ElectraNet Transmission Network Revenue Reset Regulatory Information Notice

Non – coincident and MVA Maximum Demand Measures Methodology

1 July 2018 to 30 June 2023

March 2017

Version 1

ElectraNet Corporate Headquarters
52-55 East Terrace, Adelaide, South Australia 5000 • PO Box 7096, Hutt Street Post Office, Adelaide, South Australia 5000
Tel: (08) 8404 7966 • Fax: (08) 8404 7956 • Toll Free: 1800 243 853

Company Information

ElectraNet Pty Ltd (ElectraNet) is the principal electricity transmission network service provider (TNSP) in South Australia.

For information about ElectraNet visit www.electranet.com.au.

Contact

For enquiries about this Revenue Proposal please contact:

Simon Appleby
Senior Manager Regulation & Land Management
ElectraNet
52-55 East Terrace
Adelaide SA 5000

revenue.reset@electranet.com.au

Copyright and Disclaimer

Note

This basis of preparation forms part of our Revenue Proposal for the 2018-19 to 2022-23 regulatory control period. It should be read in conjunction with the other parts of the Revenue Proposal.

Our Revenue Proposal comprises the attachments listed below, and the supporting documents that are listed in Attachment 15:

Attachment 1 – Maximum allowed revenue

Attachment 2 – Regulatory asset base

Attachment 3 – Rate of return

Attachment 4 – Value of imputation credits

Attachment 5 – Regulatory depreciation

Attachment 6 – Capital expenditure

Attachment 7 – Operating expenditure

Attachment 8 – Corporate income tax

Attachment 9 – Efficiency benefit sharing scheme

Attachment 10 – Capital expenditure sharing scheme

Attachment 11 – Service target performance incentive scheme

Attachment 12 – Pricing methodology

Attachment 13 – Pass through events

Attachment 14 – Negotiated services

Attachment 15 – List of supporting documents

In addition to the Revenue Proposal and above mentioned documents our Regulatory Information Notice comprises the documents listed below:

PwC Audit and Review Opinions

Statutory Declaration

Basis of Preparation – Historical

Workbook 1 – Regulatory Determination

MIC Data Template 2010

MIC Data Template 2011

MIC Data Template 2012

MIC Data Template 2013

MIC Data Template 2014

MIC Data Template 2015

MIC Data Template 2016

Non – coincident and MVA Maximum Demand Measures Methodology (this document)

Map of Transmission System

Corporate Structure

Service Target Performance Incentive Scheme Network Capability Component: Network Limits Information

ElectraNet Enterprise Agreement 2016

Forecast Expenditure Preparation Overview Assumption Information

Contents

Tables

1. Introduction

On 15 November 2016, ElectraNet Pty Limited was served with a Regulatory Information Notice pursuant to Division 4 of Part 3 of the National Electricity (South Australia) Law (the RIN).

The following document describes the data sources and methodology used by ElectraNet to generate forecast maximum demands for this RIN.

2. Maximum Demand and Utilisation Spatial

2.1 Data requirement

Regulatory Information Notice Instructions for clause 6. Demand Forecasts:

> *6.1 Provide and describe the methodology used to prepare the maximum demand forecasts.*
>
> *6.2 Provide:*
>
> *(a) the model(s) ElectraNet used to forecast maximum demand;*
>
> *(b) where ElectraNet's approach to weather correction has changed, provide historically consistent weather corrected maximum demand data, as per the format in Workbook 1 - regulatory determination, regulatory templates 3.4, and 5.4 using ElectraNet's current approach. If this data is unavailable, explain why; and*
>
> *(c) any supporting information or calculations that illustrate how information extracted from ElectraNet's forecasting model(s) reconciles to, and explains any differences from, information provided in Workbook 1 - regulatory determination, regulatory templates 3.4, and 5.4.*
>
> *6.3 For each of the methodologies provided and described in response to paragraph 6.1, and, where relevant, data requested under paragraph 6.2(b) and 6.2(c), explain or provide (as appropriate):*
>
> *(d) the models used;*
>
> *(e) a global (or top-down) and spatial (bottom-up) forecasting processes;*
>
> *(f) the inputs and assumptions used in the models (including in relation to economic growth, customer numbers and policy changes and provide any associated models or data relevant to justifying these inputs and assumptions);*
>
> *(g) the weather correction methodology, how weather data has been used, and how ElectraNet's approach to weather correction has changed over time;*
>
> *(h) an outline of the treatment of block loads, transfers and switching within the forecasting process;*
>
> *(i) any appliance models,5 where used, or assumptions relating to average customer energy usage (by customer type);*

U) how the forecasting methodology used is consistent with, and takes into account, historical observations (where appropriate), including any calibration processes undertaken within the model (specifically whether the load forecast is matched against actual historical load on the system and substations);

(k) how the resulting forecast data is consistent across forecasts provided for each connection point identified in Workbook 1 - regulatory determination, regulatory template 5.4 and system wide forecasts;

(l) how the forecasts resulting from these methods and assumptions have been used in determining the following:

(i) capex forecasts; and

(ii) operating and maintenance expenditure forecasts.

(m) whether ElectraNet used the forecasting model(s) it used in the joint planning process for the purposes of its revenue proposal;

(n) whether Electra Net forecasts both coincident and non-coincident maximum demand at the connection point, or other nominated network elements, and how these forecasts reconcile with the system level forecasts (including how various assumptions that are allowed for at the system level relate to the network level forecasts);

(o) whether ElectraNet records historic maximum demand in MW, MVA or both;

(p) the probability of exceedance that ElectraNet uses in network planning;

(q) the contingency planning process, in particular the process used to assess high system demand;

(r) how risk is managed across the network, particularly in relation to non-network solutions to peak demand events;

(s) whether and how the maximum demand forecasts underlying the revenue proposal reconcile with any demand information or related planning statements published by AEMO, as well as forecasts produced by any distribution network service providers connected to ElectraNet's network; and

(t) how the normal and emergency ratings are used in determining capacity for individual transmission connection points.

6.4 Provide:

(u) evidence that any independent verifier engaged by ElectraNet has examined the reasonableness of the method, processes and assumptions in determining the forecasts and has sufficiently capable expertise in undertaking a verification of forecasts; and

(v) all documentation, analysis and models evidencing the results of the independent verification.

Table 2.1: Definitions Specific to Regulatory Template 4.3 - Maximum Demand and Utilisation – Spatial

Term	Definition
Embedded generation	See 'embedded generator'.
Embedded generator	Has the meaning prescribed in the National Electricity Rules
Maximum demand	Has the meaning prescribed in the National Electricity Rules Note: this RIN sets out the specific types of maximum demand information we require to perform our obligations under the NER. For the avoidance of doubt, maximum demand refers to 30 minute demand unless otherwise indicated.
MVA	Mega volt ampere.
MW	Megawatt.
Network	Has the meaning prescribed in the National Electricity Rules
Network coincident maximum demand	The load on the network at the time during which the network was experiencing its maximum demand for the relevant regulatory year.
Non-coincident maximum demand	The load on the connection point, or other spatial level, at the time during which the relevant connection point, or spatial level, was experiencing its maximum demand for the relevant regulatory year.
Non-scheduled generator	Has the meaning prescribed in the National Electricity Rules
Normal cyclic rating	The maximum peak loading based on a given daily load cycle that an asset or element of the network can supply each day of its life under normal conditions resulting in a normal rate of wear. ElectraNet must provide its definition(s) of 'normal conditions'.
Power factor	The ratio of demand in MW to demand in MVA.
Probability of exceedance (PoE)	Typically, actual maximum demand is standardised to either, or both, of 10 per cent and 50 per cent PoE levels. The 50 (10) PoE demand level is the level of maximum demand that, on average, would be exceeded in 50 per cent (10 per cent) of seasons. It can be thought of as the maximum demand that would be observed or exceeded once every two (ten) years on average. The key driver of variability in demand is usually weather. However this is not always the case and the concept of POE is not necessarily tied directly to weather.
Raw data	Refers to demand without weather correction.
Raw adjusted maximum demand	Raw unadjusted maximum demand that is adjusted to system normal conditions. ElectraNet must adjust to system normal conditions by accounting for (temporary) switching relevant to the network segment, and for temporary load changes from major customers (such as temporary closure of major industrial customers). ElectraNet must not adjust maximum demand data for (permanent) transfers, block loads or embedded generation. The term, 'raw', refers to demand data that has not undergone weather correction.
Raw unadjusted maximum demand	Actual maximum demand as measured by ElectraNet at the specified network segment. This must not include any adjustments for factors such as switching, temporary load changes from major customers, transfers, block loads or

Term	Definition
	embedded generation. The term, 'raw', refers to demand data that has not undergone weather correction.
Scheduled generator	Has the meaning prescribed in the National Electricity Rules
Semi-scheduled generator	Has the meaning prescribed in the National Electricity Rules
Summer peaking	Maximum demand experienced over the period 1 October to 31 March.
Switching	Temporary changes in network configuration and restoration made by ElectraNet for operational reasons.
Transfers	Permanent (or indefinite) changes in network configuration made by ElectraNet usually to manage demand growth.
Weather correction	The removal of the impact of temperature fluctuations so as to derive a maximum demand measure corrected to a probability of exceedance (PoE), usually 50% PoE and/or 10% PoE.
Winter peaking	Maximum demand experienced over the period 1 April to 30 September.

2.2 Demand Forecasts Methodology

2.2.1 Response to Section 6.1 of Regulatory Information Notice

6.1 Provide and describe the methodology used to prepare the maximum demand forecasts.

AEMO Transmission Connection Point Forecasts have been used for SA Power Networks connection points, and agreed maximum demands were used for direct connect customers.

For each SA Power Networks connection point, the relevant AEMO Transmission Connection Point Forecast was copied into the regulatory template for each type of forecast and financial year required.

For each direct connect customer, the relevant contract agreed maximum demand (AMD) was used and modified as required, detailed in the response to 6.2 (a).

For regulatory template 3.4, these maximum demand forecasts are summated for each type of forecast, for example each connection point's coincident 10% PoE maximum demand forecast is summated to create a system demand.

ElectraNet does not calculate a "peak" maximum demand forecast, only 10% PoE maximum demand and 50% PoE maximum demands were reported.

2.2.2 Response to Section 6.2 of Regulatory Information Notice

6.2 (a) the model(s) ElectraNet used to forecast maximum demand

The "AEMO Transmission Connection Point Forecast for South Australia" was used for SA Power Networks connection points. This forecast and supporting documents are found here:

http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Transmission-Connection-Point-Forecasting

AEMO Transmission Connection Point Forecast 2016 - Reactive Power Forecast.csv contains data used for the forecasts:

http://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/TCPF/2016/2016-SA-Reactive-Power-Forecast.csv

Generally ElectraNet uses the SA DNSP SA Power Networks forecasts in our planning and reporting. This year, these forecasts did not include the data types required by the AER (such as coincident forecasts and 50% PoE) so AEMO forecasts were instead used for SA Power Networks connection points.

Contract agreed maximum demands (AMD) were used for direct connect customers, which exclude the customer SA Power Networks and are confidential. AMDs include maximum demands and power factors.

For non-coincident 10% PoE MW maximum demands the AMD is given for the forecast years.

For coincident 10% PoE MW maximum demands the AMD is multiplied by the 10% PoE connection point diversity factor for the forecast years.

For non-coincident 50% PoE MW maximum demands the AMD is given for the forecast years.

For coincident 50% PoE MW maximum demands the AMD is multiplied by the 50% PoE connection point diversity factor, and given for the forecast years.

All MVA maximum demands have had the respective direct connect customers' AMD power factor applied.

Diversity factors are calculated based on historical data of each connection point, compared to state maximum demand, for the last 12 years.

2.2.3 Response to Section 6.2 (b) of Regulatory Information Notice

6.2 (b) where ElectraNet's approach to weather correction has changed, provide historically consistent weather corrected maximum demand data, as per the format in Workbook 1 - regulatory determination, regulatory templates 3.4, and 5.4 using ElectraNet's current approach. If this data is unavailable, explain why;

ElectraNet has used weather corrected 10% POE and 50% POE demands from AEMO's Transmission Connection Point Forecast for South Australia for SA Power Networks connection points.

Historically, ElectraNet was provided with weather corrected 10% POE and 50% POE demands from SA Power Networks.

ElectraNet does not weather correct the non-coincident demands of our direct connect customers as these loads are not weather dependant. Direct connect customers are estimated similarly to historical values.

2.2.4 Response to Section 6.3 of Regulatory Information Notice

6.3 For each of the methodologies provided and described in response to paragraph 6.1, and, where relevant, data requested under paragraph 6.2 (b) and 6.2 (c), explain or provide (as appropriate);

2.2.5 Response to Section 6.3 (d) of Regulatory Information Notice

6.3 (d) the models used;

See response to 6.2 (a)

2.2.6 Response to Section 6.3 (e) of Regulatory Information Notice

6.3 (e) a global (or top-down) and spatial (bottom-up) forecasting processes;

Each connection point is reported where either SA Power Networks define a connection point, or ElectraNet have a direct connect customer connection point. These are bottom-up forecasts given in template 5.4, summated in template 3.4 to provide a system-wide forecast.

2.2.7 Response to Section 6.3 (f) of Regulatory Information Notice

6.3 (f) the inputs and assumptions used in the models (including in relation to economic growth, customer numbers and policy changes and provide any associated models or data relevant to justifying these inputs and assumptions);

The AEMO Transmission Connection Point Forecast for South Australia uses assumptions detailed in the "AEMO Transmission Connection Point Forecasting Methodology Report" at: http://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/TCPF/2016/AEMO-Transmission-Connection-Point-Forecasting-Methodology.pdf

Agreed maximum demands used are confidential.

"Adjustments - Embedded Generation" are from an internal ElectraNet model, using a generic solar PV trace, for non-coincident SA Power Networks Connection Points. For direct connect customers, zeroes have been supplied for embedded generation, as is historic practice.

For SAPN Connection Points, coincident, an estimation of large embedded generators has been added to the forecast, using knowledge of historical generation at the time of statewide maximum demand. This was 8.6% of any embedded wind farms, an embedded generator at Snuggery Industrial and Angaston at Dorrien.

2.2.8 Response to Section 6.3 (g) of Regulatory Information Notice

6.3 (g) the weather correction methodology, how weather data has been used, and how ElectraNet's approach to weather correction has changed over time;

See response to 6.2 (b)

2.2.9 Response to Section 6.3 (h) of Regulatory Information Notice

6.3 (h) an outline of the treatment of block loads, transfers and switching within the forecasting process;

For SA Power Networks connection points, the AEMO Transmission Connection Point Forecast analyses block loads and load transfers as detailed in the "AEMO Transmission Connection Point Forecasting Methodology Report".

Direct connect customers are assumed to not be affected by load transfers and switching.

2.2.10 Response to Section 6.3 (i) of Regulatory Information Notice

6.3 (i) any appliance models where used, or assumption relating to average customer energy usage (by customer type).

For SA Power Networks connection points, the AEMO Transmission Connection Point Forecast takes into account energy efficiency in appliances and buildings as detailed in the "AEMO Transmission Connection Point Forecasting Methodology Report".

No appliance models are used for direct connect customers.

2.2.11 Response to Section 6.3 (j) of Regulatory Information Notice

6.3 (j) how the forecasting methodology used is consistent with, and takes into account, historical observations (where appropriate), including any calibration processes undertaken within the model (specifically whether the load forecast is matched against actual historical load on the system and substations);

For SA Power Networks connection points, the AEMO Transmission Connection Point Forecast uses historical demand traces as detailed in the "AEMO Transmission Connection Point Forecasting Methodology Report".

2.2.12 Response to Section 6.3 (k) of Regulatory Information Notice

6.3 (k) how the resulting forecast data is consistent across forecasts provided for each connection point identified in Workbook 1 - regulatory determination, regulatory template 5.4 and system wide forecasts;

Each maximum demand type for each connection point in regulatory template 5.4 is summated into the system wide maximum demand forecasts in template 3.4.

For example each connection point's forecast coincident 10% PoE maximum demand in template 5.4 is summated into TOPSD0102 "Transmission System coincident weather adjusted maximum demand 10% POE" in template 3.4.

2.2.13 Response to Section 6.3 (l) of Regulatory Information Notice

6.3 (l) how the forecasts resulting from these methods and assumptions have been used in determining the following:

(i) capex forecasts; and

(ii) operating and maintenance expenditure forecasts.

ElectraNet generally uses SA Power Networks forecasts. The AEMO Transmission Connection Point Forecasts are used as an independent verification of the SA Power Networks forecasts. The use of AEMO and SA Power Networks forecasts do not result in a material difference in timing or expenditure over the next reset period.

2.2.14 Response to Section 6.3 (m) of Regulatory Information Notice

6.3 (m) whether ElectraNet used the forecasting model(s) it used in the joint planning process for the purposes of its revenue proposal;

ElectraNet generally uses SA Power Networks forecasting models in planning. The AEMO Transmission Connection Point Forecasts are used as an independent verification of the SA Power Networks forecasts.

2.2.15 Response to Section 6.3 (n) of Regulatory Information Notice

6.3 (n) whether ElectraNet forecasts both coincident and non-coincident maximum demand at the connection point, or other nominated network elements, and how these forecasts reconcile with the system level forecasts (including how various assumptions that are allowed for at the system level relate to the network level forecasts);

Connection point maximum demand forecasts reported in regulatory template 5.4 summate to the system level maximum demand forecasts in template 3.4, see response to 6.3 (k).

2.2.16 Response to Section 6.3 (o) of Regulatory Information Notice

6.3 (o) whether ElectraNet records historic maximum demand in MW, MVA or both;

ElectraNet records historic maximum demand in both MW and MVA. For SA Power Networks connection points, ElectraNet receives historic maximum demand from SA Power Networks. For direct connect customer connection points, National Grid Metering (NGM) data on which the NEM financial settlement is based has been used.

2.2.17 Response to Section 6.3 (p) of Regulatory Information Notice

6.3 (p) q the probability of exceedance that ElectraNet uses in network planning;

ElectraNet generally uses 10% PoE maximum demand in network planning.

2.2.18 Response to Section 6.3 (q) of Regulatory Information Notice

6.3 (q) the contingency planning process, in particular the process used to assess high system demand;

For SA Power Networks connection points, the reliability requirement for each connection point is stipulated independently by the Essential Services Commission of South Australia (ESCOSA), with some connection points requiring redundancy, some requiring only some redundancy, and some requiring no redundancy at all. This redundancy requirement can be found in the SA Electricity Transmission Code (ETC).

Direct connect customer connection point reliability is confidential.

2.2.19 Response to Section 6.3 (r) of Regulatory Information Notice

6.3 (r) how risk is managed across the network, particularly in relation to non-network solutions to peak demand events;

ElectraNet is required to consult with non-network providers as part of the Regulatory Investment Test for Transmission (RIT-T) process. Previous non-network arrangements are reviewed on a regular basis.

2.2.20 Response to Section 6.3 (s) of Regulatory Information Notice

6.3 (s) whether and how the maximum demand forecasts underlying the revenue proposal reconcile with any demand information or related planning statements published by AEMO, as well as forecasts produced by any distribution network service providers connected to ElectraNet's network; and

SA Power Networks forecasts use AEMO source data for underlying state demand, PV and battery storage. These forecasts are used for the revenue proposal, with the AEMO Transmission Connection Point Forecasts used for independent verification.

2.2.21 Response to Section 6.3 (t) of Regulatory Information Notice

6.3 (t) how the normal and emergency ratings are used in determining capacity for individual transmission connection points.

If the connection point is a substation, the connection point rating is the Normal cyclic rating of the substation transformer/s. Where there is more than one transformer such as for a N-1 configuration the summation of the transformer normal cyclic ratings is given. For the case of a line where there is more than one line directly in parallel such as for a N-1 configuration, the summation of the line seasonal thermal ratings is given.

This represents the N capacity of a given connection point (i.e. with all transformers and lines in service). The reliability requirement for each connection point is stipulated independently by the Essential Services Commission of South Australia (ESCOSA), with some connection points requiring redundancy, some requiring only some redundancy, and some requiring no redundancy at all. This redundancy requirement can be found in the SA Electricity Transmission Code (ETC). ElectraNet does not consider that using the summation of the ratings gives a true and representative proxy of the connection point rating in a N-1 configuration.

ElectraNet's transformers do not have seasonal cyclic ratings hence the non-coincident and coincident ratings will be the same. If the connection point is a line then it will be the seasonal thermal rating (constrained by terminal equipment if applicable) occurring at that time.

In the case where another party owns the assets to which the ratings apply the rating is assumed to be either the highest nameplate of the customer transformer (preferred) or the rating of the next upstream (ElectraNet owned) constraining piece of plant.

Some connection points are configured as grouped connection points. Such connection points in any given group are located in geographically separate locations, but service a common (meshed) load area.