2016 AEMO TRANSMISSION CONNECTION POINT FORECASTING REPORT

FOR VICTORIA

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IMPORTANT NOTICE

Purpose

AEMO has prepared this document to provide information about its 2016 transmission connection point forecasts for Victoria, as at the date of publication.

AEMO publishes these connection point forecasts as requested by the Council of Australian Governments' energy market reform implementation plan.

This publication is based on information available to AEMO as at 20 July 2016, although AEMO has endeavoured to incorporate more recent information where practical.

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Version control

Version	Release date	Changes
1	29/7/2016	

EXECUTIVE SUMMARY

AEMO has developed Maximum Demand (MD) transmission connection point forecasts for Victoria to provide insights to local changes and trends in MD from 2016 to 2025–26.

Together with the regional-level MD forecasts published in AEMO's *National Electricity Forecasting Report* (NEFR)[1], the forecasts provide an independent and transparent view of electricity demand in the National Electricity Market (NEM). This increased transparency is intended to lead to more efficient network investment decisions, and ultimately provide long-term benefits to energy consumers.

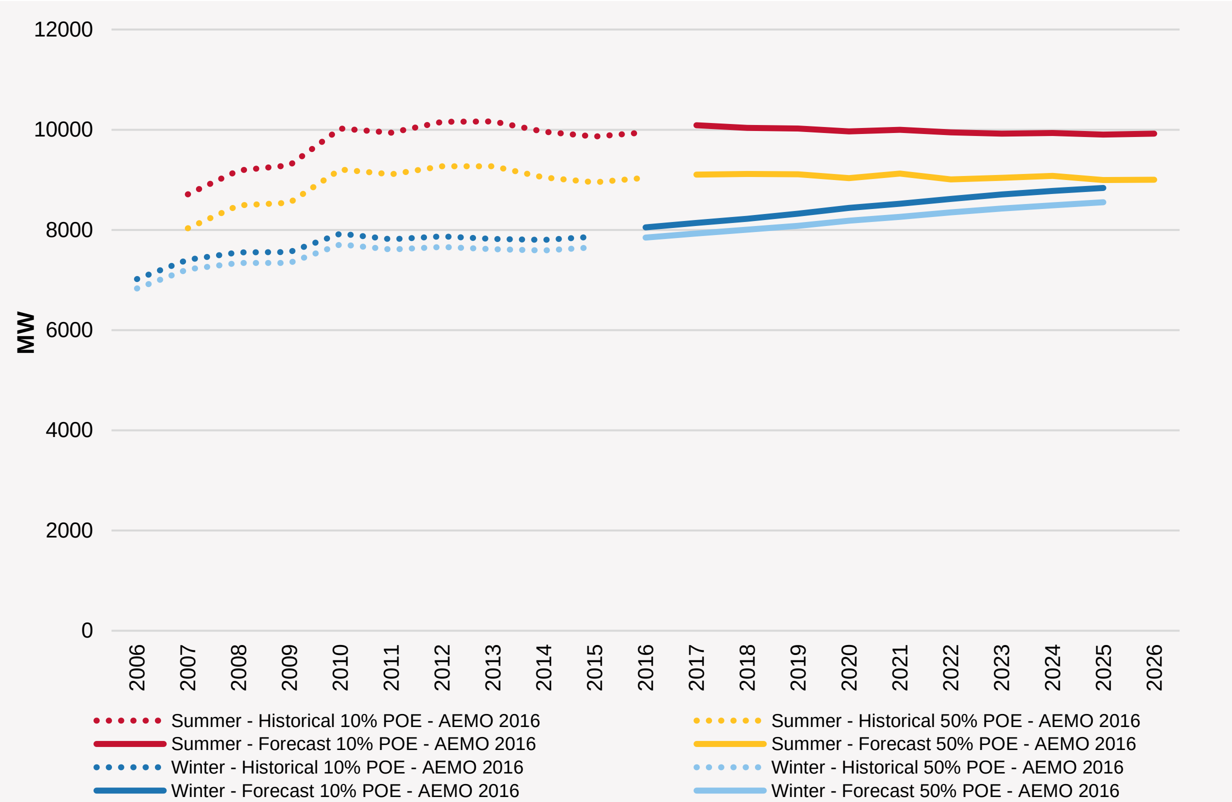
This report provides 10% and 50% probability of exceedance (POE)[2] MD forecasts, for both summer (2016–17 to 2025–26) and winter (2016 to 2025).

AEMO's forecasts of Victorian connection point MD show:

- Summer MD is forecast to decline over the 10-year outlook period.
- Winter MD is projected to increase.

Figure 1 shows the summer and winter MD forecasts. Table 1 summarises the average annual forecast rates of change and main drivers of the forecasts, and compares these 2016 forecasts to those published last year.[3]

Figure 1 AEMO's aggregated, non-coincident 2016 forecasts (including direct-connect loads)



[1] AEMO. *2016 National Electricity Forecasting Report*. Available at: http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/National-Electricity-Forecasting-Report.

[2] Probability of exceedance (POE) is the likelihood that a maximum demand forecast will be met or exceeded. A 10% POE MD forecast is expected to be exceeded, on average, one year in 10. A 50% POE projection is expected to be exceeded, on average, one year in two.

[3] AEMO. *2015 AEMO Transmission Connection Point Forecasting Report for Victoria.* Available at: http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Transmission-Connection-Point-Forecasting.

Table 1 AEMO 2016 connection point forecast average annual rates of change, 10% POE

Category	Summer	Winter
Total connection point MD	-0.2%	1.0%
Typical range of individual growth rates	-10.5 – 7.6%	-9.3 – 4.8%

Key features:

- Overall summer transmission connection point MD in Victoria is expected to decline due to energy efficiency gains in the residential and commercial sectors. Winter MD is projected to increase.
- Energy efficiency gains in summer are expected to come from appliance upgrades to more energy efficient stock, in particular air-conditioning equipment.
- Forecast changes in MD at some connection points are compounded by load transfers and industrial load changes.
- New connection point Deer Park commences operation in 2018 with transfers from Altona, Brooklyn and Keilor.
- New connection point Brunswick 66 kV commences operation 2017 with transfers from Richmond and West Melbourne, with the eventual closure of West Melbourne 22 kV.

Compared to the 2015 forecasts:

- The AEMO 2016 summer forecast (10% POE) is lower than AEMO's 2015 forecast by 950 MW (11.0%) at 2024–25.
- This is attributed mainly to the collective effect of differences in energy efficiency impacts modelled in the 2016 NEFR MD forecast, compared to the 2015 NEFR. These impacts were included in the connection point forecasts through reconciliation to the 2016 NEFR.
- The AEMO 2016 winter forecast (10% POE) is higher than AEMO's 2015 forecast by 123 MW (1.7%) at 2024.

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1. INTRODUCTION

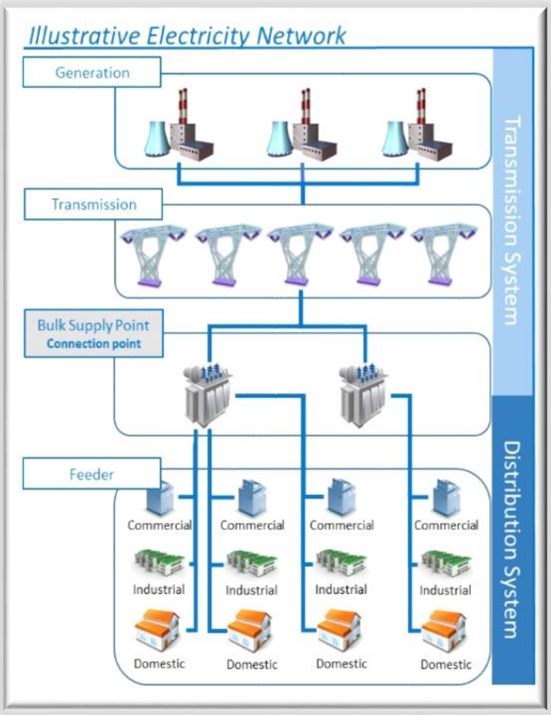
In its role as independent market and system operator, AEMO develops maximum demand (MD) forecasts for each transmission connection point, to provide a higher level of detail than AEMO's *National Electricity Forecasting Report* (NEFR) about changes in demand and observations on local trends.

Together with the regional level MD forecasts published in the NEFR, the transmission connection point forecasts provide an independent and transparent view of electricity demand in the National Electricity Market (NEM), supporting efficient network investment and policy decisions for the long-term benefit of consumers.

AEMO provides non-coincident forecasts in this report, because they represent the MD required for connection asset planning and also affect network planning. Non-coincident forecasts are the MD forecasts of a connection point, regardless of when the system peak occurs. Coincident forecasts are the MD forecasts of a connection point at the time system peak occurs.

1.1 Connection point definition

AEMO's connection point forecasting methodology[4] defines a transmission connection point as the physical point at which the assets owned by a transmission network service provider (TNSP) meet the assets owned by a distribution network service provider (DNSP), as illustrated (right).



These may also be known as bulk supply points (BSPs), terminal stations, or exit points, and in the NEM's market metering and settlements processes they are called transmission node identities (TNIs).[5]

Connection points may be connected to one another at the distribution network level. In situations where this interconnectivity is extensive, AEMO develops a forecast for the aggregated load.

1.2 Forecast scope

The forecasts in this report:

- Apply to active power in megawatts (MW) at each connection point (see Section 1.3 for information about accessing reactive power estimates).
- Exclude transmission system losses and power station auxiliary loads.

Embedded generators that are mentioned in the dynamic interface (see Section 1.3), are assumed to be off at the time of forecast MD.

Where there is just one customer at a connection point, AEMO has only published forecasts if the customer has given permission.

[4] AEMO, *Transmission Connection Point Forecasting Methodology 2016*. Available at: http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Transmission-Connection-Point-Forecasting.

[5] For a complete list of TNIs, refer to *List of Regional Boundaries and Marginal Loss Factors the 2016-17 Financial Year*. Available at: http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Loss-factor-and-regional-boundaries.

1.3 Supplementary information on AEMO's website

Supplementary information to this report is available on AEMO's website.[6]

Resource	Description
Dynamic interface http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Transmission-Connection-Point-Forecasting	An Excel workbook with the following information for each transmission connection point: • Historical and forecast MD, including 10% POE and 50% POE, for active power. • Coincident and non-coincident values. • High-level commentary. • The option to export all forecast and historical data.
Reactive power system forecast spreadsheet http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Transmission-Connection-Point-Forecasting	Separate spreadsheet for reactive power forecasts at each transmission connection point, providing complementary information for power system studies.
Interactive planning map http://www.aemo.com.au/aemo/apps/nem_map/index.php	The interactive map complements AEMO's planning publications to enhance readability and clarity. The map contains various layers, including layers displaying forecasts and planning information.
Transmission Connection Point Forecasting Methodology 2016 http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Transmission-Connection-Point-Forecasting	The current AEMO transmission connection point forecasting methodology outlines the process through which the forecasts were developed.

1.4 Improvements to the forecasting methodology

Since publishing the 2015 forecasts, AEMO has completed process improvements focussed on data management and improved analytical capability. These will set the foundation for the next program of modelling and methodological improvements.

AEMO's *Transmission Connection Point Forecasting Methodology 2016*[4] represents the current state of AEMO's transmission connection point forecasting methodology, and was employed to develop the forecasts presented in this report.

[6] Supplementary information is available at http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Transmission-Connection-Point-Forecasting.

2. RESULTS

2.1 Background

Historically, in Victoria:

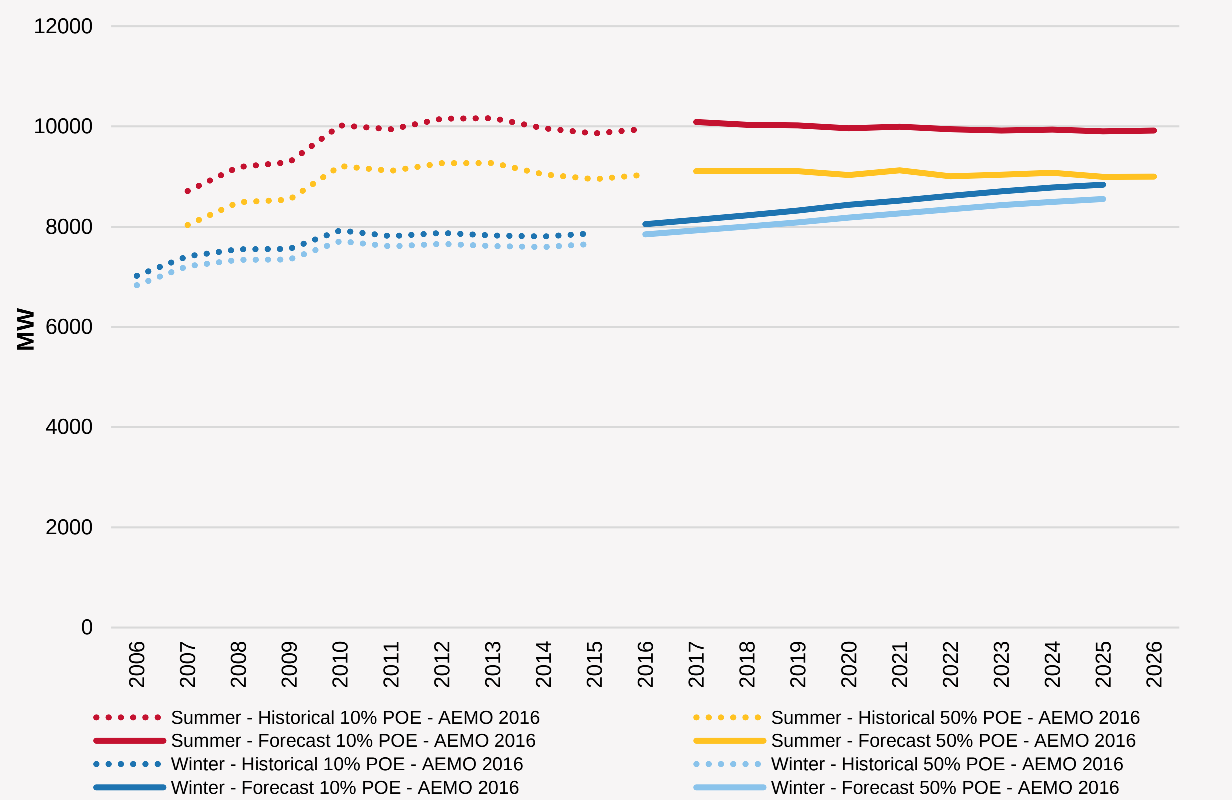
- Summer MD grew until 2010, after which demand plateaued.
- Summer MD has been greater than winter, attributed mainly to demand for cooling appliances and equipment.

2.2 Aggregated AEMO 2016 connection point forecasts

AEMO's aggregrated forecasts of Victorian connection point MD (see Figure 2) show:

- Regional average annual growth over the summer outlook period is decreasing at -0.2% and -0.1% per annum for the 10% and 50% POE forecasts respectively.
- Winter MD is projected to steadily increase at a regional average growth rate of 1.0% per annum.
- The aggregate summer and winter forecasts are converging, although summer MD remains above winter MD throughout the outlook period.

Figure 2 AEMO's aggregated, non-coincident 2016 forecasts (including direct-connect loads)



The forecasts are reconciled to AEMO's 2016 NEFR, which incorporated the effects of forecast population growth , increases in electricity prices, fuel-switching, appliance usage, manufacturing, rooftop photovoltaic (PV), and energy efficiency in appliances and buildings.

Key insights from the forecasts are:

- Improvements in appliance and building energy efficiency, as well as increasing generation from new installations of PV systems, are forecast to offset growth in consumer demand
- Population growth is seen as the key driver in consumer demand, with increased uptake and usage of electric appliances also playing an important role.
- Energy efficiency savings for air-conditioners are forecast to be higher than for many other appliances, thereby lessening the impact of increasing uptake in space cooling on summer MD. Older, less-efficient, air-conditioners are expected to be replaced with newer types, so less electricity is required for cooling on hot, high demand days. The efficiency gains are forecast to impact residential and commercial MD to a greater extent than industrial MD.
- Growth in rooftop PV is also forecast to reduce demand, but the impact of increasing installed PV capacity over the outlook period is expected to be subdued as peaks tend to occur later in the afternoon when solar radiation is weaker.
- Strong growth of rooftop PV uptake is forecast to continue, with an 12.4% average annual increase in installed capacity predicted across the region between 2017 and 2026.
- Increasing generation from rooftop PV acts to both reduce MD and move the time that the peak occurs to later in the day.
- A 37.7% penetration of reverse-cycle air-conditioning in Victorian households means a majority of homes do not yet have the ability to use electricity for highly efficient space heating. Gas to electric appliance switching is expected to occur as consumers begin to pursue this option for heating (and cooling), leading to a growth in winter MD across the outlook period.

2.3 Individual AEMO 2016 connection point results and insights

While aggregated summer MD is forecast to decline, individual connection point forecasts[7] increase at some locations, and decrease at others, due to various drivers. Table 2 shows connection points with average annual increases or decreases of more than 2%, as well as the drivers of demand. Appendix A shows plotted individual 10% POE rates of change for each connection point in Victoria.

Key features of the summer forecasts are:

- Forecast average annual rates of change for 10% POE are between -10.5% (Richmond 34 CitiPower 66 kV) and 7.6% (Brunswick Citipower 66 kV). Further information on drivers of change are listed in Table 2.
- Declining summer demand exceeding -2% per annum is forecast for 21% of connection points while 63% of connection points have declining demand.
- Of the four connection points with summer MD increasing at rates higher than 2%, two have either new loads connecting or transfers from other connection points over the outlook period.

Key features of the winter forecasts are:

- Forecast average annual rates of change for 10% POE are between -9.3% (Richmond 34 CitiPower 66 kV) and 4.8% (Cranbourne AusNet 66 kV). Drivers are listed in Table 2.
- 14% of connection points are forecast to see growth greater than 2% per annum, at 10% POE.
- Of the 10 connection points with growth rates above 2%, five have either new loads connected or transfers from other connection points over the outlook period.
- The extreme changes in summer and winter MD arise from the project to create the new Deer Park terminal station (transfers from Altona, Brooklyn and Keilor), and the Brunswick 66 kV terminal station project (transfers from Richmond and West Melbourne 22 kV which eventually closes).

[7] Refer to the dynamic interface for detailed information on individual connection points. Available at: http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Transmission-Connection-Point-Forecasting.

Table 2 Drivers at connection points with average annual increase or decrease greater than 2%[a]

Season	Forecast MD increase greater than 2%	Forecast MD decrease greater than 2%
Summer MD	**Cranbourne (AusNet) 66 kV:** Population growth. **South Morang (AusNet) 66 kV:** Population growth. **Brunswick (CitiPower) 66 kV:** New terminal station. **Deer Park (Powercor) 66 kV:** New terminal station.	**West Melbourne (CitiPower) 22 kV:** Load transfer to Brunswick 66 kV. **Richmond 34 (CitiPower) 66 kV:** Load transfer to Brunswick 66 kV. **Keilor East (Powercor) 66 kV:** Load transfer to Deer Park. **Keilor West (Powercor) 66 kV:** Load transfer to Deer Park. **Khancoban (Essential Energy) 11 kV:** Energy efficiency. **South Morang (Jemena) 66 kV:** Energy efficiency. **Thomastown 12 (Jemena) 66 kV:** Energy efficiency. **Templestowe (CitiPower) 66 kV:** Energy efficiency. **Ringwood 24 (AusNet) 66 kV:** Energy efficiency. **Richmond (CitiPower) 22 kV:** Energy efficiency. **Springvale 34 (CitiPower) 66 kV:** Energy efficiency. **Wodonga (AusNet) 66 kV:** Energy efficiency. **Horsham (Powercor) 66 kV:** Energy efficiency. **Altona-Brooklyn (Jemena) 66 kV:** Energy efficiency. **Ringwood (AusNet) 22 kV:** Energy efficiency.
Winter MD	**Altona West (Powercor) 66 kV:** Population growth. **Cranbourne (United Energy) 66 kV:** Population growth. **Terang (Powercor) 66 kV:** Population growth. **Bendigo (Powercor) 22 kV:** Population growth. **Brunswick (Jemena) 22 kV:** Population growth. **Fishermans Bend (Citipower) 66 kV:** Population growth. **South Morang (AusNet) 66 kV:** Population growth. **Cranbourne (AusNet) 66 kV:** Population growth. **Brunswick (CitiPower) 66 kV:** New terminal station. **Deer Park (Powercor) 66 kV:** New terminal station.	**West Melbourne (CitiPower) 22 kV:** Load transfer to Brunswick 66 kV. **Richmond 34 (CitiPower) 66 kV:** Load transfer to Brunswick 66 kV. **Keilor East (Powercor) 66 kV:** Load transfer to Deer Park. **Richmond (CitiPower) 22 kV:** Energy efficiency. **Keilor West (Powercor) 66 kV:** Energy efficiency. **Springvale 34 (CitiPower) 66 kV:** Energy efficiency. **Thomastown 12 (Jemena) 66 kV:** Energy efficiency. **Templestowe (AusNet) 66 kV:** Energy efficiency. **West Melbourne (CitiPower) 66 kV:** Energy efficiency.

[a] 2% is set to capture extreme rates. Major industrial loads are excluded due to confidentiality.

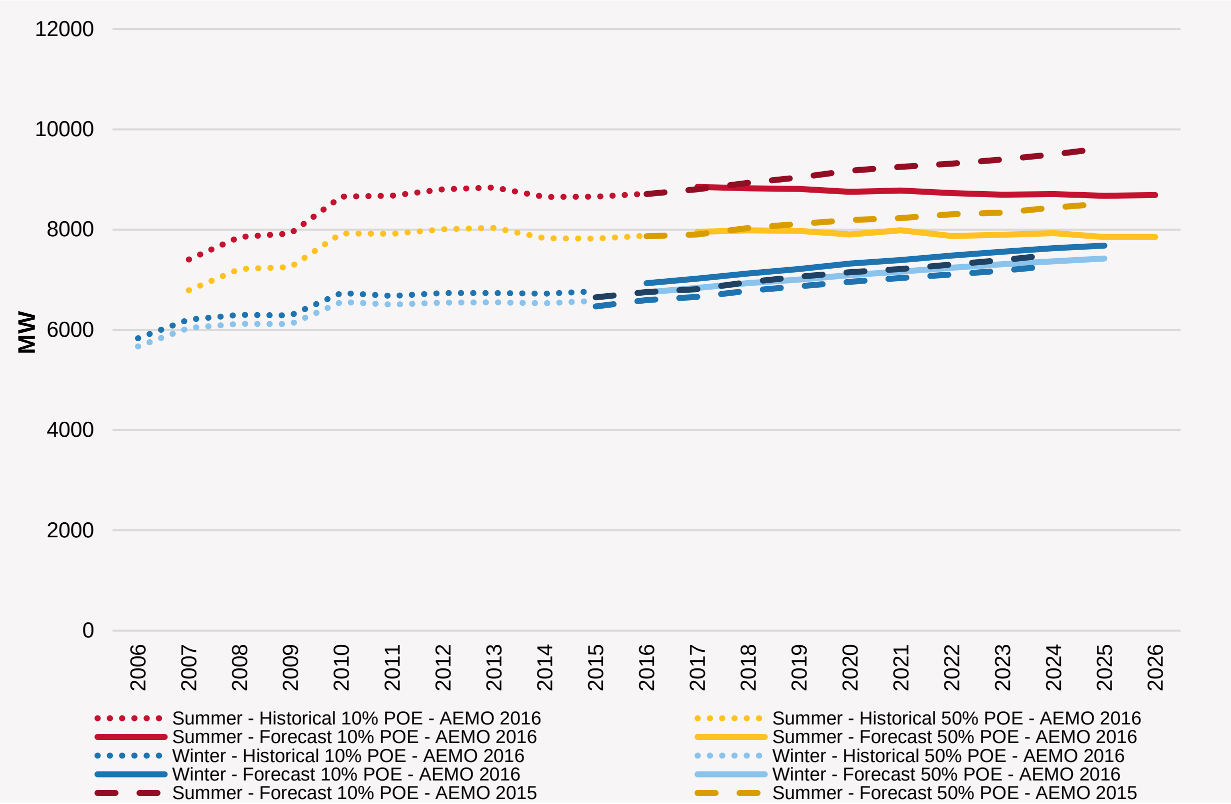
2.4 Comparison of AEMO's 2015 and 2016 forecasts

AEMO's 2015 and 2016 connection point MD forecasts are plotted in Figure 3, and the growth rates are compared in Table 3. Compared to the 2015 forecasts:

- Summer 10% POE MD forecasts are 11.0% lower at 2024–25.
- Winter 10% POE MD forecasts are 1.7% higher at 2024.

Reasons for these changes are summarised in Table 4.

Figure 3 AEMO 2015 and 2016 (10% and 50% POE) non-coincident connection point MD forecasts (excluding direct-connect loads)[a]



[a] The figure excludes direct transmission-connected customer load forecasts which are not distribution-connected and not included in DNSP distribution network forecasts.

Table 3 Region-level average change rates (10% POE)

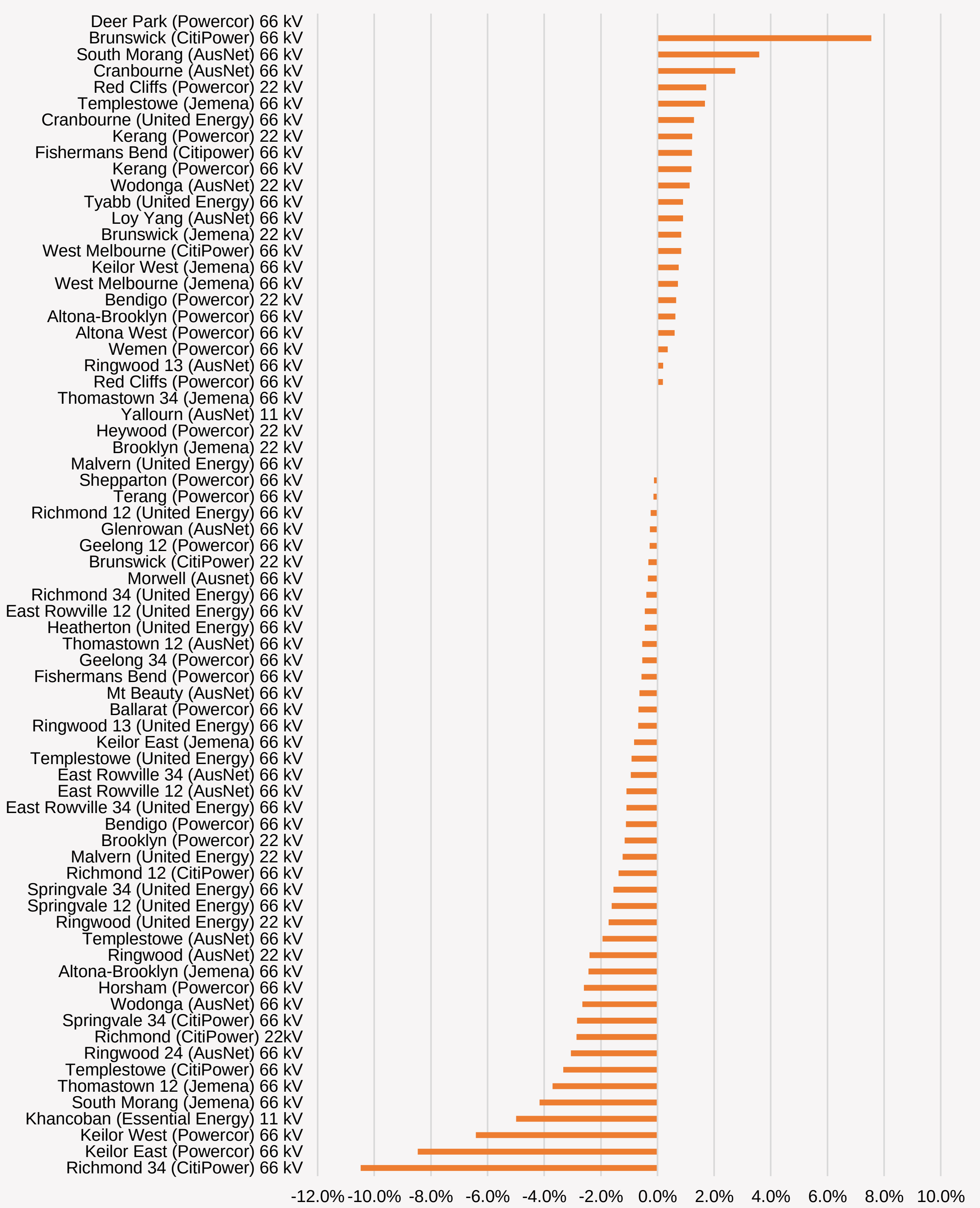
Forecast	2015 Region level average annual change rate	2016 Region level average annual change rate
Summer MD	1.1%	-0.2%
Winter MD	1.2%	1.0%

Table 4 Differences between AEMO 2015 and 2016 forecasts (10% POE)

Forecast	Differences between AEMO 2015 and 2016 aggregated MD forecasts (10% POE)
Summer MD	AEMO's connection point forecast is 11.0% (950 MW) lower than the previous forecast at 2024–25.
Winter MD	AEMO's connection point forecast is 1.7% (123 MW) higher than the previous forecast at 2025.
Key drivers for change: • **Increased impact of energy efficiency in buildings and new appliances, in the 2016 NEFR, in contrast to the impacts modelled in the 2015 NEFR. These differences are attributed to changes in NEFR forecasting methodology.**	

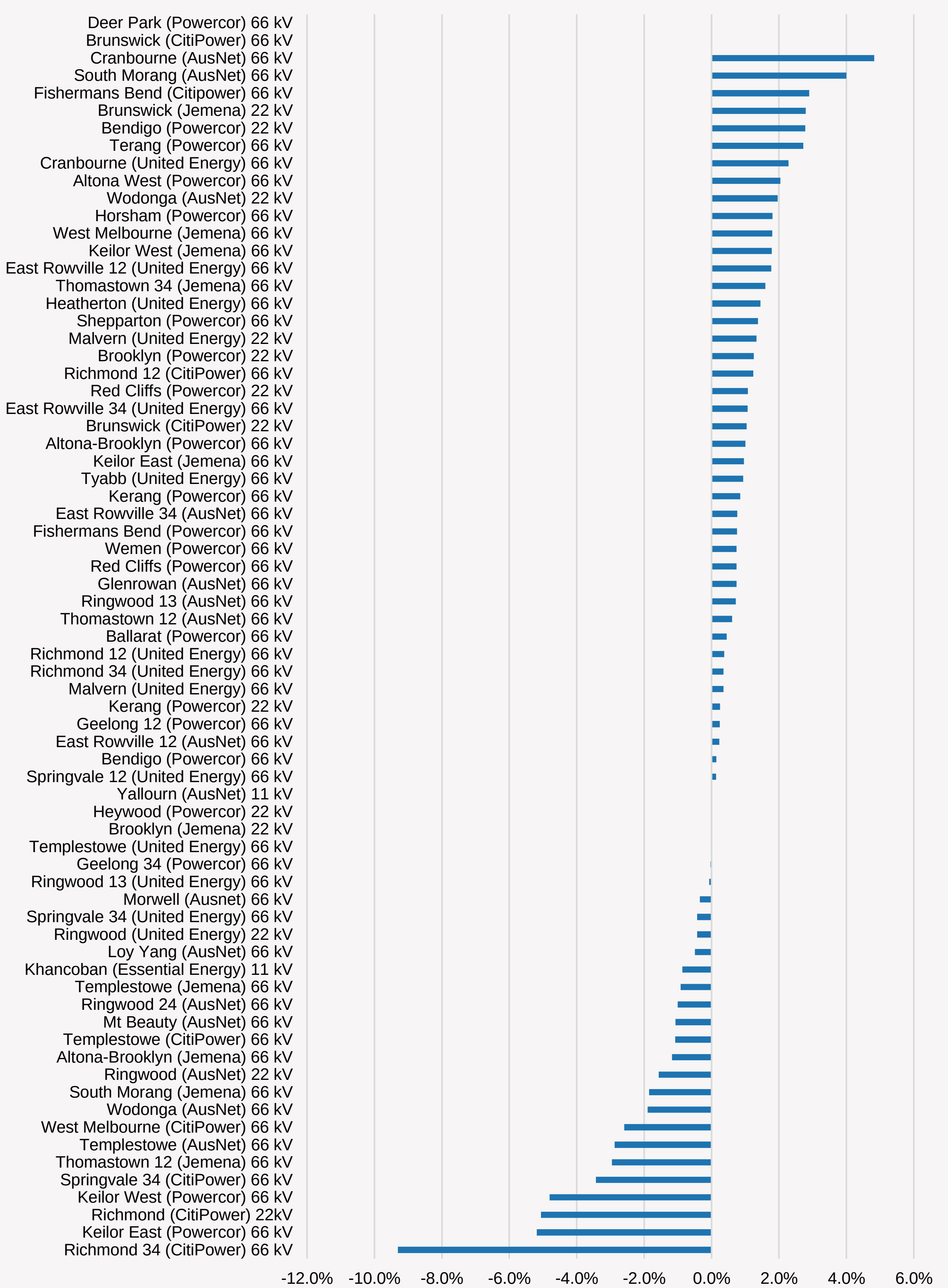
APPENDIX A. GROWTH RATES BY CONNECTION POINT

Figure 4 Victoria 10% POE summer 10-year average annual growth rates, 2016–17 to 2025–26[a]



[a] Some direct-connect industrial loads are excluded due to confidentiality. West Melbourne (CitiPower) 22 kV is excluded as it is scheduled to close.

Figure 5 Victoria 10% POE winter 10-year average annual growth rates, 2016 to 2025[a]



[a] Some direct-connect industrial loads are excluded due to confidentiality. West Melbourne (CitiPower) 22 kV is excluded as it is scheduled to close.