

Expansion of demand scenarios

TransGrid

10 October 2016

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Dear Vincent,

In accordance with our work order (Order No. T68127) under Panel Agreement No. Q26/14 dated 8 September 2016 ("Agreement"), Ernst & Young ("we" or "EY") has been engaged by TransGrid ("you", "TransGrid" or the "Client") to provide an analysis of sub-regional demand probabilities (the "Services") in connection with TransGrid's Revenue Application to the Australian Energy Regulator (AER) for the next Regulatory Control Period (RCP) (the "Project").

The enclosed report (the "Report") sets out the outcomes of our work. You should read the Report in its entirety. A reference to the report includes any part of the Report.

Purpose of our Report and restrictions on its use

Please refer to a copy of the Agreement for the restrictions relating to the use of our Report. We understand that the deliverable by EY will be used for the purpose of assisting TransGrid with its Revenue Application to the AER by analysing potential new demand growth on its transmission network infrastructure (the "Purpose"). This Report was prepared on the specific instructions of the Order No. T68127 solely for the Purpose and should not be used or relied upon for any other purpose.

EY understands and agrees that TransGrid may provide this Report to the Australian Energy Regulator ("AER") and that TransGrid and the AER may publish this Report publicly on their websites. We accept no responsibility or liability to any person other than to TransGrid or to such party to whom we have agreed in writing to accept a duty of care in respect of this Report, and accordingly if such other persons choose to rely upon any of the contents of this Report they do so at their own risk.

Nature and scope of our work

The nature and scope of our work, including the basis and limitations, are detailed in our Agreement and in this Report.

Our work commenced on 9 September 2016 and was completed on 10 October 2016. Therefore, our Report does not take account of events or circumstances arising after 10 October 2016, and we have no responsibility to update the Report for such events or circumstances.

This assessment considers only a few combinations of input assumptions relating to future conditions, which may not necessarily represent actual or most likely future conditions. There will usually be differences between estimated and actual market developments, because events and circumstances frequently do not occur as expected, and those differences may be material.

We highlight that our analysis and Report do not constitute investment advice or a recommendation to you on your future course of action. We provide no assurance that the scenario we have modelled will be accepted by any relevant authority or third party.

Our conclusions are based, in part, on the assumptions stated and on information provided by TransGrid throughout the engagement. Neither Ernst & Young nor any member or employee thereof undertakes responsibility in any way whatsoever to any person in respect of errors in this Report arising from incorrect information provided by TransGrid.

In the preparation of this Report we have considered and relied upon information from a range of sources believed after due enquiry to be reliable and accurate. We have no reason to believe that any information supplied to us, or obtained from public sources, was false or that any material information has been withheld from us.

We do not imply and it should not be construed that we have verified any of the information provided to us, or that our enquiries could have identified any matter that a more extensive examination might disclose. However, we have evaluated the information provided to us by TransGrid as well as other parties through enquiry, analysis and review and nothing has come to our attention to indicate the information provided was materially mis-stated or would not afford reasonable grounds upon which to base our Report.

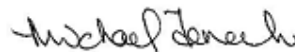
This letter should be read in conjunction with our Report, which is attached.

Thank you for the opportunity to work on this project for you. Should you wish to discuss any aspect of this Report, please do not hesitate to contact Ben Vanderwaal on 0414 670 713 or Michael Fenech on 07 3243 3753.

Yours sincerely



Ben Vanderwaal
Executive Director



Michael Fenech
Partner

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EY is a registered trademark. Our report may be relied upon by TransGrid for the purpose of informing possible future load development assumptions in New South Wales. We disclaim all responsibility to any other party for any loss or liability that the other party may suffer or incur arising from or relating to or in any way connected with the contents of our report, the provision of our report to the other party or the reliance upon our report by the other party. Liability limited by a scheme approved under Professional Standards Legislation.

1. Executive summary

TransGrid engaged EY to identify and assess the likelihood of new sources of electrical load coming on to the grid in New South Wales. This focussed on approximately the next 7 years to align with TransGrid's next Regulatory Control Period. Based on documentation submitted for the governmental approval process and available public information, a probability of project completion has been determined based on low, medium and high economic growth scenarios. We anticipate that this information will inform TransGrid's Revenue Application for the 2018-23 Regulatory Control Period in terms of helping to assign a probability weighting to potential network upgrades to support such load projects, in much the same way as has already been done for generation projects.

EY identified a total of 66 different load projects by conducting a significant market research exercise. These projects were assembled into a detailed spreadsheet pulling together the information relevant to TransGrid. Information sources used include public information (especially the NSW major projects website), news websites, company and project websites, and a metals and mining industry database service (SNL Metals & Mining Database). Of these 66 projects, those that would potentially require some level of transmission reinforcement were identified by EY and TransGrid together.

EY developed a weighting strategy to rank the likelihood of the load projects proceeding in approximately the next 7 years. This was based on a range of objective and subjective criteria. Some of the criteria considered were:

- How advanced the project was in its development cycle
- Whether the project had achieved necessary approvals (planning, environmental, etc.)
- Whether the project had scheduled (or even commenced) construction
- The level of opposition or support of the project from councils, governments, land owners, community groups and other relevant organisations
- Whether general market conditions were supportive of the project

Using these criteria, EY developed a base likelihood for each project. This was considered the 'business as usual' case and was therefore aligned with AEMO's central demand growth scenario (AEMO's Medium growth demand scenario). For AEMO's High and Low demand growth scenarios, different likelihoods were assigned for most projects. For some particular projects – particularly those at the extremes of likelihoods – other factors were considered to be at play and probabilities were not adjusted for the High or Low growth scenarios. For example, in the case of a project that has appears to have achieved all financial conditions and was commencing the building phase, the probability of that project proceeding could be stated to be extremely high and not affected by medium term economic growth. In essence, it is already 'committed'. The same might be true of a project that is very unlikely – in essence it might be gauged to be essentially a 'dead' project.

With the likelihood values assigned to each project for each demand scenario, EY provided recommendations to TransGrid as to how to use this information in considering capital expenditure requirements for supporting transmission infrastructure. This was designed to be as consistent as possible with the generation scenarios approach used by EY previously for TransGrid and for many other transmission network service providers. The recommended approach was to identify the possible transmission augmentation cost for a given project, and then calculate an overall probability-weighted likelihood for that project and apply it to the augmentation cost.

2. Introduction

TransGrid has commissioned EY to provide an independent assessment of the probability of new sources of load connecting to the New South Wales electricity grid. This was to focus on the forthcoming RCP (Regulatory Control Period), which covers 1 July 2018 to 30 June 2023. It is anticipated that EY's assessment will be considered by TransGrid in drafting their Revenue Application to the AER. This assessment may be read in conjunction with the Generation Development Scenarios report prepared by EY for TransGrid in October 2015.

3. Scope

This assessment of possible new electrical loads expands on previously provided work for TransGrid, which assessed the likelihood of possible new generators connecting to the grid in New South Wales over the coming RCP. In particular, this scope of works was to consider:

- Updates from the Australian Energy Market Operator's (AEMO) 2016 National Electricity Forecasting Report (NEFR) and Electricity Statement of Opportunities (ESOO). These documents outline AEMO's forecast ranges of electricity consumption over 20 years, as well as identifying investment opportunities arising from evolving demand and generation profiles across the network.
- Expand on previous demand scenarios by providing greater detail of demand across each sub-region in New South Wales – Northern New South Wales, Central New South Wales and South West New South Wales – according to known projects that may materially impact load.

Our assessment is informed by an analysis of market announcements and economic and regulatory conditions that impact on the probability of known projects proceeding, and thus load increasing on the electricity grid in New South Wales.

4. Methodology

The first and arguably most important step was to carefully identify potential new sources of load. To do this, EY began with projects known to TransGrid, and expanded on this via searches of the New South Wales Department of Planning & Environment's Major Project Assessments database to identify projects that were under assessment or were approved within the preceding three years. This search enabled us to identify projects where feasibility assessments had been completed and approval had formally been sought.

A subscription-based industry database (SNL Metals & Mining Database), to which EY has access, revealed details of other projects in the feasibility stage for which the formal approval process had not commenced (at least according to the NSW government's website).

Our estimation of probability was conducted on the basis of five main criteria:

- How advanced the project was in its development cycle
- Whether the project had achieved necessary approvals (environmental, etc)
- Whether the project had scheduled (or even commenced) construction
- The level of opposition or support of the project
- Whether market conditions were supportive of the project

Where available, the project application and environmental assessments were examined for any information relating to these criteria. Due to the general lack of detail and the customary delay between the compilation of such documentation and the project's approval, media and industry sources were also analysed to provide more recent information on the status of projects. This was especially relevant for projects where production targets had changed or medium-term movements in commodity prices had impacted the economic viability of the project.

As expected, many of these details were not publically available. As a result, with our identified list of projects being dominated by resource extraction activities, production rates and recoverable resource estimates were considered to determine the likely timeframe for construction and production, as well as the load generated by the projects' targeted output. We draw attention to the fact that many of the potential load values are broad estimates. Where possible, EY recommends TransGrid validate this information using its own sources. For example, where TransGrid has current data of similar projects (e.g. an above-ground coal mine, or a gold mine), it would likely be much more accurate to use load estimates calculated from a pro-rata of the anticipated mine production rate. For example, should TransGrid have records of an existing above-ground coal mine that (hypothetically) consumes 10MW peak for an production rate of 2.5 mtpa (million tonnes per annum), then it would be reasonable to assume a 20MW peak load for a new above-ground coal mine project with an anticipated production rate of 5 mtpa).

Project summaries and environmental assessments available from the Department of Planning & Environment database, as well as proponents' websites, provided the bulk of information about project scale and anticipated timeframes. Where possible, additional information was sourced from industry websites and reputable news sources. Local news sources were consulted where available for information relating to project status, such as recent job losses and appeals in the approvals process.

Our analysis also accounted for the probability that projects that have received approval would not progress to the production phase. Our analysis identified several projects that had received final approval from the Department of Planning & Environment that we assessed as having a low or moderate probability of completion due to factors such as the owner's financial difficulties (including depressed commodity prices), significant local opposition and significant delays between the

completion of feasibility assessments and seeking governmental approval or otherwise being seen to achieve further project milestones.

To turn the qualitative 'likelihood' designations into probability values, EY assumed the values shown in Table 1. These values are by necessity subjective and any other similar spread is likely to be just as valid. Projects that were designated a likelihood of 'Already included' were projects that TransGrid had already allowed for in their planning; in many cases, these were projects that had already commenced operations or were committed. They were included for completeness, as they are not to be considered any further in this task of identifying 'new' load. For this reason they were assigned a 0% probability value.

Table 1 - Probability assignments

Likelihood	Probability
Already included	0%
Very Low	10%
Low	30%
Moderate	60%
High	75%

EY recommends that the analysis described in this Report and detailed in the accompanying load databook (filename *Transgrid load databook 2016-10-10A.xlsx*) be read in conjunction with the Generation Development Scenarios provided to TransGrid by EY in October 2015.

We recommend that TransGrid calculate an aggregate or weighted probability for each project by considering combining the probability the project will go ahead in each demand scenario. This value may then be used against potential transmission augmentation costs that may be required to support the new load project. We use the Narrabri Gas Project to demonstrate this calculation.

In the medium demand scenario (which has a probability of 60%), the project was assigned a 60% chance of proceeding. In the High demand scenario (which has a probability of 10%), the project was assigned a 70% chance of proceeding. In the Low demand scenario (which has a 30% probability), the project was assigned a 35% chance of proceeding. To calculate an overall weighted probability for the project the demand scenarios must be combined, therefore the project probability is multiplied by the demand scenario probability for each demand scenario, and the total summed. This gives an overall weighted likelihood of 53.5% for the project. Table 2 shows these probabilities by demand scenario, and calculation of the overall weighted probability of the project.

Table 2 - Calculation of probability-weighted likelihood of example project

Demand scenario likelihood	Demand probability	Project probability in demand scenario	Project probability
High	10.0%	70%	7.0%
Med	60.0%	60%	36.0%
Low	30.0%	35%	10.5%
Overall weighted likelihood (sum):			53.5%

About EY

EY is a global leader in assurance, tax, transaction and advisory services. The insights and quality services we deliver help build trust and confidence in the capital markets and in economies the world over. We develop outstanding leaders who team to deliver on our promises to all of our stakeholders. In so doing, we play a critical role in building a better working world for our people, for our clients and for our communities.

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