2016 AEMO TRANSMISSION CONNECTION POINT FORECASTING REPORT

FOR SOUTH AUSTRALIA

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AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

IMPORTANT NOTICE

Purpose

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

AEMO publishes these connection point forecasts as part of its national transmission planner (NTP) functions and clause 5.20.6(b) of the National Electricity Rules.

This publication is based on information available to AEMO as at 15 July 2016, although AEMO has endeavoured to incorporate more recent information where practical.

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Acknowledgement

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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 South Australia 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.

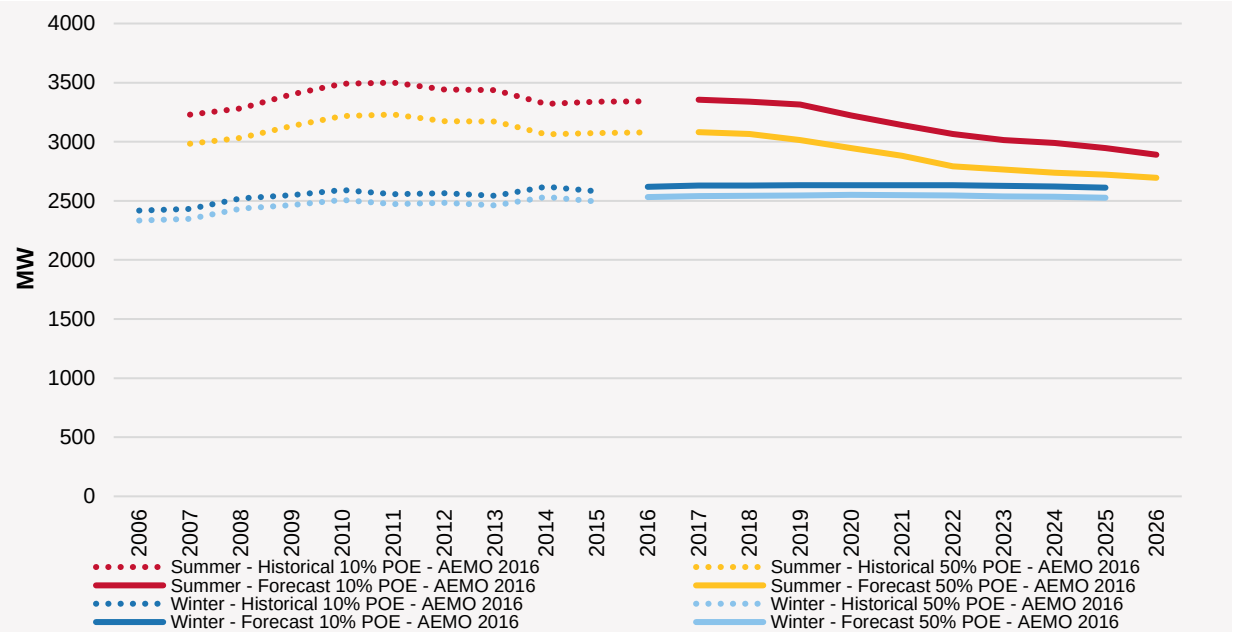
This report provides 10% and 50% probability of exceedance (POE)[2] MD forecasts, for both summer (2016–17 to 2025–26) and winter (2016 to 2025).

AEMO's forecasts of South Australian connection point MD show:

- Summer MD is forecast to decline over the 10-year outlook period.
- Winter MD is projected to remain at current levels and, with some exceptions, remain lower than summer MD.

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 non-coincident summer and winter forecasts for 10% POE and 50% POE



[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 South Australia.* 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	-1.6%	0.0%
Typical range of individual growth rates	-4.1 to 1.6%	-4.9 to 4.3%

Key features:

- **Overall summer transmission connection point MD in South Australia is expected to decline due to energy efficiency gains in residential and commercial sectors. Winter MD remains close to current levels.**
- **Energy efficiency gains in summer are coming from appliance upgrades to more energy efficient stock, in particular air-conditioning equipment.**
- **The impact of a growing number of rooftop photovoltaic (PV) systems is projected to diminish, as most residential connection points already peak later in the day when solar radiation and and related power generation is weak.**
- **Forecast changes in MD at some connection points are compounded by load transfers and industrial load changes.**

Compared to the 2015 forecasts:

- **The AEMO 2016 summer forecast (10% POE) is 455 MW (17.3%) lower than AEMO's 2015 forecast 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 26 MW (1.1%) lower than AEMO's 2015 forecast at 2024.**

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1. INTRODUCTION

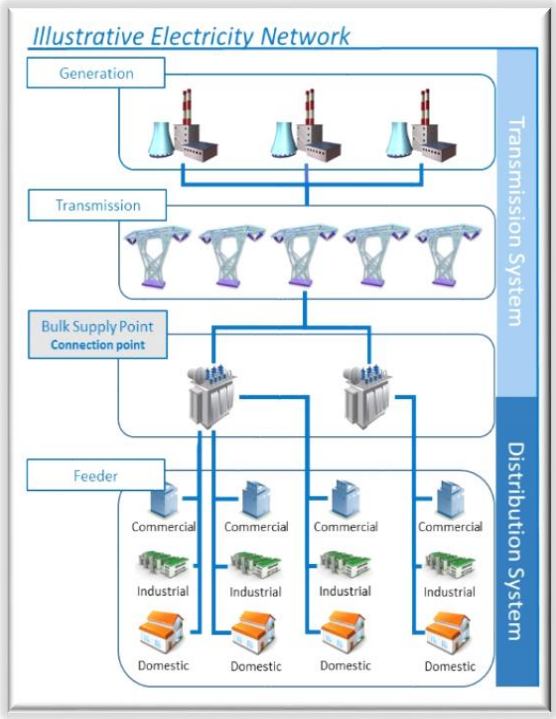
In its role as independent market and system operator, AEMO develops maximum demand (MD) forecasts for each transmission connection point, to provide a higher level of detail than AEMO's *National Electricity Forecasting Report* (NEFR) about changes in demand and observations on local trends.

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 forecasted 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 South Australia:

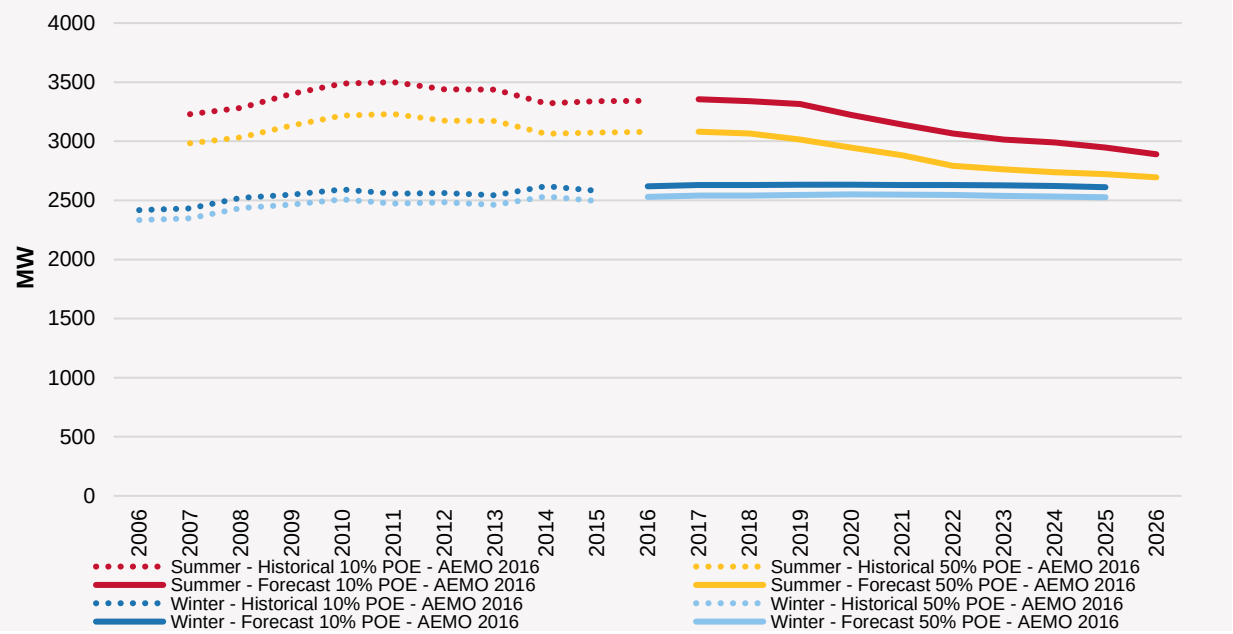
- Summer MD grew until 2011, after which demand decreased and appeared to plateau.
- Summer MD has been greater than winter, attributed mainly to demand for cooling appliances and equipment.
- Winter MD has not changed considerably, in comparison to summer MD.

2.2 Aggregated AEMO 2016 connection point forecasts

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

- Summer MD is forecast to decline overall over the 10-year outlook period.
- Winter MD is projected to remain at current levels and, with some exceptions at individual connection points, remains lower than summer MD in the outlook period. These exceptions are discussed further in section 2.3.
- Regional average annual growth over the summer outlook period is decreasing at 1.6% and 1.5% per annum for the 10% and 50% POE forecasts respectively.

Figure 2 AEMO's aggregated, non-coincident 2016 forecasts



The forecasts are reconciled to AEMO's 2016 NEFR, which incorporates 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:

- Summer MD is projected to continue occurring on extremely hot days, implying that a considerable component of MD is used by appliances and equipment for space cooling.
- The aggregated forecasts show declining summer MD, due to the relationship between electricity required for cooling and energy efficiency gains on space cooling appliances and equipment. This was modelled in the 2016 NEFR and incorporated into the connection point forecasts through reconciliation. The decline is established as older, less-efficient, air conditioners are expected to be replaced with newer more efficient 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.
- PV growth is forecast to continue at weaker levels (8.6% per annum) than seen in the past. Furthermore, capability of rooftop PV to offset MD is projected to be small relative to energy efficiency because the time of MD at many connection points occurs later in the afternoon or in the early evening and at these times rooftop PV power generation is reduced relative to the maximum output at solar noon.
- The difference between 10% and 50% POE levels in summer is slightly higher than that of winter, demonstrating that summer MD exhibits greater year-to-year variability, due to weather sensitivity, than winter MD.

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 South Australia.

Key features of the summer forecasts are:

- Forecast average annual rates of change for 10% POE are typically between –4.1% (Ardrossan West) and +1.6% (Penola West). However Leigh Creek South is experiencing an exceptional decline (12.4%), associated with the closure of the Leigh Creek Coal mine and related effects on town services. Table 2 lists further information on drivers of change.
- Declining demand exceeding -2% per annum is forecast for 32% of connection points, while 80% of connection points have declining demand.
- Of the five connection points with increasing MD, three have either new loads connecting or transfers from other connection points over the outlook period.
- The Summer 10% POE forecasts for Blanche and Kanmantoo decline to the extent that they are forecast to be winter-peaking by the end of the outlook period. This is due to projected energy efficiency gains in cooling equipment and rooftop PV suppressing the peak that would otherwise by forecast to occur earlier in the day.

Key features of the winter forecasts are:

- Forecast average annual rates of change for 10% POE are between -4.9% (Ardrossan West) and 4.3% (Penola West), with Leigh Creek South and Stony Point Distribution experiencing an exceptional decline (-15.3%) and increase(12.2%), respectively. Drivers are listed in Table 2.
- 12% of connection points are forecast to growth greater than 2% per annum for 10% POE.

[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.

- Of the connection points with growth rates above 2%, only one has the growth attributed to growing consumer demand. The others have either new loads connecting or transfers from other connection points over the outlook period.

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	**None**	**Eastern Suburbs:** Due to energy efficiency. **Leigh Creek South:** Due to coal mine closure. **Blanche:** Due to energy efficiency. **Adelaide Central:** Due to energy efficiency. **Yadnarie:** Due to energy efficiency. **Waterloo:** Due to energy efficiency. **Western Suburbs:** Due to energy efficiency. **Baroota:** Due to energy efficiency. **Northern Suburbs:** Due to energy efficiency and industrial demand. **Wudinna:** Due to energy efficiency. **Kincraig:** Due to energy efficiency. **Ardrossan West:** Due to load trasfer to Dalrymple.
Winter MD	**Templers:** Due to population growth. **Port Pirie Network:** Due to resumption of industrial demand. **Dalrymple:** Due to transfer from Ardrossan West **Penola West:** Due to increased industrial demand. **Stony Point Distribution:** Due to increased industrial demand taking effect from summer 2016-17.	**Ardrossan West:** Due to load transfer to Dalrymple. **Leigh Creek South:** Due to coal mine closure.

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

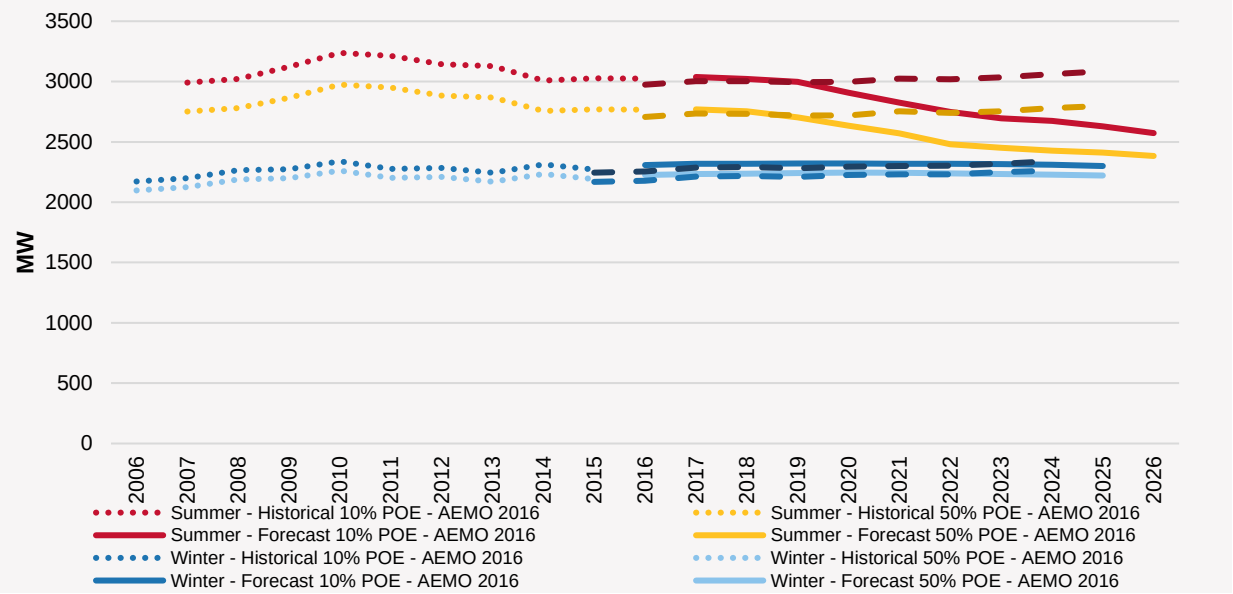
2.4 Comparison of AEMO's 2015 and 2016 forecasts

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 17.3% lower at 2024–25.
- Winter 10% POE MD forecasts are 1.3% lower 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)

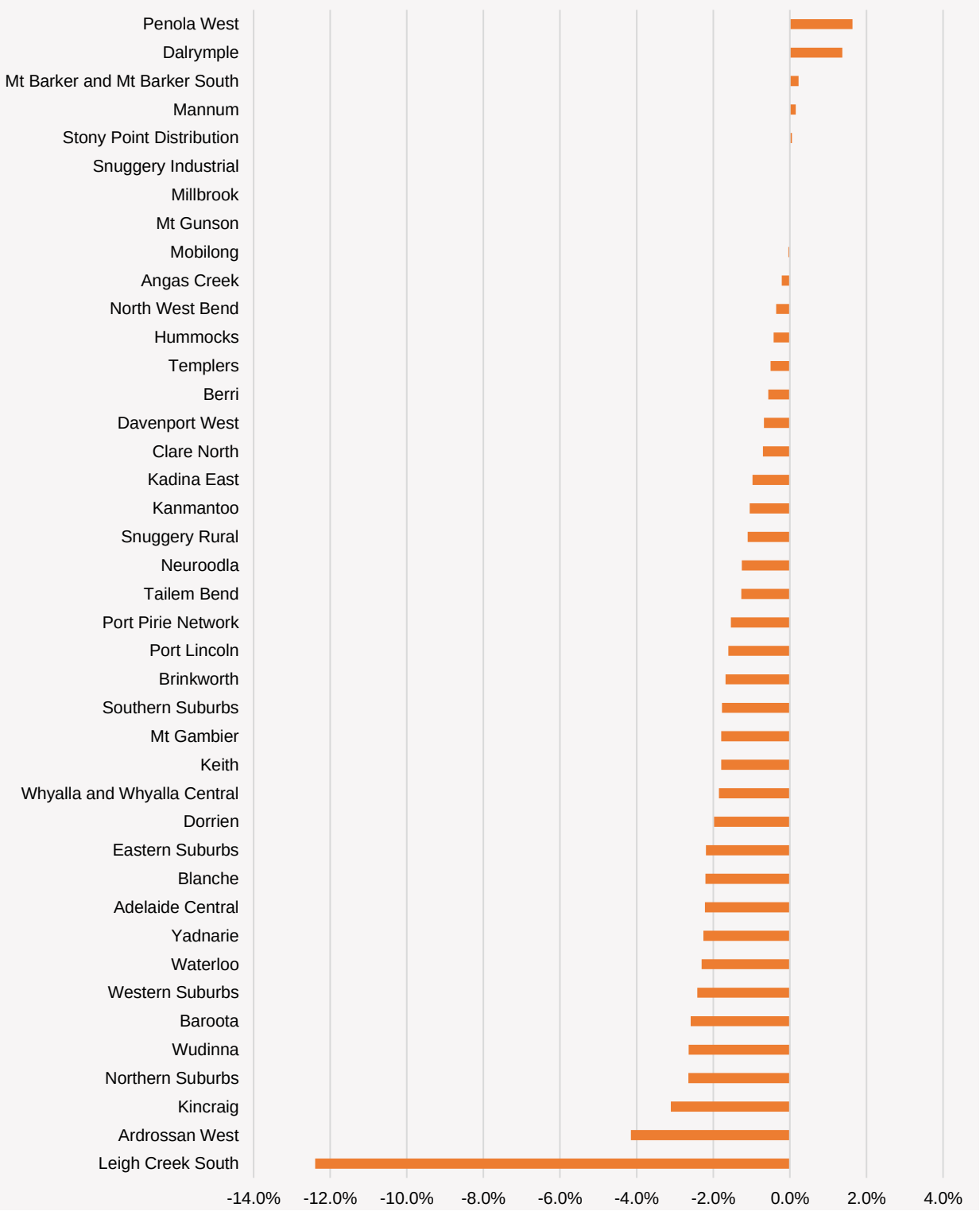
Forecast	2015 Region level average annual change rate	2016 Region level average annual change rate
Summer MD	0.4%	-1.6%
Winter MD	0.5%	0.0%

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 updated connection point forecast is 17.3% (455 MW) lower than the previous forecast at 2024–25.
Winter MD	AEMO's updated connection point forecast is -1.1% (26 MW) lower than the previous forecast at 2024.
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.** • **Increases in forecast MD at some connection points are generally due to load transfers or forecast increases in industrial demand associated with agriculture and horticulture.**	

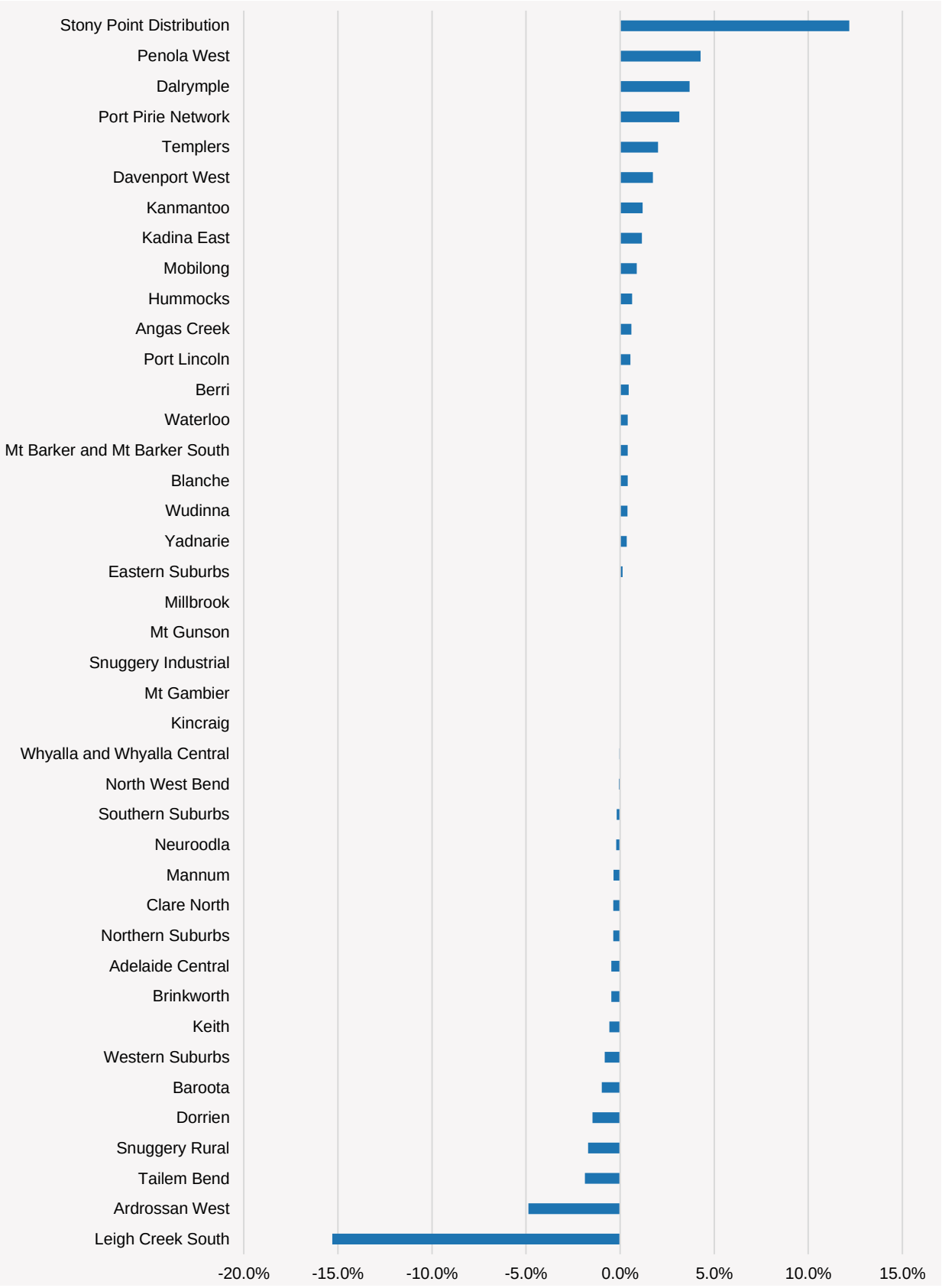
APPENDIX A. GROWTH RATES BY CONNECTION POINT

Figure 4 South Australia 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.

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



[a] Some direct-connect industrial loads are excluded due to confidentiality.