Reset RIN Response – Demand Forecast

2018/19 – 2022/23

Schedule 1: 6. Demand Forecast

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

TransGrid does not produce the maximum demand forecasts it uses for network planning. Rather, it uses the NSW region forecast produced by AEMO and bulk supply point forecasts produced by DNSPs.

TransGrid has access to historical actual 10% and 50% POE (weather corrected) data for summer and winter maximum demands from the 2016 AEMO model for the NSW region of the NEM. TransGrid has worked out summer and winter relationships between AEMO's actual network maximum demands for the NSW region and TransGrid's actual maximum demands on its network. These relationships have been used to estimate 10% and 50% POE historical maximum demand for TransGrid's network. Similarly forecasts of 10% and 50% coincident maximum demand for TransGrid's network were derived from AEMO's 10% and 50% POE forecasts for the NSW Region using these relationships.

6.2 Provide:
(a) the model(s) TransGrid used to forecast maximum demand;

As indicated in 6.1 above, TransGrid does not produce the maximum demand forecasts it uses for network planning. The details of the AEMO forecast models can be found in "2016 Forecasting Methodology Information Paper" at this direct link:

https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NEFR/2016/Forecasting-Methodology-Information-Paper---2016-NEFR---Final.pdf

(b) where TransGrid'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 TransGrid's current approach. If this data is unavailable, explain why; and

As indicated in 6.1 above, TransGrid does not produce the maximum demand forecasts it uses for network planning. Consequently, where weather correction information has been provided, it is consistent with the AEMO weather correction processes.

(c) any supporting information or calculations that illustrate how information extracted from TransGrid'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.

The supporting information provided in regulatory templates 3.4 and 5.4 is taken from the AEMO and DNSP forecasts. Therefore there are no material differences between the forecasts that are used for planning purposes and the information provided in 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;

As indicated in 6.1 above, TransGrid does not produce the maximum demand forecasts it uses for network planning. The details of the AEMO forecast models can be found in "2016 Forecasting Methodology Information Paper" at this direct link:

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TransGrid understands that the AEMO models have been peer reviewed and DNSP models are peer reviewed by SKM-MMA. This gives TransGrid adequate assurance that AEMO and DNSP models are appropriate and would be refined further as per the recommendations of the independent consultants/peer reviewers.

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

As indicated in 6.1 above, TransGrid does not produce the maximum demand forecasts it uses for network planning. TransGrid undertakes a high level sense check on actual maximum demands and forecasts received from the DNSPs for each BSP.

TransGrid's 2016 TAPR (Section 2.2.3.3; Page 30), provided as the revenue proposal supporting document TransGrid – Transmission Annual Planning Report 2016 – 0616 – PUBLIC, contains comparison between AEMO's (top down) 10% POE and 50% POE (Neutral Scenario) maximum demand projections for summer and winter and the aggregated DNSP (bottom up) projections. Since the top down and bottom up projections are prepared on different bases, they do not align.

DNSP forecasts are used for connection planning (of subsystems supplying customers). AEMO forecasts are used for main system planning.

(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);

Not used

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

As indicated in 6.1 above, TransGrid does not produce the maximum demand forecasts it uses for network planning. The inputs and assumptions that are used in the AEMO models are outlined in the AEMO Forecasting Methodology Information Paper provided at this direct link:

https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NEFR/2016/Forecasting-Methodology-Information-Paper---2016-NEFR---Final.pdf

DNSPs use their own weather correction methodologies which TransGrid understands are independently reviewed by SKM-MMA.

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

As indicated in 6.1 above, TransGrid does not produce the maximum demand forecasts it uses for network planning. The inputs and assumptions that are used in the AEMO models are outlined in the AEMO Forecasting Methodology Information Paper provided at this direct link:

https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NEFR/2016/Forecasting-Methodology-Information-Paper---2016-NEFR---Final.pdf

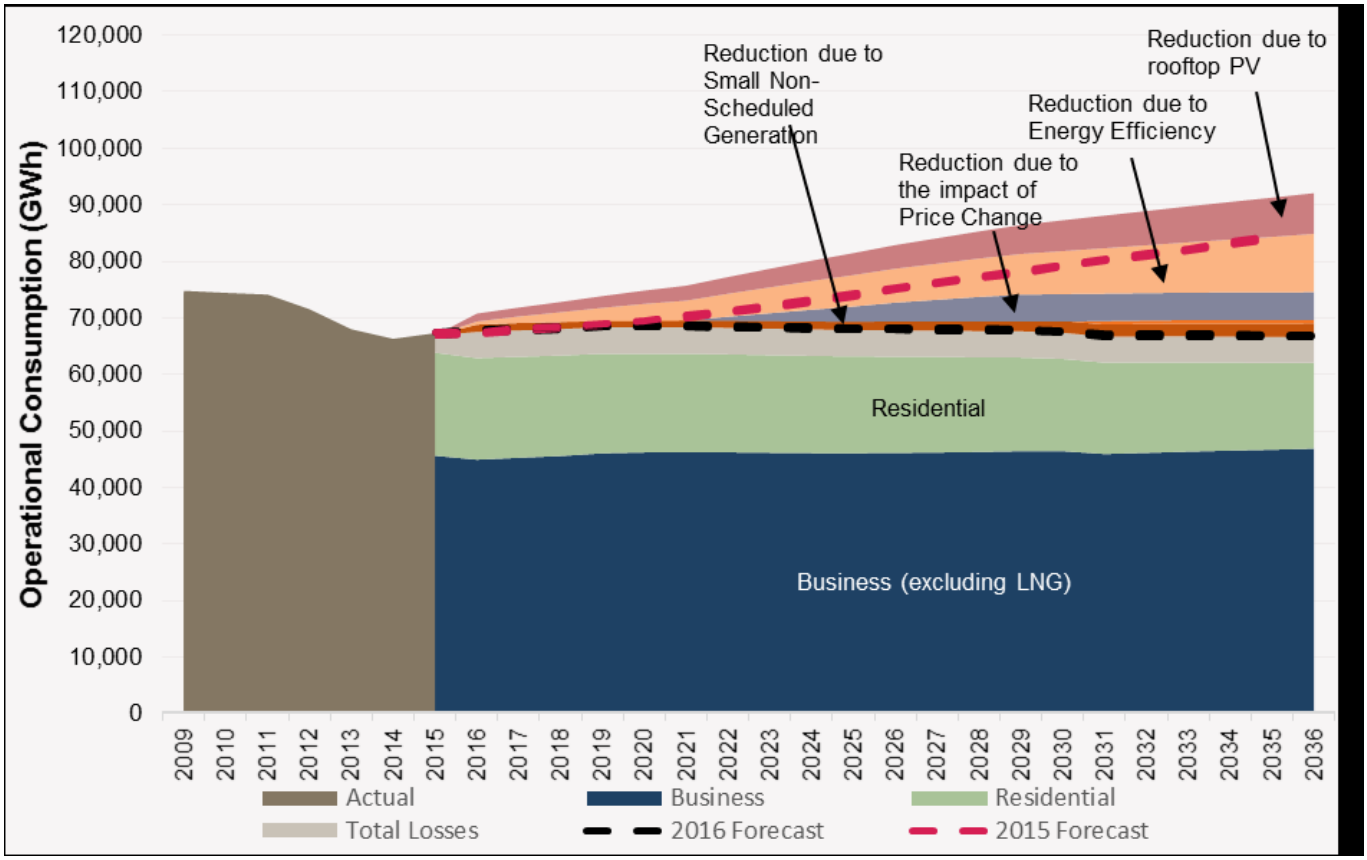
(i) any appliance models , where used, or assumptions relating to average customer energy usage (by customer type);

As indicated in 6.1 above, TransGrid does not produce the maximum demand forecasts it uses for network planning. AEMO provides a breakdown of the energy usage forecast component that is attributable to Business (excluding LNG), and Residential, as well as reductions due to Small Non-Scheduled Generation, due to the impact of price change, due to energy efficiency and due to energy efficiency. The NSW Annual consumption – Neutral case is shown in the graph that follows.

The assumptions that are used in the AEMO models are outlined in the AEMO Forecasting Methodology Information Paper, and further information can be found on AEMO's website :

https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/National-Electricity-Forecasting-Report

NSW Annual consumption – Neutral case



(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);

As indicated in 6.1 above, TransGrid does not produce the maximum demand forecasts it uses for network planning. The inputs and assumptions that are used in the AEMO models are outlined in the AEMO Forecasting Methodology Information Paper provided at this direct link:

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AEMO monitors actual energy consumption and compares them against forecasts on a periodic basis and issues updates if necessary.

As part of the APR preparation process, TransGrid undertakes comparison of actual demand and AEMO forecasts for the NSW Region and high level checks on BSP forecasts.

(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;

DNSP forecasts are used for connection planning (of subsystems supplying customers). AEMO forecasts are used for main system planning.

The forecasts for TransGrid's network have been derived from AEMO's forecasts for the NSW region. TransGrid's 2016 TAPR (Section 2.2.3.3; Page 30), provided as revenue proposal supporting document TransGrid – Transmission Annual Planning Report 2016 – 0616 – PUBLIC, contains comparison between AEMO's (top down) 10% POE and 50% POE (Neutral Scenario) maximum demand projections for summer and winter and the aggregated DNSP (bottom up) projections. Since the top down and bottom up projections are prepared on different bases, it would be unreasonable to expect them to align.

In an ideal world there is a possibility that top down econometric forecasts undertaken on a regional basis would reconcile with aggregated bottom up forecasts which are undertaken separately for each BSP within the region.

However in practice, the production of top down regional forecasts are based on broad macro economic and demographic parameters which apply to the whole state or region. For the bottom up BSP forecasts, it is difficult to assign economic factors at a localized level that would influence load growth for a particular BSP. Thus the BSP forecasts are undertaken by the concerned DNSP using localized knowledge pertaining to a particular BSP (for e.g historical growth rates, load transfers, committed spot loads etc.). This localized knowledge may or may not have any relation to the broad macro economic assumptions used to produce top down regional forecasts. Hence the top down forecasts and bottom up aggregated BSP forecasts do not necessarily align.

Notwithstanding the above, TransGrid does undertake a high level comparison as part of the TAPR preparation process to ascertain whether the two types of forecasts lie within an acceptable range.

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

The forecasts are included in network models which are used to identify network limitations. Possible solutions to those limitations are then developed and assessed, lending eventually to proposals for expenditure.

(ii) operating and maintenance expenditure forecasts.

The forecasts are used to identify Augmentation projects that increase the scale of TransGrid's network. TransGrid's opex model uses change in network scale in the calculation of forecast opex.

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

As indicated in 6.1 above, TransGrid does not produce the maximum demand forecasts it uses for network planning. The inputs and assumptions that are used in the AEMO models are outlined in the AEMO Forecasting Methodology Information Paper provided at this direct link:

https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NEFR/2016/Forecasting-Methodology-Information-Paper---2016-NEFR---Final.pdf

TransGrid has identified eleven jointly planned projects in the forecast capital expenditure. These are

1. Powering Sydney's future
2. Macarthur 330/66kV second Tx
3. Molonglo Substation Connection
4. Second Supply to the ACT - Stockdill Dr Switching Station
5. Thermal Limitation on 969 Line

6. Voltage Support at Narrabri
7. Canberra Sub - Installation 132kV Switchbay - Line Single CB
8. Haymarket 132 kV Ausgrid Cables Replace
9. Macarthur 66kV Switchbay - Menangle Park Zone Substation
10. Macarthur 66kV Switchbay - Mt Gilead Zone Substation
11. Vineyard 132kV Switchbay for Box Hill Zone Substation.

The joint planning process utilised AEMO and DNSP forecasts.

(n) whether TransGrid 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);

TransGrid does not produce the forecasts. AEMO's forecasts for the NSW region are for maximum demands of that region. The forecasts produced by Essential Energy are for "local" maximum demands. Those by Endeavour, Ausgrid and ActewAGL are diversified with respect to their own regions.

Transgrid does not attempt to forecast co-incident maximum demand at each connection point as this would require the time and date of the system maximum demand to be known. The strong influence of weather on actual maximum demand means that it is not possible to accurately forecast the time, date or (in TransGrid's case) the season in which the system maximum demand will fall.

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

TransGrid records maximum demand information in MW. For some, but not all, locations, MVAr data are also available.

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

TransGrid uses forecasts of both 10% PoE and 50% PoE maximum demands. TranGrid's planning approach which includes the use of various forecasts is detailed in a separated Appendix 6 of its 2016 TAPR which is provided as revenue proposal supporting document TransGrid – Transmission Annual Planning Report 2016 – 0616 – PUBLIC.

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

The contingency planning process it is taken to be TransGrid's reliability obligations and planning processes. TransGrid's planning process is described in Appendix 6 of its 2016 TAPR.

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

TransGrid's network planning process involves identifying needs (the inability to meet its reliability or other obligations). Both network and non-network options to meet those needs are then considered.

TransGrid's planning approach is described in Appendix 6 of TAPR 2016, which is provided as revenue proposal supporting document TransGrid – Transmission Annual Planning Report 2016 – 0616 – PUBLIC. TransGrid's planning process considers, inter alia, generation redispatch and load transfers. TransGrid has had contracts for network support in Summer 2008-09 and Summer 2012-13.

(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 TransGrid's network; and

As indicated in 6.1, TransGrid uses the NSW region forecast produced by AEMO and bulk supply point forecasts produced by DNSPs. Refer to (h) for comparison.

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

TransGrid uses contingency (emergency) ratings in its network planning process where limitations arise due to thermal ratings. However, the capacity of transmission systems can be limited by a range of factors including thermal ratings, voltage stability, transient stability and small signal (oscillatory) stability. These factors can be influenced by the magnitude and distribution of loads and generation across the network. Consequently it is neither practical nor sensible to assign a rating to a particular BSP.

Name plate or normal ratings will be used when developing the "connection point ratings". TransGrid's planning approach is described in Appendix 6 of TAPR 2016 which is provided as revenue proposal supporting document TransGrid – Transmission Annual Planning Report 2016 – 0616 – PUBLIC.

6.4 Provide:
(a) evidence that any independent verifier engaged by TransGrid 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

n/a

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

n/a

Appendix E Instructions: Part B: Workbook 1 – Regulatory Determination

2.26 If TransGrid cannot use raw unadjusted maximum demand as the basis for the information it provides in table 5.4.1, it must describe the methods it employs to populate those tables. See paragraph 1.4(d) of this appendix for further guidance.

The maximum MW demand provided in table 5.4.1 is unadjusted from the DNSPs forecast, the maximum MVA demand is adjusted using the power factor from the actual maximum demand in the 2016 Category Analysis RIN for that data point.

2.28 TransGrid must provide inputs for 'Embedded generation' if it has kept and maintained historical data for embedded generation downstream of the connection point and/or if it accounts for such embedded generation in its maximum demand forecast.
(a) TransGrid must allocate embedded generation figures to the appropriate connection point under system normal conditions (consistent with the definition of raw adjusted maximum demand).
(b) TransGrid must describe the type of embedded generation data it has provided. For example, TransGrid may state that it has included scheduled, semi-scheduled and non-scheduled embedded generation in the tables for connection points. In this example, we would be able to calculate native demand by adding these figures to the raw adjusted maximum demand figures.

TransGrid does not keep or maintain historical data for embedded generation. No embedded generation data has been provided.