04/11/25

ENDGAME

Jemena

Demand Forecast Review

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1 Executive summary

Jemena Electricity Networks is currently undergoing its five-year regulatory determination reset for the 2026–2031 period. After lodging its proposal in January, the Australian Energy Regulator (AER) provided feedback on Jemena's demand forecasts, which identified several key areas for improvement, including transparency, methodological independence, and reconciliation between top-down and bottom-up forecasts. In response, Jemena has undertaken a comprehensive redevelopment of its methodology, directly addressing the AER's feedback.

The previous forecasting framework employed separate top-down and bottom-up models, with a reconciliation process applied to align the results. While this approach is standard and allows for flexibility, it introduced some opacity in how final forecasts were derived. The AER highlighted that this process reduced the transparency and repeatability of results.

In response, Jemena has implemented a revised, unified forecasting framework developed in partnership with Blunomy. This new methodology eliminates the reconciliation process entirely, instead relying on a single, integrated spatial model to capture both system-wide and local network demand. The framework aligns closely with the AER's Forecasting Best Practice Guidelines by ensuring forecasts are transparent, evidence-based, and capable of independent validation.

Key methodological advancements

The new forecasting methodology incorporates both advanced statistical techniques and improved data management processes:

- **Unified modelling framework**: All demand components—residential, commercial, industrial, and major customer—are now modelled within a single spatially coherent framework, removing the need for manual reconciliation and ensuring consistency across all forecast layers.
- **Bayesian neural network (BNN)**: A BNN is used for short-term load forecasting, capturing non-linear relationships between temperature and calendar variables. This machine-learning approach allows for a more accurate representation of peak and shoulder load conditions, as well as explicit quantification of uncertainty through Monte Carlo simulations.
- **Two-Stage long-term forecasting**: The long-term model projects demand growth by customer segment and connection type using econometric and demographic drivers such as population, Gross State Product, and electrification trends.
- **Spatial customer energy resource (CER) modelling:** The method allocates future rooftop solar, electric vehicles (EVs), and battery storage at different asset levels.
- **Enhanced major customer forecasting**: Jemena has refined its approach to forecasting demand from major customers. This includes standardised protocols, scenario-based probability assessments, and improved documentation of project inclusion criteria, improving both accuracy and transparency.
- **Updated inputs and assumptions:** Jemena is now incorporating AEMO's 2025 assumptions from their Inputs, Assumptions and Scenarios Report.
- **Behind-the-meter storage treatment:** Storage is now modelled using daily profiles from AEMO, allowing batteries to assist with reducing peak demand.

Alignment with regulatory expectations

The revised methodology demonstrates strong alignment with the AER's Forecasting Best Practice Guidelines, particularly in relation to:

- **Transparency:** Clear traceability of data sources, assumptions, and model steps has been achieved through the removal of reconciliation and the use of an integrated model architecture.
- **Independence:** The engagement of Blunomy as an independent forecaster ensures objectivity and methodological rigour.
- **Repeatability:** The new process is documented and replicable, with structured data flows and defined modelling protocols.
- **Accuracy and validation:** Model calibration has been undertaken using recent historical data, with validation against observed outcomes and cross-comparison with AEMO's Integrated System Plan (ISP) demand scenarios.

Opportunities for Further Refinement

While the revised framework represents a significant step forward, two areas has been identified for future enhancement:

- **Major customer scenario weighting:** Applying probability-weighted load development scenarios would strengthen the treatment of uncertainty around large industrial connections.
- **Transparency:** Despite transparency improving with the elimination of the reconciliation process, Jemena could encourage Blunomy to develop a step-by-step procedure that is submitted along with their forecast to the AER. All assumptions should also be documented, and the data provided.

Overall, Jemena's revised demand forecasting methodology represents a substantial methodological and procedural improvement. The unified, data-driven approach has enhanced transparency, strengthened independence, and improved the accuracy of demand projections at both system and spatial levels.

The new framework provides a robust foundation for the 2026–2031 regulatory proposal, supporting prudent network investment and enabling Jemena to continue delivering safe, reliable, and efficient electricity services. It positions Jemena well to navigate the ongoing energy transition, ensuring its network remains responsive to customer needs and evolving technologies in a rapidly decarbonising system.

2 Introduction

2.1 Jemena is undergoing its regulatory determination reset

Jemena is progressing through its five-year regulatory determination reset for the 2026–2031 period. After lodging its proposal in January, the Australian Energy Regulator (AER) provided feedback on Jemena's demand forecasts. This report examines Jemena's forecasting methodology for its revised proposal and considers the issues raised by the AER.

Infrastructure investment by electricity distributors typically occurs in stages, triggered when peak demand approaches or exceeds network capacity. As such, peak demand forecasting is crucial to ensure that investment decisions are made in advance of demand growth. Failing to do so risks placing undue pressure on the network, which could potentially lead to asset damage and reduced service reliability for customers. As the energy transition gains momentum, electricity demand is expected to increase, driven by electrification and the growing adoption of Electric Vehicles (EVs).

Jemena has produced maximum demand forecasts for the following regulatory period by employing a top-down, reconciled approach to a bottom-up approach. They have engaged a separate consultant, Blunomy, to produce the top-down forecast, minimum demand and energy consumption forecast.

2.2 The AER is concerned that Jemena's method is overly complex and lacks transparency

The AER engaged Baringa to review the demand forecasts of Victorian DNSPs and provided the following feedback[1]:

- The current methodology is overly complex and lacks transparency, especially throughout the weather normalisation process and native demand growth.
- The reconciliation process between the top and bottom forecasts is unclear.
- CER uptake is not modelled at a spatial level.
- Major customer block loads need more justification, and the method is difficult to reproduce.
- Scenario trends should follow the Australian Energy Market Operator's (AEMO) most recent publication.

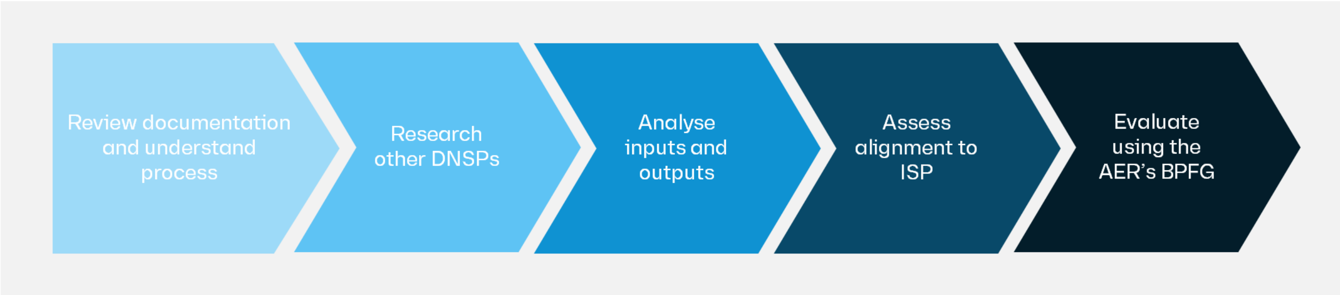
Jemena is currently in the process of updating its forecasts and has decided to outsource the entire process to Blunomy following initial AER feedback. This report comments on their development and how it addresses the AER's concerns.

[1] https://www.aer.gov.au/documents/baringa-distribution-demand-forecast-assessment-review-jemena-2026-31-regulatory-proposal-july-2025-0

2.3 We assessed Jemena's demand forecast using a five-step process

Our assessment approach consisted of five stages, shown in the diagram below.

Figure 1 – Overview of the assessment approach



We conducted our assessment by first reviewing key documents and data provided to us by Jemena. This included internal and external (consultant) demand forecasting procedures, as well as the inputs and outputs of the forecast, and the information provided to the AER as part of the consultation process. We also held multiple discussions with Jemena to review these documents and gain a deeper understanding of their process.

We then compared their approach to the forecasts of other Distribution Network Service Providers (DNSPs) and completed our assessment by evaluating alignment with the Australian Market Operator's (AEMO) Integrated System Plan (ISP) and the AER's Best Practice Forecasting Guidelines (BPFG).

2.4 The report comprises of 7 sections

This report is structured as follows:

Section 3, provides a summary of Jemena's original demand forecasting method.
Section 4, summarises Jemena's new demand forecasting method, which is fully based on Blunomy's approach.
Section 5, discusses the AER's concerns.
Section 6, assesses the forecast against the ISP and BPFG guidelines.
Section 7, summarises and concludes.

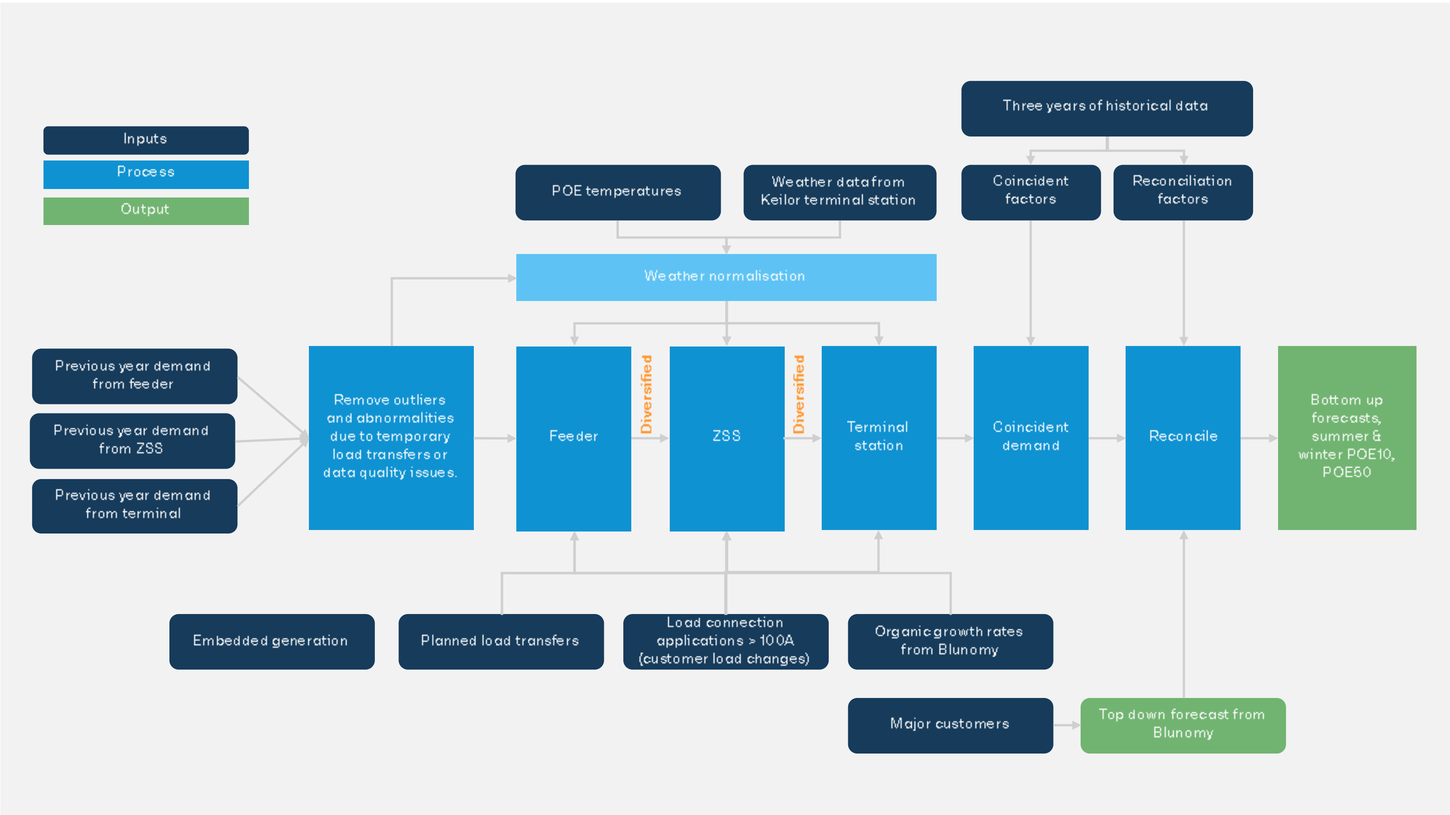
3 Jemena originally produced a bottom-up forecast, which was reconciled to a top-down forecast.

Jemena produces summer and winter Probability of Exceedance (POE) 10 and 50 maximum demand forecasts using a bottom-up model and reconciles estimates with a top-down forecast completed by Blunomy, an independent consultant.

Various inputs, such as historical load, temperatures, transfers, embedded generation, growth rates, and future load connections, are fed into the model. A forecast for each asset level is developed and the loads are diversified to match the timing of the next level's peak. Then, the bottom-up forecast is consolidated with the top-down estimates to ensure consistency and to reconcile the peaks.

The result is maximum demand forecasts for each asset level, feeder, zone substation (ZSS), terminal station and the whole network. The process is illustrated in the diagram below.

Figure 2 - Jemena's forecasting method



3.1 Jemena pre-processes the data

3.1.1 Inputs

Various inputs are required in the model, including:

- Historical demand data for each asset level, feeder, ZSS and terminal station.

- Temperature data from the Kelior terminal station.
- Embedded generation.
- Planned load transfers.
- Load changes from load connection applications that are >100A but only at the feeder level.
- Organic growth rates (taken from Blunomy).
- Major customers that are large block loads, such as data centres.
- Blunomy's top-down forecast.

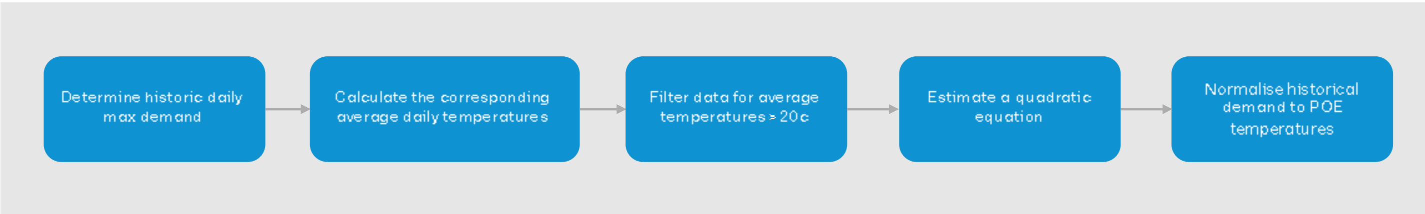
3.1.2 Data processing

The first step of Jemena's process is to check historical data for abnormalities. The demand forecasting team removes data associated with temporary load transfers and outliers due to data quality issues.

3.2 Jemena weather normalises to find POE max demand

Jemena has a five-step process to weather normalisation, demonstrated in the diagram below.

Figure 3 – Weather normalisation process



Jemena first identifies the maximum daily demand for the previous year, summer or winter season and each asset level. They then calculate the corresponding average daily temperature using the maximum daytime and minimum overnight temperatures. Jemena typically filters data for temperature averages that are greater than 20°C and fits a quadratic equation specified by the following:

$$MD_{d,A} = B_0 + B_1 AvgTemp_{d,A} + B_2 AvgTemp_{d,a}^2$$

Where:

- MD is daily maximum demand
- d is day
- a is asset
- B0 is the intercept
- AvgTemp is the average daily temperature defined by the maximum daytime temperature and minimum overnight temperature.
- B1, B2 are the respective coefficients

They then normalise the asset's summer yearly maximum demand to POE temperatures by using the fitted quadratic equation:

$$Max\ Demand\ at\ X\%\ POE\ for\ summer = RMD * \frac{B_0 + B_1 POETemp_{d,A} + B_2 POETemp_{d,a}^2}{B_0 + B_1 AvgTemp_{d,A} + B_2 AvgTemp_{d,a}^2}$$

Where:

- RMD is the asset's recorded maximum demand for the last summer.
- POETemp is the temperature corresponding to the 50th or 10th percentile. We understand that Jemena uses 29.4°C for POE 50 and 32.9°C for POE 10.
- AvgTemp is the asset's actual recorded average temperature.

For assets that do not have a relationship with temperature eg, zone substations with large business loads, they are excluded from this process.

3.3 Jemena adjusts for transfers, organic growth and load changes

After deriving the baseline estimate, Jemena accounts for planned transfers, organic growth and load changes.

- Future feeder re-configurations and works are accounted for by moving a percentage of the load to another feeder.
- Load changes are included for connection applications that are >100A, this does not include major block loads, whilst applications <100A are captured by organic growth rates.
- Organic growth rates are provided by the top-down consultant based on economic growth.

3.3.1 Jemena diversifies load connection applications and transfers before inclusion

Load changes from load connection applications >100A and transfers are built from feeder forecasts. To be appropriately included in the ZSS forecast, they are diversified prior to inclusion.

Diversification refers to aligning the timing of maximum demand estimates from customer load changes and transfers from feeders with that of the zone substation. This is done by multiplying the feeder estimates by a factor chosen by Jemena which are based on historical observations.

Similarly, customer load changes and transfers from ZSS are also diversified before being included in terminal station forecasts.

3.4 Jemena calculates coincident demand

Jemena calculates coincident factors to ensure each asset is aligned to the system peak. This is done using an average of the past three years:

$$Conincidence\ factor_a = \left[\frac{Historical\ peak\ demand\ at\ time\ of\ system\ MD_a}{Historical\ MD_a}\right]_{3\ yr\ avg}$$

Where MD is maximum demand, a is the asset level, such as a feeder.

This factor is then multiplied by the demand estimate to derive the coincident maximum demand, as demonstrated by the formula below:

$$Coincident\ demand_a = Conincidence\ factor_a * \widehat{MD_a}$$

Where a is the asset level and MD_a is the forecasted peak demand for a POE and season.

3.5 Jemena reconciles to the top-down forecast

The penultimate step of the forecasting process is to reconcile coincident demand with the external consultant's top-down forecast without major customer loads. This is done by first calculating system-level reconciliation factors:

$$Reconcilation\ factor_a = \frac{\left[\frac{\sum Historical\ conincident\ demand_a}{Histoical\ system\ MD}\right]_{3\ yr\ avg}}{\left[\frac{\sum Coincident\ demand\ forecast_a}{Top\ down\ forecast}\right]}$$

Where a is asset level.

The reconciliation factor is then multiplied by the forecast to achieve the final estimate.

$$Reconciled\ MD_a = Coincident\ demand_a * Reconcilaton\ factor_a$$

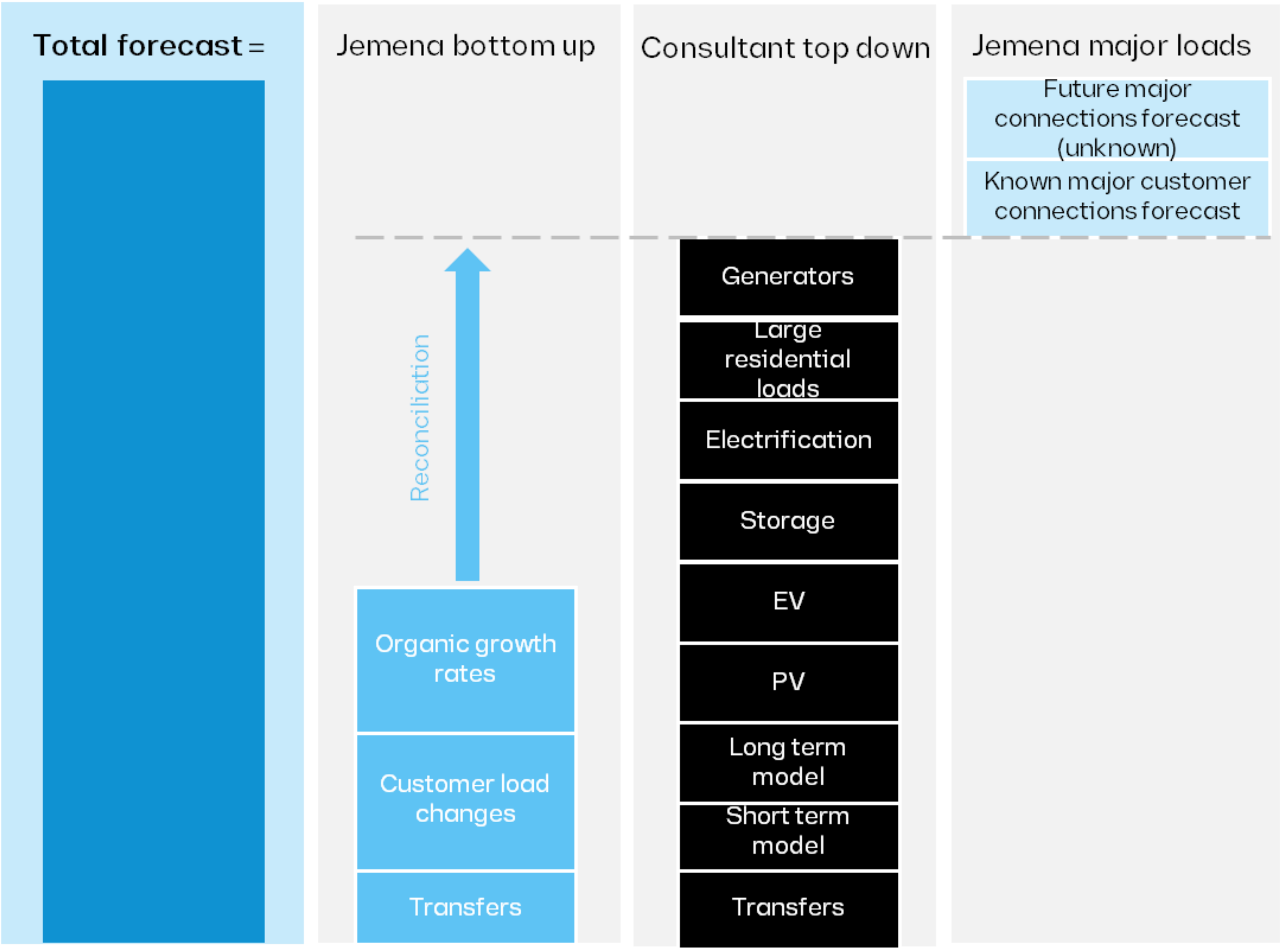
3.6 Jemena includes major customer loads

Finally, Jemena includes major customer loads in the forecasts that typically have their own asset associated with them and are connected to the sub-transmission network. They have substantially refined their methodology, and the new process is described in a further section of this report. It should be noted that overall Jemena includes four types of block loads in their forecasts.

- Block loads <100A, which are incorporated into the underlying growth rate.
- Block loads > 100A, which are diversified and added to feeders.
- Subtransmission known major customers that are allocated to specific assets at the end of the demand forecasting process.
- Subtransmission future major customers that are also allocated to specific assets at the end of the demand forecasting process.

Overall, Jemena's forecasting approach is standard in the energy industry. It starts with a weather normalisation process, followed by the addition of organic growth forecasts, block loads, CER uptake and electrification through the external top-down forecast. This is demonstrated in the diagram below.

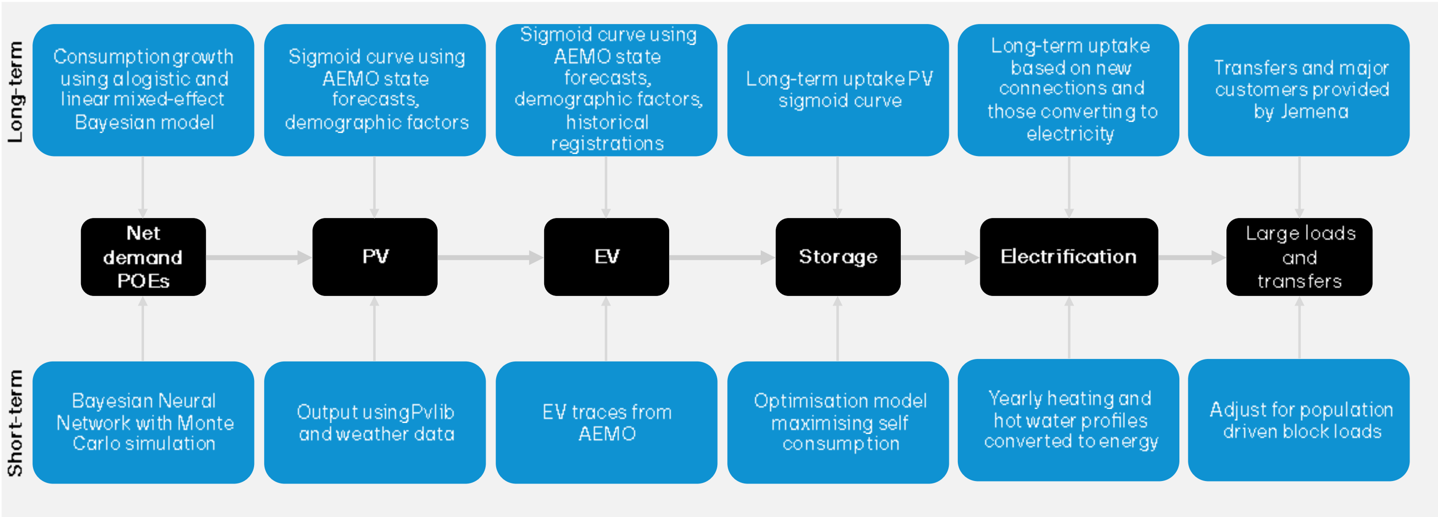
Figure 4 – Demand forecast components



4 Since the proposal, Jemena has decided to use Blunomy's spatial forecast.

After initial feedback from the AER, Jemena has decided to use Blunomy's forecast and remove the reconciliation component. Blunomy models each asset level independently, and a reconciliation is not performed. Their overall process is described in the diagram below.

Figure 5 – Blunomy's methodology



4.1.1 Blunomy uses a Bayesian Neural Network to conduct the Monte Carlo analysis

Blunomy first models net demand using a short-term weather normalisation model and a long-term macro-economic trend model. The short-term model forecasts demand at a 30-minute interval utilising a variety of explanatory variables, including temperature, solar irradiance, predicted wind generation, and calendar variables such as time and day of the week etc. They then use 12 years of historical weather data to run a Monte Carlo simulation with a Bayesian Neural Network, producing POE10 and POE50 estimates.

The long-term model is completed in two stages: first, with a logistic function, and second, with a linear mixed-effects Bayesian model. The logistic function uses long-term data for Victoria from the Department of Climate Change, Energy, the Environment and Water (DCCEEW) to forecast short-term consumption[2]. The output is then used in the second model, which captures long-term drivers of electricity such as Gross State Product (GSP), electricity prices, energy efficiency, population, cooling degree and heating degree days. To produce the final net demand, Blunomy scales the temperature-normalised POE demands by the long-term trend.

4.1.2 Blunomy adds CER based on AEMO's state-wide forecasts

Rooftop solar PV is added to the forecast by first estimating the potential power output of a typical household system in Victoria using historical irradiance and temperature data and the Python PVlib package. Then, a sigmoid curve is estimated to model the long-term trajectory, with demographic information, such as home ownership, used to determine the maximum saturation capacity, and AEMO's state-wide forecast for the growth rate. Battery storage is also forecasted using the same rooftop PV sigmoid function, whilst EVs have their own sigmoid function based on demographics and historical vehicle registrations.

[2] https://www.energy.gov.au/energy-data/australian-energy-statistics

Electrification is modelled by considering different customer segments and time periods. Blunomy models heating and hot water profiles by assuming they follow electrical loads, then scales them with the long-term forecast. Residential long-term growth is based on annual gas consumption, average building energy requirements, and conversion efficiencies from the Department of Energy, Environment, and Climate Action (DEECA). On the other hand, industrial electrification is modelled using the National Pollutant Inventory and gas network tariffs, then converted to energy. Finally, Blunomy adds block loads provided by Jemena.

5 The AER has concerns about Jemena's forecast

JEN's demand forecasting method is sophisticated; however, it is neither unnecessarily complex nor difficult to understand. The AER has several concerns, as expressed through its consultant, Baringa. Jemena has taken steps to resolve these issues, and we outline the resolution below. All quotes are derived from their report submitted to the AER[3].

5.1 The reconciliation process is removed with Blunomy conducting the entire forecast

Jemena's original methodology was a top-down approach reconciled to a bottom-up forecast; however, Baringa had concerns about their independence and process.

"The lack of clarity around the reconciliation process, which involves scaling the internal spatial-level forecast to reconcile with the external system-level forecast, raises a concern in the absence of further information…We consider Jemena's approach to validating their bottom-up forecasts to be somewhat unreasonable, as we have concerns about the independence of their bottom-up and top-down forecasts, as Jemena's consultants' modelling plays a key role in both."

Due to their concerns, Jemena has decided to remove the reconciliation process and use Blunomy's forecast exclusively, who models each asset level independently. This ensures that no scaling is involved and inputs remain consistent throughout the entire process.

5.2 Jemena has updated their assumptions to align with 2025 data

Originally, Jemena used scenarios defined by AEMO in the 2024 ISP, which are Step Change, Progressive Change and Green Energy Exports. These scenarios have different levels of CER uptake, electrification, economic growth and trajectories of the state's progress towards the transition. It is standard practice in industry to use scenarios from AEMO, as they undergo an extensive consultation process and utilise various multi-sector modelling.

Since the 2024 ISP, AEMO has released new publications, rendering Jemena's assumptions outdated.

"The top-down peak demand forecast incorporates AEMO Step Change, however, the EV forecasts use ISP inputs, which are out of date."

We understand that Jemena has updated their assumptions and is now using AEMO's final 2025 Inputs Assumptions and Scenario Report (IASR) in their latest forecast.

5.3 Blunomy has made reasonable choices and the method is clear

As previously explained, Blunomy has a two-step process to forecast net demand[4], starting with the short-term Bayesian Neural Network (BNN) weather normalisation model. Baringa had a number of concerns with their process.

[3] https://www.aer.gov.au/documents/baringa-distribution-demand-forecast-assessment-review-jemena-2026-31-regulatory-proposal-july-2025-0

[4] Demand measured by the network which differs from underlying demand by not considering energy produced behind the meter

5.3.1 Historical data employed by Blunomy is typical in industry

Baringa stated in their report that, *"Jemena's use of historical data is somewhat unreasonable as it is not transparent and unable to validated. The starting point maximum demand at HV Feeder level uses historical, weather-corrected and transfer-corrected data. In the top-down model, historical demand, weather data, and calendar data feed into the short-term model."*

Jemena's use of historical data is standard in the industry, as all demand forecasting methodologies require the disentanglement of temperature and demand. Data is transparent and easily accessible. Jemena uses historical data collected from their meters for each asset type and cleans the data for abnormalities or transfers. Zone substation data is also publicly published on their website[5]. Blunomy utilises weather reanalysis data, called ERA-5, from the European Centre for Medium-Range Weather Forecasts (ECMWF), which can be downloaded through an API or on the website[6]. Reanalysis data, such as ERA-5 or MERRA, is commonly used over data provided by the Australian Bureau of Meteorology because it offers more weather variables and covers the entire globe on a 31km grid.

5.3.2 A BNN overcomes shortfalls of traditional forecasting approaches

"Usage of a BNN is reasonable for capturing multiple nonlinear relationships. However, the algorithm is complex, not transparent and difficult to validate without clear data. We therefore consider this approach is not easily reproducible as Jemena has not sufficiently described how this is being derived from Jemena's consultant's model."

Within the BNN, Blunomy utilises temperature, solar irradiance, and wind variables from the ERA-5 data, while also incorporating time, day of the week, and public holiday indicator variables. A BNN is a good choice for modelling uncertainty and provides multiple benefits over simple linear regressions. The BNN models each weight as a random variable with a probability distribution, and the model learns distributions from the underlying data. This then allows Blunomy to sample outcomes using a Monte Carlo simulation to produce POEs without an added step of creating synthetic weather years. The synthetic weather year approach employed by other DNSPs, such as Essential Energy, has its own limitations because of breaking spatiotemporal correlations, resulting in weather that's mathematically varied but physically impossible. Furthermore, the BNN captures non-linear relationships and does not underestimate tail events.

Baringa also had concerns about the weather normalisation approach Jemena employed because it did not include heating and cooling degree day variables, *"We have a moderate level of concern with Jemena's weather normalisation approach because it does not sufficiently factor the impact of heating degree days (HDD) and particularly cooling degree days (CDD) in the regression."* This concern is now alleviated because Jemena is using Blunomy's model instead, which forecasts consumption on a 30-minute interval basis and includes these variables in the long-term forecast.

5.3.3 Net demand growth rates are now simplified

Baringa had multiple concerns over demand growth rates employed by Jemena and the independence of the forecasts.

"Jemena forecasts native demand both in their internal bottom-up forecast and Jemena's consultant's top-down forecast. While Jemena states these forecasts are undertaken independently, their internal bottom-up forecast relies on the consultant's modelling for a key input."

"Adjustments to organic growth rates are also made towards the end of the forecast period to take into account that known load information is limited in the later years. Although the exact process for making these adjustment remains unclear."

[5] https://www.jemena.com.au/electricity/jemena-electricity-network/network-information/zone-substation-information/

[6] https://cds.climate.copernicus.eu/datasets/reanalysis-era5-single-levels?tab=overview

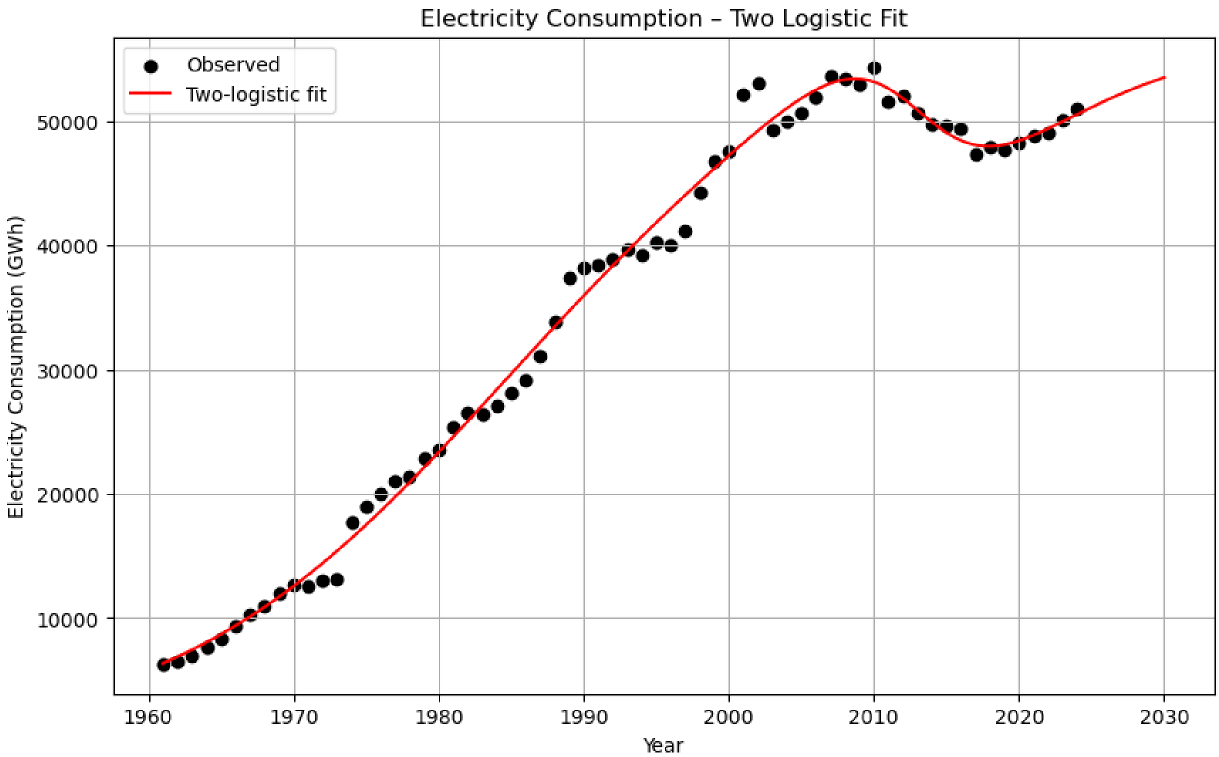
Following initial feedback, Jemena has since decided to use Blunomy's forecast exclusively and remove their bottom-up component, which necessitates scaling. Growth rates are now based on a single source without any adjustments. These growth rates are based on macroeconomic drivers, improvements in energy efficiency and changes to electricity prices.

5.3.4 The two-stage long-term growth model assists with forecasting structural changes to the economy.

Baringa was also confused about Blunomy's overall process to forecast net demand and had difficulty validating the approach. *"While logistic functions are generally considered reasonable for population growth, this overall approach is not well documented and difficult to validate."*

Endgame was able to reproduce and validate the logistic function using electricity consumption data from DCCEEW, which has state historical data from 1960. We fitted a logistic curve to historical data, using upper and lower bounds with an adjustment for the observed decline in the 2010s. The results are demonstrated below.

Figure 6 – Logistic function



This was an insightful approach by Blunomy to first model the decline in the 2010s and then the uplift post-COVID. We understand that Blunomy then uses the predicted outputs up to 2028 as training data for the linear mixed-effects Bayesian model.

In the second model, a linear mixed effects Bayesian model, standard drivers are used such as GSP, energy efficiency, electricity prices, population, cooling and heating degrees days to estimate long-term growth in electricity consumption. However, Baringa had some concerns.

"We have some concern with Jemena's assumptions for economic growth because their methodology documents do not refer to a clear primary source and the process for model ingestion. Jemena's consultant is stated as the independent forecaster source for Jemena's underlying organic economic growth, adopting GSP forecasts from AEMO's ISP. However, the methodology has not clearly explained the incorporation of economic growth into native demand. We consider that it is typical to include economic growth as an input into demand, particularly business demand (for example, it is a key component that AEMO includes as a driver for ESOO) and is a useful differentiator from population driven growth."

The primary economic indicator of growth is GSP and other related variables such as household income, unemployment, exchange rates and inflation are highly correlated with GSP. Therefore, these factors are already included through the use of GSP as a variable. Historical GSP and population variables are obtained from the Australian Bureau of Statistics[7].

Blunomy fits historical electricity consumption data with the previously listed drivers and estimates distributions for each by creating a linear mixed-effects Bayesian model. Forecast data is then fed into the model to predict future consumption. This is how economic growth and general electricity consumption drivers are incorporated into the forecasting methodology. Forecast data is taken from AEMO's inputs and assumptions workbooks for Energy efficiency, GSP and electricity prices[8], while population growth is taken from the 2023 Victoria in Future (VIF) publication[9]. The trend is then multiplied by the POE, weather-normalised demand output from the first-stage short-term model.

5.4 CER uptake is now modelled spatially but a minor change is required

5.4.1 Blunomy models CER on a spatial level

Originally, Jemena relied on the top-down forecast to allocate CER growth across the network, which was done evenly through the reconciliation process. This raised concerns for Baringa, as it did not capture the dynamics within and between locations across the network.

"System-level EV, PV, and BtM BESS uptake are provided in Jemena's consultant's top-down model. While this is reasonable for the system-level, it does not accurately take into account the potential discrepancies in the granular locational detail across different parts of Jemena's network. CER uptake is only modelled at the system level. It would be more accurate to look at current levels of CER uptake on a ZSS/Postcode/SA2 level and then grow these out using AEMO's latest uptake rates."

In their new forecast, Jemena utilises Blunomy's complete methodology, which allocates CER using sigmoid functions that include demographic information, for example, EVs are done on an SA2 basis. This should alleviate the AER's concern.

5.4.2 Storage is now contributing to reducing maximum demand

Baringa also noted that behind-the-meter home storage is included in the forecast, which contradicts traditional assumptions.

"We note that the model assumes BtM storage is acting to increase max demand and also reduce minimum demand, whereas we would expect the impact to be reversed. This assumption has not been able to be validated and has raised a minor concern for us."

Jemena has historically included these loads in the maximum demand forecast, as the network does not control them. However, Blunomy has addressed this by using daily profiles from AEMO, and storage is now acting to reduce maximum demand.

5.5 Block loads

Baringa had many concerns with Jemena's treatment of major customers, and since then, Jemena has made progress towards refining their methodology. Their new procedure is reasonable and

[7] https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-state-accounts/latest-release

[8] https://www.aemo.com.au/consultations/current-and-closed-consultations/2025-iasr

[9] https://www.planning.vic.gov.au/guides-and-resources/Data-spatial-and-insights/discover-and-access-planning-open-data/victoria-in-future

utilises methodologies from respectable industry institutions such as AEMO, other Australian and international DNSPs like Ausgrid and Pacific Gas & Electric Company (PG&E).

5.5.1 Jemena's probability adjustments for major customers are sound and follow standard industry practice

Jemena forecasts major customer demand using the following equation:

$$Forecast\ Demand = Nameplate \times ADMD \times LR \times Connection\ Likelihood \times Ramp\ Profile$$

- Nameplate is the enquired capacity by the business.
- ADMD stands for After Diversity Maximum Demand, which is the contribution of that load to peak demand. Jemena has set this at 85%.
- LR is the load realisation factor, which reflects the proportion of declared load that is expected to materialise. In their central scenario, Jemena has set this at 80%.
- Connection likelihood accounts for the actual probability of connecting to the network and its timing, which varies by project stage.
- Ramp profile corresponds to the staged deployment of demand; Jemena has set this as 15 years for large-scale connections (≥100 MVA) and 10 years for smaller connections.

The table below summarises how different organisations apply probability-weighted factors to nameplate capacity for block load forecasts.

Table 1 - Comparison of weights across organisations

	ADMD	Load realization	Connection likelihood	Ramp profile
Jemena	85%	80%	Varies	10-15 years
PG&E[10]	79%	67%		10 years
Endeavour[11]	60%-80%	80%		
Ausgrid[12]		82%		Mentioned not defined
Ausgrid[13]			34%-90%	
AEMO[14]		40-70%	Varies	10-15 years

When considering the four adjustments together, Jemena's approach is conservative and similar to the industry as a whole. Consider an example of a 10MW data centre.

Jemena: 10*80%*80% = 6.4MW

AEMO: 10*70% = 7MW

Ausgrid: 10*82% = 8.2MW

The example above also does not include the adjustment for connection likelihood, which is explored in the table below:

Table 2 – Jemena's connection likelihood weightings

Project stage	Category	Connection Likelihood	Timing compared to customer's request (year)
EWA or CWA executed	In Flight	100%	0
Customer paid for firm offer	Firm Offer	60%	-1
Customer paid for feasibility	Feasibility	40%	-2
Preliminary Enquiry	Enquiry	20%	-3

Therefore, Jemena's forecasts are even more conservative than the DNSPs and organisations listed above.

Baringa was concerned that there were inconsistencies when applying their framework to the old forecasts. *"It should be noted that even at the maximum likelihood, several "In Flight" projects have a 30% derating to their customer demand forecast, while others have 0% derating. This scoring approach is subjective and would not be reproducible."*

[10] https://www.energy.ca.gov/filebrowser/download/6686?fid=6686

[11] https://www.aer.gov.au/system/files/Endeavour%20Energy%20-%207.01%202023-2032%20Summer%20Demand%20Forecast%20-%20August%202022%20-%20Public.pdf

[12] https://www.ausgrid.com.au/-/media/Documents/Regulation/reg-investment-test/DPAR-Macquarie-Park-2024

[13] https://www.aer.gov.au/system/files/Ausgrid%20-%20KPMG%20-%20Att.%205.6.b%20-%20Maximum%20demand%20forecast%20and%20DER%20integration%20model%20review%20%20-%2021%20Dec%202022%20-%20Public.pdf

[14] https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2024/2024-electricity-demand-forecasting-methodology-consultation/final-determination/electricity-demand-forecasting-methodology_.pdf?rev=683642cd0a264f11b0e5d1c7ef9aefde&sc_lang=en

The new forecast methodology adjustments are sound, and Jemena should follow the new procedure, which can lead to reproducible results.

5.5.2 Jemena should align scenarios between AEMO's and their block loads

Baringa was concerned that Jemena's final forecast was a weighted average between the various scenarios.

"Final block load forecast is a weighted average - The final block load maximum demand is based on a weighted average, that is weighted 50% to the 'base' scenario, 25% to the 'low' scenario, and '25%' to the high maximum demand forecast scenario. The assumption adopted is that the likelihood of connection is driven by level of advancement of connection process, but it is unclear the rationale for adopting a speculative weighted average…"

This weighted average is a conservative approach that reduces the final forecast; however, to address this comment, we suggest that Jemena follow AEMO's approach. AEMO varies the types of load considered by the scenario[15]. For example, in the central scenario (Step change), AEMO considers including anticipated and committed block loads in the first few years ('period up to reliability obligation threshold'), then, beyond that, they include all proposed block loads in the enquiry stage. However, in the slow-growth scenario, they contain only committed loads for the entire forecast horizon. Jemena could take a similar approach, where, in the low scenario (corresponding to progressive change), only include the in-flight, firm offer, and feasibility categories.

Baringa also has concerns about the number of load connections considered by Jemena,

"Major customers considered - In Jemena's methodology, it is stated they consider all current enquiries received for DCs, irrespective of how advanced the connection process is. This contrasts to the other Victorian DNSPs. Jemena's assumption to forecasting block loads and DCs lacks strong reasoning, particularly regarding the likelihood of the connection proceeding, making it difficult to reproduce. We are not satisfied with the evidence Jemena has provided to substantiate the commitment levels of the block load scoring system."

Jemena's position in Victoria makes the network very attractive to investors, as there is enough land to locate large loads, such as data centres, whilst remaining close to the CBD. Jemena has a list of enquiries totalling 4100 MW of load in their new Known DC load forecasting model.

Their process differs from the other Victorian DNSPs however, Jemena's procedure follows AEMO, who includes proposed projects, including prefeasibility, enquiries and applications in the forecast. One way Jemena could improve its methodology is to better align it with AEMOs by augmenting its categories, making comparisons and validations easier. An alternative would be to explain how Jemena's categories relate to AEMO's. Integrating this, along with removing the weighted average, can make the forecast more palatable.

Furthermore, the other Victorian DNSPs provided more evidence to Baringa on their block loads, for example, Powercor also provided ramp-up rates and load profile estimates[16]. Jemena could conduct something similar, such as providing enquiry letters as proof or demonstrating the proportion of enquiries that have progressed through the offer and in-flight stages. Jemena could also conduct more due diligence on large proposals by investigating if they are financially sound or have invested in similar areas in the past.

Uncertainty around large loads is inevitable, particularly in the later years of the forecast. Aligning with AEMO's scenarios provides a useful benchmark to validate future major customer demand growth. AEMO applies a blended approach—combining survey-based data with macroeconomic

[15] https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2024/2024-electricity-demand-forecasting-methodology-consultation/final-determination/electricity-demand-forecasting-methodology_.pdf?rev=683642cd0a264f11b0e5d1c7ef9aefde&sc_lang=en

[16] https://www.aer.gov.au/documents/baringa-distribution-demand-forecast-assessment-review-powercor-2026-31-regulatory-proposal-july-2025

modelling—to project large industrial load growth, and a similar approach could strengthen Jemena's future major customer projections. Jemena should consider comparing their future horizon block loads with AEMO's and if the former is higher, implement a limit. Then conduct a sensitivity analysis based on their original approach, which uses historical connections.

Ultimately, if the network lacks sufficient capacity to accommodate these loads, they will either go elsewhere or not connect, hindering economic growth. JEN has sufficiently derated all projects, and it is ultimately out of their control on how many data centres enter, as the result depends on the industry. The AER will need to determine whether it wants to encourage data centres that contribute to economic growth or make Jemena a closed network. We don't think this will particularly impact the bills of customers, as the centre itself would need to pay for the connection.

5.5.3 Jemena already considers materiality thresholds

Baringa suggested that Jemena should establish materiality thresholds, *"Materiality thresholds could be established based on minimum size (e.g., 1MW) and/or relative to the capacity of the assets (e.g., 5% of the asset capacity) to mitigate the potential overlapping with the trend component."* However, Jemena already employs a threshold for block loads; they classify loads greater than 100A as a block load, such as residential premises and smaller commercial buildings. Then Jemena separately considers larger loads connected to the sub-transmission network as major customers, such as data centres. Loads greater than 100A are diversified before being included, which means that only a proportion of energy, the amount that aligns with the asset's peak demand, is included in the forecast. This ensures that the load outside of peak demand times are not included. We understand that this is a static number based on historical observations. For future improvements, we suggest that diversity factors vary by load type, although this adds complexity to the forecasts.

5.5.4 Blunomy's approach to addressing potential block load overlaps is sufficient and uncomplicated

Baringa highlighted that Blunomy's methodology could lead to potential overlaps when considering Jemena's block loads in the forecasts.

"Jemena's consultant's approach to addressing the potential overlap between blockloads and other components of the modelling for system-level demand may not be sufficient as it is limited to population-driven blockloads, and may also fail to properly account for the impact of other demand drivers such as electricity price increases, demand management and greater energy efficiency that continue to drive down demand from the existing broader customer base."

Jemena provides block loads to Blunomy that exceed 100A. These are known developments in the short term and are unlikely to be affected by factors such as demand management and energy efficiency, which are long-term drivers.

Blunomy caps new large developments if population growth is less than Jemena's provided block loads. We are not aware of Blunomy adjusting for business growth; however, this would be very difficult to untangle from the long-term economic growth trend.

6 Jemena's forecasts are aligned with best practice

To conduct our assessment, we reviewed the AER's best practice forecasting guidelines (FBPG)[17] and applied it to Jemena's methodology. Although these guidelines are primarily intended to oversee AEMO's reliability and ISP forecasts, they may also be used more generally to inform forecasting approaches undertaken by other industry stakeholders.

At its core, the FBPG outlines several guiding principles for the development and application of forecasting methodologies, ensuring stakeholder confidence and enabling improved decision-making. This includes:

- Accuracy and unbiasedness, including reasonable inputs and assumptions
- Transparency
- Scenarios and sensitivity analysis
- Regular reviews
- Consult with stakeholders
- Fit for purpose

6.1.1 Accuracy and unbiasedness

Jemena ensures there is no sampling bias by using appropriate data and removing outliers, abnormal observations or temporary load transfers. They also remove large block loads and treat them separately in their modelling process. Jemena adjusts historical loads for abnormal weather conditions. Blunomy applies the correct functional form to the weather normalisation process, using a Bayesian Neural Network to capture temperature non-linearities (which is crucial because very hot and cold days lead to more cooling and heating energy usage, while mild days do not) and produce a distribution of outcomes to determine POEs.

Additionally, Blunomy feeds reasonable inputs to their long-term model, which contributes to the forecast's accuracy and unbiasedness. They incorporate key economic growth drivers, such as GDP, population, and prices. They use AEMO's assumptions, which are the industry standard and discussed more below.

6.1.2 Transparency

Jemena has submitted a demand forecasting procedure document, accompanied by their forecasts, with their regulatory submission. The document was sufficient at explaining the high-level approach; however, for complete transparency, more detailed information on the step-by-step process may be required in the future. The updated Blunomy approach eliminates reconciliation, creating a simpler, more transparent, and easier-to-understand process. Although for complete transparency, we suggest providing the AER with a full list of assumptions and data, encouraging Blunomy to update their methodology document with more detail and or getting Blunomy to present to the AER on their method.

6.1.3 Scenarios and sensitivity analysis

Jemena created three forecasts for each of AEMO's ISP scenarios: Step Change, Progressive Change and Green Energy Exports. Further, they conduct a sensitivity analysis on major customers (large block loads) using base, low and high scenarios, which also correspond to the ISP scenarios (in that

[17] https://www.aer.gov.au/industry/registers/resources/guidelines/forecasting-best-practice-guidelines

order). These scenarios explore different levels of economic growth, including customer adoption of CER and electrification, as well as various pathways to achieving the net-zero transition by 2050. Jemena should update these to reflect more recent AEMO assumptions and publications.

6.1.4 Fit for purpose

Bluomy's spatial bottom-up approach is appropriate for forecasting maximum demand at different asset levels by considering the demographics of Jemena's network. This approach is commonly employed in industry. Blunomy follows a component-based method, which involves combining various modules, such as weather normalisation, CER uptake, and electrification projections, to produce the final forecast.

6.1.5 Reviews

We understand that Jemena undertakes annual reviews of the forecasts and assesses accuracy for its Distribution Annual Planning Report.

7 Conclusion

Jemena has produced a sound economic demand forecast which complies with the AER's best practice forecasting guidelines. Jemena has made substantial progress in refining its demand forecasting methodology in response to the AER's feedback. The transition from a reconciled top-down and bottom-up approach to a fully integrated, spatially modelled forecast developed by Blunomy addresses key concerns regarding transparency, independence, and reproducibility. By removing the reconciliation process and relying on a single, consistent methodology, Jemena has significantly simplified its forecasting framework while maintaining analytical rigour.

Blunomy's use of a Bayesian Neural Network and a two-stage long-term modelling framework represents a modern, data-driven approach that aligns with industry best practice. The method effectively captures non-linear temperature relationships, incorporates uncertainty through Monte Carlo simulations, and integrates macroeconomic and demographic drivers consistent with AEMO's ISP assumptions. Furthermore, the inclusion of spatial CER modelling and the refinement of major customer demand forecasts demonstrate Jemena's responsiveness to the AER's recommendations and its commitment to continual improvement.

While further enhancements could strengthen future iterations, such as encouraging Blunomy to publish a new step-by-step methodology with more detail or aligning the block load categories with AEMO's, the overall framework is now robust, transparent, and fit for purpose. The revised approach provides a defensible basis for Jemena's 2026–2031 regulatory proposal and supports prudent network investment decisions amid the ongoing energy transition.

In summary, Jemena's updated demand forecasting process is aligned with the AER's Best Practice Forecasting Guidelines and demonstrates marked improvements in accuracy, transparency, and methodological coherence. The revised forecast provides a credible foundation for regulatory decision-making and ensures Jemena is well-positioned to meet future electricity demand reliably and efficiently.