determination 2026-31 - March 2025. During the RFI process this was corrected to $911.0M.

AusNet uses an internal methodology to prepare their demand forecasts, based originally on an approach developed at Monash University in 2015.



Notes: This depiction of AusNet's methodology has been prepared by Baringa and reflects our interpretation of available documentation from AusNet.

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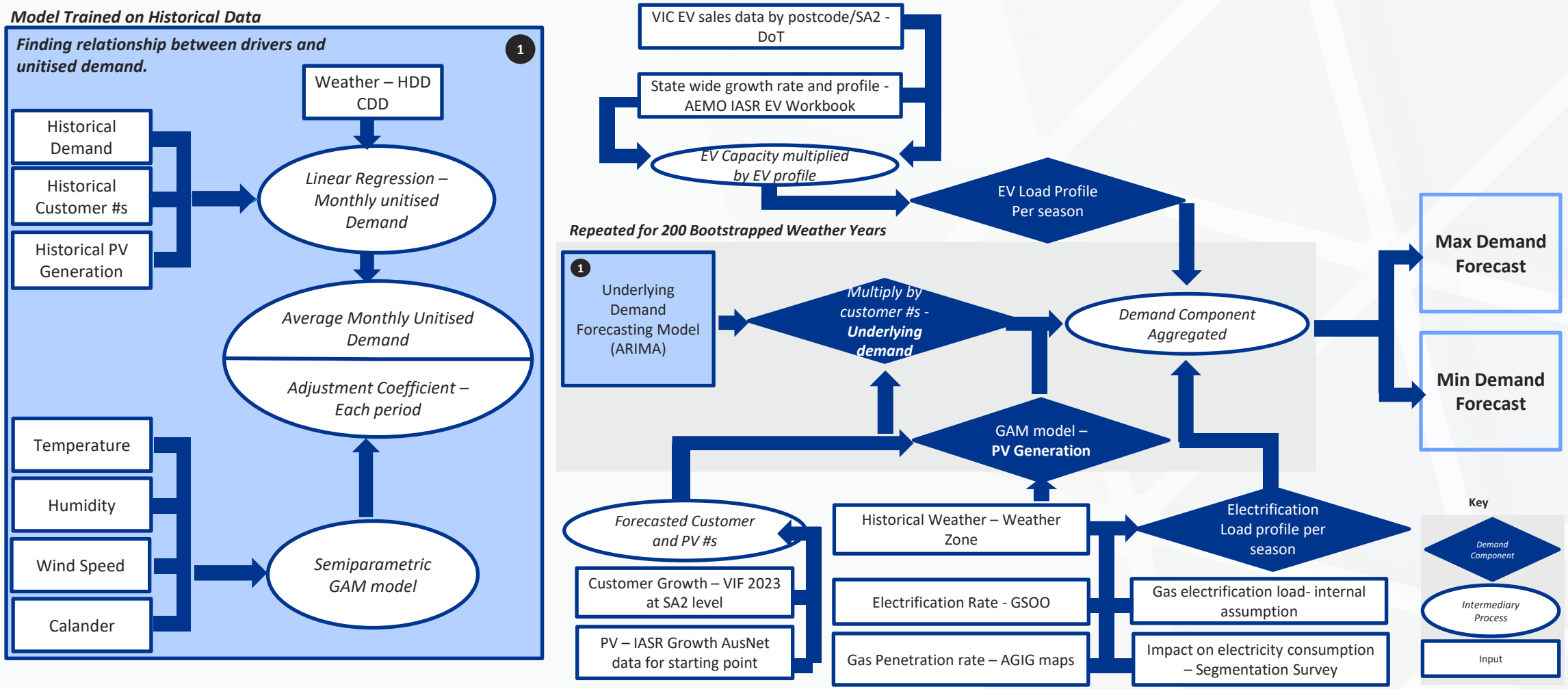
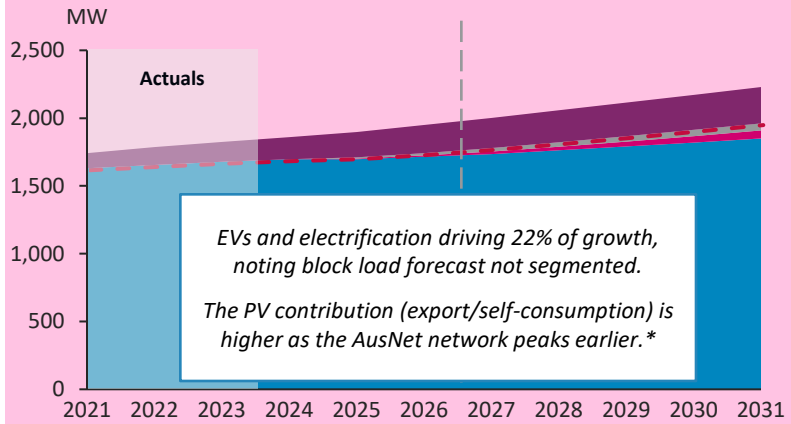
AusNet's demand forecasting process is clear and repeatable, involving a statistical model trained on historic data to forecast demand at the spatial level.



Notes: This depiction of AusNet's methodology has been prepared by Baringa and reflects our interpretation of documentation by AusNet.

AusNet's maximum demand growth forecasts sit at the lower to mid range compared to other Victorian DNSPs.

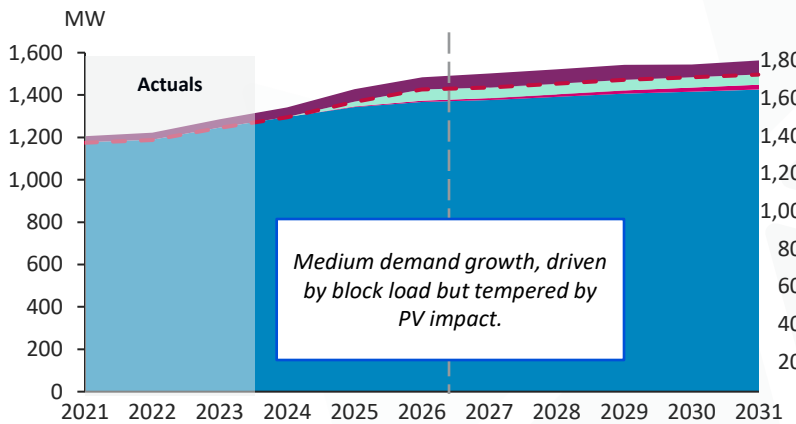
AusNet



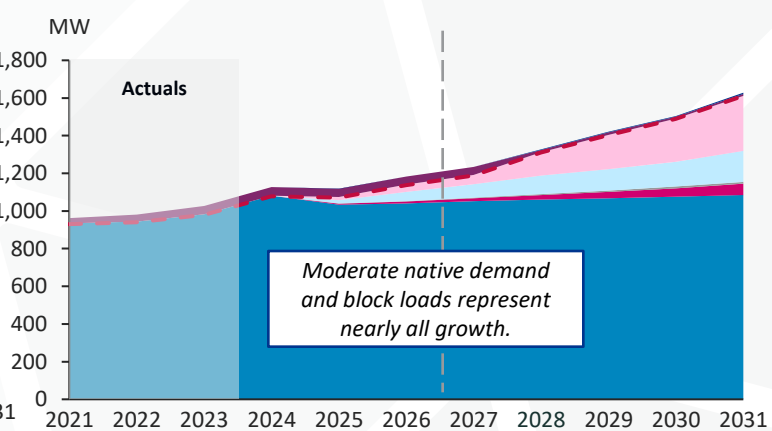
Commentary

- AusNet has low to medium demand growth, at approximately 2% compounding over 2024.
- EVs and electrification drive 22% of growth, noting data centre and other block load forecasts are not included in their forecast.
- *The PV contribution is relatively higher than other DNSPs as the network peaks earlier, where AusNet forecasts to become winter peaking by 2027 due to gas electrification.
- The network switches to winter-peaking over the horizon but chart above has been kept as summer maximum demand for ease of representation.

CitiPower



Jemena



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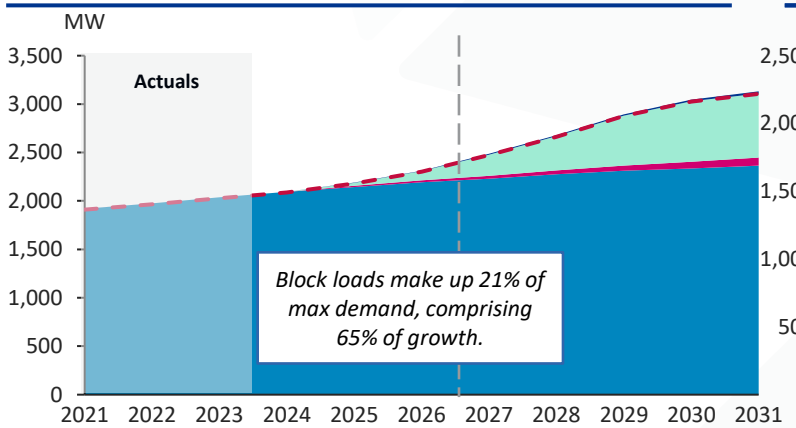
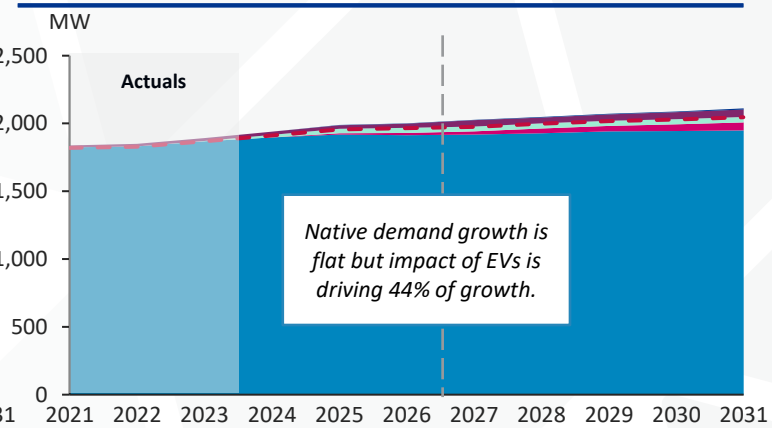


United Energy

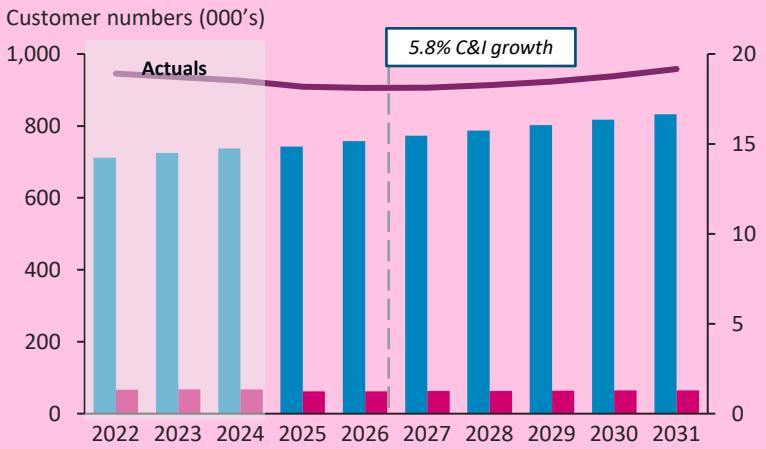


Source: Data provided by DNSP in IR responses

Source: *AusNet proposal Jan 2025, p. 276

AusNet's customer number forecasts for all new connections are largely in line with the other Victorian DNSPs.

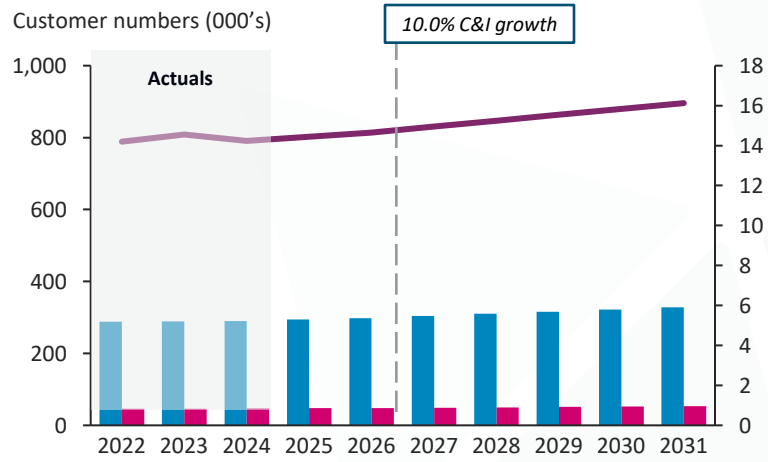
AusNet



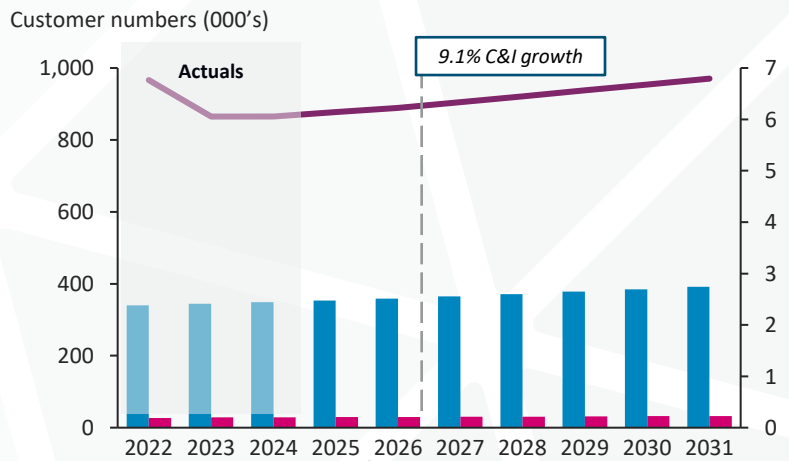
Commentary

- AusNet is forecasting total customer growth over the regulatory period to increase by 9.4% with steady customer growth across residential and small business segments.
- New large business customer types such as EV charging infrastructure are contributing to greater C&I customer growth over the regulatory period at 5.8%.
- This trend is resulting in higher expenditure for, augmentation, connections and customer-driven works.

CitiPower



Jemena



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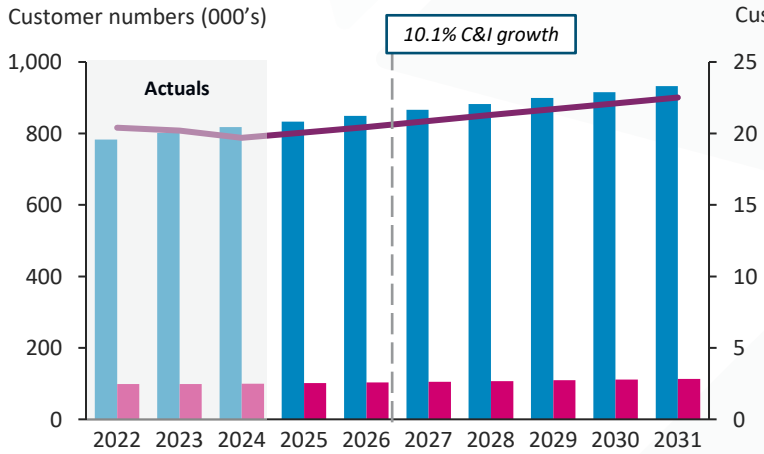
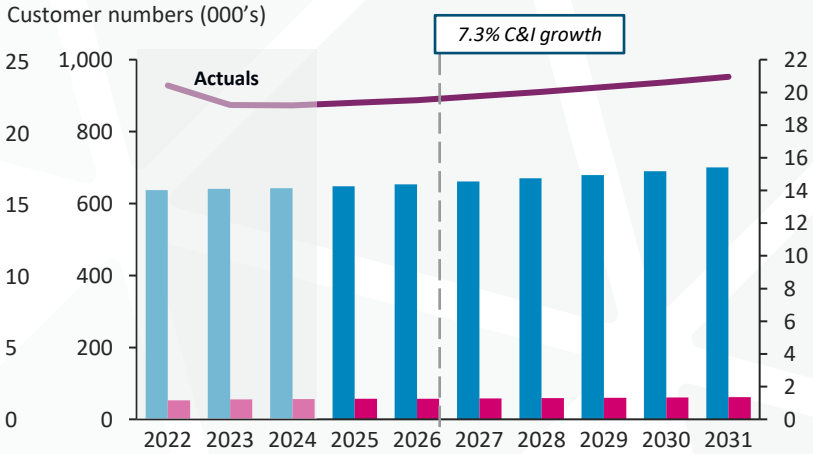


United Energy



Residential (LHS) | Small Business (LHS) | Commercial/Industrial (RHS)

Source: Analysis based on DNSP Reset RIN data

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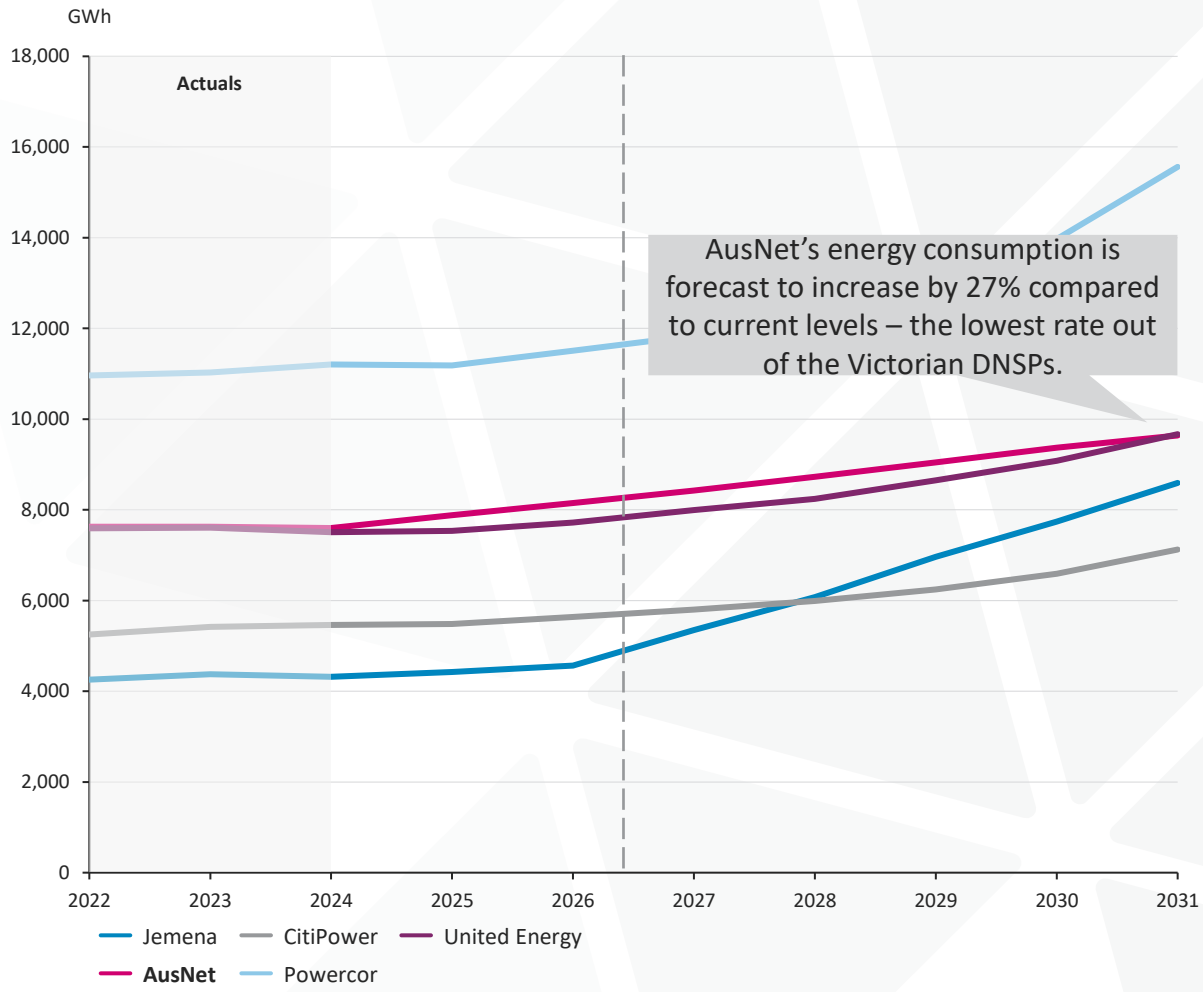
AusNet's energy consumption represents the topography and customer base within its network, with forecast increases moderate and driven by steady growth.

Key consumption drivers

- Energy consumption is a measure of all customers' total energy use over time. The chart illustrates the energy consumption for the five Victorian DNSPs for the current and upcoming regulatory periods.
- Forecasting energy consumption is relevant as the consumption volumes for each year act as an input into setting prices for that given year such that the DNSP's expected revenue is equal to the maximum regulated revenue.
- Key changes and drivers include:
  - **AusNet**: Relatively consistent at approximately 7,600 GWh before a moderate increase to over 9,600 GWh by 2031 driven by steady growth across all consumption categories – native demand, CER and gas electrification.
  - **Jemena**: Shows the most significant increase in consumption pinpointed at the start of the period, driven primarily by data centres and ultimately doubling energy throughput to 8,594 GWh by 2031.
  - **CitiPower**: A 31% increase compared to 2024 levels with 7,124 GWh by the end of the period. Driven initially by CER and electrification of gas then data centres late in the regulatory period.
  - **Powercor**: Highest level of throughput with a significant rate of change driven largely by data centre uptake in the network. 11,204 GWh in 2024 and projected to reach over 15,562 GWh by 2031, representing a 39% increase.
  - **United Energy**: Similar to AusNet, at approximately 7,500 GWh before a steady increase to over 9,600 GWh by 2031. Driven initially by CER and electrification of gas then data centres late in the regulatory period.

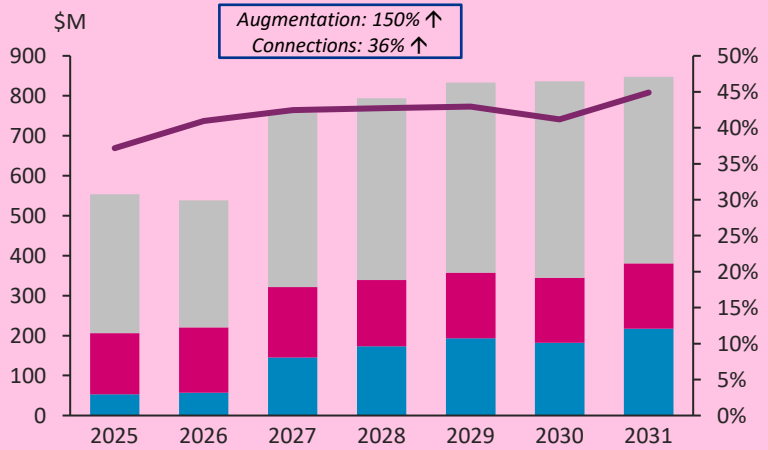
Victorian DNSP energy consumption historical and forecast



Source: Analysis based on DNSP Reset RIN data

AusNet's forecast demand is driving higher investment, when compared to other DNSPs it has the highest augmentation increase and the lowest connections increase.

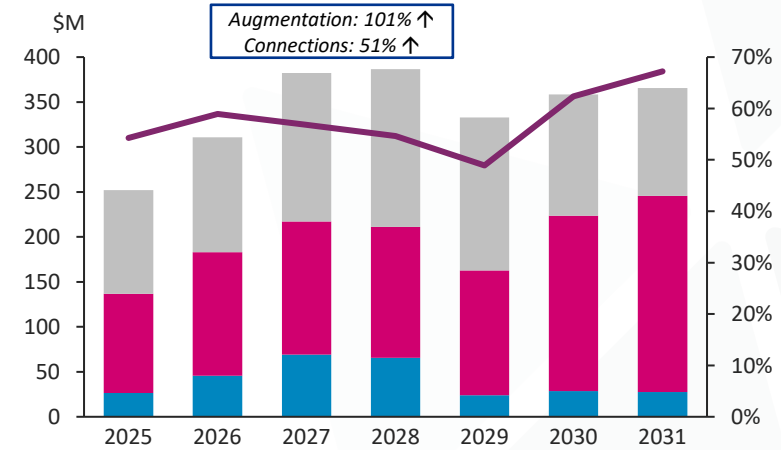
AusNet



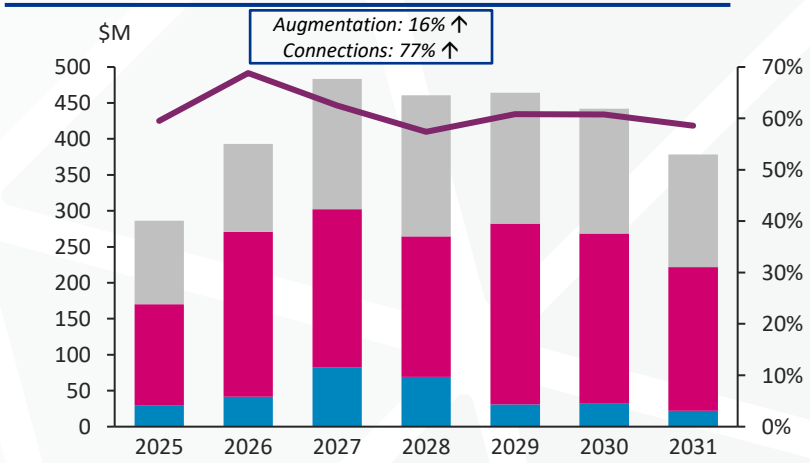
Commentary

- All DNSPs are proposing increases in expenditure, with demand-related capex accounting for approximately 43% of AusNet's total capex.
- AusNet's augmentation proposal is providing a significant contribution to the uplift in expenditure over the next regulatory period as seen in the first year. Relative to the other Victorian DNSPs, it has the highest increase at 150% when compared to expenditure levels in the current period.
- Gross connections capex is also 36% higher, but this is relatively low compared to the other DNSPs.

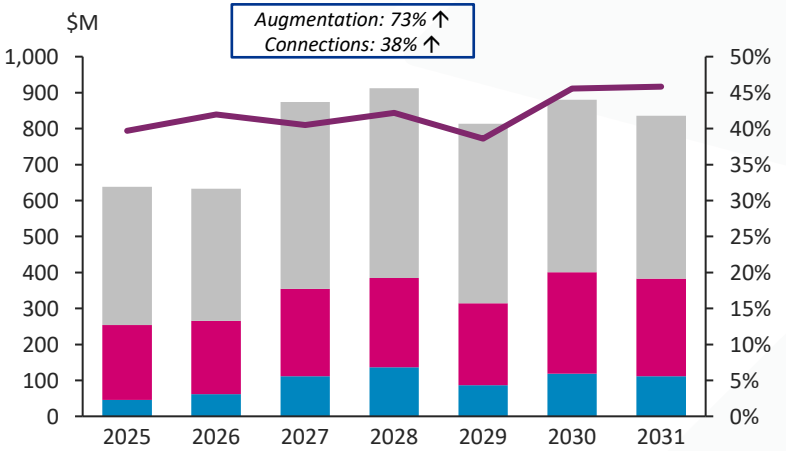
CitiPower



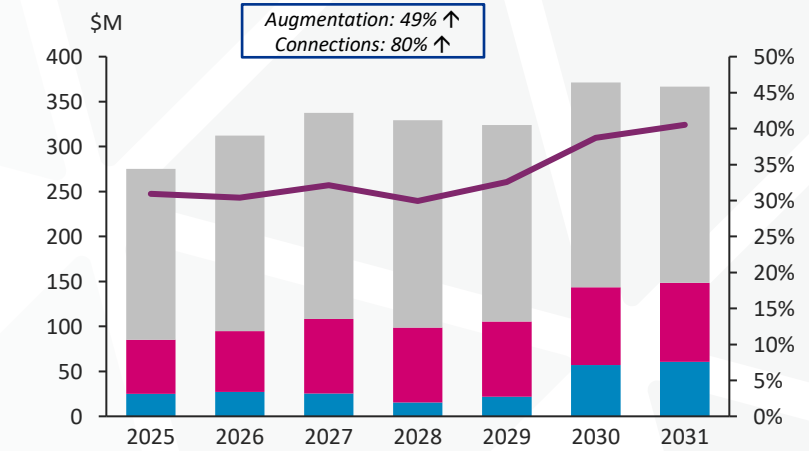
Jemena



Powercor



United Energy



Augmentation capex
Other Capex
Connections capex (Gross)
Proportion of demand-related capex (RHS)

Change from current period

Source: Analysis based on DNSP Reset RIN data

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4. Our overall evaluation on key demand methodology and input assumptions

We identified the following as the key input assumptions and methodology processes for review.

Key inputs

Traditional drivers

- Population
- Economic growth
- Customer numbers

Technology-induced drivers

- PV
- Electric vehicles
- BtM batteries
- Gas electrification
- Data centres & other block loads

Key methodological processes

Max/min demand

- Native demand forecasting
- Technological uptake
- Spatial disaggregation
- Historical data use
- Major customers and block loads
- Gas electrification
- Profile creation
- Scenario use and sensitivities
- Validation, testing and review
- Post-model adjustment

Customer numbers

- Spatial population forecast (Residential)
- Gross state product forecast (C&I)

Energy consumption

- Native demand forecasting
- Technological uptake
- Historical data use
- Major customers and block loads
- Scenario use and sensitivities
- Validation, testing & review
- Post-model adjustment

AusNet does not incorporate economic growth into its forecasts.

Traditional

Key inputs	Output	Materiality × Reasonableness = Concern	Assessment detail – Inputs and assumptions

Population growth	Max/min	No or limited concern	• We consider AusNet's assumption is reasonable as it has sourced its population growth forecasts (or more precisely, dwelling forecasts) from a credible source and applied those forecasts to its network in a logical way to derive residential and non-residential customer forecasts:
			  • AusNet forecasts residential customer numbers using private dwelling growth forecasts from the Victorian Government's Victoria in Future (VIF) publication[1]. It maps VIF dwelling forecasts at the Statistical Area 2 (SA2) level – which are comparable to postcode regions – to its zone substations to forecast residential customer growth by zone substation, and in turn, customer numbers by terminal station and feeder.
			  • AusNet forecasts non-residential customer numbers by first estimating the historical residential-to-non-residential customer ratio at the zone substation/feeder level, and then applies that ratio to the residential customer forecast.
			• Under AusNet's unitised (per customer) demand forecasting assumption, these customer number forecasts subsequently inform the max/min demand forecasts.

	Energy	No or limited concern	
	Customers	No or limited concern	
Economic growth	Max/min	Some concern	• Economic growth has not been explicitly included within the forecasts. AusNet acknowledges that this is not explicitly modelled and has referred to the CIE report for discussion supporting this position.[2] • We consider that it is typical to include economic growth as an input into demand for forecasting accuracy, particularly business demand (for example, it is a key component that AEMO includes as a driver for ESOO). The other Victorian DNSPs (CPU and Jemena) incorporate economic growth to some degree. It is therefore a useful indicator as a differentiator from population driven growth.
	Energy	Some concern	
	Customers	Some concern	
Customer Numbers	Customers	Moderate concern	• See section *Methodological approach – Customer numbers*

Source: (1) Total population tab in VIF2023_Victoria_Demographic_Projections_to_2051_Release_2.xlsx; (2) AusNet – IR#022 – Q14 & The CIE - Appendix 4B Demand forecasting methodology review - 31 Jan 2025 – PUBLIC, p. 17

AusNet's inputs and assumption are generally aligned with AEMO, although they are out of date (Draft 2024 FAU from 2023).

Technology-based

Key inputs	Output	Materiality ×	Reasonableness =	Concern	Assessment detail – Inputs and assumptions
PV generation and uptake	Max/Min	◑	●	Some Concern	• For PV uptake rates used in their maximum demand forecast AusNet has used AEMO's VIC growth scenarios - Draft 2024 Forecasting Assumptions Update (FAU) data for Step Change.[1] This input was out of date at submission on initial proposal. • Solar profiles have been developed using solar irradiance sources from Weatherzone's satellite data (in which Weatherzone states as sources from the Bureau of Meteorology). AusNet has used their own actual PV data used for historical. These are appropriate sources. • For AusNet's energy consumption, PV is not included explicitly – only through historical billing. We consider this should be explicitly modelled to segment across load types.
	Energy	●	●	Significant concern	
EV charging profiles and uptake	Max/min	◑	●	Some Concern	• We have some concern over AusNet's selection of EV data inputs. AusNet has relied on AEMO's Draft 2024 Forecasting Assumptions Update data (Step Change scenario) for EV growth and charging profiles.[1] This is outdated at the time of preparing their forecasts (December 2023). Historical EV counts at postcode level are sourced from Victorian Department of Transport and Planning. AusNet used Q2 2023 release data. • We consider that more recent data would have been available for their initial proposal. We later assess AusNet's use of AEMO scenarios and sensitivities in *Methodological approach – Maximum and minimum demand [3]*
	Energy	◑	●	Some Concern	
BtM BESS charging profiles and uptake	Max/min	◔	●	Moderate concern	• We consider that AusNet's assumption that BtM BESS is excluded from the forecast to be somewhat unreasonable. This should be included for completeness as it may have a non-negligible impact for max/min demand forecasts. AusNet's independent reviewer, the CIE, also noted this omission.[2] This results in a moderate level of concern in our assessment as the forecast is incomplete without this demand driver. • However, our concern regarding this input assumption does not apply to energy consumption forecasts, as BtM BESS has no material impact on (net) consumption.
	Energy	○	●	No or limited concern	

Source: (1) AusNet – IR#022 – Q14; (2) The CIE - Appendix 4B Demand forecasting methodology review - 31 Jan 2025 – PUBLIC, p. 2

The block load inputs and assumptions for maximum demand are reasonable, but this is not carried over to energy consumption.

Technology-based

Key inputs	Output	Materiality	× Reasonableness	= Concern	Assessment detail – Inputs and assumptions
Gas electrification residential, commercial and industrial	Max/min	◑	●	No or limited concern	• AusNet has assumed AEMO's Victoria-wide gas electrification scenarios (2024 Final GSOO for Step Change) as their input for electrification. [1] The gas electrification rate is also aligned with GSOO gas customer disconnection rate. Further, AusNet arrived at the gas electrification rate using a 2022 Customer Segmentation research item to survey the impact of electrification which included actual smart meter data.[2] Historical gas connection numbers estimated from AGIG map. • We consider these assumptions reasonable and have no or limited concern with AusNet using these figures as their input sources as they represent quality and available information.
	Energy	◑	●	No or limited concern	

Data centre and other block loads	Max/min	◑	●	No or limited concern	• We consider AusNet's block load assumption for max/min demand is reasonable as it has only included block loads in the forecast if the connection is well progressed and expected to proceed (i.e. committed and contracted), where it is later included as a post modelling adjustment.
					• We note that 1 data centre has been included in the connections forecast. The demand associated with this data centre demand has been omitted from AusNet's demand forecasts due to several layers of uncertainty including:[3]
					  • The evolving scope of the project and the associated development approvals.
					  • Delivery timeframes and associated risks.
					  • The data centre remains not yet committed with no formal connection agreement.
					• We have limited concern with this approach as it is intuitive and broadly conservative.
					• However, we note that the corresponding energy consumption forecast has no block loads where we expect there to be (given their inclusion in demand) and is therefore inconsistent. We have moderate concern with this assumption as we would consider that the material developments could be incorporated as a defined post-modelling adjustment subject to inclusion criteria and no overlapping with native demand.

	Energy	◑	●	Moderate concern	

Source: (1) AusNet – IR#022 – Q14; (2) AusNet – IR#008 – Q4iii; (3) AusNet – IR#033 – Q1.

AusNet excludes energy efficiency from its native demand. Spatial methodology for EVs appears to be misaligned with provided data.

Key approach	Output	Materiality ×	Reasonableness =	Concern	Assessment detail – Maximum demand
Native Demand Forecasting	Max/Min	●	●	Some concern	• Forecast excludes the impact of energy efficiency. Unclear on rationale for excluding. AusNet's independent consultant CIE also noted the omission stating is had the potential to have material impact on maximum and minimum demand. We agree with this assessment.[1] • Residential customer numbers are grown by VIF SA2 demand forecasts (mapped approx. to ZS level). The VIF growth data is adjusted to reflect Ausnet's own view[2], which adds subjectivity. The full extent of the manual intervention is unclear. • Non-residential customer numbers are assumed to grow proportional to residential customer growth. This is moderated by manual intervention for anticipated large customer connections. • AusNet calculates underlying demand (operational + embedded and rooftop gen) on a per customer basis (unitised demand) which is the multiplied by customer numbers to get underlying demand forecast.[2] • Efficacy of the native demand method is difficult to validate with current data provided by AusNet. Ausnet's approach is generally good practice, but the exclusion of energy efficiency is a clear oversight and the manual adjustments to customer growth are subjective and difficult to validate. • Model projects half hourly unitised demand by fitting an Autoregressive Integrated Moving Average (ARIMA) model trained on historical data by randomly selected explanatory variables (bootstrap method)[2]. • Approach appears reasonable as it incorporates historical asset level data and different explanatory variables (local weather, month, day of week, etc.) to produce a probabilistic demand forecast based on the observed relationship between explanatory variables. However, has been difficult to validate without visibility of historical data.
Spatial disaggregation	Max/min	●	●	Some concern	• We have concern about AusNet's approach to spatial disaggregation as they do not consider technological saturation points at each ZSS or incorporate any demographic data. • Historical EV numbers used as baseline. Penetration rate is grown by AEMO statewide uptake profiles.[2] From approach would assume areas of early adoption continue to have the strongest uptake rate, i.e. if statewide penetration rate increase 5x, then a ZSS with a penetration of 1% would increase to 5%, and a ZSS with a penetration of 8% would increase to 40%. Cross-checking data, we are unable to replicate this uniform approach to uniform % growth in penetration, i.e. we are seeing feeders receive a range of penetration growth rates. • Local PV growth forecast uses a blend of historical localised PV growth and projected statewide growth rates.[2]

Source: (1) The CIE - Appendix 4B Demand forecasting methodology review - 31 Jan 2025 - PUBLIC.pdf; (2) AusNet - Appendix 4A Demand forecasting methodology - 31 Jan 2025 - PUBLIC.pdf

AusNet's electrification methodology utilises an internal study. AusNet's near-term intraday EV charge profile shows misalignment with AEMO but is conservative.

Key approach	Output	Materiality ×	Reasonableness =	Concern	Assessment detail – Maximum demand

Technological Uptake	Max/Min	●	●	No or limited concern	• We are not concerned with AusNet's technological uptake forecast because they are in line with AEMO's approach:[1]
					  • Historical EV grown consistent with using AEMO statewide uptake profiles.
					  • PV counts are grown based on the multiplication of historic growth rates and AEMO statewide uptake.
					• This approach is reasonable and transparent to validate.

Use of historical data	Max/min	◑	●	No or limited concern	• We assess that AusNet's use of historical data is reasonable and we have no reason for concern. Their demand forecasting methodology uses historical network and weather data to forecast demand based on the relationship between different variables. • Bootstrap method simulates future demand variability by sampling interrelated explanatory variables by sampling historical data. 200 sets of explanatory variables are created to produce POE50 and POE90 demand forecasts.[2] • Their use of historical EV, PV, customer count, and gas penetration data for starting points and/or growth rates for forecast uptake is reasonable.
Major customers and block loads and data centres	Max/min	◑	●	Some concern	• We consider AusNet's methodology for block loads appears to be somewhat reasonable, however, the approach is difficult to validate that their forecasts accurately reflect the stated methodology • Block loads are applied as a post model adjustment by assessing actual connection requests for loads over 1MVA that are well progressed and are expected to proceed. AusNet considers several factors such as the probability of the project commencing, whether the load is coming from a residential or commercial/industrial customer, expected start year of the project and load uptake in years.[3] • Block loads from commercial EV fast chargers are omitted to avoid double-counting of EV load. • To avoid overlap, AusNet identifies where a block load is already implicitly included in the forecast via organic growth. Where this occurs, only the difference between forecast growth and the block load is added to the forecast.[4] • No data centres have been added to the demand forecast. • We consider that the methodology for identifying block load overlap relies on internal engineering judgment and therefore is difficult to externally validate.

Source: (1) AusNet – IR#008 – Q4i; (2) AusNet - Appendix 4A Demand forecasting methodology - 31 Jan 2025 – PUBLIC, pg. 6; (3) AusNet – IR#033 – Q5; (4) AusNet – IR#017 – Q7

AusNet did not use the latest AEMO inputs at the time of preparing its demand forecasts.

Key approach	Output	Materiality ×	Reasonableness =	Concern	Assessment detail – Maximum demand
Gas electrification	Max/min	◑	●	Some concern	• We consider AusNet's approach to gas electrification to be somewhat reasonable, as their historical penetration rate and forecast electrification rate from GSOO has been used to calculate the expected number of customers undertaking electrification of gas.[1] AusNet undertakes an internal study to estimate the number of gas customers within their network, which assumes that gas penetration rates are comparable to AGIG (the overlapping gas network) gas penetration rates.[2] • We have some concern as this is not easily verifiable and can be improved from more direct data.

Profile Creation	Max/min	●	●	No or limited concern	• We consider the profile creation approach to be reasonable and that this has been accurately reflected within the methodology:[1]
					  • AusNet's EV profiles are consistent with AEMO's charging behaviour archetypes . We note that by 2031, the weighted average charge profile is broadly equivalent to AEMO's latest figures. The 2026 profile is less peak-oriented and is therefore more conservative with respect to max demand. Overall, weighted profile remains broadly similar from 2026-2031, only slightly reducing in peak contribution.
					  • Solar profiles are based on post-code PV irradiance data
					  • BtM profiles are excluded from the modelling
					• We have limited concern with AusNet's approach as aligning with AEMO profiles and using granular data where available is robust.

Scenario use and sensitivities	Max/min	●	●	Significant concern	• Similar to their input assumptions, AusNet has relied on AEMO's Draft 2024 Forecasting Assumptions Update data (Step Change scenario).[3] This is outdated at the time of preparing their forecasts (December 2023). • Given the materiality, and the importance for demand forecasts to be accurate and unbiased, this is somewhat unreasonable and we therefore have significant concern with this, as we consider this was not the most up to date AEMO forecast at the time.

Source: (1) AusNet – IR#008 – Q4ii; (2) AusNet – IR#034 – Q12; (3) AusNet – IR#022 – Q14

AusNet's post-modelling adjustment is intuitive but is subjective and not robust and may lead to overestimating the demand forecasts.

Key approach	Output	Materiality ×	Reasonableness =	Concern	Assessment detail – Maximum demand
Validation of bottom-up forecasts	Max/min	◑	●	Some concern	• We consider AusNet's approach to validating their bottom-up forecasts to be reasonable, by using the same NMI data in a bottom-up build of forecasts for both feeders and zone substations, these forecasts are inherently consistent between feeders and zone substations. • However, we have some concern as AusNet does not perform a separate reconciliation between system-level and spatial-level forecasts. They note that their rationale for this is that system-level impacts do not directly inform expenditure forecasts, which are instead derived from the more granular spatial forecasts, which we agree with.[1] • We note this approach is reasonable but still consider that AusNet performing a reconciliation step would demonstrate the rigour of both forecasts. For different forecasting approaches at different levels of the network, feeder-level block load adjustments should be properly offset rather than automatically carried over to adjustments at more aggregated levels of the network.
Review of forecasting approach	Max/min	◑	●	Some concern	• The maximum demand forecasting approach has been independently reviewed by CIE. CIE noted issues with AusNet's approach to system-level reconciliation, BtM BESS omission, energy efficiency omission, among other issues.[2] • The CIE report has discussed the relevance of key variables (including GSP, electricity price) and energy efficiency, and AusNet's exclusion of these may fail to properly capture the potential of them to contribute towards downward impacts on demand.
Post-modelling adjustment	Max/min	●	●	Significant concern	• AusNet adjusts their customer number forecasts during a post-modelling adjustment stage. It is during this later post-modelling adjustment stage that we have concerns with AusNet's approach. • AusNet's forecasting methodology includes post modelling adjustments for electrification and block loads. Block loads were manually added on top of the zone sub and feeder operational demand forecasts as a post-model adjustment.[3] Adjusting block loads from forecast new connections for forecast net growth from the demand model, will fail to properly incorporate other drivers (e.g. demand management and energy efficiency) from the existing broad customer base and may overestimate demand at the system level. • In principle, we consider the use of post-modelling adjustments to improve the forecast accuracy to take into account local knowledge as intuitive but not easily reproducible. Our concern is with the limited transparency and a degree of subjectivity for the basis of relying on local knowledge. Our concerns would be addressed if this process was better defined with more justification and clear criteria for when, where, why and how material AusNet's post-modelling adjustments are.

Source: (1) AusNet – IR#017 – Q1; (2) The CIE - Appendix 4B Demand forecasting methodology review - 31 Jan 2025 - PUBLIC.pdf; (3) AusNet – IR#017 – Q7

Methodology for customer growth has inconsistency with segmental customer numbers in the RIN.

Key approach	Output	Materiality	×	Reasonableness	=	Concern	Assessment detail – Customer numbers
Customer Number Forecast (Spatial and GSP)	Customers	◑		●		Moderate concern	• We consider AusNet's methodology for customer numbers to be somewhat unreasonable, with the approach difficult to independently reproduce due to the differences in growth rates and residential and non-residential ratios across the network. • Residential customer numbers are grown by VIF SA2 demand forecasts (mapped approx. to ZS level).[1] Non-residential customer numbers are assumed to grow at a slower rate than residential customers, but at a rate proportional to residential growth.[2] This relationship takes into account the relative growth rate between residential and non-residential customers, therefore, if non-residential customers grew at a slower rate than residential historically, they would grow at a slower rate in the forecast. • This is moderated by manual intervention for anticipated large customer connections. • The VIF growth data is adjusted to reflect AusNet's own view, which adds subjectivity. The full extent of the manual intervention is unclear.

Source: (1) ASD - AusNet - Appendix 4A Demand forecasting methodology - 31 Jan 2025 – PUBLIC, pg. 8; (2) AusNet – IR#034 – Q13

AusNet's energy forecasting approach is inconsistent with the maximum demand approach.

Key approach	Output	Materiality	× Reasonableness	= Concern	Assessment detail – Energy consumption

Native Demand Forecasting	Energy	◑	●	Moderate concern	• AusNet uses a different approach to their maximum demand forecasting for energy consumption, their reasoning for this being the different nature of what is being forecasted and the different application of the forecast. AusNet has provided little data beyond what is provided in the RIN and therefore we have had difficulty in validating their approach.[1]
					  • Customer count by tariff calculated using an exponential smoothing model with an additive linear trend. The description of the approach is very different to customer growth in the max/min demand forecast. It remains unclear if this approach reconciles with the max/min demand approach as AusNet has not provided data for validation.
					  • Native demand kWh forecast per NMI uses a 'Temporal Fusion Transformer' method developed by Google which incorporates customer count by tariff type. AusNet's native demand forecasting approach for energy consumption has been difficult to validate and it remains unclear why it differs so much from their maximum demand forecasting approach.

Technological Uptake	Energy	◑	●	Moderate concern	• The impact of gas electrification on energy consumption profile is based on an internal study of customers on the network. While electrification (EV and Gas) energy consumption forecast are taken from their half hourly max demand forecast and seem reasonable, we have concerns with their PV energy consumption forecast, and to a lesser extent their BtM assumptions.[1]
					  • There is no explicit forecast of rooftop PV generation, rather the impact of rooftop PV generation is captured in the growth in PV customers. The approach to calculating the PV customer growth is not clear, and, without this, the reasonableness cannot be validated.
					  • BtM BESS are excluded from consumption forecast, though impact of including this is expected to be minor.

Use of historical data	Energy	◔	●	No or limited concern	• We consider AusNet's use of historical data in their stated methodology somewhat reasonable. This is because they incorporate customer numbers calculated by tariff direct from their billing database at the start of the current regulatory period.[1] This approach uses the most recent input information to derive their energy consumption forecast. • We have a minor concern though as AusNet's energy consumption forecast is higher than the historical trend but consider this is attributable to their approach to other drivers (native demand, electrification).

Source: (1) AusNet – IR#022 – Q15, supporting attachment: Forecast_Methodology_v1.3 (CONF)

We have concerns with AusNet's inconsistencies to energy consumption as these may not produce a replicable forecast.

Key approach	Output	Materiality	× Reasonableness	= Concern	Assessment detail – Energy consumption
Major customers and block loads and data centres	Energy	◑	●	Some concern	• The approach is inconsistent with the max/min demand forecast, as no block loads have been added to the consumption forecasts. AusNet considers that the differences between its methodologies for max/min demand and energy consumption are appropriate given their different uses.[1] • We have some concern with this, as we consider there should be a defined inclusion process and criteria for incorporation of large new development impacts that do not overlap with native consumption levels and could reasonably increase overall energy consumption forecasts.
Scenario use and sensitivities	Energy	◑	●	Moderate concern	• For energy consumption, AusNet's forecasting methodology does not mention or incorporate scenarios or alignment with AEMO other than EV load and electrification. We note though that these two elements are inherently aligned with an AEMO scenario since they are taken from the max/min demand forecast.[2] Overall, we consider this to be a somewhat unreasonable approach. • All AEMO inputs should be sourced from the latest update available at the time and linked to the relevant scenario. Using the latest AEMO scenario and forecasting update would demonstrate that AusNet's forecast is based on the most recent input information.
Review of forecasting approach	Energy	◑	●	Moderate concern	• The energy consumption forecasting approach has not been reviewed independently. AusNet has explained that differences in methodologies used for consumption and max/min demand reflect the different nature and applications of these forecasts.[1] • We have moderate concern with this as we consider that a review of AusNet's forecasting approaches would support the validation of their energy consumption methodology and processes. This is important for overall transparency and replicability.
Post-modelling adjustment	Energy	◑	●	Moderate concern	• Post-model adjustments have been made for 4 unmetered coal mining loads. The volumes for these sites are not accounted for within the underlying methodology.[2] • We have a moderate level of concern with this approach given the lack of transparency on the reasoning for the manual adjustment.

Source: (1) AusNet – IR#034 – Q11; (2) AusNet – IR#022 – Q15, supporting attachment: Forecast_Methodology_v1.3 (CONF)

We note the quality and completeness of the information for the following methodology processes have limited our review.

Key inputs

Traditional drivers

- Population
- Economic growth
- Customer numbers

Technology-induced drivers

- PV
- Electric vehicles
- BtM batteries
- Gas electrification
- Data centres & other block loads

Key methodological processes

Max/min demand	Customer numbers	Energy consumption
Native demand forecasting	Spatial population forecast (Residential)	Native demand forecasting
Technological uptake	Gross state product forecast (C&I)	Technological uptake
Spatial disaggregation		Historical data use
Historical data use		Major customers and block loads
Major customers and block loads		Scenario use and sensitivities
Gas electrification		Validation, testing & review
Profile creation		Post-model adjustment
Scenario use and sensitivities		
Validation, testing and review		
Post-model adjustment		

Key: *Sufficient* *Incomplete information*

AusNet should address the below deficiencies in their Revised Proposal which would enable a clear review of their submission.

Input/process	Output	Expected level of detail required
• **Native demand forecasting** • **Customer numbers**	Demand Customers	• Evidence and example of manual intervention for adjustment of VIF growth data • Evidence and example of manual intervention for adjustment of anticipated large customer connections • Submission of historical data for ARIMA modelling example
• **Major customers and block loads** • **Post-model adjustment**	Demand Energy	• Defined process and inclusion criteria beyond 'internal engineering judgment' to validate manual block load adjustments for demand and energy • Methodology for identifying overlap • Evidence of block load register (showing list and materiality of block loads)
• **Gas electrification**	Demand	• Actual count of residential and non-residential gas customers; or • Survey parameters and results of internal study for gas customers
• **Native demand forecasting**	Energy	• Additional detail on energy consumption methodology • Evidence and breakdown of underlying energy consumption forecast
• **Technological uptake**	Energy	• Evidence of calculation of growth in PV customers

5. Further assessment on selected topics

Assessment of locational demand-driven business case

Background for selected business cases

We selected the Pakenham South business case and Wollert Area Upgrade business case to dive deeper into AusNet's approach to spatial disaggregation of demand. These projects were selected because they are both major capex projects that are driven by location-specific demand growth.

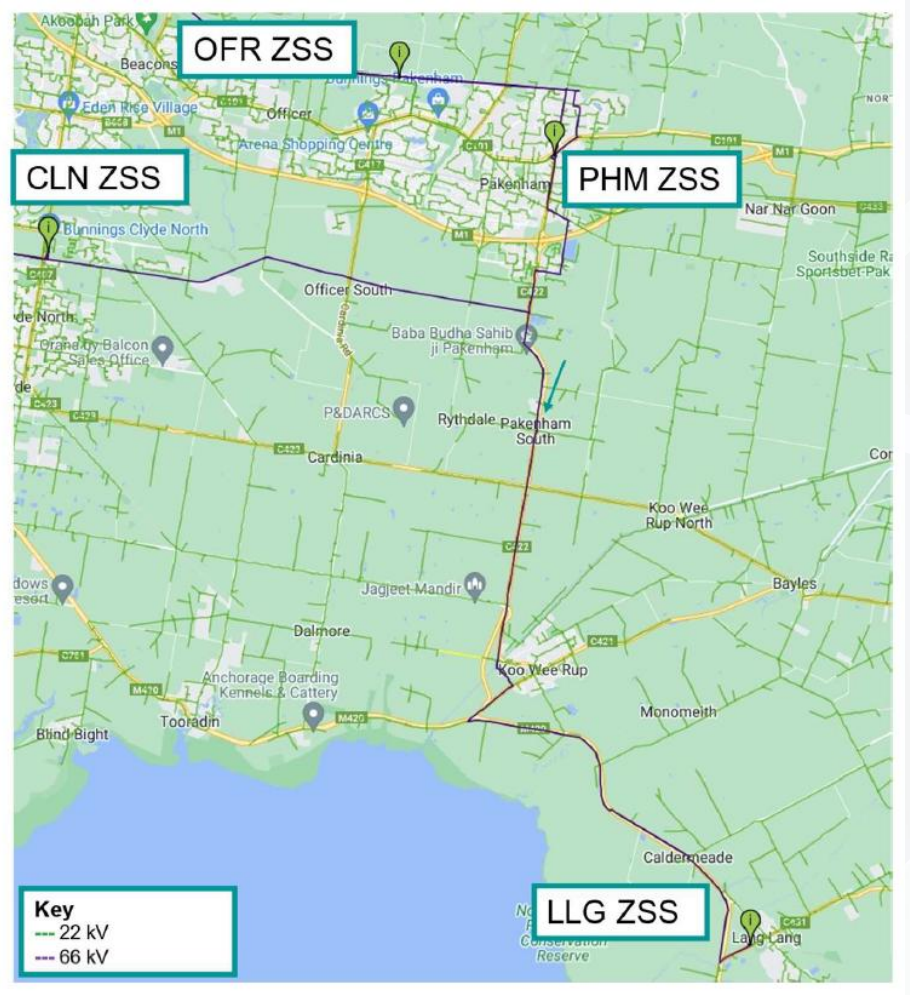
Pakenham South Upgrade	
Location of Project	South-Eastern Metropolitan Melbourne, area of Cardinia (Clyde North, Officer, Pakenham, and Lang Lang)
Problem addressed by project	Mitigate forecast unserved energy at the Clyde North and Lang Lang substations, driven by high forecast population growth.
Preferred option description	New Zone substation at Pakenham South.
Cost of preferred option	$56.5m

Wollert Area Upgrade	
Location of Project	North Metropolitan Melbourne, area of Wollert (Kalkallo, Doreen, South Morang, Epping)
Problem addressed by project	Mitigate forecast unserved energy at the Kalkallo substation, driven by high forecast population growth.
Preferred option description	New Zone Substation at Wollert
Cost of preferred option	$46.2m

Population growth at Clyde North is the primary driver for the Pakenham South Upgrade Business Case.

Summary of AusNet's demand forecasting drivers for Pakenham South Upgrade:

- AusNet has identified population growth at Clyde North and the subsequent unserved energy as the key driver of unserved energy in the Pakenham South Upgrade business case[1]. Under AusNet's forecast from 2024 to 2031, c. 85% of the demand growth at Clyde North is driven by underlying demand growth. c. 13% of the growth is driven by EV load growth, and c.4% of the growth is driven by gas electrification, offset by a c. 3% decline driven by PV generation.
- Underlying demand at Clyde North is forecast to grow by 45% between 2024 and 2031. This is underpinned by strong forecast customer growth: 68% growth in Small Business, 35% growth in Medium/Large Business, and 45% growth in residential customers.
- There are no block loads in the forecast for Clyde North. Although not driving any immediate unserved energy, block loads account for 59% of the growth at Pakenham (10.0 MW), 23% at Officer (4.7 MW), and 21% at Lang Lang (1.2 MW). These block load contributions are broadly aligned or lower than what is found in Ausnet's block load register: Pakenham (13.7 MW), Officer (8.6 MW), Lang Lang (2.8 MW).
- EV peak demand accounts for 4.9% of 2031 peak load at Clyde North, compared to AusNet's network-wide EV load contribution of 3.0%.

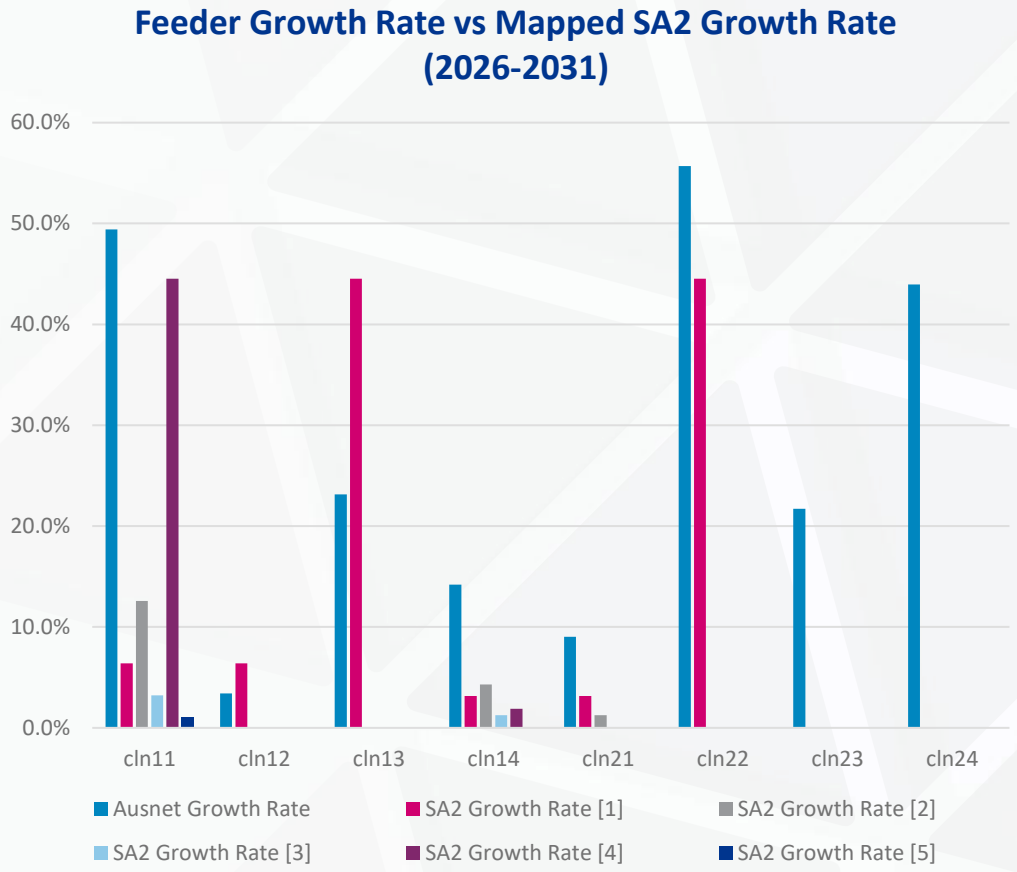


Source: (1) ASD - AusNet - New ZSS Pakenham South BC - 31012025 – CONF; (2) Baringa Analysis of supporting data from IR34

AusNet's connection growth, and therefore native demand growth is very high, and difficult to reconcile with reliable dwelling estimates.

Assessment findings

- We are not able to reconcile the connection growth at Clyde North[1] against reliable dwelling estimates[2]. Of the 29 combinations (noting SA2:Feeder is a many-to-many mapping) of mapped SA2 and feeders for Clyde North, 15 have missing dwelling data in VIF 2023. Of the 14 combinations with available population data, AusNet's estimate of connection growth rate at the feeder exceeds the VIF 2023 figures in 12 cases.
- Clyde North's most populous feeder, CLN11, grows from 12,426 customers in 2026, to 18,567 in 2031 (49% growth). The total dwelling growth at CLN11 over the mapped SA2 regions is from 35,954 to 42,443 (18% growth). It's clear that the SA2 data is covering a larger area, but it's unclear how the SA2 data is being used to calculate the connection growth rates at the feeder level within AusNet's forecast. Of the mapped SA2 codes, Cranbourne South has the highest growth rate at 46%.
- Non-residential customer growth exceeding residential growth is aligned with historical trend at Clyde north.
- AusNet notes in IR034 Q1 that their previous energy at risk model referenced MVA numbers rather than MW numbers, and has stated that this would understate numbers because MVA < MW. However, Baringa notes that MW < MVA for Clyde North in all of the years in the RIN, and the business case is therefore likely to be overstating energy at risk.
- EV load contribution is greater than AusNet's network-level average. Clyde North's EV peak demand contribution is 93 W per customer, while AusNet's network average is 65 W. It should be noted that aligning with the system average level would not significantly alter the energy at risk values.

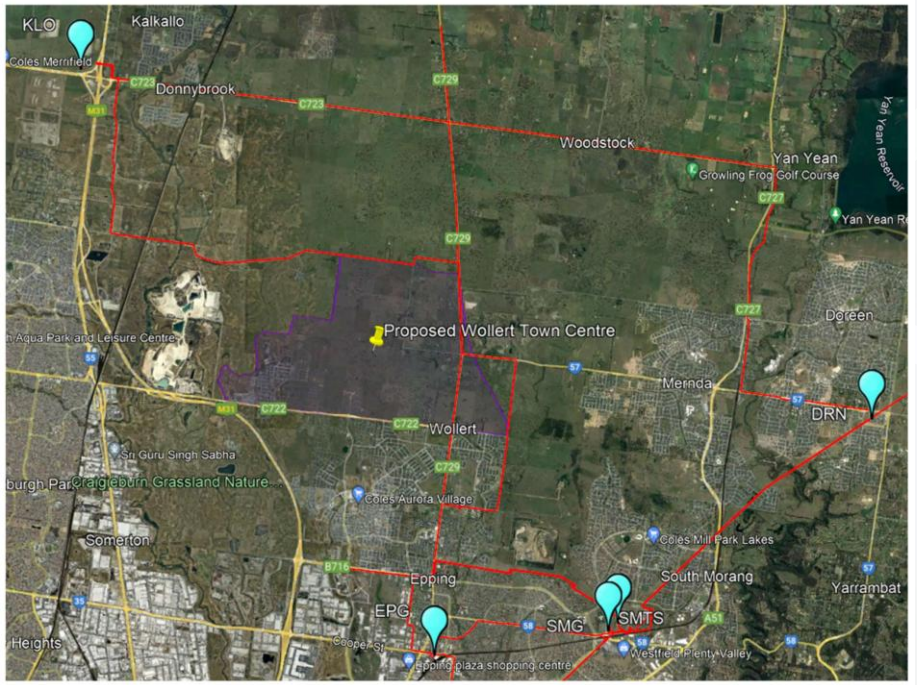


Source: (1) Ausnet growth rates from accompanying data from IR008 Q2; (2) VIF growth rates from Total_Dwellings tab in VIF2023_Victoria_Demographic_Projections_to_2051_Release_2.xlsx

Population growth at Kalkallo is the primary driver for the Wollert Area Upgrade Business Case.

Summary of AusNet's demand forecasting drivers for Wollert Area Upgrade:

- AusNet has identified population growth at Kalkallo and the subsequent unserved energy as the key driver of the Wollert Area Upgrade business case[1]. Under AusNet's forecast from 2024 to 2031, c. 70% of the demand growth at Kalkallo is driven by underlying demand growth. c. 9% of the growth is driven by EV load growth, and c.18% of the growth is driven by gas electrification, c.4% is due to a decrease in PV generation in peak demand periods (driven by transitioning from summer to winter peaking)[2].
- Underlying demand at Kalkallo is forecast to grow by 102% between 2024 and 2031. This is underpinned by extremely high forecast customer growth: 169% growth in Small Business, 122% growth in Medium Business, 143% growth in Large Business, and 220% growth in residential customers[2].
- There are no block loads in the forecast for any of the substations in the Wollert Area Upgrade business case[2].
- EV peak demand accounts for 3.5% of 2031 peak load Kalkallo, compared to AusNet's network-wide EV load contribution of 3.0%[2].

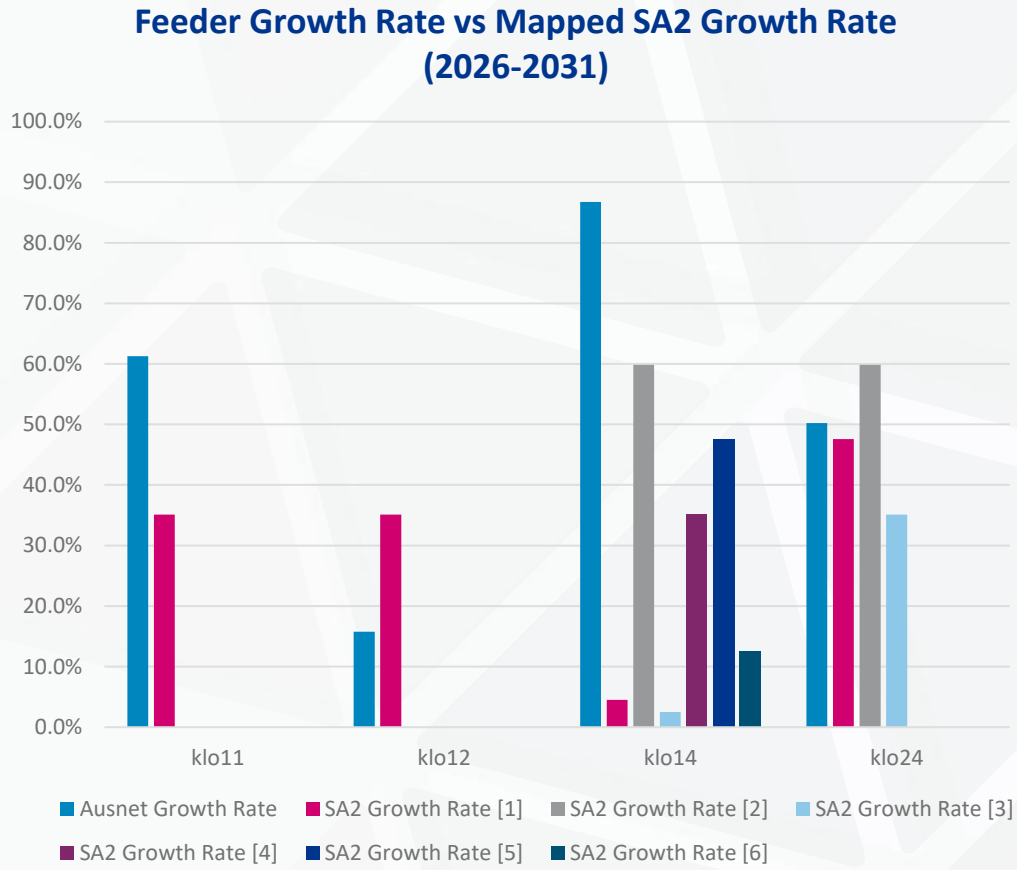


Source: (1) ASD - AusNet - New Wollert ZSS BC - 31012025 - PUBLIC.pdf; (2) Baringa Analysis of supporting data from IR34

AusNet's connection growth, and therefore native demand growth is very high, and hard to reconcile with reliable dwelling estimates.

Assessment findings

- We are not able to reconcile the connection growth at Kalkallo[1] against reliable dwelling estimates[2]. Of the 11 mapped SA2/feeder pairs (noting SA2:Feeder is a many-to-many mapping) for Kalkallo, AusNet's estimate of connection growth rate at the feeder exceeds the VIF 2023 figures in 9 cases.
- Kalkallo's most populous feeder, KLO14, grows from 12,465 customers in 2026, to 23,280 in 2031 (87% growth). The total dwelling growth at KLO14 over the mapped SA2 regions is from 49,595 to 66,834 (35% growth). It's clear that the SA2 data is covering a larger area, but it's unclear how the SA2 data is being used to calculate the connection growth rates at the feeder level within AusNet's forecast. Of the mapped SA2 codes, Wallan has the highest growth rate at 60%.
- Residential customer growth exceeding non-residential growth is aligned with the historical trend at Kalkallo.
- AusNet notes in IR034 Q1 that their previous energy at risk model referenced MVA numbers rather than MW numbers, and has stated that this would understate numbers because MVA < MW. However, Baringa notes that MW < MVA for Kalkallo in all of the years in the RIN, and the business case is therefore likely to be overstating energy at risk.
- EV load contribution is broadly aligned with AusNet's network-level average



Source: (1) Ausnet growth rates from accompanying data from IR008 Q2; (2) VIF growth rates from Total_Dwellings tab in VIF2023_Victoria_Demographic_Projections_to_2051_Release_2.xlsx

Plans to update demand forecasts for changes in external data

Instead of using AEMO's Feb 2025 IASR update, AusNet should update to the latest information available which will be July 2025 IASR plus any further updates in ESOO.

Key data sources (Jan 2025 initial proposal)	**AusNet's plans to update its forecast** (Dec 2025 revised proposal)	**Our assessment**
• December 2023 IASR *CER Uptakes, EV profile*	• February 2025 AEMO IASR update	• AusNet should update their forecast inputs to align to AEMO's ESOO. Noting that AEMO's 2025 IASR is used as inputs for their 2025 ESOO. There is adequate time for AusNet to update to Final IASR 2025 (July 2025) before the revised proposal. • We agree it is reasonable for AusNet to include the most recent historical weather year (2024-25). We not this will likely put upward pressure on maximum demand forecast. • The 2025 GSOO report was released in March 2025 and should be used as updated gas input data.
• Historical Network Data (Up to March 31 2024)	• Historical Network Data (Up to March 31 2025)	

Timing	Milestone
2025 January	DNSPs submitted Proposals
2025 February	AEMO published Draft IASR 2025 **(window opened to re-run forecasts based on this assumptions set)**
2025 July	AEMO to publish Final IASR 2025
2025 August	**AusNet expects to complete updated max demand forecasts**
2025 September	AER publishes Draft Determination
Window to re-run demand forecasts for feedback and update proposals	
2025 December	DNSPs submit Revised Proposals
2026 April	AER published Final Determination

Notes: *The Draft IASR 2025 includes higher electrification but, lower PV, EV, and higher energy efficiency.

Appendix

Abbreviations and Technical glossary

Note: This section is identical across all reports.

Technical glossary

Term	Definition
Block loads	Customers that drive significant step changes in loads, e.g. data centres, apartments.
Bootstrapped weather year	A synthetic weather year created by resampling weather data from historical records to simulate a range of plausible weather conditions.
Consumption/Energy Forecast	In the context of this review, consumption/energy forecast is the DNSP's forecast of energy volume summed across a measurement period (typically year or month). This contrasts to max/min demand, which is the maximum/minimum interval reading across a measurement period.
Gas electrification	The process of replacing gas appliances and industrial processes with electrical equivalents, e.g. electric stoves, heat pumps.
Historical data use	Approach to incorporating historical data into the forecast
Monte-Carlo Simulation	An approach that uses repeated random sampling to approximate numerical results. It leverages randomness to estimate solutions.
Native Demand Forecasting	In the context of this review, the approach to forecasting demand based on traditional drivers, e.g. population and consumption per customer, in contrast to technology-driven demand growth, e.g. electric vehicles and rooftop solar
Post modelling adjustments	Manual adjustments to a forecast made outside of the core forecasting model.
Profile Creation	The process of generating interval level, e.g. charging profile for an electric vehicle, generation profile for rooftop solar.
Scenario use and sensitivities	The DNSP's selection and usage of base and alternative scenarios and whether they run any sensitivities to the base scenario.
Spatial disaggregation	Approach to mapping system-level demand drivers to the level of network elements, e.g. Feeders, Zone Substations.
Spatial Pop Forecast	Approach to applying population forecasts at the level of network elements, e.g. Feeders, Zone Substations.
Technological uptake	Demand growth driven by customers deploying Consumer Energy Resources, e.g. electric vehicles, rooftop solar, BtM batteries
Weather normalisation	The approach to adjusting demand data to account for weather variability and extreme events to allow for better evaluation of demand trends.

Abbreviations

Term	Definition
ABS	Australian Bureau of Statistics
AEMO	Australian Energy Market Operator
AGIG	Australian Gas Infrastructure Group
AMI	Advanced metering infrastructure
ARIMA	Autoregressive integrated moving average, a type of predictive statistical model
BtM	Behind-the-meter
BESS	Battery energy storage systems
BNN	Bayesian neural network
CER	Consumer energy resources
CIC	Customer initiated capital
CPI	Consumer Price Index
CPU	In the context of this report, Citipower, Powercor, United Energy
DC	In the context of this report, a data centre
DCCEW	Department of Climate Change, Energy, the Environment and Water
DELWP	Department of Environment, Land, Water and Planning
DNSP	Distribution network service provider
DoT	Department of Transport
ERA5	Fifth generation of ECMWF (European Centre for Medium-range Weather Forecasts) Atmospheric Reanalysis of the Global Climate
ESOO/GSOO	Electricity Statement of Opportunities/Gas Statement of Opportunities
EV	Electric vehicles
GAM	Generalised additive model
GSP	Gross state product

Abbreviations

Term	Definition
HDD/CDD	Heating degree days/cooling degree days
HV/LV	High voltage/low voltage
IASR	Inputs, Assumptions and Scenarios Report
ISP	Integrated System Plan
NPI	National Pollutant Inventory
POE	Probability of exceedance
PV	Photovoltaic
SA2	Statistical areas Level 2
VIF	Victoria in Future
ZSS	Zone substation