nzier
authoritative analysis

EMC[a]
energy market consulting associates

ElectraNet Revenue Determination 2014-18

Review of Demand Forecast Proposed by ElectraNet

Report to

Australian Energy Regulator

Energy Market Consulting associates
NZIER

30th October 2012

This report has been prepared to assist the Australian Energy Regulator (AER) with its determination of the appropriate revenues to be applied to the prescribed transmission services of ElectraNet from 1 July 2013 to 30 June 2018. The AER's determination is conducted in accordance with its responsibilities under the National Electricity Rules (NER).

This report relies on information provided to EMCa by ElectraNet. EMCa disclaims liability for any errors or omissions, for the validity of information provided to EMCa by other parties, for the use of any information in this report by any party other than the AER and for the use of this report for any purpose other than the intended purpose.

In particular, this report is not intended to be used to support business cases or business investment decisions nor is this report intended to be read as an interpretation of the application of the NER or other legal instruments. EMCa's opinions in this report include considerations of materiality to the requirements of the AER and opinions stated or inferred in this report should be read in relation to this over-arching purpose.

Energy Market Consulting associates

PO Box 542,
St Leonards, NSW 2065
Australia
Phone: 0412 559 138 /
Phone (intl): 61 412 559 138
Email: psell@emca.com.au
Web: www.emca.com.au

NZIER

8 Halswell St, Thorndon
P O Box 3479, Wellington
Phone: +64 4 472 1880
Fax: +64 4 472 1211
Email: econ@nzier.org.nz
Web: www.nzier.org.nz

About EMCa

Energy Market Consulting associates (EMCa) is a niche firm, established in 2002 and specialising in the policy, strategy, implementation and operation of energy markets and related access and regulatory arrangements. Its Director, Paul Sell, is an energy economist and previous Partner in Ernst & Young and Vice President of Cap Gemini Ernst & Young (now Capgemini). Paul has advised on the establishment and operation of energy markets and on matters such as electricity network open access, pricing and regulation and forecasts for over 30 years.

About NZIER

NZIER is a specialist consulting firm that uses applied economic research and analysis to provide a wide range of strategic advice to clients in the public and private sectors, throughout New Zealand and Australia, and further afield.

NZIER is also known for its long-established Quarterly Survey of Business Opinion and Quarterly Predictions.

Our aim is to be the premier centre of applied economic research in New Zealand. We pride ourselves on our reputation for independence and delivering quality analysis in the right form, and at the right time, for our clients. We ensure quality through teamwork on individual projects, critical review at internal seminars, and by peer review at various stages through a project by a senior staff member otherwise not involved in the project.

NZIER was established in 1958.

Authorship

Prepared by:	David de Boer and Paul Sell
Quality approved by:	Paul Sell
Date:	30/10/2012 11:28 a.m.
Version:	Final 5.0
Acknowledgements:	ElectraNet, AEMO, ETSA and ESCOSA met with us and provided valuable information that has informed this report

Table of Contents

Figures

Tables

[This page intentionally blank]

1 Introduction and background

1.1 Introduction

1. Under the National Electricity Rules, the Australian Energy Regulator (AER) is required to assess whether the Regulatory Proposal (RP) from ElectraNet reasonably reflects a realistic expectation of demand for the 2013/14 – 2017/18 regulatory period[1]. The AER asked EMCa/NZIER to conduct a high-level assessment and to provide advice regarding ElectraNet's demand forecast, as presented in its Revenue Proposal (RP)[2].

1.2 Background context for this report

2. In May 2012 ElectraNet lodged a regulatory proposal for the next regulatory period, and which is subject to review by the AER. This proposal describes a state wide demand forecast at 10% PoE of 3,960 MW by 2017/18 that is attributed to the AEMO 2011 SASDO[3]. ElectraNet states that it uses this diversified forecast for main grid transmission planning only.

3. Appendix J of the RP details the load forecasts for individual connection points from ETSA[4] and from ElectraNet's direct connected customers. ElectraNet has stated that it uses these forecasts, which were updated in 2012, for its regional and connection point

[1] In the remainder of this report we will refer to this as the "next regulatory period"

[2] *ElectraNet Transmission Network Revenue Proposal (1 July 2013 – 30 June 2018),31 May 2012, ElectraNet*

[3] *South Australian Supply and Demand Outlook 2011*, AEMO.

[4] ETSA is the distribution network owner and operator in South Australia.

network planning to meet its supply reliability obligations under the Electricity Transmission Code (ETC)[5].

4. During the early stages of our assessment of ElectraNet's approach to forecasting we were made aware that ElectraNet does not use the AEMO demand forecast in its RP but uses only the load forecasts at connection point and regional level as provided to it by ETSA and direct customers.[6] We were also aware that AEMO was about to publish a revised forecast (and which was published on 29th June 2012). AER consequently agreed an amendment to our scope, to focus our assessment on the reasonableness of the ETSA 2012 connection point load forecasts (which comprise the majority of the forecast load as used by ElectraNet in its RP) rather than AEMO 2011 state-wide demand forecast[7].

5. The AER's terms of reference called for a "high-level review". Our agreed scope of work for this review involves consideration of the way in which ElectraNet uses the forecasts it is provided with, and major aspects of methodology and assumptions that form the basis for these forecasts. We consider our review to be sufficient to inform a principles-based opinion as to the reasonableness of the forecast. Our review has not assessed all elements of the forecast and a more detailed review would examine other factors and would seek to quantify the impact of these more detailed aspects of the forecast. Accordingly, apart from some basic reconciliation to confirm our understanding of the forecasts, we have not conducted econometric or other quantitative analysis.

1.3 Our approach to this assessment

6. Our assessment of ElectraNet's demand forecast is principle based[8] and we use the same frameworks and follow a similar process to our 2011 review of Powerlink's demand forecast, though modified to meet the AER's terms of reference and the shift of focus to connection point forecasts:

   a. We review ElectraNet's approach to the demand forecast, examining its methodology, the extent to which it takes in bottom up and top down demand information and how it assembled the RP demand forecast;

   b. We review the structural nature of the demand forecasting method that ElectraNet and ETSA use to prepare and utilise the forecasts, including their approach to regional and state diversity of maximum demand;

[5] For the purposes of its RP, ElectraNet has used version TC/07 of the ETC. This is a draft of the revised version of the Code, which came into effect on 1st July 2013.

[6] EMCa were advised of this situation during a teleconference meeting with ElectraNet in June 2012.

[7] While this report has been completed after publication of AEMO's 2012 demand forecast, and we make reference to this forecast in some instances, our assessment did not include a review of the AEMO 2012 forecast or its possible relevance to the ElectraNet regulatory process.

[8] Our approach focusses on the forecasting process and methodology, and whether based on this, the forecast is likely to be fit-for-purpose. As a high-level review, we have not undertaken statistical testing or detailed evaluation of input assumptions nor have we prepared an independent check model.

c. Since the major component of ElectraNet's forecast is ETSA's forecast, we undertook a limited review of the methodology used by ETSA to produce this forecast.

7. Our review is necessarily limited by available information. No significant ETSA documentation of its forecast was available. ElectraNet provided its own report which described the ETSA 2011 demand forecast and methodology in some detail, but a similar description of the ETSA 2012 demand forecast used by ElectraNet in its RP, has not been prepared. The reconciliation provided by ElectraNet, while useful as a guide, compared the ETSA and AEMO 2011 forecasts and so cannot be used as a definitive basis for assessing the ETSA 2012 forecasts used in the RP. The AEMO 2012 forecasts have been published on the 29th June, subsequent to the RP and to the assessment which forms the basis for the current report.

1.4 Our qualifications

8. Our review of ElectraNet's regulatory demand forecast and this report have been prepared by Paul Sell of EMCa and David Boles de Boer of NZIER. We make the assessments in this report based on our training as economists and our experience as regulatory economists, including forecasting experience in the electricity and utilities sector.

1.5 Structure of this report

9. In section 2, we present our headline findings from our assessment of ElectraNet's demand forecast.

10. In section 3 we describe the approach used to develop the demand forecasts that ElectraNet has relied on.

11. In section 4 we provide our assessment of this forecast, including our high-level review and assessment of the forecast methodology, use of historical data, the resulting demand projections and the way in which they are used by ElectraNet in driving the capex budget in its RP.

12. Following on from the high-level findings in sections 1 to 4, and subsequent to the release of AEMO's much lower 2012 forecast, we were asked to undertake further analysis in order to provide an opinion to AER on this new information. We undertook some broad-brush comparability adjustments so that the AEMO demand forecast could be compared with ElectraNet's forecast, and developed a trend projection as a means of revealing the key reasons for the differences between them.

13. The content of this report is understood to be suitable for public release, based on advice from the AER.

[This page intentionally blank]

2 Key findings and our overall assessment

2.1 Headline findings

14. We consider that the demand forecast ElectraNet uses in its regulatory proposal is not reasonable and that it does not represent a realistic projection of the most likely demand and the distribution of sensitivities around this.

15. The reasons that we have formed this view are:

    a. Based on ElectraNet's interpretation of the ETC, ElectraNet takes a relatively hands-off approach to forecasting and has used the ETSA 2012 connection point forecasts as is.[9] We consider that a prudent approach would be for ElectraNet to form its own view on the validity of forecasts provided to it, including by reconciling these bottom-up forecasts with a top-down forecast[10].

    b. The ETSA demand forecasts reset the base case peak demand and the "growth rate" off what was presented as being a 2008/09 all-time peak, resulting from a rare heatwave[11]. Subsequently we have been presented with further information which shows that ElectraNet had made adjustments to the original demand readings which significantly increased the apparent peak demand for this year, and that it is not in fact the all-time peak demand. The demand forecast is nevertheless presented as covering for the possibility of such heatwave conditions recurring in

[9] ElectraNet's approach to demand forecasting and its use of ETSA and direct connect customer forecast data is described in the APR's and in the RP.

[10] As previously noted, ElectraNet has sought to reconcile the AEMO and ETSA 2011 forecasts and we understand that it is in the process of reconciling the AEMO 2012 top-down forecast with the ETSA 2012 connection point forecast.

[11] The probability of such a heatwave is considered further in this report, see section 5.

the next RCP, though without formal consideration of temperature-related "probability of exceedance", and appears to be a considerably more stringent planning standard than is used in other TNSPs.

c. The resultant forecast is materially higher than AEMO's 2011 econometric top-down forecast, and the reasons for the difference are "reconciled" only by reference to the claimed wide error range on the AEMO forecast[12].

d. The forecast growth rate of demand is materially higher than the historical trend despite evidence of significant and growing penetration of photovoltaic (rooftop solar) generation.

e. The forecast is used by ElectraNet for regional augmentation planning, without consideration of diversity. The forecast effectively discounts (by adding back) the positive contribution to peak demand reduction of consumer demand response and embedded generation.

16. In our high-level review, we briefly considered the suitability of the AEMO 2011 demand forecast since ElectraNet presents this in its RP and in its reconciliation report. We consider that this forecast also suffers from weaknesses that we would regard as material to its use in the RP. The AEMO forecasts have been criticised by ElectraNet and by others for an unsatisfactory methodology that exhibits poor regression statistics and unreasonable coefficients and these are evident in its 2011 forecast.[13] We also consider it preferable that a top-down check model forecasts peak demand directly, rather than forecasting energy and then converting it to a peak demand forecast. In this regard we note the significant differences in drivers between peak demand and energy use.

17. Subsequent to our high-level review, AER requested that we undertake further analysis. Our findings from this analysis are presented in section 5.2. These findings provide further information and quantification, which updates, but does not materially alter, the findings above.

2.2 Our opinion

18. We consider that the peak demand forecasts in the RP and the methodologies behind these forecasts are not reasonable. We consider a more appropriate demand forecast is likely to be lower.

[12] We note that AEMO's 2012 demand forecast, which we have not reviewed, is approximately 500 MW lower than its 2011 forecast, by the end of the RCP, therefore considerably increasing this gap.

[13] See – Load forecast reconciliation ElectraNet March 2012

3 ElectraNet's demand forecast

3.1 Introduction

19. The NER[14] requires ElectraNet to develop a forecast of peak demand for the next ten years and the ETC requires ElectraNet to have agreed a forecast of maximum demand with its customers. The revenue proposal provides two forecasts - a top down forecast developed by AEMO in 2011 and a bottom up connection point forecast developed by ETSA in 2012, to which ElectraNet adds forecasts for its own directly-connected customer loads. ElectraNet's connection point forecast represents an average growth rate of 3.0% p.a. over the five years of the next RCP.

20. ElectraNet has provided a reconciliation between the 2011 AEMO demand forecast and 2011 connection point demand forecasts[15]. The 2011 AEMO forecast does not feed into the RP because ElectraNet has not included any state wide network augmentation capex in its RP.

21. ElectraNet uses 2012 connection point forecasts (from ETSA and from ElectraNet's direct customers) as the basis for its connection point and regional augmentation capex in the RP. This forecast is not reconciled to a top-down forecast, though some general reconciliation factors can be inferred from the reconciliation of the 2011 forecasts.

22. Although neither of the 2011 forecasts is used by ElectraNet in its RP, the reconciliation report on these forecasts provides us with the only substantial description of the methodologies used by AEMO and ETSA. We therefore rely largely on this

[14] NER 6A.6.7(a)

[15] ENET068, Load Forecast reconciliation (ElectraNet, March 2012)

reconciliation report for our description of the ETSA and AEMO forecast methodologies below.[16]

3.2 ElectraNet's use of demand forecasts, and demand forecast process

23. The ETC provides for an "agreed forecast maximum demand" between ETSA and ElectraNet, and applies a less onerous reliability requirement on ElectraNet where demand exceeds the forecast agreed three years previously, than when actual demand is within that previously forecast. In this regard, the latest (2012) connection point forecasts appear to have relevance for ElectraNet's reliability obligations to 2015.

24. ETSA annually prepares 10-year demand forecasts for each connection point (CP) in the distribution network and provides these to ElectraNet. We understand that the ETSA 2012 forecasts were provided to ElectraNet in draft form in early April, and in final form in mid April.[17] ElectraNet separately obtains CP forecasts from its direct-connect customers.

25. ElectraNet uses these CP demand forecasts to prepare its CP augmentation plan, so as to meet the reliability standards specific to each CP, as set out in the ETC. It also aggregates them by region and uses these to model regional load flows, for use in preparing regional augmentation capex forecasts. ElectraNet assumes a diversity of 1.0 for the connection points, for each electrical region, on the basis that the driver for peak events (such as heatwaves) affects all connection points simultaneously. This assumption also implicitly assumes no diversity within that region for other reasons, i.e. between CPs that feed residential loads as opposed to commercial and industrial loads.

3.3 ElectraNet's demand forecast

3.3.1 ETSA connection point forecast

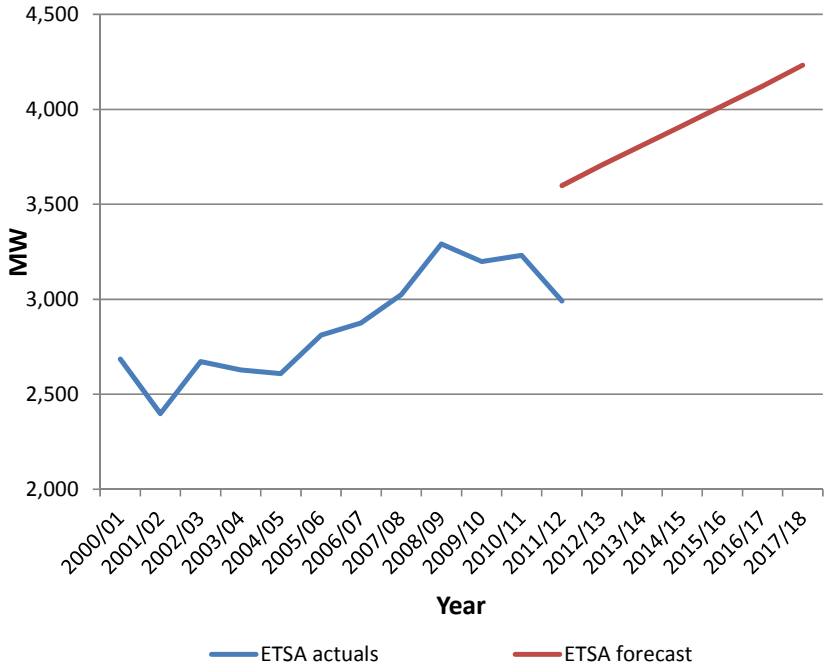
26. The chart below shows the ETSA 2012 connection point forecast from Appendix J of the RP, as presented by ElectraNet in undiversified form, compared with the historical actual peak demands for the last 10 years. This data includes the 2012 actual peak demand that was advised to us by ElectraNet after submission of its Revenue Proposal and shows a reduction of 500MW, or almost 20%[18].

[16] ElectraNet states in its 2012 APR that it largely uses the same forecasts as for 2011and that the main difference between 2011 and 2012 forecasts is a review of major direct connect customers

[17] EMCa was advised of this situation during a meeting with ETSA in June 2012

[18] ETSA's forecast demand for 2012 was 3490MW and the actual demand was 2990MW, see section 5.4.2

Figure 1 : ETSA connection points – undiversified actual maximum demand and ETSA "planning forecast"



Source: EMCa/NZIER from data supplied by ElectraNet - ENET063(C)

27. The ETSA demand forecast is determined from two historical data points:

    a. The 2008/09 "one in one hundred years heatwave" peak;

    b. Data from the 2000/01 peak demand, which ETSA has adjusted upwards by a temperature correction factor, to represent the peak demand as it would have been under a temperature condition equivalent to that in 2008/09.

28. The measured peak demands both have a further upwards adjustment, adding back the assessed levels of demand response that occurred at those times and some embedded generation. The "actual" data is therefore increased to assume that demand response and some embedded generation are not present, or at least not operating.

29. ETSA uses the 2008/09 peak demand as the base year for its projection, and uses the growth rate between 2001 and 2009 to project the peak demand growth rate forward. With minor adjustments, this methodology is applied at each connection point.

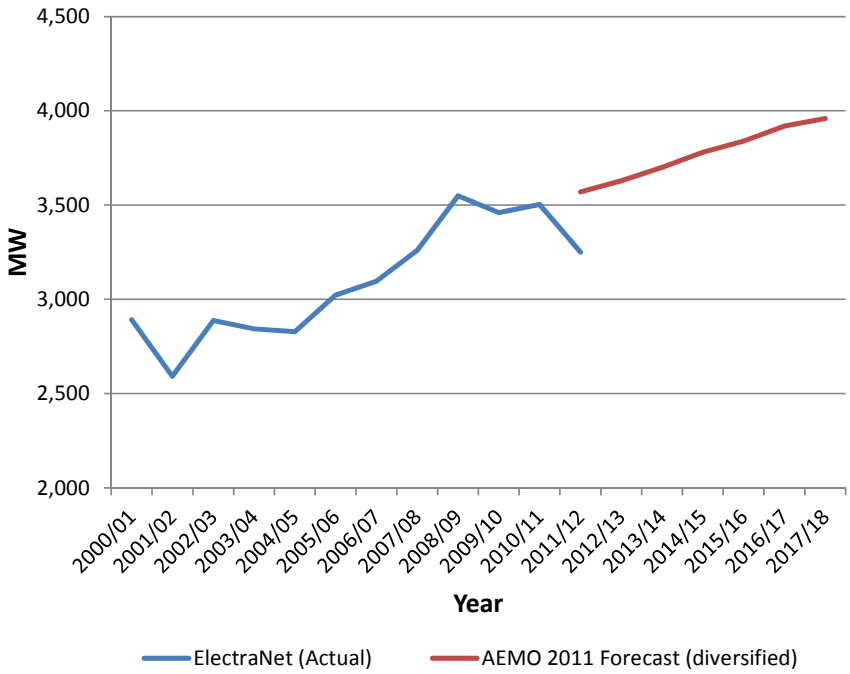
3.3.2 AEMO forecast

30. AEMO prepares its forecast using an econometric approach which forecasts energy consumption for South Australia using drivers - GSP and income, electricity prices and the effects of time lags of these energy drivers. AEMO converts the GWh energy forecast to maximum demand requirements using a simulation model of the impact of temperatures in South Australia that was developed by Monash University. Matters such as changes to major demand loads and the use of photovoltaics are handled outside of the econometric modelling.

31. Making use of its simulation approach and associated temperature-demand relationships, AEMO has prepared forecasts for a range of probabilities of exceedance: 50%, 10%, 5% and 2%. AEMO presents its PoE10% forecast as the appropriate

forecast for planning purposes, in line with industry practice, and it is this forecast that is presented in figure 3 below.

Figure 2 : State-wide maximum demand – actual undiversified maximum demand and diversified planning forecast (at PoE10%)



Source: EMCa/NZIER from data provided by ElectraNet - ENET063(C)

3.3.3 Forecast comparison

32. The following table shows the AEMO top down and the ETSA connection point forecasts for the period 2013 to 2018. As a state-wide forecast, the AEMO forecast is a diversified forecast that cannot be directly compared with the undiversified connection point forecast (in terms of the values of the peak demands). However it is valid to compare the growth rates: ElectraNet's forecast corresponds to a growth rate of 3.0% p.a., compared with the AEMO forecast of 1.8% p.a.

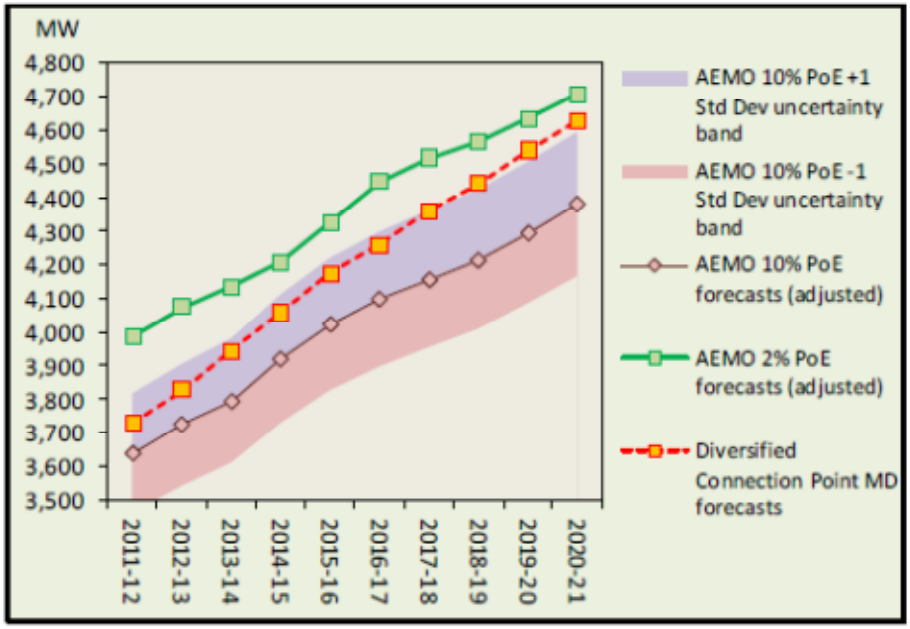
Table 1: Comparison of peak demand forecasts for South Australia from RP

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
RP AEMO state-wide (2011, PoE 10%, diversified)	3,630	3,700	3,780	3,840	3,920	3,960
RP Appendix J (2012 Connection Points, heatwave conditions, undiversified)	3,932	4,077	4,200	4,321	4,443	4,553

Source: EMCa/NZIER (from ElectraNet RP) - ENET063(C)

33. The following graph shows ElectraNet's reconciliation between the 2011 AEMO state-wide forecast and ElectraNet's 2011 connection point forecast. ElectraNet has sought to place these forecasts on a comparable footing by (for example) applying diversity factors to the connection point forecasts, allowing for transmission losses and making various other comparability adjustments.

Figure 3 : ElectraNet comparison between AEMO 2011 state-wide forecast (adjusted by ElectraNet) and ElectraNet 2011 diversified connection point forecast[19]



Source: Load Forecast Reconciliation, Figure ES1, ENET068(P)

[19] *Load Forecast Reconciliation*, ElectraNet (March 2012)

[This page intentionally blank]

4 High-level assessment of ElectraNet's forecast

4.1 Introduction

34. ElectraNet uses ETSA connection point forecasts together with forecasts from its major direct-connected customers, "as is" – that is unadjusted and without diversity. Our assessment is focused on the Appendix J connection point forecasts since ElectraNet has informed us that this is the basis for its load-driven components of its capex program (namely, connection point capex and (regional) augmentation capex.

4.2 Assessment

4.2.1 Methodology for assessment

35. In this assessment, we have considered three aspects of the demand forecast:
    a. The way in which ElectraNet uses the connection point forecasts provided to it (section 4.2.2);
    b. The ETSA connection point forecast itself (since this comprises the majority of demand) (section 4.2.3);
    c. Consideration of the 2011 AEMO top-down demand forecast, and the comparison provided by ElectraNet between this and ElectraNet's 2011 connection point forecast.
36. In section 4.3, we provide our overall findings from this assessment.

4.2.2 ElectraNet use of ETSA connection point forecasts

37. EMCa/NZIER does not agree with ElectraNet's contention that it is obliged to accept ETSA's demand forecasts "as is" for the RCP period:
    a. The wording of the ETC refers to "agreed" forecasts. However we have not been presented with evidence of an agreement process between the two organisations.

We have been advised that ETSA provided its 2012 connection point forecasts to ElectraNet shortly before publication. We have not been presented with any evidence of ElectraNet's analysis of these forecasts and we have been advised that ElectraNet did not seek any modifications to those forecasts.[20]

b. The "agreed forecast maximum demands" referred to in the ETC are for 3 years only, such that the latest would be to 2014/15. The RCP forecast is however through to 2017/18 which leaves 3 years without "agreement" in terms of the Code obligations.

c. The ETC obliges ElectraNet, if and when actual demand exceeds the agreed forecast at a connection point, to restore the reliability standard at that connection point within a year of it being breached[21]. We consider it reasonable to infer that ElectraNet is entitled to form its own view as to how it can most efficiently and effectively meet this obligation, which would include prudently deferring expenditure and monitoring actual demand up until the time when an augmentation decision must be made. We do not read a direct obligation on ElectraNet to augment purely to provide capacity for ETSA's forecast demand.

38. EMCa/NZIER considers that ElectraNet should apply some diversity factor to connection point forecasts, in determining regional electrical forecasts. While it seems logical that temperature-driven peaks will have a high correlation within a given region (as ElectraNet claims), diversity data provided by ElectraNet for the time of system-wide peak shows that this has not been unity at this time and we consider it unlikely that it would be unity at the time of each region's peak[22]. Discussions with ETSA also confirmed our view that regional diversity should be allowed for.

39. ElectraNet's approach of using forecasts provided by its direct customers appears sound, however EMCa/NZIER has not reviewed the specific direct customer forecasts and would need to establish that the direct connect customer forecasts are not in effect 'trigger events" for any contingent projects, in order to ensure that there is not double-counting with capex included in the RP.

4.2.3 Assessment of the suitability of the ETSA connection point forecast

40. The ETSA Connection Point forecasts presented in the RP are not considered a reasonable basis for determining a capex forecast:

a. EMCa/NZIER considers that ETSA's methodology of extrapolating from a single peak demand, with a growth rate determined from an adjusted notional equivalent peak demand from a single previous year, is not sound[23]. It is not statistically valid

[20] Formally, ElectraNet agrees to a set of MDs in schedule 3 of its Connection Agreement with ETSA.

[21] ETC clauses 2.11.1 and 2.11.2

[22] The data and our analysis of it are discussed in section 5.4.6

[23] ETSA advised us its view that the peak of demand is in fact "flattening" off as demand patterns change and PV usage rise. ETSA also advise that it appears that only 50% of the peak load is temperature sensitive and that embedded generation capacity is growing also.

to drive a five-year forecast off the peak demands that occurred in just two half-hours, eight years apart.

b. The forecast growth rate for the ETSA connection points appears high, at 2.7% p.a., compared with underlying historical growth of 1.9% p.a. in the ten years to 2010/11 and 1.0% p.a. average growth in the eleven years to 2011/12.

c. Temperature PoE is not explicitly considered, but our assessment is that the implicit inclusion of temperature, by basing the forecast on the 2008/09 "once-in-100 years" extreme heatwave condition, appears to be well in excess of that required to meet a PoE10% standard.

d. EMCa/NZIER considers that a sound bottom-up connection point forecast should also be reconciled to a top-down econometric forecast that ElectraNet either undertakes or endorses. ElectraNet has not prepared a top-down check forecast. ElectraNet has compared its connection-point forecast to a top-down forecast prepared by AEMO, but ElectraNet states that it does not accept this top-down forecast as being valid.[24]

e. EMCa/NZIER considers that there is reasonable evidence that PV, distributed generation and demand response have not been appropriately accounted for and would lead to a materially lower forecast.

41. Without further analysis of each of these factors, we cannot assess the extent of over-forecasting, however we consider that there is an a priori case that it is material.

4.2.4 Consideration of AEMO forecast

42. The AEMO forecast is derived from a multivariate econometric model which we consider to be an appropriate approach for producing top down demand forecasts. However the objective function of the econometric model produces an energy forecast by time period for generation modelling, and which is then converted to peak demand using temperature effects accounted for via monte-carlo simulations of "10,000 summers".

43. For a number of reasons, we do not consider this the preferred means for forecasting peak demand at the transmission level. For example, energy consumption is far less influenced by temperature than peak demand and therefore the base energy forecasting model would tend not to capture the effect of historical temperatures on peak demand. Further, there is evidence in the AEMO and ElectraNet reports of some significant and relatively recent changes in the relationship between peak demand at the connection point level and grid generation (as measured for the purposes of AEMO's modelling), for example through rooftop solar (PV), demand response and embedded generation, and this further complicates the use of a generated-energy model for transmission peak demand forecasting purposes.

44. On the other hand, AEMO's simulation approach provides, if calibrated appropriately, the ability to determine "probability of exceedance" forecasts at a relatively granular

[24] ElectraNet has provided a detailed critique of the AEMO forecast in its March 2012 reconciliation report and states in its APR that it considers that it is required to use ETSA's connection point forecasts as its base peak demand load forecasts for capex planning purposes.

level. AEMO shows these at 50%, 10%, 5% and 2% PoE levels and, while we have not reviewed AEMO's model, we expect that its approach could capture temperature / demand relationships in an appropriate manner.

45. In the course of our review, AEMO has published an updated forecast, which (by 2017/18) is over 500 MW (13%) lower than its 2011 forecast. We have been advised by AEMO that it has taken account of, and corrected for, deficiencies identified in its 2012 forecast.[25] Our observations on AEMO's 2012 forecast are included in Section 5: Additional Analysis[26].

4.3 Findings

4.3.1 Summary of findings

46. The ETSA Connection Point forecasts presented in the RP (and which are the revised focus for this review) are not considered a reasonable basis for determining a capex forecast. Our primary reason for this is that ETSA's approach of forecasting from a single peak demand, with a growth rate determined from an adjusted notional equivalent peak demand from a single previous year, is not sound and does not appropriately consider temperature PoE's.

47. We consider that ElectraNet is not obliged (under the ETC or the NER) to accept the ETSA demand forecasts "as-is". As a prudent basis for its capex planning, we consider that ElectraNet should have undertaken independent analysis of connection point forecasts and that there should be a formal process of agreement between ElectraNet and ETSA as to their reasonableness and suitability as a basis for transmission planning.

48. The AEMO 2011 demand forecast presented in the Revenue Proposal is also not considered a reasonable basis for determining ElectraNet's capex because it is out of date and a much lower forecast has now been prepared. We are also concerned about the criticisms that ElectraNet has levelled at it; the 2011 model does appear to have a poor statistical fit and coefficients that are not within a reasonable range. It is below ETSA's connection point forecasts, and is presented as "reconciling" only because of wide error bands.

4.3.2 Opinion

49. We consider that the peak demand forecasts in the RP and the methodologies behind these forecasts are not reasonable. We consider a more appropriate demand forecast is likely to be lower.

[25] EMCa was advised by AEMO of its work in progress to improve the forecasts during discussions in July 2012

[26] Section 5.3

4.3.3 Next steps

50. Since our assessment, AEMO's 2012 demand forecast has been published, and shows a considerably reduced forecast. Further investigation would be required to determine a suitable alternative forecast to that presented by ElectraNet.

[This page intentionally blank]

5 Additional analysis

5.1 Scope of further analysis

51. Subsequent to the high-level assessment, AER requested that EMCa/NZIER undertake analysis of specific aspects of the ElectraNet demand forecast to assist with its draft determination, as follows. We were asked to provide the AER with the following:

    a. An analysis of the basic demand forecast trending focusing on the underlying growth trend evident in ETSA Utilities' 2012 Connection Point demand forecasts;

    b. A broad-brush adjustment of ETSA Utilities' 2012 Connection Point demand forecasts to a PoE10% estimate using AEMO's adjustments as a proxy, comparing the proportionate adjustments that EMCa has derived for this purpose for the Powerlink determination, and with any broad-brush evidence from ETSA Utilities' connection point data itself;

    c. Adjustments to ETSA Utilities 2012 Connection Point demand forecasts to take into consideration regional diversity based on evidence available elsewhere to "calibrate" against, to obtain a broad-brush estimate of a reasonable basis for assessment of ElectraNet's capex;

    d. Review the AEMO 2012 state wide demand forecasts and provide indicative comparisons on such things as growth rates, starting point adjustments, diversity, temperature correction, allowance for PV and other factors to the extent that this is feasible from readily available information in AEMO's report;

    e. Provide comments on the proposed reconciliation to be completed by ElectraNet of ETSA Utilities' 2012 connection point demand forecast with AEMO's 2012 state wide demand forecast (provided this is available within the timeframe of this work);

    f. Conduct a high-level review of the basis for demand forecast for major direct loads, reconciling between the 2012 APR published by ElectraNet and the High / Medium / Low demand forecasts that ElectraNet asked ROAM to use in its scenario studies.

52. As at the date of this report, neither AEMO nor ElectraNet has provided a reconciliation between the AEMO 2012 state-wide diversified generation forecast and the 2012

ElectraNet undiversified connection point demand forecast. In the absence of a reconciliation report being provided, we have undertaken some broad-brush adjustments to AEMO's demand forecast, based on ElectraNet's 2011 reconciliation, in order to facilitate working comparisons between the forecasts.

5.2 Findings and implications from further analysis

5.2.1 Findings

53. We consider that a realistic expectation of peak demand for the 2014 to 2018 regulatory period in South Australia is materially below the connection point demand forecast that ElectraNet has used as the basis for its forecasts for augmentation capex and for connection capex, and which relies for the most part on ETSA's demand forecasts for its connection points. The reasons for this finding are as follows:

a. The growth rate is too high. ElectraNet proposes an annual peak demand growth rate of 2.9% p.a. for the forecast period which is significantly above the AEMO forecast diversified "generation output" growth rate of 1.0% p.a., and is above the historical average trend growth rate of 2.1% p.a. that we have assessed, measured over the past 12 years.

b. The ETSA connection points' component of the ElectraNet demand forecast inappropriately uses historical data that has been adjusted upwards by adding back significant amounts of demand response and embedded generation that were operating at the times of network peaks. This significantly increases the historical data points used as the basis for its forecasts, to the extent that the ETSA data shows an all-time peak in 2009 (and forecasts demand using this year as its starting point) whereas the actual data, and AEMO's analysis, show that the all-time peak was in 2011. As a result, the starting point and the 2001 to 2009 growth rate that ETSA has used for its projection are both significantly biased upwards.

c. While the details of AEMO's 2012 demand forecast methodology and underlying assumptions are not yet available, at a conceptual level we can observe and agree with the reasoning that AEMO presents for the material reduction inherent in its 2012 forecast to recognise changes to economic conditions, increasing prices for electricity, the material impact of PV[27] in South Australia and a growing presence from embedded generation in the network. We are inclined to the AEMO view that the combination of increasing use of PV systems and reduced expectations for growth in large industrial direct connects will considerably dampen future demand growth.

d. The ETSA connection points' component of the ElectraNet demand forecast is not based on a temperature-related Probability of Exceedance (PoE), such as "once-in-ten years" (PoE10%), that would represent a prudent capex planning standard, as commonly used in other States. ElectraNet states that the ETSA forecasts are intended to represent demands that would occur under "extreme heat-wave conditions" and claims that the ETC requires such an approach. We disagree with this claim.

[27] Photovoltaic panel systems installed on roof tops.

e. ElectraNet has not applied diversity at a regional level, in assessing its need for regional augmentation, claiming that peak demands are entirely coincident at the regional level. Data provided by ElectraNet indicates that there is a level of diversity at the regional level, and we assess this to be of the order of 5%. In other words, the forecasts used for regional planning purposes should be of the order of 4% lower.

5.2.2 Impact of these findings

54. Our trend analysis, and consideration of the factors listed in the previous section, leads us to a view that a reasonable forecast would be around 624 MW (14%) lower than ElectraNet's forecast, by 2017/18.

5.3 Review of AEMO 2012 Forecast

55. Our overview of the AEMO 2011 forecasting methodology and resulting forecast is contained in sections 3 and 4. Our overview of the recently-published 2012 AEMO forecast for South Australia is as follows. The overview is based on published statements in AEMO's report; we have not independently reviewed AEMO's methodology or assumptions.

5.3.1 AEMO's Methodology

56. The AEMO 2012 NEFR presents a modified and updated approach to forecasting demand in all the NEM states. AEMO advises that it has modified its methodology for forecasting energy consumption to improve quality, attend to a number of weaknesses that were identified over recent years and as far as possible to bring consistency across state forecasts in the NEM. Peak demand forecasting for SA is undertaken by Monash University (as was described in relation to its 2011 forecast) using econometric models developed by AEMO but modified and improved by Monash.

57. We do not have detail of the very recent improvements we understand Monash has made but we recall our earlier comments regarding the material third party criticisms that are made about AEMO forecasting. We also note that AEMO uses different econometric methods for each state in the 2012 NEFR forecast, with timing difficulties cited as the reason for this. Overall we see its methodology as work in progress while AEMO attends to its own improvements and responds to feedback from third parties.

5.3.2 Historical data and basis of forecast

58. AEMO records and forecasts state-wide generation requirements, which therefore represent diversified demands that are understood to included transmission losses and generator own use (as was the case in 2011). ElectraNet's demand forecasts are of the undiversified peak demands from each connection point.

59. AEMO has revised its 2012 forecasts downwards from the 2011 ESOO, based on the 2012 update that NIEIR has published regarding the economic and demographic outlook for Australia. We agree with the fundamental reasons for this revision which is

consistent with our own 2011 assessment of the economic outlook for Queensland that was part of our review of Powerlink's regulatory proposal. We also agree with a reduced growth rate in the forecast and note that AEMO now forecast average growth below 1% per annum (at the generation level), down from the 1.7% that was included in its 2011 forecast for South Australia[28].

5.3.3 Factors taken into account in our trend analysis

60. From the AEMO report, we have taken account of the growth rate, the PoE temperature-related planning margins and AEMO's assessment and forecast of PV. We have described how we have used this information in describing our analysis in the next section.

5.4 Description of additional analysis

5.4.1 Approach

61. In our additional analysis we have examined each of the factors as required by the scope. We have then combined the assessment of each of these factors, to produce a check forecast that helps in quantifying broadly what we consider a reasonable forecast, how much this would vary from ElectraNet's proposed forecast and from AEMO's forecast. We have followed a sequence in making progressive analysis, leading to this check forecast as follows:
    a. Determining a linear trend forecast (at PoE50%) for the ETSA connection points, using original (rather than ETSA adjusted) historical data;
    b. Making a separate adjustment for PV, based on AEMO's most recent data and forecasts;
    c. Adjusting to create a temperature-related "probability of exceedance" to facilitate capex planning with sufficient temperature-related demand margin;
    d. Adding direct connect customer forecasts, using ElectraNet's RP; and
    e. Allowing for regional diversity.

62. In order to facilitate comparisons with AEMO's 2012 demand forecast, and in the absence of a reconciliation having been done at this stage, we have adjusted the AEMO demand forecast for transmission losses, for the inclusion of generator own-use and to "un-diversify" the forecast. For this purpose, we have used simple ratios from ElectraNet's 2011 reconciliation between its and AEMO's forecasts.

5.4.2 ETSA 2012 connection point forecast

63. The ETSA connection point peak demand forecast is determined from two historical data points:

[28] In later analysis which includes allowance for adjustment factors made by ElectraNet in its 2011 reconciliation, we find that the 1% p.a. growth in generation output forecast by AEMO translates to a native demand growth forecast that is approximately 2%.

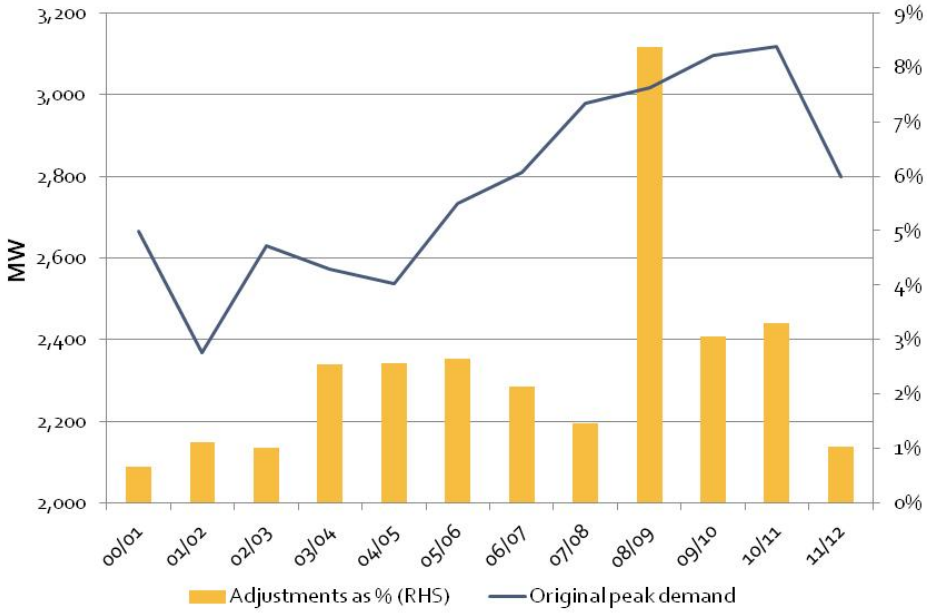
a. The 2008/09 "heatwave" peak;

b. Historical data from the 2000/01 peak demand, which ETSA has adjusted upwards by a temperature correction factor, to represent the peak demand as it would have been under a temperature condition equivalent to that in 2008/09.

64. From further data provided to us by ElectraNet, we found that the historical peak demand data initially provided had been adjusted upwards, by adding back an assessed level of demand response that occurred at peak times and some embedded generation. The "original" data had thereby been increased to assume that demand response and some embedded generation were not present, or at least not operating. By projecting off a 2009 "peak", the growth rate and starting point used ETSA forecast also does not take full account of the growing penetration of PV, which has largely occurred since 2009 and (from AEMO's analysis) has moderated peak demand by more than 100 MW.

65. The original actual peak demands from 2001 and the range of the annual adjustments are shown in chart 1 below. It can be seen that the 2009 measured peak demand was adjusted upwards by 8%.

Figure 4 : ETSA Peak Demand historical adjustments



Source: EMCa/NZIER from data supplied by ElectraNet

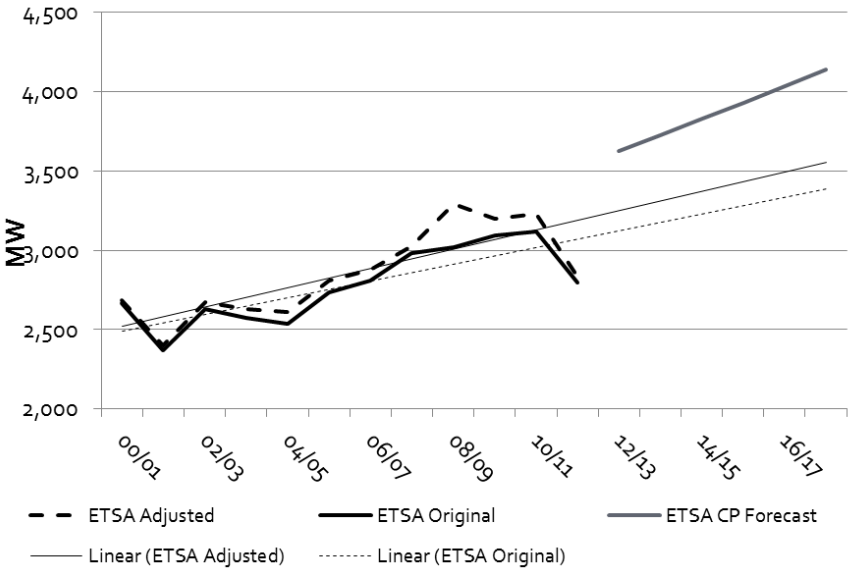
66. In our view the credibility of the ETSA "peak to peak" forecasting approach is challenged by the material adjustments that it made to recent historical actuals and especially the large upward adjustment that was made to create an apparent 2009 "all-time peak". This adjustment critically compromises both the growth rate (which was measured between the 2001 and 2009 "adjusted" peaks) and the choice of the 2009 adjusted peak as base year for the forecast.

5.4.3 Trend analysis

67. Our terms of reference required us to undertake some trend analysis, as a pragmatic means of gaining further understanding of the historical data and the proposed forecast. We consider such an approach to be fit for this purpose and an improvement on the "peak to peak" extrapolation method used for the ETSA connection points[29].

68. The chart below shows the historical original and adjusted peak demands (as the sum of the connection point demands)[30] and the ETSA 2012 connection point peak demand forecast, as per the RP. We have added a trend line to identify the growth trends in both data sets[31]. Unlike the ETSA "peak-to-peak" method, which uses only two of the data points, the trend growth rate takes account of the data for all twelve years of actual peak demands.

Figure 5 : ETSA Connection Points - Peak Demand Trend Analysis



Source: EMCa/NZIER from data supplied by ElectraNet

69. The "point to point" growth rate from 2001 to 2012 in this ETSA data is only 1% p.a. However the graph shows that this is heavily influenced by "above trend" demand in 2001 and "below trend" demand in 2012. Using a log-log function to overcome this effect, we find that the trend underlying growth rate over the past 12 years averaged 2.1%.

[29] For an alternative forecast, we would propose an econometric approach, such as we used in our advice to AER regarding Powerlink's demand forecast. We understand that AEMO has used such an approach, however as noted above it is on a different basis and the method and assumptions have not yet been made available.

[30] Data from response ENET221

[31] This analysis is of the ETSA connection points, and excludes the major loads connected directly to the transmission network.

70. We consider the trend growth rate provides a better indication of the underlying growth rate than either the 2001 to 2012 "point to point" growth rate of 1% or the "peak to peak" growth rate of 2.9% p.a. that has been used for the ElectraNet RP forecast. The chart shows the widening difference in forecasts that arises from this assumed growth rate.

71. The chart also highlights the "step up" between the 2012 actual peak demand (2990MW) and ElectraNet's forecast for 2013 (3490MW), which we come back to later in this section.

5.4.4 Rooftop Photovoltaic systems

72. AEMO forecasts that penetration of PV systems will continue its recent trend and grow materially over the RP forecast period. In its recently published South Australian Electricity Report AEMO has provided a summary assessment of penetration to date (the highest of any Australian state) as well as a forecast of the annual impact that PV will have on peak demand through the RP forecast period.[32]

73. We have used AEMO's historical PV assessment and PV forecast in the next stage of our check analysis. AEMO has estimated that as at 2012, PV has reduced peak demand by around 100MW from what it would otherwise have been and is forecasting a peak contribution of 175MW by 2017/18.

74. Since this is a recent moderating effect on demand, it is not picked up in a twelve-year historical linear trend. We have therefore allowed for PV explicitly by:

    a. Adding back the effect of PV on historical demand, to derive a proxy for underlying "native" demand in the absence of the contribution from PV generation;

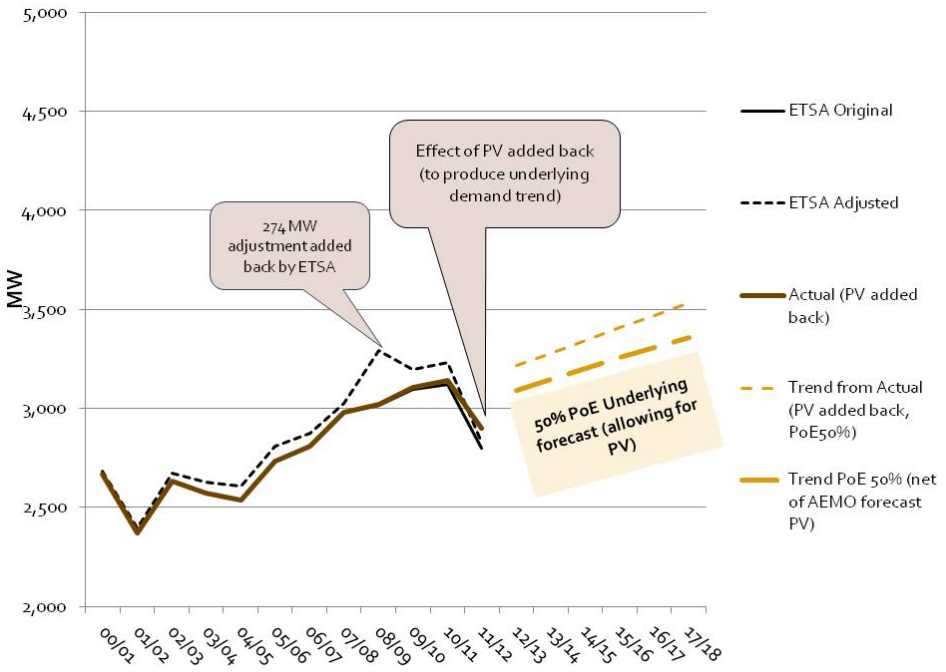
    b. Determining a trend line on this underlying native demand;

    c. Subtracting AEMO's forecast of the increasing contribution of PV from the unadjusted trend line.

75. The result of this process is shown in the Figure 6 overleaf. Adding back PV in the final years of the forecast makes a material difference to both the rate and the level of demand growth at connection points.

[32] AEMO have recently published a detailed report on the forecasted impact of PV in all NEM states.

Figure 6 : ETSA Peak Demand - PV Impact



Source: EMCa/NZIER from data supplied by ElectraNet and AEMO

5.4.5 Temperature effects

76. In its "overview of the forecasting methodology[33]" ElectraNet states that the forecasts

> *"….are not associated with a particular PoE level. The forecasts are intended to represent peak demand levels that might be expected under extreme heatwave conditions that have tended to occur in South Australia once or twice a decade".*

77. Taken literally, this would tend to imply that the forecasts do in fact represent PoE 10% (i.e. once a decade) or even PoE20% (twice a decade) temperature conditions. However because temperatures in the 2001 heatwave were not considered sufficiently "extreme" ElectraNet adjusted them upwards to the temperature equivalence of the 2009 heatwave, which it considered to be extreme. In section 4.1 of the same report, following a similar statement to that quoted above, it is stated that:

> *"the connection point forecasts are therefore compared with AEMO's PoE10% and PoE2% forecasts."*

78. This statement would suggest that ElectraNet views the heatwave peaks that it is planning to, as having probabilities somewhere between once per decade and twice per century.

79. We consider that good practice planning requires explicit recognition of planning uncertainty. Concepts such as 'one-in ten years" planning margins do this. Higher

[33] ENET068, section 3.3.2

planning margins are costly, leading to investment in ever more rarely-used capacity. We are further concerned that ElectraNet has not defined its demand-related planning margin in probability terms. As stated earlier in this report, we are not persuaded by ElectraNet's view that it is somehow exempt from such considerations, as a result of the ETC.

80. With this in mind we have therefore considered the possible implications of using a more conventional approach to temperature-related probability, using PoE10% as a benchmark – i.e. a one-in-ten years planning margin.

81. As a means of assessing the quantum of the proposed planning margin, we have assessed the difference at the "starting point" (i.e. in 2013) between ElectraNet's forecast and our trend forecast (which conceptually is a PoE50% forecast – that has an equal probability of actual demand exceeding or being less than this level). We have done this for the ETSA connection point loads, since it is these underlying loads (as opposed to directly-connected mining loads etc) that are temperature-dependent. In this way we find that ElectraNet's 2013 demand forecast is 14% greater than the trend line and, since differences in growth rate have little impact for this year, a reasonable interpretation of this difference is that the 14% approximately reflects the planning margin attributable to "heatwave peaks".

82. AEMO define its PoE10% forecast from detailed temperature simulations and demand modelling of South Australian conditions and we prefer to use its PoE10% margin for this assessment. We note that its PoE10% "margin" (that is the difference between the 50% PoE MW and the 10% PoE MW) is materially higher than the Powerlink 10% band for Queensland that we reviewed earlier in 2012. The following table describes the AEMO and Powerlink 10% PoE margins, expressed as a percentage of the 50% PoE peak demand.

Figure 7 : PoE 10% margins (AEMO – for South Australia, Powerlink for Queensland)

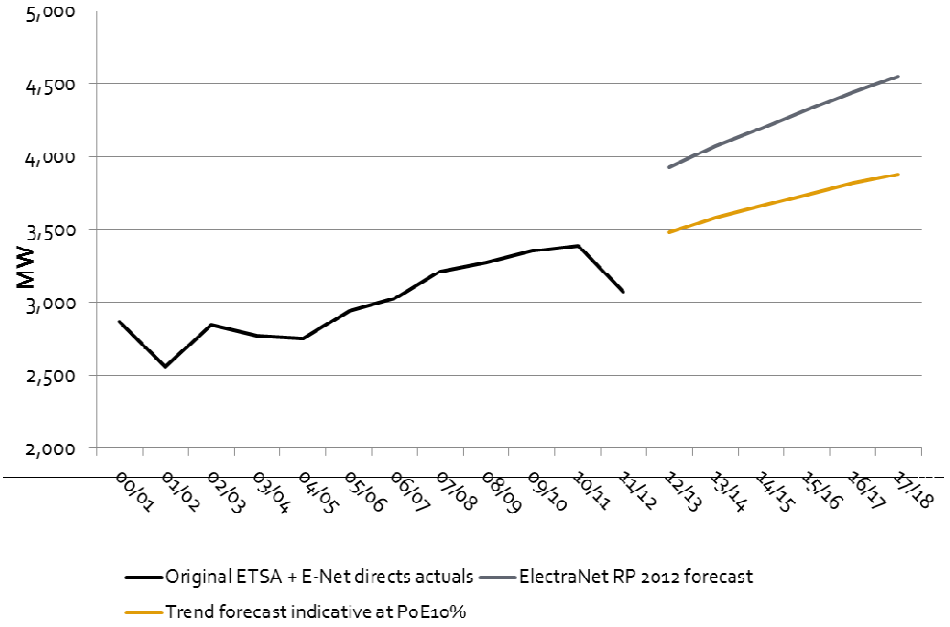
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
AEMO 10% band	9.4%	9.4%	9.4%	9.5%	9.5%	9.5%
Powerlink 10% band	5.0%	4.9%	4.8%	4.7%	4.7%	4.7%

Source: EMCa analysis from AEMO 2012 demand forecast and EMCa report to AER on Powerlink demand forecast

83. We have not been asked to undertake fundamental analysis of the PoE margin. At a conceptual level, we can accept that the margin is likely to be somewhat higher than for Powerlink Queensland, given the low load factor and more extreme temperature conditions in South Australia. We have no reason to doubt AEMO's assessment while noting that, at 9.4%, this is around 5% lower than the temperature margin implicit in ElectraNet's 2013 peak demand forecast.

84. For check forecasting purposes, we .have added the AEMO PoE10% demand margin to the PoE50% trend forecast derived above for the ETSA connection points, then added ElectraNet's forecasts for its direct connect customers. The resulting forecast, shown in orange in the graph below, is considerably below the ElectraNet RP forecast (blue).

Figure 8 : Comparison of PoE10% check forecast with ElectraNet RP forecast (all customers)



Source: EMCa/NZIER from data supplied by ElectraNet and AEMO

5.4.6 Diversity

85. In its RP, ElectraNet states that:

> *"Peak demand forecasts at individual connection points are, by necessity, used for connection point planning and **local regional planning**. This is due to minimal diversity at a regional level during peak times; i.e. in most cases, heat wave conditions simultaneously affect the entire area in question."*[34] *[emphasis added]*

86. As part of our high-level review, we discussed this matter with ETSA, who expressed a view that in their opinion there is some diversity at the regional transmission level, that is, it is not unity.

87. We investigated this as part of our further analysis, in order to identify broadly how material diversity might be at this level. The data that we had available for this purpose was data on individual connection point demands and diversity factors associated with each connection point, at the time of system peak. This showed a system-wide diversity (at time of system peak) of 0.9.

88. We also sought, and were provided with, data on the date and time of the 2012 peak demand for each connection point. We analysed this data by region, and found that typically only around half of the connection points peaked on the same day. In some cases the non-coincident connection points peaked a day apart, when we would expect the adjacent connection point loads to also be high. In other cases they peaked a month or more apart.

[34] RP, page 64

89. Other data would be required to definitively determine diversity factors for each region. However the evidence was clear to us that there is a diversity of less than unity at the regional level.

90. The Adelaide metro region comprises around 70% of SA load, and at the time of the state-wide peak, our analysis revealed a diversity of 0.955 for this region[35]. We consider it a reasonable assumption that the state-wide peak will have occurred at the same time as the metro area "regional" peak or, if not, that the pattern of usage across the connection points is likely to have been very similar at the time of regional peak. At the time of the state-wide peak, we see much lower diversity factors in the other regions (as low as 74%); however this is a mix of inter-regional and intra-regional diversity and the data does not allow us to distinguish between these different levels of diversity.

91. For regional augmentation planning purposes, we consider it reasonable that a diversity factor should be applied to the undiversified connection point demands. Rounding up conservatively from the metro area diversity factor derived above, we have applied a factor of 0.96 in comparing ElectraNet's demand forecast with the trend forecast, and with AEMO's state-diversified forecast.

5.5 Comparisons between forecasts

5.5.1 Adjustments to allow comparisons between forecasts

92. We have been advised that both AEMO and ElectraNet are currently working on reconciliation analyses to identify the reasons for the differences between their respective 2012 forecasts. At time of writing, these reports have not yet been provided.

93. In order to provide reasonable comparisons between the forecasts, we have made some adjustments to the AEMO forecast, based on the 2011 adjustments made by ElectraNet in its reconciliation report. In essence, the adjustments we have made are to place the two forecasts (ElectraNet's and AEMO's), together with the trend line check-projection that we have developed, onto a common basis which is as regionally-diversified connection point demand forecasts, at a probability-level suitable for planning purposes. Specifically, these would be the forecasts that are used for regional augmentation planning purposes.

94. We have not adjusted the ElectraNet forecast, which is as proposed for this purpose; that is, a "heat-wave" peak demand forecast that is the aggregate of a set of connection point forecasts for each region.

95. We have developed the trend forecast as described in the preceding sections, based on trending underlying historical demand, adding direct customer forecasts (from ElectraNet) and taking account of PV, a temperature-related planning margin and diversity to the regional level.

96. We have adjusted the AEMO diversified peak generation forecast to:

[35] We excluded SA water, which has an extremely low load factor.

a. Un-diversify the load to an equivalent "undiversified connection point sum";

b. Deduct transmission losses;

c. Make an aggregate adjustment for the factors identified in ElectraNet's 2011 report[36]

d. Diversify back to the regional level

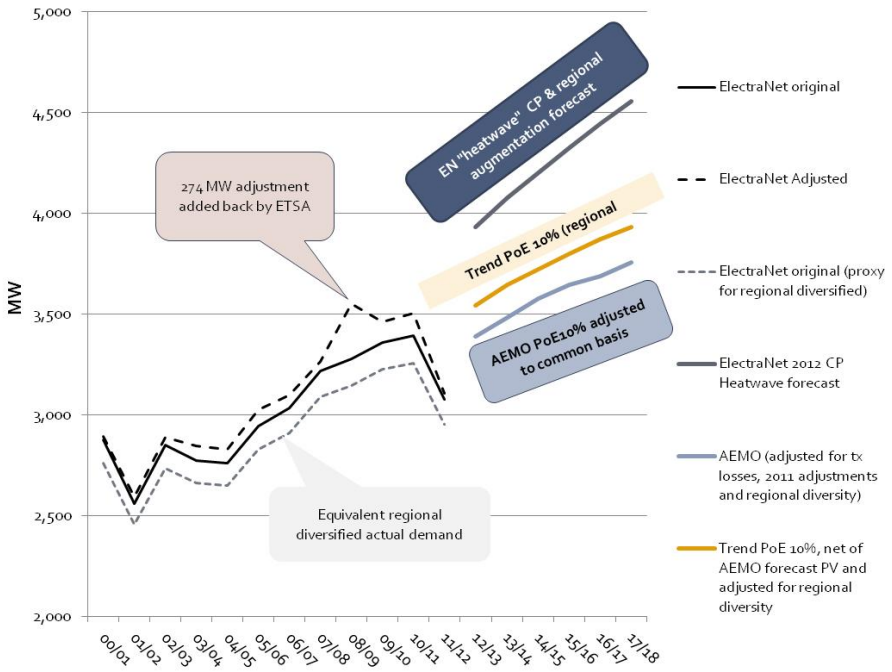
97. We stress that we have not been provided with a 2012 reconciliation, nor have we independently assessed the various adjustments that were made. We have considered the nature of the adjustments that ElectraNet made to each of the forecasts but the scope of our work does not include detailed analysis of the validity and quantum of each adjustment. In the absence of further and updated information, we have applied the adjustments that were made by ElectraNet in reconciling the 2011 forecasts, to AEMO's 2012 forecast.

5.5.2 Comparative results

98. As for our basic trend analysis, a comparison based on this approach shows an ElectraNet connection point forecast (and which was used by ElectraNet also for regional augmentation planning) that remains materially above the AEMO SA state 10% PoE medium demand forecast. On the other hand, the trend projection that we have developed is close to the AEMO forecast and in our view provides a reasonableness check on that forecast. The results of this comparison are shown in the graph below.

[36] Three adjustments were made, described by ElectraNet as adjustments for offset and spot load differences, adjusting for AEMO model bias with regards to controlled loads and solar PV, and adjusting for the omission of DSP.

Figure 9 Peak demand comparative analysis of demand forecasts for regional augmentation capex planning (ETSA + direct CPs)



Source: EMCa/NZIER from data supplied by ElectraNet and AEMO

99. The comparative analysis indicates that an adjusted equivalence of AEMO's demand forecast is of the order of 800MW (17%) below ElectraNet's demand forecast to 2017/18. The trend projection that we developed is 624MW (14%) below ElectraNet's forecast regional augmentation forecast at that time [at 2017/18], demand is only just at the level that ElectraNet has forecast for 2012/13.

100. While the trend projection is not a definitive forecast, and noting that we have not assessed AEMO's 2012 methodology or assumptions, at the output level we consider that the trend projection that we developed lends credence to the AEMO forecast. It also seems reasonable to expect that a lower forecast is likely to result from consideration of price rises and the slowing of economic growth (in an econometric model such as AEMO has used), notwithstanding the presence of significant mining / major load opportunities that are separately accounted for.

101. For further comparison purposes, we have shown on graph above (dashed grey line) a proxy for historical peak loads diversified to a regional level (consistent with the other data on the graph). This helps to interpret the forecasts and trend projection. It can be seen that a demand forecast such as the AEMO forecast (light blue) and, to a greater extent, the trend projection (orange) provide a planning margin "buffer" over and above a visual trending of the historical data demand.

Glossary

AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CP	Connection point
EMCa	Energy Market Consulting associates
ESCOSA	Essential Services Commission of South Australia
ETC	(South Australian) Electricity Transmission Code, as published by ESCOSA
ETSA	ETSA Utilities (since drafting of this report, renamed SA Power Networks)
NER	National Electricity Rules
NZIER	New Zealand Institute of Economic Research
PoE	Probability of Exceedance (referring to the temperature-related probability that a forecast for a particular year will be exceeded)
PV	Photovoltaics (referring to solar photovoltaic “rooftop” generation)
Region	One of ElectraNet’s seven intra-State electrical regions (Metropolitan, Eastern Hills, Mid North, Riverland, South East, Eyre Peninsula, Upper North)
RCP	Regulatory Control Period
RP	Regulatory Proposal
SASDO	2012 South Australian Supply and Demand Outlook