TransGrid

Revenue proposal

2014/15 – 2018/19

responsive
efficient
price aware

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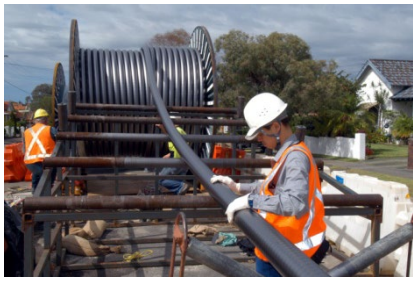

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1 Executive Summary

TransGrid is pleased to present its revenue proposal for the 2014/15 to 2018/19 period.

TransGrid is the major electricity transmission network service provider in New South Wales and the Australian Capital Territory. TransGrid's role is to provide efficient, reliable transmission services to New South Wales, the Australian Capital Territory and the National Electricity Market.

TransGrid has worked hard in the current regulatory control period to pursue efficiencies, implement continuous improvement programs, manage costs and defer expenditure where prudent. These achievements benefit consumers in this proposal, in which TransGrid has contained forecast revenue growth to no higher than the consumer price index (CPI).

This revenue proposal sets out the expenditure and revenue TransGrid requires to efficiently provide electricity transmission services over the 2014/15 to 2018/19 period.

A Changing World

The five years since TransGrid's last revenue proposal have seen a time of unprecedented change in the electricity industry. At the time of lodgement of the last revenue proposal, the recent level of economic uncertainty had not been anticipated, a less ambitious renewable energy target applied, uptake of energy efficiency initiatives was minimal and solar bonus schemes in New South Wales and the Australian Capital Territory had not commenced.

The scenarios considered in this revenue proposal are significantly different to those considered five years ago. Five years ago, the scenarios used in developing the network plans considered electricity demand, changes in interstate electricity transfers, water availability (as large areas of New South Wales were in drought) and the potential introduction of a carbon price.

The changes in the electricity industry environment over the last five years have created a wider range of scenarios for the future. Demand forecasts now incorporate projections of domestic solar installations, demand reduction from energy efficiency initiatives and changes to consumer behaviour. Scenarios now consider the introduction of large scale renewable generation, potential changes to network reliability standards, and potential future developments affecting Australia's electricity industry as a whole.

TransGrid is responsive to the changing world. It has deferred over $600 million of capital expenditure over the last five years in response to changes in electricity demand. Consumers benefit from these decisions directly in this proposal, with forecast revenue over the next five years some $230 million lower due to the deferrals. TransGrid has connected renewable generation, pursued low cost methods of improving network capacity, and

improved project initiation and delivery processes to be able to respond more rapidly to short notice needs. The ability to respond more rapidly allows TransGrid to make investment decisions closer to the need for the investment, and respond better to the changing environment.

As demand forecasts remain subdued, TransGrid has responded and this proposal features significantly less capital expenditure for network augmentations than that in previous proposals.

Priced Affordably

In recent years, significant price rises have occurred for all electricity consumers. TransGrid understands that electricity is an essential service, and that consumers should pay no more than necessary for their electricity supply.

While transmission is a small component of most bills, at approximately 7% on average for residential and small business consumers, TransGrid understands that every dollar is important and that recent electricity price rises have added to household and business financial pressures.

In 2012, TransGrid announced a revenue freeze for 2013/14, which delivered a reduction in price volatility for consumers. This initiative is part of TransGrid's ongoing commitment to minimise the price impact of its transmission services for consumers.

Electricity consumers in New South Wales and the Australian Capital Territory pay amongst the lowest transmission costs in the National Electricity Market. This proposal forecasts revenue increases no higher than CPI over the next five years to continue this trend.

Efficient

TransGrid is commercially focused, and has responded to the incentives established by the Australian Energy Regulator (AER). In particular, in the current regulatory control period TransGrid has undertaken a thorough review of its business activities, improving efficiencies and reducing costs. These changes are most significant in operating expenditure for business support. Consumers will benefit from these initiatives from July 2014, with forecast revenue over the next five years some $30 million lower as a result.

TransGrid's efficiency has also been demonstrated over many years through benchmarking studies with both Australian and international peers.

The expenditure forecasts in this proposal comprise the efficient costs required to sustainably provide the transmission services on which the people of New South Wales and the Australian Capital Territory depend.

Informed by Consumers

TransGrid has established a comprehensive consumer engagement program, to give consumers a voice in the development of TransGrid's business plans and ensure that the revenue proposal takes into consideration consumers' perspectives and priorities.

Consumer workshops have been held to discuss topics such as operating expenditure, capital expenditure, incentive schemes, demand management, pricing methodology and the rate of return. Workshops have been held with residential consumers, small and medium businesses, large industrial and commercial customers and a range of consumer representative groups.

The workshops have sought to explore aspects of the revenue proposal, to better understand important aspects from a consumer's perspective and understand if TransGrid's priorities and objectives are aligned with those of consumers. They have been supplemented by TransGrid's "Have Your Say" website that has shared the workshop content and findings, providing opportunities for all consumers to share their perspectives and request further information.

In 2013, TransGrid published a consultation paper on transmission pricing to assist consumers and stakeholders in formulating their views on TransGrid's pricing methodology. The consultation paper considered the principles and issues that need to be addressed in efficient transmission pricing. Public submissions were sought, and where possible TransGrid has incorporated the feedback that has been received into its proposed pricing methodology.

TransGrid's newly developed approach to community consultation on major capital projects was strongly endorsed by both large energy users and consumer representative groups. This new approach is being implemented on TransGrid's Powering Sydney's Future project, which is examining supply requirements to the Sydney inner metropolitan area.

In addition, valuable feedback has been received on the information consumers need to understand, and have confidence in, TransGrid's expenditure plans. This has resulted in a more accessible and transparent revenue proposal.

In the Interests of Consumers

This proposal has been prepared to align with the national electricity objective and be in the long term interests of consumers.

The plans underpinning this proposal have been developed to defer network investment where possible, pursue the possibility of demand management or other non-network solutions and manage TransGrid's long life assets to ensure they perform acceptably over their entire life cycle.

The plans reflect an appropriate balance of current and future expenditure, to avoid either significant degradations in transmission reliability or future price "shocks" that can result from underinvestment. Either of these outcomes would adversely affect consumers, and TransGrid is committed to providing a level of reliability consumers are satisfied with at the most efficient cost.

Changes to the Regulatory Framework

TransGrid submitted a transitional revenue proposal in January 2014, under transitional arrangements arising from the *Economic Regulation of Network Service Providers* rule change in 2012. The AER's transitional determination in March 2014 set a "placeholder" revenue for 2014/15, which will be set aside and replaced by the transmission determination on this revenue proposal.

In the full determination, TransGrid's maximum allowed revenue from 2015/16 onward will be adjusted to take account of any difference in the maximum allowed revenue for 2014/15 between the transitional and full determinations.

The transitional arrangements allow TransGrid to propose, and the AER to approve, a four year overall period. TransGrid proposes a four year overall period from 2014/15 to 2017/18, comprised of a one year transitional regulatory control period and three year subsequent regulatory control period. If accepted by the AER, this would enable a more integrated and efficient approach to transmission revenue determinations to be achieved by 2022, assuming that further amendments are made to the Rules.

1.1 Capital Expenditure

Capital expenditure is forecast to be 28% lower in the next five years than in the current regulatory control period.

The mix of capital expenditure in the next five years is significantly different from any period in recent history for TransGrid. In particular, load driven investment is small, reflecting the significant change in recent electricity usage. In contrast, replacement expenditure has increased significantly from that of the current period, reflecting many of the assets built during the establishment of the transmission network in the 1950s and 1960s reaching the end of their serviceable lives.

The interconnected electricity transmission network in New South Wales was first developed in the mid 1950s and 1960s, with a large number of assets commissioned at that time. The interconnected network was developed to improve efficiency and reliability above that of individual networks with local generation that existed at the time.

Transmission equipment is typically designed and manufactured with an intended life, on average, of around 40 to 50 years. To date, TransGrid has mainly undertaken replacement and refurbishment of individual items of equipment to keep existing substations operational at the lowest cost. This has been an appropriate strategy in the current and previous regulatory control periods.

However, when the majority of equipment in a substation reaches the end of its serviceable life or the majority of structures on a transmission line reach the end of their serviceable lives at around the same time, a complete rebuild can be a more prudent and economic option. TransGrid has included a number of substation and transmission line renewal projects in this proposal, as substations and transmission lines constructed in the 1950s and 1960s have started to reach a condition that reflects the end of their serviceable lives. Given the significant number of assets constructed when the transmission network was first developed, this has led to a material increase in the number of assets requiring replacement over the next five years.

TransGrid has proposed an asset renewal program in this proposal that comprises the most economic combination of replacement and refurbishment options to ensure a sustainable electricity supply. The asset renewal program is essential to the safety of staff, contractors and the public and to maintain a reliable electricity supply.

The projects that comprise the forecast capital expenditure have undergone thorough option identification, economic evaluation and optimisation across the whole portfolio. Where low cost options exist that defer more expensive capital investment, these have been proposed.

The forecast capital expenditure in this proposal comprises the efficient costs TransGrid requires for the provision of transmission services in the upcoming regulatory control period, and is consistent with both the national electricity objective and capital expenditure objectives.

The forecast capital expenditure is shown in Table 1.1.

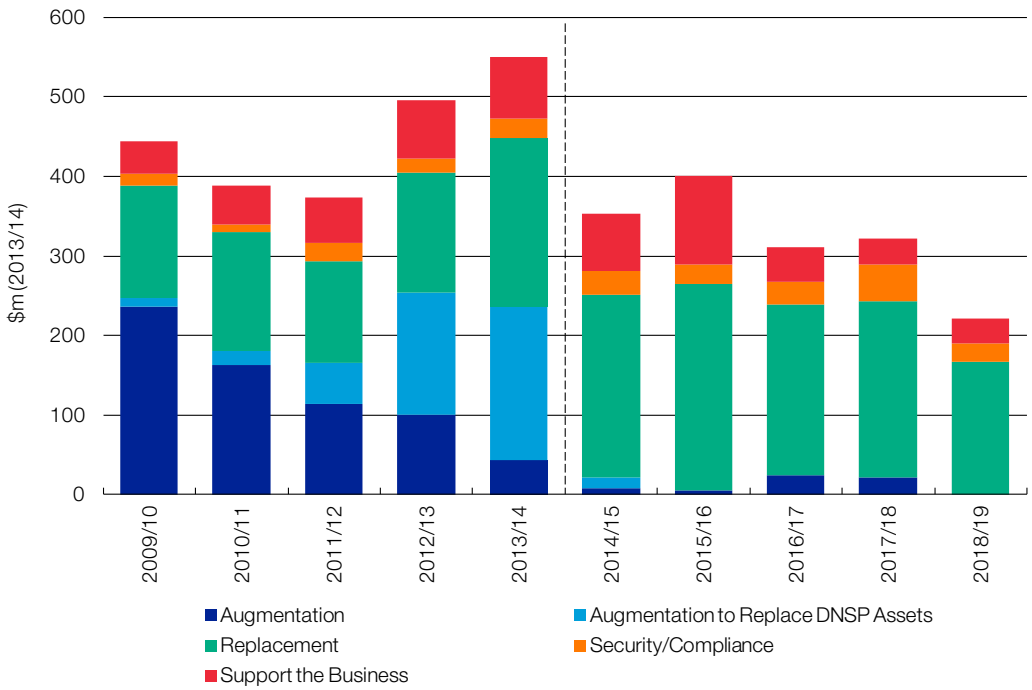
Table 1.1
Forecast Capital Expenditure ($m nominal)

Category	2014/15 Expected	2015/16 Forecast	2016/17 Forecast	2017/18 Forecast	2018/19 Forecast
Augmentation	22.2	6.1	25.7	23.2	0.0
Replacement	235.5	272.3	231.0	245.4	189.7
Security/Compliance	30.8	24.8	31.9	51.3	25.6
Support the Business	**73.9**	**118.2**	**46.6**	**36.0**	**35.1**
Information Technology	19.8	20.7	19.5	23.0	21.5
Accommodation	8.8	11.5	5.2	0.0	0.0
Vehicles	9.2	8.1	10.0	11.7	12.2
Strategic Property	33.5	76.3	10.2	0.0	0.0
Other Business Support	2.6	1.5	1.6	1.3	1.4
Total	**362.4**	**421.4**	**335.2**	**355.8**	**250.3**

Source: TransGrid. Totals may not add due to rounding.

A comparison of the historical and forecast capital expenditure is shown in Figure 1.4. This is shown in 2013/14 dollar terms for comparability.

Figure 1.1
Historical and Forecast Capital Expenditure ($m 2013/14)



Source: TransGrid.

1.2 Operating Expenditure

Operating expenditure trends at around 1.3% above CPI on average over the next five years. The first year's increase is primarily driven by enhanced consumer and community engagement, regulatory obligations arising from new guidelines issued by the AER and a demand management initiative endorsed by consumers. Forecast increases in labour costs and major operating projects primarily account for the trend in later years.

In the current regulatory control period, TransGrid has undertaken a thorough review of its business activities and made a number of sustainable changes, resulting in efficiencies throughout its business. The main business improvements achieved over this period are:

- the transition to a "virtual control room" for operating the network, closure of one control room and rostering improvements to better match workload;
- transfer of external insurance cover to SICorp, the NSW Government self insurer;
- a change in the sourcing mix of information technology activities, and strong negotiation of efficiency in information technology contracts;
- a reduction in staff travel, following the installation and increasing use of video conferencing;
- a review of fleet management, including the standardisation of vehicles and consolidation of contracts;
- consolidation of inventory warehouses to one warehouse in each region; and
- a change in sourcing mix for internal audit activities, to include cosourcing.

The cost savings from these initiatives benefit consumers directly in this proposal, through a reduction in forecast operating expenditure in the upcoming regulatory control period of approximately $6 million per year.

The forecast operating expenditure in this proposal comprises the efficient costs TransGrid requires for the provision of transmission services in the upcoming regulatory control period, and is consistent with both the national electricity objective and operating expenditure objectives.

The forecast operating expenditure is shown in Table 1.2.

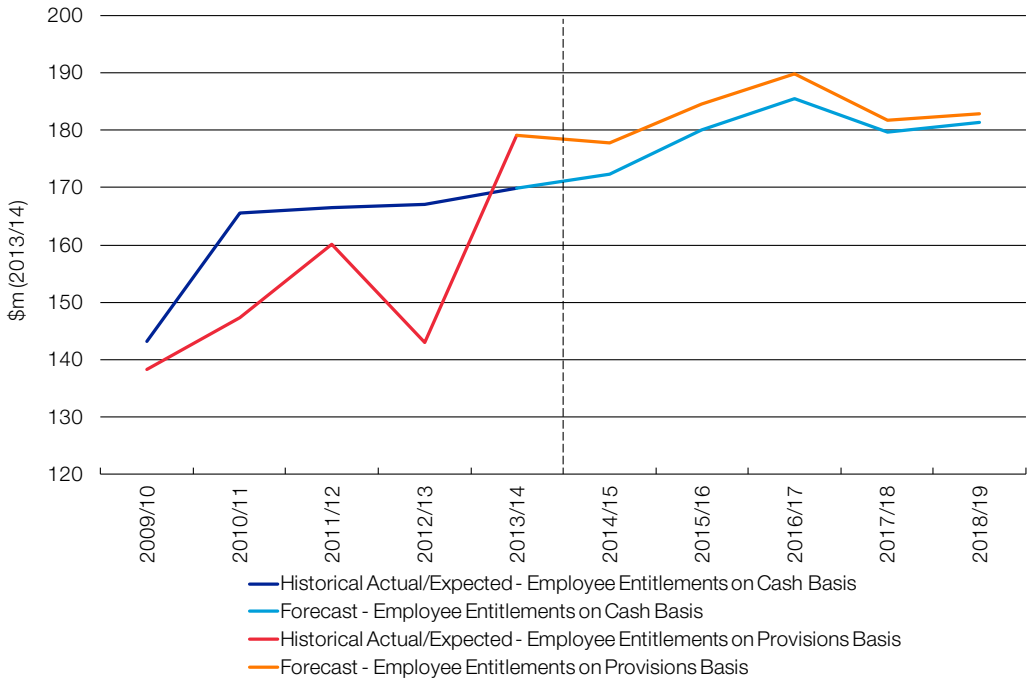
Table 1.2
Forecast Operating Expenditure ($m nominal)

Category	2014/15 Expected	2015/16 Forecast	2016/17 Forecast	2017/18 Forecast	2018/19 Forecast
Maintenance	**78.5**	**87.8**	**93.5**	**86.1**	**90.0**
Maintenance	69.4	75.6	79.4	79.9	83.8
Major Operating Projects	9.1	12.1	14.0	6.2	6.2
Maintenance Support and Asset Management	11.4	11.8	12.3	12.9	13.4
System Operations	9.3	9.7	10.1	10.6	11.1
Grid Planning	10.1	10.5	11.0	11.5	12.0
Rates and Taxes	5.6	5.9	6.1	6.4	6.6
Property	3.4	1.5	1.5	1.6	1.7
Health, Safety and Environment	3.7	3.9	4.1	4.2	4.4
Information Technology	14.1	14.6	15.1	15.7	16.3
Business Administration	12.1	12.6	13.1	13.7	14.3
Corporate and Regulatory Management	25.0	26.9	28.3	30.3	29.0
Total Controllable Operating Expenditure	**173.2**	**185.1**	**195.2**	**192.9**	**198.9**
Debt Raising Costs	7.4	7.8	8.2	8.4	8.7
Insurance	6.1	6.8	7.6	8.5	9.5
Self Insurance	0.0	0.0	0.0	0.0	0.0
Network Support	5.5	6.6	7.8	8.7	9.6
Total	**192.2**	**206.3**	**218.7**	**218.5**	**226.7**

Source: TransGrid. Totals may not add due to rounding.

A comparison of the historical and forecast operating expenditure is shown in Figure 1.2. This is shown in 2013/14 dollar terms for comparability, with trends shown using both cash and provisions approaches to employee entitlements such as long service leave and superannuation. The cash approach has been used in the forecasts in this proposal, consistent with the AER's expressed preference in its *Expenditure Forecast Assessment Guideline*.

Figure 1.2
Historical and Forecast Operating Expenditure ($m 2013/14)



Source: TransGrid. Excludes network support and debt raising costs.

1.3 Allowed Rate of Return

TransGrid proposes a rate of return calculated by use of a weighted average cost of capital (WACC) of 8.83%. TransGrid considers that its approach to estimating the WACC is consistent with the Rules and best achieves the national electricity objective and the rate of return objective.

The cost of debt is derived from a 10 year historic trailing average for a benchmark efficient business of 7.72%. This rate should be updated annually to maintain the trailing average approach. TransGrid proposes that the Reserve Bank of Australia's published data series is used to estimate the cost of debt.

No transition to the historic trailing average is required or proposed. TransGrid considers that a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid would periodically issue fixed rate corporate debt regardless of whether it was:

- formulated to mimic the outcomes of a competitive market; or
- formulated to mimic the efficient financing practices of an entity subject to the previous regulatory regime.

In both of these circumstances, a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid would not require a transition as its debt financing practices would already be consistent with the trailing average approach.

Under the first approach, where a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid was formulated to mimic the outcomes of a competitive market, NERA notes that:

> …in the absence of any regulatory distortions a benchmark efficient entity would finance its long lived assets with a portfolio of long term debt with staggered maturity dates, thereby optimising the trade-off between refinancing risk and the overall cost of debt.[1]

In the alternative, where a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid was formulated to mimic the efficient financing practices of an entity subject to the previous regulatory regime, TransGrid considers that there is a range of efficient debt management practices available to that entity. The choice of which practice to use will depend on the businesses' particular circumstances. The specific regulatory framework that the business is subject to will not necessarily influence the choice of debt management practice as there are likely to be more significant factors that determine the most efficient approach. TransGrid is not alone in this view, as it was recognised by both the AEMC when drafting the new Rules in 2012 and by SFG when advising the AEMC on the development of the new Rules.[2]

The cost of equity is estimated at 10.5%, based on all the relevant information from noted and respected financial theory models, an independent capital market expert's recent valuation of a business comparable to a benchmark efficient entity and a comparison of the estimated return on equity to observed debt yields as a means of a reasonableness check.

TransGrid's approach to estimating the return on equity concludes that there are a number of sources of relevant information that can be used to improve the estimate of the return on equity. These are:

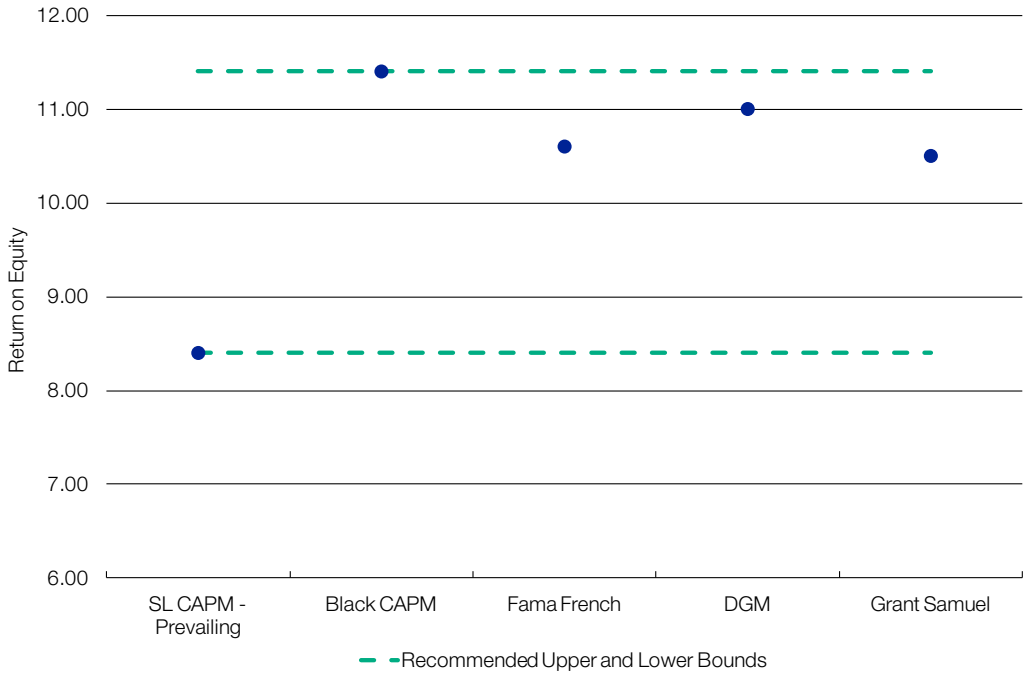
- the Sharpe-Lintner Capital Asset Pricing Model (CAPM);
- the Black CAPM;
- the Fama-French Three Factor Model (FFM);
- the Dividend Growth Model (DGM);
- an independent capital market expert's recent valuation of a business comparable to a benchmark efficient entity; and
- a comparison of the return on equity to observed debt yields as a means of a reasonableness check.

In TransGrid's opinion a rate of 10.5% represents the best estimate of the prevailing return on equity for a benchmark efficient transmission network service provider (TNSP).

Figure 1.3 shows the range of estimates for the return on equity estimated by NERA from different sources of relevant information. The range is 8.25% to 11.5%.[3]

[1] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p22.
[2] AEMC 2012, *Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services: Final Position Paper*, 15 November 2012, p56.
[3] Noting that return on equity estimates are rounded to the closest 25 basis points.

Figure 1.3
Return on Equity Estimates with Upper and Lower Bounds



Source: NERA.

The estimate from the Sharpe-Lintner CAPM clearly lies well below all other estimates, which is to be expected since there is a substantial body of evidence suggesting that this model will underestimate the return on equity for a low equity beta business.

A return on equity of 10.5% is equal to the mid-point of the gamma adjusted return on equity range used by Grant Samuel to value Envestra, an entity recognised by the AER as comparable to a benchmark efficient TNSP. In that context, it represents an unbiased, independent expert estimate of the return on equity.

A return on equity of 10.5% is consistent with estimates derived using the Fama French Model and the Dividend Growth Model. In addition it is consistent with the observed risk premium provided to debt investors in recent years.

TransGrid has applied a gearing ratio of 60% to estimate the return on capital.

1.4 Maximum Allowed Revenue

TransGrid's forecast revenue for 2014/15 to 2018/19 is projected to remain in line with CPI over this period.

TransGrid proposes the forecast revenue in Table 1.3 as the efficient revenue that is required for the provision of its transmission services. The revenue has been forecast taking into account TransGrid's revealed efficient costs, benchmark efficient costs and the regulatory and commercial risks involved in the provision of transmission services.

TransGrid's forecast satisfies both the national electricity objective and the revenue and pricing principles in the National Electricity Law.

Table 1.3 shows TransGrid's proposed maximum allowed revenue smoothed over both four year and five year periods. TransGrid is proposing a four year regulatory control period in this proposal. However, smoothed revenue forecasts over both periods have been provided to assist the AER in determining the length of the regulatory control period.

Table 1.3
Proposed Maximum Allowed Revenue ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19
Return on Capital	542.8	567.4	596.1	615.6	638.2
Return of Capital (Regulatory Depreciation)	91.7	106.7	121.6	107.5	120.9
Operating Expenditure	192.2	206.3	218.7	218.5	226.7
Efficiency Carryover	21.0	12.1	14.5	23.5	0.0
Tax Allowance	44.6	48.1	68.0	69.6	72.9
Unsmoothed Revenue	**892.4**	**940.7**	**1,018.9**	**1,034.8**	**1,058.7**
Five Year Smoothed Revenue	**937.4**	**961.1**	**985.3**	**1,010.2**	**1,035.7**
Five Year X-Factor	2.13%	0.00%	0.00%	0.00%	0.00%
Four Year Smoothed Revenue	**932.9**	**956.5**	**980.7**	**1,005.4**	
Four Year X-Factor	2.59%	0.00%	0.00%	0.00%	

Source: TransGrid. Totals may not add due to rounding.

A comparison of the forecast revenue with the maximum allowed revenue in the current regulatory control period is shown in Figure 1.4. This is shown in 2013/14 dollar terms for comparability.

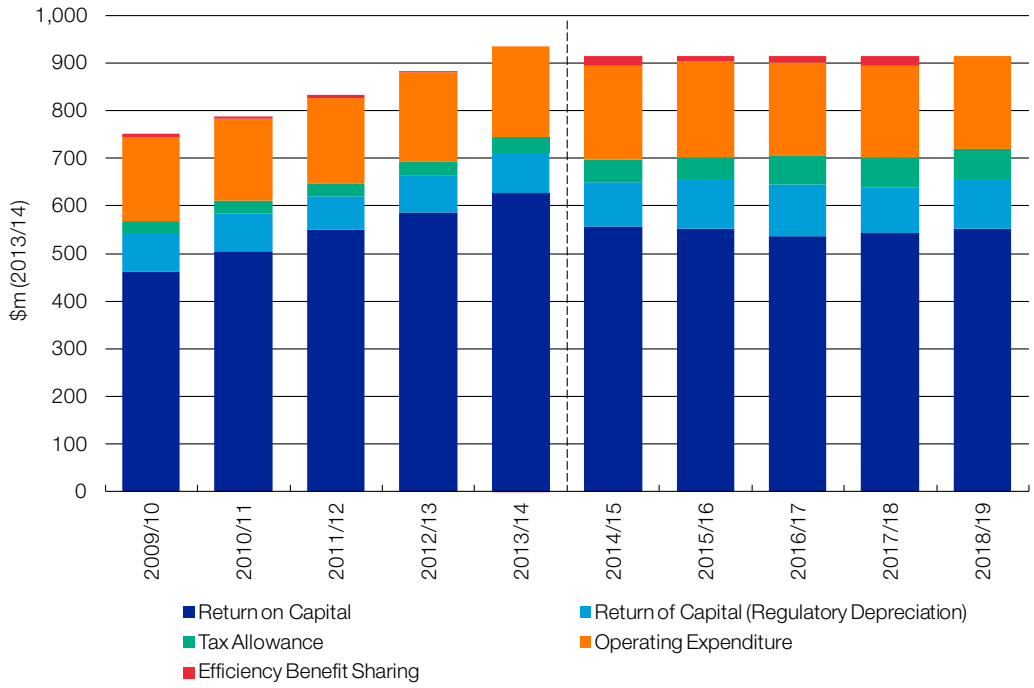
1.5 Price

To minimise price rises for consumers, TransGrid has worked hard to ensure that its smoothed revenue forecast is no higher than CPI for the upcoming regulatory control period.

The prices represent a 4% real decrease from the maximum allowed revenue in 2013/14 to 2014/15, followed by price changes below CPI over the remaining years. They represent a 3.5% real increase from TransGrid's revenue freeze in 2013/14 to 2014/15, followed by price changes below CPI over the remaining years.

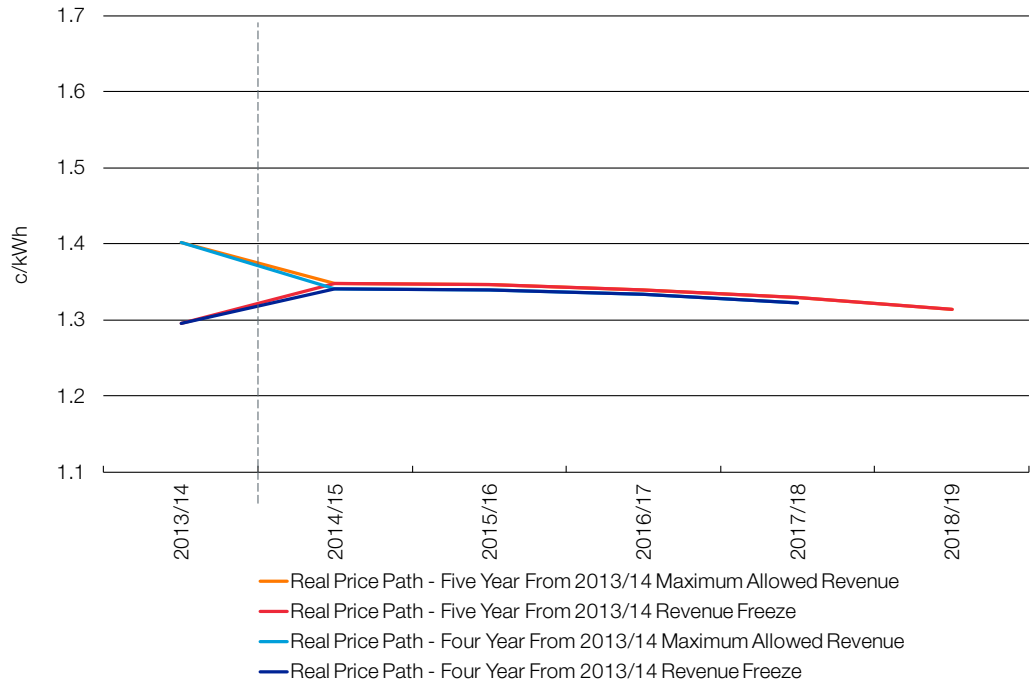
The average price path over both four year and five year periods, from TransGrid's maximum allowed revenue and the revenue following the revenue freeze in 2013/14, is shown in Figure 1.5.

Figure 1.4
Historical and Forecast Revenue ($m 2013/14)



Source: TransGrid. Totals are smoothed maximum allowed revenue and do not reflect TransGrid's revenue freeze in 2013/14. The disaggregation into building block components is approximate as the building block components relate to unsmoothed rather than smoothed revenue.

Figure 1.5
Average Price Path ($ 2013/14)



Source: TransGrid.

2 Introduction

TransGrid is pleased to present its revenue proposal for the 2014/15 to 2018/19 period.

TransGrid is the major electricity transmission network service provider in New South Wales and the Australian Capital Territory. Its network transmits electricity from generators to directly connected large energy users and distribution networks, which in turn distribute electricity to local households and businesses.

The network provides an essential service to New South Wales and the Australian Capital Territory, including both the national capital and the largest state capital city in Australia. Over 7 million consumers rely on TransGrid's network to provide them with their electricity supply.

TransGrid's network is the backbone of the National Electricity Market, enabling energy trading between the three largest states along the east coast and supporting the competitive wholesale electricity market.

TransGrid's role is to provide efficient, reliable transmission services to New South Wales, the Australian Capital Territory and the National Electricity Market.

As a regulated network service provider, TransGrid submits a revenue proposal to the Australian Energy Regulator (AER) in advance of each regulatory control period. The revenue proposal sets out the forecast expenditure and revenue for the upcoming regulatory control period.

2.1 TransGrid's Network

TransGrid's network comprises 96 substations and switching stations, and over 12,900 kilometres of high voltage transmission lines operating at voltages of 500kV, 330kV, 220kV and 132kV.

It spans New South Wales, from the coast to the western-most areas of the state and from the Queensland border at the north to the Victorian border at the south.

The network has been developed over more than 50 years to meet consumer demand and underpin the state's economic growth and prosperity.

TransGrid's capability in planning, building, operating and maintaining the network has matured over this time, and continues to incrementally improve in line with the frontier of good electricity industry practice. This experience and capability have meant that customers have enjoyed a reliable electricity supply from a network that has been progressively and economically developed to meet the needs of the state.

A map of the network is shown in Appendix P.

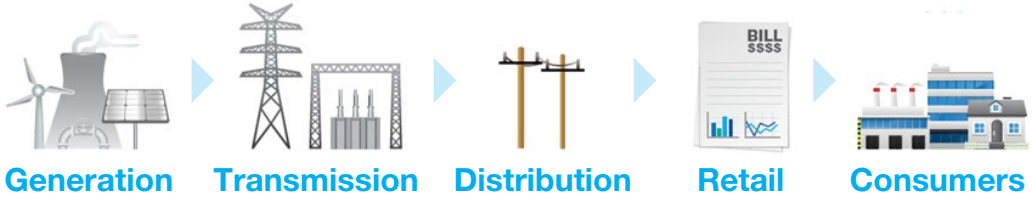
2.2 The Role of Electricity Transmission

Electricity transmission transports electricity from the locations at which it is generated to the locations at which it is used.

In general, it is more efficient to transport electricity than to transport the raw energy source. Therefore, generators are often situated near energy sources such as coalfields, major gas pipelines, dams or areas of steady wind. These tend to be some distance from major load centres.

Electricity transmission, therefore, transports electricity in large quantities and over long distances. Major generators supply electricity into the transmission network, which delivers it across the state to major supply points where it is transferred to large customers and distribution networks, for regional and local distribution to households and small and medium businesses.

Figure 2.1
The Electricity Supply Chain



Electricity transmission provides a further important role in the National Electricity Market. That is, it provides the platform on which the competitive wholesale electricity market can operate. It does this by providing sufficient capacity and interconnection with other states for generators to be able to deliver their output to meet demand, and therefore to be effectively able to compete with each other and generators in other states.

2.2.1 National Electricity Objective

Electricity transmission is designed and operated to promote the national electricity objective, which is set out in the National Electricity Law (NEL). It is:

> to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to—
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system.[4]

2.3 Priced Affordably

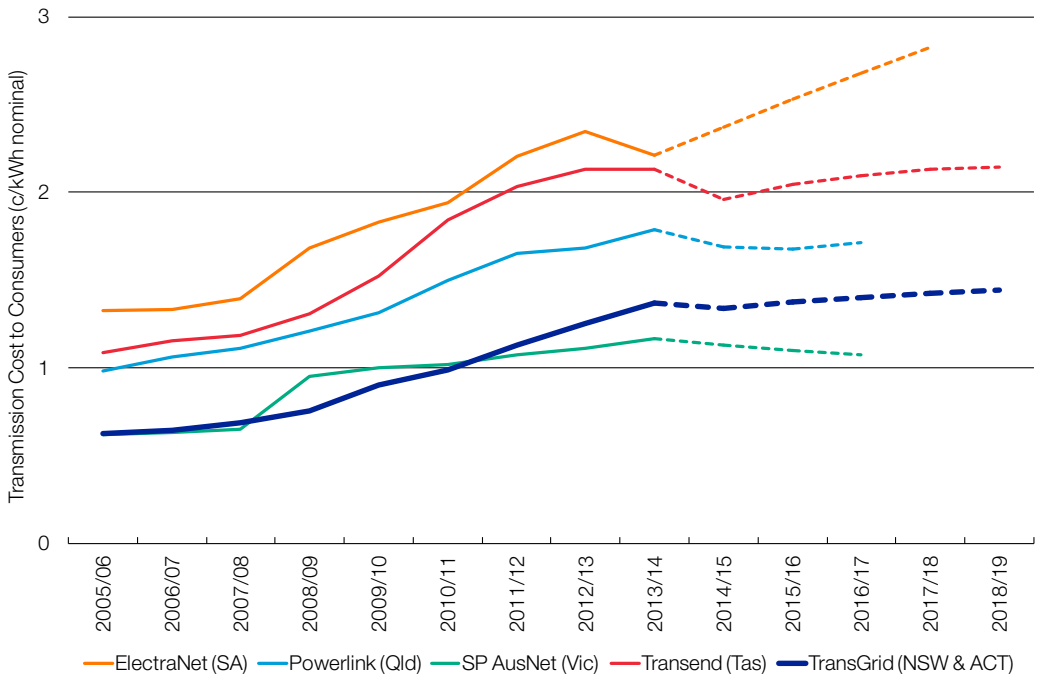
In recent years, significant price rises have occurred for all electricity consumers. TransGrid understands that electricity is an essential service, and that consumers should pay no more than necessary for their electricity supply.

[4] *National Electricity Law*, Section 7.

While transmission is a small component of most bills, at approximately 7% on average for residential and small business consumers, TransGrid understands that every dollar is important and that recent electricity price rises have added to household and business financial pressures. For households, an affordable electricity service is essential in an environment of increasing pressures on the cost of living. For small businesses and large industrial users, an affordable electricity service can provide the competitive edge in Australian and international markets.

Electricity consumers in New South Wales and the Australian Capital Territory pay amongst the lowest transmission costs in the National Electricity Market, and this proposal maintains this position. Figure 2.2 shows the historical and forecast contributions of the major transmission networks in the NEM to an indicative consumer bill.

Figure 2.2
Transmission Cost to Consumers



Source: AER performance reports, transmission revenue determinations, transitional transmission determination for Transend and National Electricity Forecasting Report.

In 2011, the AEMC published a report on trends in residential electricity price movements and the drivers behind those trends. For New South Wales, it found that transmission was the least contributor to electricity price rises, as shown in Table 2.1.[5]

[5] AEMC, *Possible Future Retail Electricity Price Movements: 1 July 2011 to 30 June 2014*, 25 November 2011, p34. The AEMC has published more recent reports in 2012 and 2013 on retail electricity price movements; however, as the reports consider future price movements the 2011 report best represents recent increases. Further, the 2012 report notes that due to changes in distribution pricing bands its figures are not representative of TransGrid's contribution to price movements.

Table 2.1
Contributors to Electricity Price Movements in New South Wales

Component	Percentage of Price Increase
Wholesale energy, including the effect of price on carbon	38%
Distribution	36%
Green energy	12%
Retail	7%
Transmission	6%

Source: AEMC, *Possible Future Retail Electricity Price Movements: 1 July 2011 to 30 June 2014.*

The transmission sector has not seen the double-digit percentage price increases that some other sectors have over the last five years.

TransGrid understands that although transmission is a small component of most bills, every dollar is important.

In 2012, TransGrid announced a revenue freeze for 2013/14, in order to reduce volatility in prices. Further, this proposal forecasts revenue growth that is no higher than CPI for the upcoming regulatory control period while also including necessary capital expenditure that contributes to the achievement of the national electricity objective and the capital expenditure objectives. These initiatives are intended to minimise the price impact of TransGrid's transmission services on consumers on an ongoing basis while maintaining a secure and reliable transmission network, and are reflected in the forecasts in Figure 2.2.

2.4 Sound Outcomes for Consumers

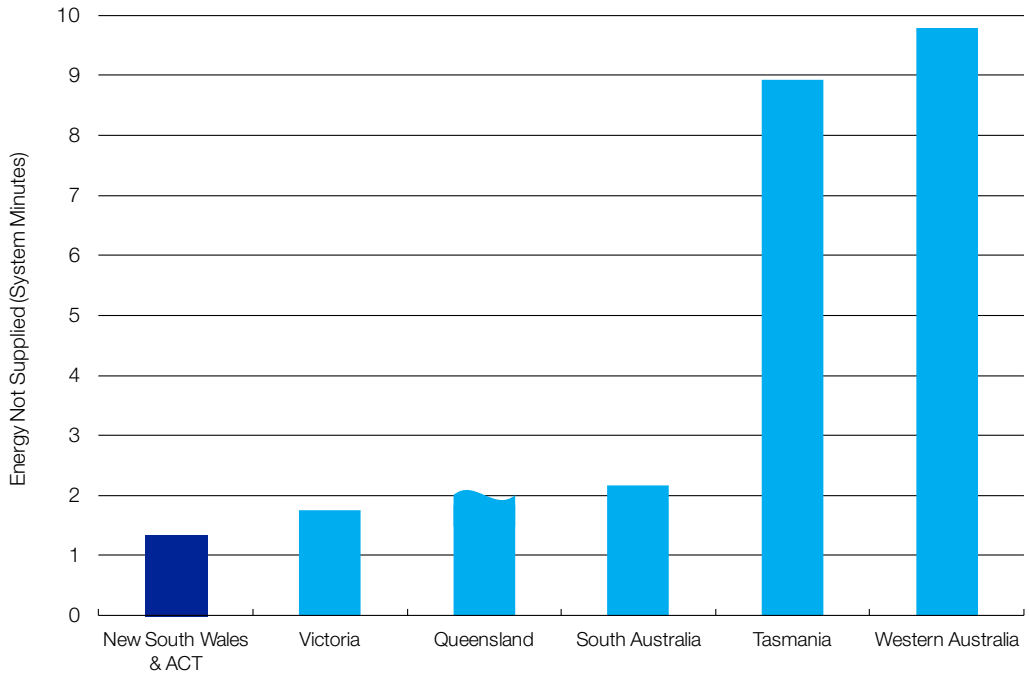
For amongst the lowest transmission costs in the NEM, electricity consumers in New South Wales and the Australian Capital Territory enjoy sound outcomes. Consumers can depend on a consistently reliable transmission network that also supports effective competition in the wholesale electricity market. Consumers benefit from this competition through downward pressure on the wholesale component of electricity prices.

A Consistently Reliable Transmission Network

TransGrid has operated its network to a higher level of reliability than any other transmission network in the NEM over the last 10 years.

Figure 2.3 compares the major transmission networks in the NEM that publish reliability data, using energy not supplied as a measure. The lower the level of energy not supplied, the more reliable the network. New South Wales and the Australian Capital Territory have enjoyed the most reliable transmission network of all the states.

Figure 2.3
Average Annual Energy Not Supplied from 2002/03 to 2011/12



Source: Survey data from Energy Supply Association of Australia, and annual STPIS performance reporting for Queensland.[6]

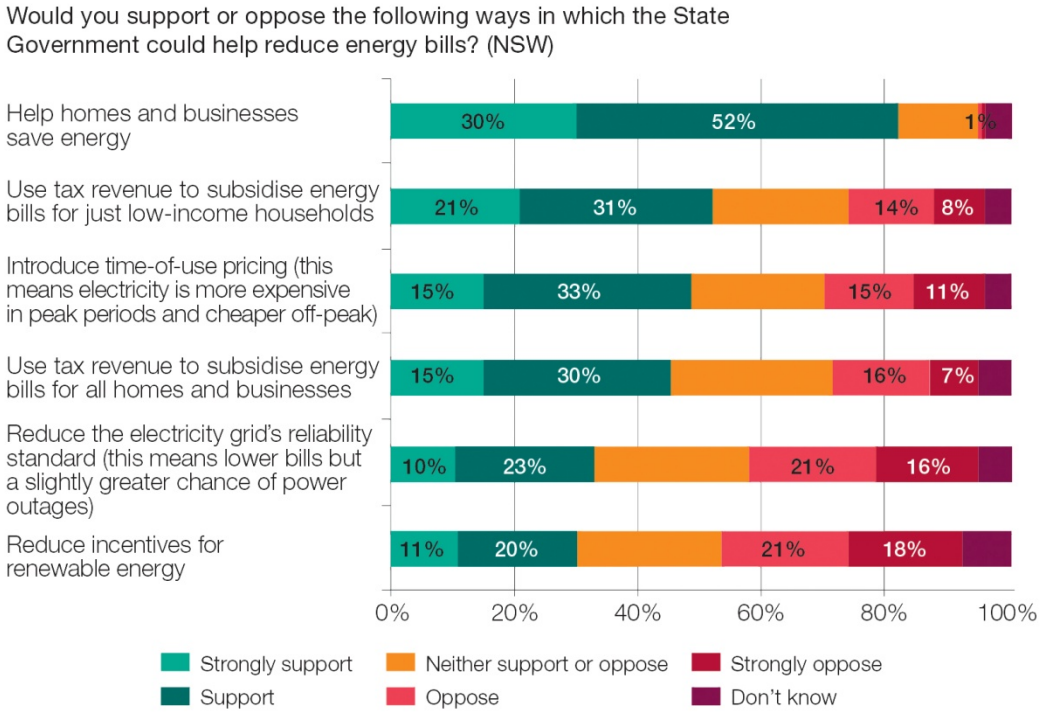
Recent consumer research has indicated that the reliability of the transmission network is valued by consumers in New South Wales, with little support for lower reliability levels to achieve price reductions.[7]

In 2013, CHOICE, the Brotherhood of St Laurence and the Energy Efficiency Council conducted a survey on energy affordability. While the survey found that most households are concerned about the cost of electricity, it also found that a reduction in the reliability of the grid was amongst the least supported ways to help reduce energy bills. The results of the survey are summarised in Figure 2.4.

The results of the survey are consistent with feedback provided to TransGrid during recent consumer engagement activities. Almost two thirds of consumers indicated they were prepared to pay a slight increase in transmission charges to maintain the current level of reliability, with the remainder willing to accept a slightly lower level of reliability for a slightly lower cost. This is explained further in Section 3.7.2.

[6] The most recent Energy Supply Association of Australia data for Queensland is in 2005/06. Data for Queensland beyond 2005/06 has been estimated from the events reported in annual STPIS reports based on the loss of supply parameter thresholds. This means that the data for Queensland is incomplete and may show better performance than has actually been achieved.
[7] CHOICE, *Survey of Community Views on Energy Affordability – New South Wales*, November 2013.

Figure 2.4
Consumer Feedback on Strategies to Reduce Energy Bills



Source: CHOICE.[8]

The results are also consistent with the results of a survey on electricity reliability conducted by the AEMC in 2012. This survey found that consumers "would require a significant discount on their bill to accept poorer reliability."[9] That is, there was not widespread support for a lower level of reliability.

Effective Competition Leads to Lower Wholesale Electricity Prices

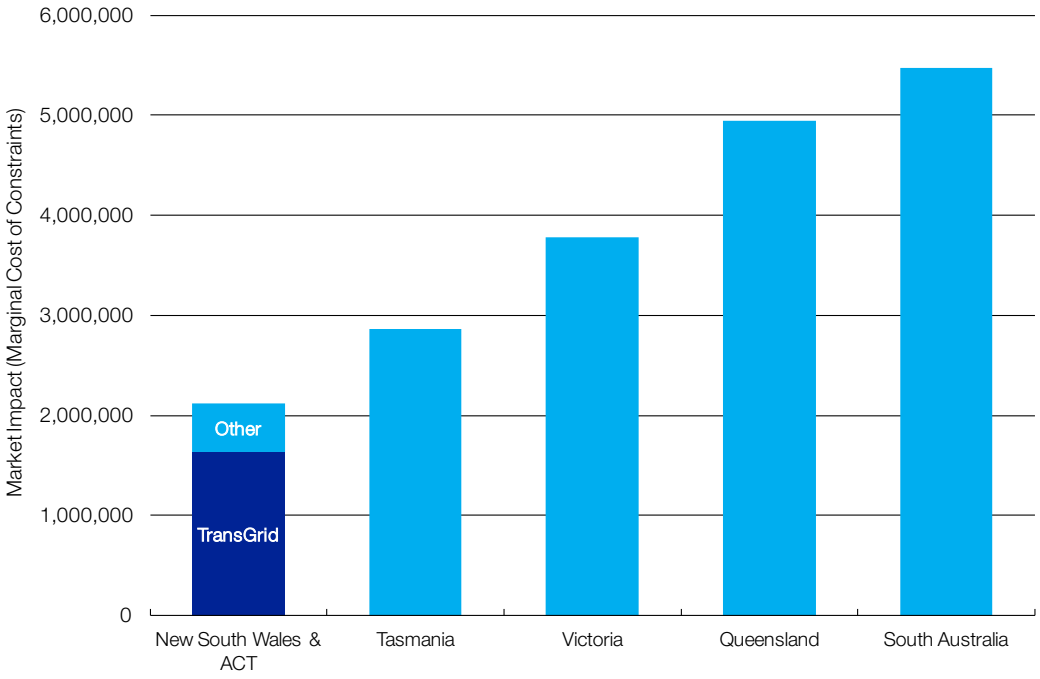
TransGrid's network is the least congested transmission network in the NEM. This places downward pressure on the wholesale component of electricity prices, by enabling effective competition between generators and allowing the lowest cost generation to be dispatched most often. This is shown in Figures 2.5 and 2.6.

Figure 2.5 compares the marginal cost of constraints over the last five years between the states in the NEM, and shows TransGrid's network separately to other electricity networks in New South Wales. The lower the marginal cost of constraints, the more the lower cost generation can be dispatched and the lower the prices consumers pay for their electricity.[10]

Figure 2.6 shows a similar comparison of the average annual hours constrained. It shows that TransGrid's network has the least duration of constraints amongst the states in the NEM.

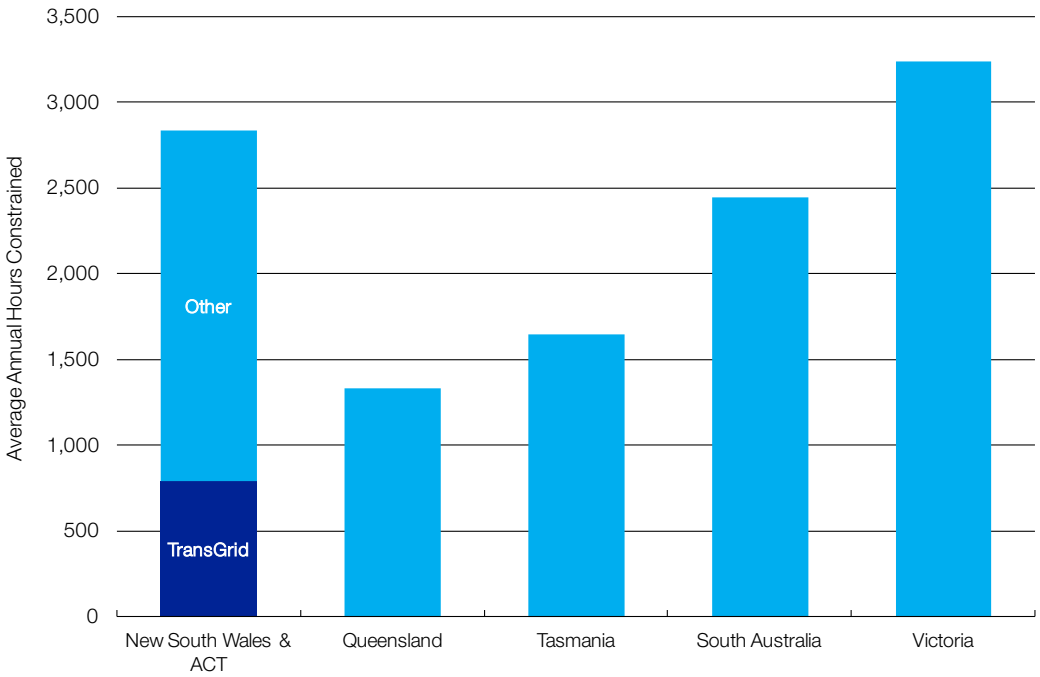
[8] CHOICE, *Survey of Community Views on Energy Affordability – New South Wales*, November 2013, p5.
[9] AEMC, *Fact Sheet: NSW Customer Survey on Electricity Reliability*, 31 August 2012, p3.
[10] The marginal cost of constraints provides an indication of the cost of constraints, but can be affected by certain market behaviour such as disorderly bidding. It is the most readily available indication of congestion and is the indicator that is generally used for congestion reporting.

Figure 2.5
Marginal Cost of Constraints from 2009 to 2013



Source: Electricity Market Management System data with classifications added by TransGrid. Excludes frequency control ancillary services, ramping, discretionary and network support constraints.

Figure 2.6
Average Annual Hours Constrained from 2009 to 2013



Source: Electricity Market Management System data with classifications added by TransGrid. Excludes frequency control ancillary services, ramping, discretionary and network support constraints.

Electricity consumers in New South Wales and the Australian Capital Territory benefit from the least congested transmission network of all the states in the NEM. Amongst other factors, this is due to regular reviews by TransGrid of the impact of its network on the electricity market and low cost initiatives and operational measures taken, where economic, to improve network capability.

2.5 TransGrid is Efficient

In the current regulatory control period, TransGrid is subject to a revenue determination made by the AER in April 2009. In this determination, the AER approved an operating expenditure allowance that reflects "the AER's conclusion on an efficient controllable opex allowance",[11] and a capital expenditure allowance that "the AER is satisfied… reasonably reflects the capex criteria".[12] These allowances reflect efficient levels of expenditure against which TransGrid's performance can be measured.

Over the last five years, TransGrid has reduced its operating expenditure below the efficient regulatory allowance through a culture of continuous improvement and innovation. It has also deferred over $600 million of capital expenditure, in response to shifts in peak demand during the period. Consumers benefit from these decisions directly in this revenue proposal, with forecast revenue over the next five years some $30 million lower due to the business improvements and $230 million lower due to the deferrals.

TransGrid's efficiency has also been demonstrated over many years through benchmarking studies with both Australian and international peers, which are discussed in Sections 5.7 and 6.8.

2.5.1 Continuous Improvement and Innovation

TransGrid has worked hard in the current regulatory control period to pursue efficiencies, implement continuous improvement programs, manage costs and defer expenditure where prudent.

The main business improvements achieved over this period are:

- the transition to a "virtual control room" for operating the network, closure of one control room and rostering improvements to better match workload;
- transfer of external insurance cover to SICorp, the NSW Government self insurer;
- a change in the sourcing mix of information technology activities, and strong negotiation of efficiency in information technology contracts;
- a reduction in staff travel, following the installation and increasing use of video conferencing;
- a review of fleet management, including the standardisation of vehicles and consolidation of contracts;
- consolidation of inventory warehouses to one warehouse in each region; and
- a change in sourcing mix for internal audit activities, to include cosourcing.

[11] AER, *Final decision: TransGrid transmission determination 2009-10 to 2013-14*, p100.
[12] AER, *Final decision: TransGrid transmission determination 2009-10 to 2013-14*, p44.

Consumers benefit from these initiatives through a reduction in operating expenditure in the upcoming regulatory control period of approximately $6 million per year. Further detail on the initiatives is provided in Section 6.6.

TransGrid has improved the management of its capital portfolio through the establishment of a Portfolio Management Office, review of its *Network Investment Process* and establishment of sourcing strategies for major capital works and maintenance contracts. A description of TransGrid's management systems and processes is provided in Chapter 4.

TransGrid's commitment to continuous improvement and innovation has been key to maintaining its standing as an efficient provider of transmission services.

Online Condition Monitoring

Over the last 15 years, TransGrid has progressively installed online condition monitoring on key substation equipment. This provides real-time diagnostics of key equipment condition measures and allows early detection of equipment failure.

In 2012, online condition monitors fitted to new transformers detected developing failures on two transformers. Further investigation confirmed a type fault in a batch of transformer bushings that affected 22 new transformers on TransGrid's network.

The online condition monitoring system avoided the major failure of two new transformers, with a combined replacement cost of approximately $15 million. It is presently being used to continuously monitor other bushings in the same manufacturing batch to detect and avoid further failures, pending replacement of the bushings.

2.5.2 Benchmarking

In order to understand its efficiency relative to that of other comparable businesses, TransGrid participates in a broad set of Australian and international benchmarking studies, as outlined in Sections 5.7 and 6.8. These cover aspects of TransGrid's business such as maintenance, asset management, IT, human resources and corporate overheads.

The benchmarking studies demonstrate that TransGrid's costs are generally in line with, or more efficient than, those of its Australian and international peers.

There are three categories in which TransGrid's costs benchmarked higher than those of its peers. In two of these categories, TransGrid already had efficiency initiatives underway that have since delivered cost reductions. The initiatives are:

- an accommodation review, which has resulted in the construction of a new office building above an existing TransGrid building at Ultimo, and a reduction in accommodation expenses; and
- streamlining of the payroll administration function, including automation of some tasks.

The cost reductions delivered by these initiatives have been reflected in the operating expenditure forecasts in his proposal.

In the third category, the management of work health and safety, TransGrid considers that given the significant health and safety risks inherent in the operation of an electricity network, TransGrid's costs would be expected to be higher than those of other companies, including other types of utilities. Therefore, TransGrid has proposed not to reduce its costs in this category.

The benchmarking presented in this proposal provides assurance that TransGrid's costs reflect the efficient costs of providing transmission services in New South Wales and the Australian Capital Territory.

2.6 Changes to the Regulatory Framework

Due to the transitional arrangements in the *Economic Regulation of Network Service Providers* rule change in 2012, TransGrid's revenue determination was deferred by a year. TransGrid submitted a transitional revenue proposal in January 2014 for 2014/15, following which the AER made a transitional determination as a "placeholder" that will be superseded in the full determination. This full revenue proposal is submitted in accordance with the transitional provisions of Chapter 11 of the Rules, and includes information on the 2014/15 transitional year. In the full determination, TransGrid's maximum allowed revenue from 2015/16 onward will be adjusted to take account of any difference in the maximum allowed revenue for 2014/15 between the transitional and full determinations.

The transitional arrangements allow TransGrid to propose, and the AER to approve, a four year overall period.[13] This was permitted to enable TNSPs and the AER to optimise the alignment of regulatory reviews across all TNSPs, which the AEMC considered may be desirable from both a resourcing and benchmarking perspective.[14]

The AEMC also recommended the alignment of regulatory control periods between TNSPs in its *Transmission Frameworks Review*. The AEMC concluded that alignment will further facilitate enhanced TNSP coordination by:

- assisting the AER to compare TNSP augmentation plans across the NEM, facilitating implementation of cross-regional planning recommendations; and
- allowing consistent regulatory arrangements between TNSPs, through the use of consistent assumptions and assisting with benchmarking.[15]

The AER agreed with the AEMC's recommendations, and confirmed that the aligned transmission resets will provide benefits in terms of transmission planning and also make it easier to invest in interconnectors.[16]

TransGrid is open to the objective of aligning the regulatory control periods of TNSPs and proposes a four year overall period to facilitate this alignment, from 2014/15 to 2017/18. Under the transitional arrangements in the *Economic Regulation of Network Service Providers* rule change,[17] this is comprised of a one year transitional regulatory control period commencing on 1 July 2014 followed by a three year subsequent regulatory control period commencing on 1 July 2015.

The proposed four year overall period is consistent with the first step of the AEMC's proposed timeline for achieving alignment.[18] Further amendment of the Rules would be required to allow a second four year regulatory control period to achieve alignment by 2022.

If accepted by the AER, a four year regulatory control period would enable a more integrated and efficient approach to transmission revenue determinations to be achieved by 2022, assuming that further amendments are made to the Rules.

[13] *National Electricity Rules*, Clause 11.58.4(l).
[14] AEMC, *Rule Determination, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, p245.
[15] AEMC, *Final Report: Transmission Frameworks Review*, 11 April 2013, p55.
[16] AER, *Second Interim Report Submission, October 2012*, p4.
[17] *National Electricity Rules*, Clause 11.58.4.
[18] AEMC, *Final Report: Transmission Frameworks Review*, 11 April 2013, pp 55-57 and Table 4.2.

2.7 Revenue and Pricing Principles

In response to this proposal, the AER will make a transmission determination.

The AER must exercise its power to make the transmission determination in a manner that "will or is likely to contribute to the achievement of the national electricity objective".[19] In addition, the AER must take into account the revenue and pricing principles in the NEL when making the transmission determination. The revenue and pricing principles are:

(2) A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in —

(a) providing direct control network services; and

(b) complying with a regulatory obligation or requirement or making a regulatory payment.

(3) A regulated network service provider should be provided with effective incentives in order to promote economic efficiency with respect to direct control network services the operator provides. The economic efficiency that should be promoted includes —

(a) efficient investment in a distribution system or transmission system with which the operator provides direct control network services; and

(b) the efficient provision of electricity network services; and

(c) the efficient use of the distribution system or transmission system with which the operator provides direct control network services.

(4) Regard should be had to the regulatory asset base with respect to a distribution system or transmission system adopted —

(a) in any previous —

(i) as the case requires, distribution determination or transmission determination; or

(ii) determination or decision under the National Electricity Code or jurisdictional electricity legislation regulating the revenue earned, or prices charged, by a person providing services by means of that distribution system or transmission system; or

(b) in the Rules.

(5) A price or charge for the provision of a direct control network service should allow for a return commensurate with the regulatory and commercial risks involved in providing the direct control network service to which that price or charge relates.

(6) Regard should be had to the economic costs and risks of the potential for under and over investment by a regulated network service provider in, as the case requires, a distribution system or transmission system with which the operator provides direct control network services.

(7) Regard should be had to the economic costs and risks of the potential for under and over utilisation of a distribution system or transmission system with which a regulated network service provider provides direct control network services.[20]

Together, the national electricity objective and the revenue and pricing principles require the AER to make a transmission determination for TransGrid that promotes efficient investment in the long term interests of consumers. Consumers benefit from the efficient use of resources in the long run, which requires prices to reflect the long run cost of supply and support efficient investment. Investors must be provided with a return that covers the opportunity cost of capital required to deliver the services provided by TransGrid's transmission network.

[19] *National Electricity Law*, Section 16(1).
[20] *National Electricity Law*, Section 7(2) to (7).

The national electricity objective and the revenue and pricing principles were not amended by the *Statutes Amendment (National Electricity and Gas Laws – Limited Merits Review) Act 2013*. However, following this amendment, the AER is required to make the transmission determination that it is satisfied will or is likely to contribute to the achievement of the national electricity objective to the greatest degree.

This proposal supports and upholds the national electricity objective. It reflects the efficient costs TransGrid requires to provide electricity transmission services to New South Wales, the Australian Capital Territory and the National Electricity Market. It provides a rate of return sufficient to allow TransGrid to efficiently invest in its network in the long term interests of consumers. It applies and is consistent with the current version of the National Electricity Rules,[21] which includes amendments made by the *Economic Regulation of Network Service Providers* rule change.[22]

In particular, this revenue proposal will or is likely to contribute to the achievement of the national electricity objective because:

- the expenditure forecasts in this proposal have been developed to reflect efficient investment for the provision of electricity transmission services that are in the long term interests of consumers. This means that the forecasts are no more than TransGrid considers necessary to sustainably provide these services into the future;
- the rate of return has been calculated in accordance with the allowed rate of return objective in Clause 6A.6.2(c) of the National Electricity Rules and has been developed using all available and relevant information. This means that the rate of return in this revenue proposal is commensurate with the efficient costs of a benchmark efficient entity with a similar degree of risk as that of TransGrid;
- the forecast capital expenditure and rate of return together ensure that TransGrid is given the incentive to efficiently invest in its network. The transmission services provided by TransGrid are essential to ensuring the safe and reliable operation of the National Electricity Market and the secure supply of electricity to the over 7 million consumers that rely on TransGrid's transmission network;
- TransGrid has achieved efficiencies in its operating expenditure over time in a manner consistent with the national electricity objective, while maintaining a consistently reliable transmission network. The forecast operating expenditure reflects these efficiencies and TransGrid considers that it is required to achieve the operating expenditure objectives; and
- at the same time as incentivising TransGrid to undertake efficient investment, the revenue proposal maintains an affordable price for electricity transmission services to consumers. In addition, the revenue proposal has been developed having regard to the outcomes of consumer engagement undertaken by TransGrid.

These matters are discussed in more detail throughout the revenue proposal. When the revenue proposal is considered as a whole, TransGrid considers that there is no other determination that would result in a greater degree of contribution to the achievement of the national electricity objective.

[21] Version 62 of the National Electricity Rules is the current version at the time of submission of this proposal.
[22] AEMC, *Rule Determination, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*.

2.8 Basis of Numbers

In this proposal, historical expenditure is presented in nominal December dollars, in alignment with annual regulatory reporting. Forecast expenditure is presented in nominal June dollars, in alignment with the post-tax revenue model (PTRM).

Comparisons and trends of historical and forecast expenditure are presented in real December 2013 (2013/14) dollars.

2.9 Confidential Information

TransGrid has not identified any aspects of this revenue proposal, including appendices, to be confidential.

3 Operating Environment and Drivers

In the five years since TransGrid's last revenue determination, the electricity industry has seen unprecedented change.

This change has come through the convergence of a number of factors. Economic growth has been subdued due to the global financial crisis in 2008 and subsequent uncertainty in global markets. The strong Australian dollar has made it challenging for Australian industries to compete internationally, resulting in some closures and the scaling back of some industries.

At the same time, electricity price increases and government policy have created incentives to pursue energy efficiency initiatives and the widespread installation of domestic solar panels. Stakeholder and community expectations have evolved in recent years, with higher expectations on early and more detailed consultation on business activities.

These factors have been considered in the development of the forecasts in this proposal.

3.1 Economic Development in New South Wales and the Australian Capital Territory

3.1.1 New South Wales

The New South Wales economy has the largest Gross State Product in Australia, reaching $471 billion in 2012/13.[23]

In 2011, the NSW Government released a 10 year plan, *NSW 2021*,[24] setting out its goals for the state through to 2021. The *NSW 2021* plan sets targets for a reduction in energy consumption through efficient energy use. It also includes targets to increase business investment in New South Wales, increase the value of primary industries and mining production, increase the population in regional New South Wales and increase exports from New South Wales.

[23] Australian Bureau of Statistics, *Australian National Accounts: State Accounts*, 28 November 2013.
[24] NSW Government, *NSW 2021: A Plan to Make NSW Number One*, 2011.

However, primary industries and mining are not the only sectors with growth potential in New South Wales. A recent report by Deloitte Access Economics envisages that the sectors likely to grow most strongly in the global economy in the coming years, and in which Australia has an advantage, are gas, agribusiness, tourism, international education and wealth management.[25] These sectors collectively have the potential to be as big as mining.[26]

The Deloitte Access Economics *Business Outlook* identifies these growth sectors as those in which New South Wales has an advantage.

> History is moving NSW's way. The Premier State wasn't a big beneficiary of the resources boom, but it is lapping up lower interest rates and a more moderate $A, while NSW's portfolio of industries also looks better suited to the sectoral growth drivers of the next two decades.[27]

The transmission services provided by TransGrid underpin the economic development of the state. This revenue proposal ensures that TransGrid's network will provide the necessary level of reliability to support regional and mining developments, large industries, future growth sectors and local business.

This proposal has been developed to align with the *NSW 2021* plan and ensure that New South Wales is poised to take advantage of its likely future growth sectors. It supports current regional and mining developments through the inclusion of forecast capital expenditure for specific expansions of the network where mine investment is underway. It is prepared to meet the needs of future growth sectors, through an approach to managing the network that enables responsive decisions in the changing environment, and through the pursuit of new approaches to satisfy network needs. These new approaches ensure investment can be made "just in time", recognising that investment that is too early or too late will impose additional economic costs on society.

The proposal also recognises the success of energy efficiency programs and initiatives, which are considered each year in TransGrid's annual planning review and have been accounted for in the peak demand forecasts on which forecast capital expenditure is based.

3.1.2 Australian Capital Territory

The Australian Capital Territory is home to Australia's national capital city, Canberra.

The Canberra Plan[28] sets out the Australian Capital Territory Government's vision and goals for the territory. Its economic objective is:

> To ensure that a strong, dynamic, resilient and diverse economy meets the needs of the Canberra community now and into the future; to maintain economic growth that promotes a fully sustainable city; and to promote the ACT's place as the heart of the economic region.

The Canberra Plan, together with the *ACT Planning Strategy*,[29] include plans for current and future residential land releases and commercial and industrial development. This is reflected in the population growth experienced in the Australian Capital Territory over recent years, which has been above the national average.[30]

TransGrid is working with the Australian Capital Territory Government to ensure that the transmission network provides the level of reliability appropriate to support the national capital.

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[25] Deloitte Access Economics, *Positioning for Prosperity? Catching the Next Wave*, 2013, p11.
[26] Deloitte Access Economics, *Positioning for Prosperity? Catching the Next Wave*, 2013, p19.
[27] Deloitte Access Economics, *Business Outlook*, September 2013, p94.
[28] ACT Government, *The Canberra Plan: Towards Our Second Century*, 2008.
[29] ACT Government, *ACT Planning Strategy*, July 2012.
[30] ACT Government, *Report on Implementation of The Canberra Plan – Towards Our Second Century*, June 2013.

3.2 Federal Energy Policy

The Federal energy policy environment has led significant discussion about Australia's energy needs in the last few years, and is likely to bring about significant change in the energy industry over the next years and decades through continuing debate and reforms.

In 2012, the Australian Government published an energy white paper titled *Australia's Energy Transformation*.[31] The white paper foreshadows a significant shift over the next three decades from conventional fossil fuel power generation to clean energy technologies such as wind generation, large scale and domestic solar generation, geothermal energy and carbon capture and storage. TransGrid is well placed to meet these potential future energy shifts, as its network passes through areas in New South Wales that are well suited to renewable generation.

The energy white paper also recognises the changing nature of energy use, and highlights the importance of initiatives to reduce peak demand. In this proposal, TransGrid is proposing an increase in its demand management innovation allowance to more proactively pursue initiatives to reduce peak demand, with a view to reducing the level of network investment needed to meet peak demand in the future.

In December 2013, the Australian Government initiated the preparation of the next white paper through the publication of an issues paper setting out the terms of reference.[32] The issues most relevant to the provision of transmission services are:

- reflection of community expectations on reliability standards;
- possible approaches to tariff structures, particularly considering recent rapid growth of distributed generation;
- use of demand-side participation to encourage energy productivity and reduce peak energy use, and enhancement of energy efficiency measures;
- regulation of energy infrastructure, including potential reduction of regulatory burden; and
- initiatives to enhance growth and investment in the energy and resources sectors.

TransGrid has considered many of these issues in the preparation of this revenue proposal. In its discussions with consumers, TransGrid has sought consumers' views on reliability standards and the trade-off between cost and reliability. These are discussed in Section 3.7.2 and the report on the deliberative forums in Appendix G. TransGrid also undertook public consultation on transmission pricing, in the course of reviewing the pricing methodology to lodge with this revenue proposal. The outcomes are discussed in the explanatory statement in Appendix AH.

In relation to the regulation of energy infrastructure, TransGrid has actively participated in the *Economic Regulation of Network Service Providers* rule change, *Transmission Frameworks Review* and consultation on the AER's new guidelines, and will continue to participate in the development of the regulatory framework in the future.

TransGrid has taken a flexible approach to preparing for growth and investment in the energy and resources sectors. This proposal includes contingent projects for prescribed network investment that may be triggered by specific growth or investment related drivers.

[31] Australian Government, *White Paper: Australia's Energy Transformation*, 2012.
[32] Australian Government, *Issues Paper to inform preparation of a White Paper*, December 2013.

3.3 Electricity Demand

Electricity demand is a key driver of growth in transmission services. Transmission services are required to provide sufficient capacity to meet electricity demand at times of peak demand, within the range of likely operating conditions.

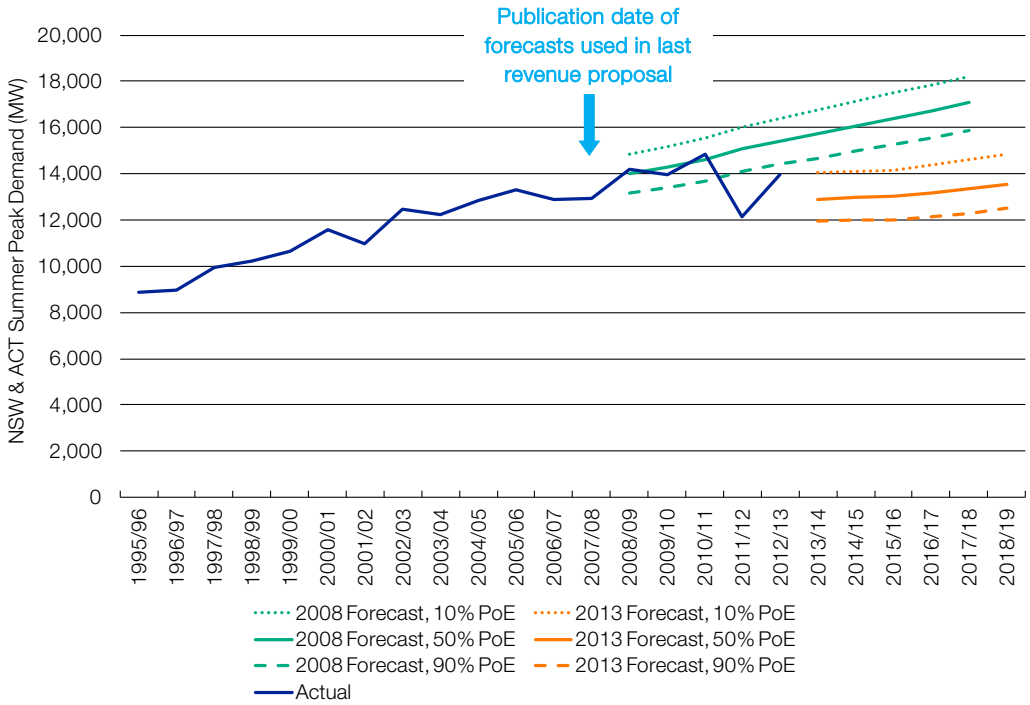
3.3.1 Responding to Peak Demand Forecasts

The past few years have seen marked changes in trends for peak demand growth across New South Wales and the Australian Capital Territory. This has largely been driven by consumer response to energy efficiency policies, green energy policies, the impact of global economic conditions on major industry and consumer confidence, and electricity price increases.

Figure 3.1 provides a comparison of the peak demand forecasts at the time of TransGrid's last revenue proposal and the forecasts used in this proposal. Forecasts are expressed in terms of the Probability of Exceedance (PoE). For example, 10% PoE is the level of demand that is expected to be exceeded one year in 10. Both 10% PoE (one year in 10) and 50% PoE (one year in two) forecasts are used for TransGrid's network planning, as outlined in the transmission network planning standard for New South Wales.[33]

The comparison clearly shows the change in consumer behaviour and electricity consumption. At the time of the last revenue proposal, the shift in peak demand was not yet evident. Solar bonus schemes had not yet commenced in New South Wales or the Australian Capital Territory, energy efficiency measures were in their infancy and the global financial crisis had not yet taken place.

Figure 3.1
Comparison of Peak Demand Forecasts in 2008 and 2013



Source: AEMO, *Electricity Network Forecasting Report 2013* and TransGrid, *Annual Planning Report 2008*.

[33] Industry and Investment NSW, *Transmission Network Design and Reliability Standard for NSW*, December 2010.

TransGrid has responded to the change in forecast peak demand in the last few years by deferring over $600 million of projects where the need has been pushed out to a later date and cancelling projects that are no longer necessary. Consumers benefit from this responsive behaviour directly from the start of the following regulatory control period, through a lower opening regulatory asset base for the period. Consumers directly benefit from these decisions in this revenue proposal, with forecast revenue over the next five years some $230 million lower due to the deferrals.

Significant projects that have been deferred out of the current regulatory control period include:

- Bannaby to South Creek 500kV transmission line;
- Dumaresq to Lismore 330kV transmission line;
- Tomerong 330kV substation;
- Beaconsfield 330kV busbar;
- Stroud to Taree 132kV transmission line; and
- Kemps Creek to Liverpool 330kV transmission line.

The Australian Energy Market Operator (AEMO) is the independent forecaster, providing state level demand forecasts for New South Wales. AEMO's *National Electricity Forecasting Report 2013* forecasts growth in electricity demand over the next 10 years at an average of 1.0% per year, as shown in Figure 3.1.[34] This growth is driven by projected population increases in New South Wales and the Australian Capital Territory, which outweigh the downward pressures from energy efficiency initiatives.

Over the next five years, forecast demand generally remains within the capacity of TransGrid's network, given the low forecast growth rate. Consequently, there is only a minimal amount of capital expenditure planned to augment the network. This is in contrast to the last decade or so of network investment requirements to meet projected growth in maximum demand.

3.4 Renewable Energy Targets

In 2001, the Australian Government established a mandatory renewable energy target, which targeted the introduction of 9,500 GWh of new renewable energy generation by 2010. Over 2009 to 2011, the scheme was reviewed and the current renewable energy target introduced, increasing the target of new large scale renewable generation to 41,000 GWh by 2020 and introducing a solar credits scheme.

The moderation in demand growth over the last few years has diminished the need for additional large generation to be introduced in the National Electricity Market. However, if the current renewable energy target is maintained, it will provide an incentive for further renewable generation to be introduced between now and 2020.

TransGrid has received a number of enquiries from renewable generation proponents about connecting to the transmission network in New South Wales. If these connections proceed, increases in the capacity of certain flow paths may be necessary to accommodate the changes to generation patterns in New South Wales.

[34] AEMO, *National Electricity Forecasting Report 2013*, June 2013, p4-1.

TransGrid proposes a contingent project to increase the capacity of certain flow paths on the shared network, which could be triggered if significant investment in renewable generation were to proceed and the benefits of the capacity increase were demonstrated.

3.5 Facilitating the National Electricity Market

Transmission networks form the platform on which the competitive wholesale National Electricity Market operates. In some cases, an augmentation of a transmission network may not be required to meet electricity demand but may deliver economic benefits that are larger than the cost of the augmentation. These are known as net market benefits.[35]

In the current regulatory control period, TransGrid has completed a project to increase the rating of a major transmission line between Tamworth and Armidale. The additional transmission capacity delivered by this project will result in market benefits that are greater than the project cost. TransGrid has also installed dynamic rating systems on some transmission lines, and reviewed the transfer limits of the Queensland to New South Wales Interconnector (QNI) in conjunction with Powerlink Queensland.

TransGrid has proposed projects with net market benefits in the upcoming regulatory control period. These projects meet the requirements for the Network Capability Incentive Parameter Action Plan (NCIPAP) projects and have therefore been included in the NCIPAP, which is attached as Appendix AG.

3.6 Asset Renewal for Sustainability

The interconnected electricity transmission network in New South Wales was first developed in the mid 1950s and 1960s, with a large number of assets commissioned at that time. The interconnected network was pursued to improve efficiency and reliability above that of individual networks with local generation that existed at that time.

Transmission equipment is typically designed and manufactured with an intended life, on average, of around 40 to 50 years. To date, TransGrid has undertaken the minimum level of replacement and refurbishment to keep existing substations operational at the lowest cost. This has been an appropriate strategy in the current and previous regulatory control periods.

However, when the majority of equipment in a substation reaches the end of its serviceable life or the majority of structures on a transmission line reach the end of their serviceable lives at around the same time, a complete rebuild can be a more prudent and economic option. TransGrid has included a number of substation and transmission line renewal projects in this proposal, as substations and transmission lines constructed in the 1950s and 1960s have started to reach a condition that reflects the end of their serviceable lives. Given the significant number of assets constructed when the transmission network was first developed, this has led to a material increase in the number of assets requiring replacement over the next five years.

Modern secondary systems, such as control, protection and metering systems, are comprised of microprocessor-based devices. While these devices have many advantages compared to older technologies such as electromechanical and solid-state devices, they have a shorter life expectancy and reach de-support and obsolescence sooner. Whereas older electromechanical relays could remain in service for over 40 years, the serviceable life of newer microprocessor-based systems is 15 years or less. This has led to an increase in the number of secondary system assets requiring replacement over the next five years.

[35] AER, *Regulatory Investment Test for Transmission Application Guidelines*, June 2010, pp14-32.

TransGrid has proposed an asset renewal program that comprises the most economic combination of replacement and refurbishment options to ensure a sustainable electricity supply. The asset renewal program is essential to ensuring the safety of staff, contractors and the public and maintaining a reliable electricity supply.

TransGrid's approach is similar to that taken by other transmission network service providers in Australia and internationally who are managing networks of a similar age.[36]

3.7 Consumer Engagement

3.7.1 TransGrid's Consumer Engagement Program

TransGrid has commenced a comprehensive consumer engagement program. One of the initial outcomes of this program is to ensure this proposal takes into consideration consumers' issues and priorities. However, the consumer engagement program is being established as an ongoing dialogue between TransGrid and consumers that will inform TransGrid's business plans into the future.

A range of approaches has been taken to consumer engagement to capture as representative a sample of views, understandings, priorities and concerns as possible. The program started by talking to consumers at a relatively high level as TransGrid developed a clearer view of consumers' baseline understanding of TransGrid and the electricity industry. From there, it moved progressively to specific topics to engage on the detail of the revenue reset program, with a focus on the topics of interest or priority for consumers.

This engagement drilled into key aspects of the revenue proposal to better understand what was most important from a consumer's perspective, and sought to understand if TransGrid's priorities and objectives were aligned with those of consumers. Understanding where consumers felt there was need for change in how TransGrid undertook its business was a priority of the consultation.

A summary of the consumer engagement activities TransGrid has undertaken by stakeholder group during the preparation of this proposal is as follows.

Consumer, Industry and Business Groups

TransGrid conducted two full-day workshops with representatives of consumer, industry and business groups. The first workshop in November 2013 sought opinions on key elements of the draft transitional revenue proposal. The second workshop in April 2014 explained how feedback had been taken into account and sought further feedback on this proposal. It included presentations from external experts on pricing and the rate of return. Representatives were engaged by direct invitation and travel expenses were covered, where requested. TransGrid also held one-on-one meetings with some attendees between the workshops.

Further detail on the discussion is available in the summary of consultation in Appendix F.

[36] AER, *Final Decision: Powerlink Transmission Determination 2012/13 to 2016-17*, April 2012, OFGEM, *RIIO-T1: Final Proposals for National Grid Electricity Transmission and National Grid Gas*, 2012, p64 and OFGEM, *Fact Sheet 67*, 2006, p2.

Large Energy Users

As with consumer, industry and business groups, TransGrid conducted two full-day workshops with large energy users. The first workshop in November 2013 sought opinions on key elements of the draft transitional revenue proposal. The second workshop in April 2014 explained how feedback had been taken into account and sought further feedback on this proposal. It included presentations from external experts on pricing and the rate of return. Representatives were engaged by direct invitation.

Further detail on the discussion is available in the summary of consultation in Appendix F.

Residential and Small Business Consumers

There were five key elements to engagement with residential and small business consumers:

1. Initial Consumer Roundtables

   The program commenced with three-hour consumer roundtables in Parramatta and Dubbo in May and June 2013 to understand high level views of consumers in urban and rural areas. This work was undertaken by KJA, specialists in community and stakeholder relations. In total, 44 participants attended, recruited by a market research company to be representative of the demographics of electricity consumers.

   Participants were educated about the electricity industry and TransGrid's role, and asked how they would like to be involved in TransGrid's expenditure forecasting activities. In addition, TransGrid discussed energy topics outlined by the AER to gauge participants' views and opinions on capital expenditure investment, alternatives to network investment, price versus reliability, reliability standards and price setting.

   The outcomes of these roundtables were used to inform later stages of development of the consumer program.

2. Deliberative Forums

   TransGrid reflected on the content of the initial consumer roundtables and full-day workshops with consumer representatives and large energy users, and commissioned Newgate Research to conduct qualitative market research in the form of deliberative forums. The deliberative forums gathered feedback on key elements of the five year plan and explored knowledge and perceptions of TransGrid, issues the community is most interested in hearing about from TransGrid and preferred methods of communications and engagement.

   This work comprised one three-hour focus group in Sydney's CBD to test materials, followed by two four-hour forums in Parramatta and Wagga Wagga. In total, 51 people attended the two forums, recruited to be broadly representative of their communities. This methodology was used to allow consumers time to understand the TransGrid business and the issues it faces before being asked for their opinions on what are relatively complex issues.

   Key outcomes of these forums are discussed in the report in Appendix G, and TransGrid's response is discussed in Section 3.7.2.

3. Consumer Website

   In October 2013, TransGrid launched a consumer focused website to continue the thematic discussion with consumers, drawing on the insights taken from the workshops and forums. The website encourages consumers to "Have Your Say" and comment on aspects of the revenue proposal and TransGrid's operations and plans that are of interest or importance to them. The full content from the forums was placed on the website, alongside independently prepared reports on the forums, to invite a broader base of consumers into the conversation.

   More information on TransGrid's consumer program and what consumers have been saying is on the "Have Your Say" website at www.yoursaytransgrid.com.au.

4. Quantitative Survey

   In order to quantify the results of the deliberative forums, TransGrid commissioned Newgate Research to conduct an online quantitative survey of 650 residential consumers in New South Wales and the Australian Capital Territory. The survey was conducted in March 2014. The survey included brief background information on TransGrid's role, operations and plans and sought consumers' feedback on specific aspects of its plans.

   A summary of the results of the survey is included in the summary of consultation attached in Appendix F, and key results are discussed in Sections 3.7.2, 5.9 and 6.8.

5. Consumer Behaviour Survey

   TransGrid commissioned Capitalis, a market research company, to undertake a survey on consumers' energy consumption attitudes, current behaviour and future intentions. The survey, of more than 1,400 consumers, was undertaken in July 2013 to help interpret energy forecasts and inform future planning requirements. The information gathered in the survey allowed TransGrid to better assess the need for contingent projects in the revenue proposal.

Feedback from this consultation has had a direct impact on TransGrid's approach to network support solutions, consumer engagement and its pricing methodology. In addition, feedback on TransGrid's newly developed community consultation approach to major capital projects, which involves consulting well in advance on project need, was strongly endorsed. This approach is being implemented in TransGrid's Powering Sydney's Future project, which is examining potential network needs to supply the Sydney CBD. Further information on this project is available on TransGrid's website.

Valuable feedback has been received on the information consumers need to understand and have confidence in TransGrid's capital expenditure plans. Improving TransGrid's understanding of the perceptions that consumers hold in relation to the electricity industry, and the information they need to interpret the revenue proposal, will result in more accessible and transparent engagement on this revenue proposal.

Feedback from engagement will also be used to guide TransGrid's approach to ongoing communications and engagement with its stakeholders.

Improvements to Community Consultation Processes

Over the last two years, TransGrid has undertaken a number of measures to improve its consultation with the community and how it plans and delivers projects to communities.

In 2012 and 2013, TransGrid openly participated in the *Review of Electricity Supply to the Mid North Coast* conducted by Mr Robert Rollinson.[37] In response to this review and a changing environment, TransGrid strengthened its approach to community engagement and commissioned RPS Group, an independent consulting company, to carry out an external and public review of its project consultation practices.[38]

The research associated with this internal review, conducted by Newgate Research, included:

- eight focus group discussions with residents, farmers and businesses within four project areas;
- 17 in-depth interviews with other stakeholders; and
- a telephone survey of 800 people (200 in each area).

The resulting report, *TransGrid Review of Public Consultation*, has assisted TransGrid to revise its approach to community and stakeholder engagement. TransGrid has committed to opening up its planning processes, engaging with the community from the onset of a project and consulting with the community over the full life cycle of a project. This change represents a significant shift in the way in which TransGrid communicates with its stakeholders by starting conversations with the community earlier, involving the community in decision making processes, and collaborating with them to develop effective, sustainable and holistic energy solutions.

TransGrid also publishes *The Buzz* e-newsletter which updates TransGrid's customers and interested stakeholders on business operations, community investment and other matters.

Transmission Annual Planning Report

Each year, TransGrid publishes a Transmission Annual Planning Report (TAPR), a public document which provides clear and relevant information on TransGrid's proposed network investment plans. A public forum is held each year to present the key features of the TAPR, and is well attended by a range of industry representatives.

While the main audience for the TAPR is interested parties such as market participants and industry representatives, TransGrid is currently reviewing how to best extend the role of the TAPR to inform consumers about its plans on an ongoing basis. TransGrid's aim is to provide the public with a better understanding of the state's high voltage transmission network and TransGrid's role.

3.7.2 Consideration of Consumer Feedback in this Proposal

TransGrid has considered the feedback received from consumers during preparation of this proposal. Full reports on the individual forums and workshops are on TransGrid's "Have Your Say" website, www.yoursaytransgrid.com.au. A summary of the main specific items of feedback and TransGrid's consideration of each is as follows.

[37] Robert Rollinson, *Review of Electricity Supply to the Mid North Coast*, http://www.energy.nsw.gov.au/__data/assets/pdf_file/0006/467448/MNC-Review-Final-Report.pdf.
[38] RPS Group, *TransGrid Review of Public Consultation,* http://www.transgridreview.com.au/.

Balance of Price and Reliability

At the deliberative forums and workshops, TransGrid discussed the balance of price and reliability with consumers. In general, consumers were satisfied with the level of reliability of the transmission network, although some concerns were raised that the overall level of reliability in regional areas could be better, noting that this is mainly affected by distribution networks rather than transmission networks.

At the deliberative forums, the balance between price and reliability was explained in some detail. Participants generally felt reliability was something they wanted to enjoy without thinking about it, with many considering it something that could not be compromised.

Participants were advised to think of reliability in terms of numbers and lengths of blackouts. They were advised that TransGrid's network experiences around 12 to 16 blackouts each year (each in a different part of the state), each lasting approximately one hour and taking out power to around 15,000 homes.

Almost two thirds of participants indicated that they were willing to pay a slight increase of around $4 per annum, which is within CPI, to maintain the same reliability as now. Almost one third advised that they would prefer to pay the same as now and accept slightly more blackouts, and a small number would prefer to pay slightly less than now and accept more blackouts.

Generally, participants were pleased that TransGrid was planning for the future and is maintaining the availability of its network. Concerns were raised that the transmission network not be allowed to deteriorate to a state of widespread lower reliability, with a significant "bow wave" of replacements needed in the future.

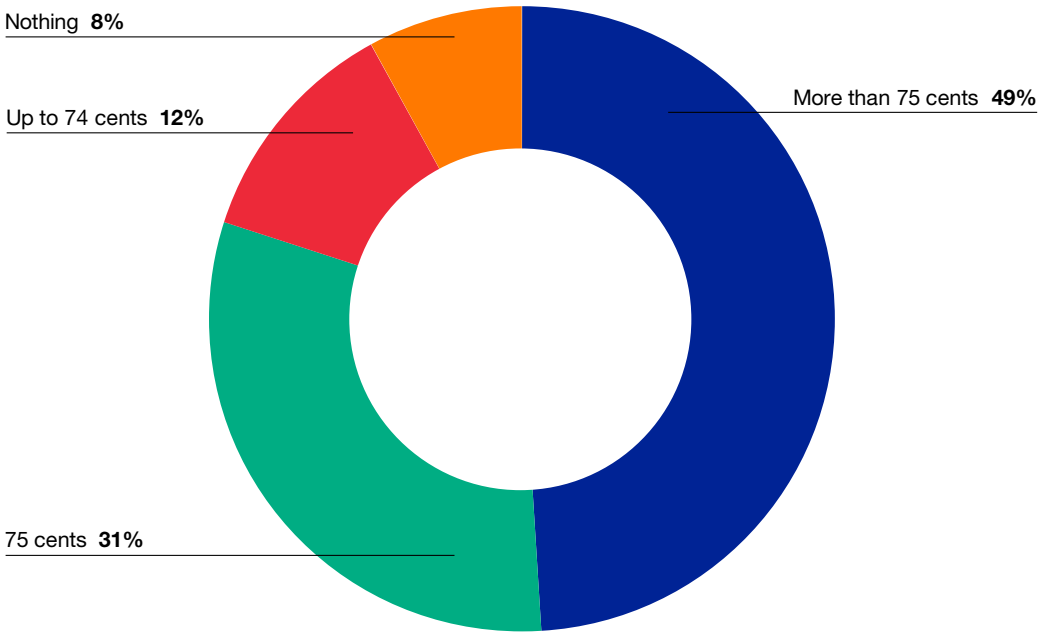
These qualitative findings were verified in the quantitative results, in which most respondents thought TransGrid's proposal to replace old infrastructure to maintain the current level of network reliability was at least fairly acceptable (84%), with half thinking it was highly acceptable (51%). To further explore this issue, TransGrid sought views on consumers' willingness to pay for reliability.

To indicate the level of transmission network reliability that is acceptable to them, the 650 survey respondents were asked to enter how much extra they would be willing to spend per quarter in the 2014/15 financial year towards this. The specific question asked was:

> Reliability is measured by the number of blackouts that are directly caused by the failure of TransGrid's transmission network. The current level of reliability is around one blackout in 10 years, lasting 1-2 hours.
>
> Blackouts relating to TransGrid's infrastructure generally affect large areas such as whole towns or groups of suburbs. Other blackouts may occur at more localised levels, but these are in "downstream" networks that are not in TransGrid's control.
>
> In order to maintain the current level of network reliability, infrastructure that is around 50-60 years old and nearing the end of its "serviceable life" needs to be replaced because it is less reliable and therefore more prone to blackouts.
>
> As previously noted, TransGrid is proposing to spend the equivalent of an additional $3.01 per customer per year for the average household over the next five years to replace ageing infrastructure and ensure the same level of reliability we have now. This means an extra 75 cents per quarter in the first year, rising to $1.50 per quarter in the second year, and so on, to $3.77 per quarterly bill in the fifth year.

> To indicate what level of electricity network reliability is acceptable to you, how much extra would you be willing to spend per quarter in the 2014/15 financial year towards this? 75 cents is roughly in line with inflation and means you want the current level of reliability to be maintained. More than 75 cents means you would like a more reliable electricity network i.e. fewer/shorter network blackouts. Less than 75 cents means you would accept a less reliable electricity network i.e. more/longer network blackouts.

The results are shown in the chart below. The majority of respondents were willing to pay 75 cents or higher, reflecting a desire to maintain at least the current level of reliability. Around one fifth expressed a preference to pay less than a CPI increase for a lower level of reliability.



Source: Newgate Research. Totals may not add due to rounding.

At a transmission level, TransGrid's investment decisions affect whole towns, regions and groups of suburbs in large cities. In considering consumers' willingness to pay, TransGrid is unable to differentiate reliability between different consumers connected to the same connection point.

Given that the majority are willing to pay a slight increase to maintain the reliability of the transmission network, and that transmission outages can have widespread effects and significant economic impact, it appears that TransGrid's replacement program is appropriate and aligned with consumers' expectations that TransGrid should maintain the reliability of the network at its current level.

Demand Forecasts

At the large energy users forum, concern was raised that demand forecasts may not sufficiently take into account the challenges facing the manufacturing sector at the present time, and may be optimistic. Indeed, soon after the publication of the 2013/14 energy forecasts, AEMO revised its energy forecast downward largely due to lower consumption than that forecast in the first quarter.[39]

[39] AEMO, *National Electricity Forecasting Report Update*, November 2013.

Future consumption of the manufacturing sector is uncertain. Over the last few years, manufacturing in Australia has remained subdued during a period of a strong Australian dollar. The Reserve Bank of Australia indicated a view in late 2013 that the Australian dollar is "uncomfortably high [and that] a lower level of the exchange rate is likely to be needed to achieve balanced growth in the economy."[40] This may happen if the US Federal Reserve continues to wind back its stimulus program.

Given this uncertainty, TransGrid has assessed its capital portfolio against a scenario of falling peak demand. The outcomes are discussed in Section 5.7.6.

Demand Management

At all consumer forums, TransGrid presented its historical approach and current initiatives on demand management. Consumers were generally supportive of initiatives to reduce peak demand and reduce or defer network investment.

TransGrid put to consumers the concept of an increase in the demand management innovation allowance to more proactively pursue developments in this area. Large energy users were supportive of further research and development into demand management, subject to a value proposition.

This area was explored in some detail during the deliberative forums and responses were almost unanimously positive. Consumers were particularly interested in pilot storage projects, smart meters and energy efficient appliances, although the concept of asking businesses to use less energy at certain times was less well understood.

Demand Management Innovation

Demand management is an arrangement whereby electricity users can opt to be available to reduce their electricity consumption during times of high demand. Users are paid for their availability, and for reducing their consumption if required. This can be useful to networks as an alternative to increasing network capacity.

Demand management is a growing area, and one that is still maturing in terms of widespread participation. TransGrid secured a demand management innovation allowance in the current regulatory control period to pursue innovative approaches to encourage, investigate, develop, implement and evaluate demand management opportunities.

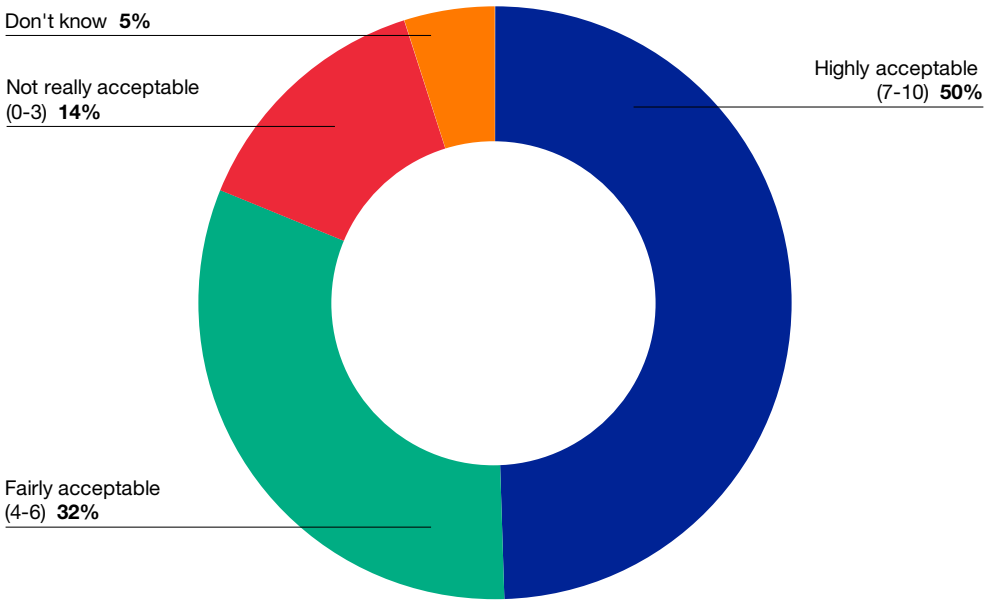
TransGrid has trialled several initiatives, in collaboration with distribution networks and research institutions. These include control of air conditioners by the grid, energy efficiency audits, research into consumer behaviour and the establishment of a small scale solar and storage facility.

In 2013, TransGrid and EnerNOC received an award at the Energy Efficiency Council Industry Awards for the Best Demand Response Project, for demand response of over 35 MW in the Sydney CBD in summer 2012/13. This project enabled the construction of a new cable in Sydney's inner west to be deferred by one year.

[40] Reserve Bank of Australia, *Statement by Glenn Stevens, Governor: Monetary Policy Decision*, 3 December 2013.

As the chart below shows, the majority of the 650 respondents to the survey also supported the increase. The question asked was:

> How acceptable to you is TransGrid's proposal to increase operating expenses by approximately $2 million each year to identify ways to reduce energy demand and, potentially, the amount that will need to be spent on replacing or building new infrastructure in future?
>
> This equates to a one-off increase of around 40 cents per year, or 10 cents per quarter for the average household bill. This is part of its operating expenditure proposal and is within the proposed $1.16 increase already discussed. Scale: 0 – not at all to 10 – totally acceptable.



Source: Newgate Research. Totals may not add due to rounding.

The responses to the quantitative survey correlate with the qualitative feedback received from consumers at the deliberative forums, where the nature of demand management was more comprehensively explained. At the deliberative forums, almost two thirds of consumers indicated strong support for the increase in expenditure on demand management.

In response to consumer support, TransGrid has proposed an increase in its demand management innovation allowance in 2014/15 to 2018/19, from the allowance of $1 million per annum in the current regulatory control period to $3.6 million per annum on average. TransGrid's *Demand Management Innovation Strategy* sets out TransGrid's specific initiatives, forecast costs and anticipated benefits. It is attached as Appendix R.

In general, consumers who were less in favour of the proposal were those who were less able to absorb the cost of higher electricity prices. TransGrid recognises this financial stress, and considers this to be most properly addressed through social measures such as the low income household rebate, family energy rebate, life support rebate and medical energy rebate available through the NSW Government.[41]

[41] Further information on these rebates, for interested consumers, is available on the NSW Trade and Investment website at http://www.energy.nsw.gov.au/customers/rebates.

Project Consultation

During the forums, TransGrid presented a new approach to consultation on major projects, which it has adopted following recent reviews of its consultation processes by the AER, Mr Robert Rollinson, and RPS Group. One of the key changes of the new approach is to start to consult with the affected community earlier, at the stage of establishing the project need, and in the context of the changing world. This encompasses the consideration of factors beyond demand forecasts such as demographics, consumer behaviour, third party demand side initiatives and other relevant trends.

TransGrid has used this approach for the Powering Sydney's Future project, which is included in this proposal as a contingent project and described further in Section 5.3.7. TransGrid has undertaken six streams of consultation in the course of investigating the need for the project:

- planning and demographics study;
- energy efficiency uptake study;
- electric vehicles study;
- seeking demand response;
- "low build" options, such as improvements to the thermal performance of existing cables; and
- advocacy for a change to the jurisdictional reliability standard.

Consumer advisory representatives and large energy user representatives strongly supported TransGrid's improved approach to consultation.

Management of Stranded Assets

Recent changes in electricity demand, together with growth in embedded generation such as domestic solar, have raised uncertainty about future trends in electricity demand. A range of plausible scenarios for the future have been identified, including the prospect of consumers going "off grid", that is, being entirely self sufficient with local electricity supplies rather than taking supplies from the grid or having the grid as a backup.

Similarly, a shift in the generation mix away from coal fired generation that may occur over the next few decades may result in changes to the supply side of the electricity supply chain.

At the November 2013 workshop, consumer advisory representatives asked TransGrid to consider the implications of commissioning assets with lives of 40 to 50 years now, when some of these assets may progressively not be required over the next 20 to 30 years if consumers disconnect from the grid or changes to the generation mix lead to generation connections no longer being required. These assets would then be stranded assets.

TransGrid has considered this possibility in the context of its long term asset management plans. The transmission network is now at a stage where it has passed the full life cycle of its earliest assets and ongoing replacement of assets will be required to maintain reliability.

Therefore, if assets progressively become stranded over 20 to 30 years, TransGrid would be able to respond by:

- relocating high voltage equipment to replace other equipment reaching its end of life, avoiding the procurement cost of new equipment;
- reusing or recycling other substation infrastructure such as steelwork; and
- selling property or making it available for other infrastructure such as community electricity storage.

TransGrid sought the views of consumer advisory representatives on this response at its second workshop in April 2014. Participants supported these measures, and also suggested that TransGrid consider the implications for transmission pricing, that is, how the cost of the remaining life of the stranded assets would be allocated. TransGrid agrees that this matter warrants careful consideration, and has noted it for further consultation beyond the submission of this revenue proposal.

At this time, TransGrid has not been approached by communities seeking to leave the grid. TransGrid therefore has not changed the expenditure forecasts in this proposal, given its current service obligations. However, it will continue to monitor electricity demand and the potential for communities to leave the grid, and respond accordingly.

Pricing

In November 2013, TransGrid commenced consultation on transmission pricing as part of the review of its pricing methodology for 2015/16 to 2018/19. Details of the consultation process, papers and submissions are available on TransGrid's "Have Your Say" website.

Customers and key stakeholders conveyed a number of common themes in written submissions and face-to-face meetings:

- all respondents commented that TransGrid's current pricing arrangements result in charges that are not sufficiently cost reflective;
- the current 50% proportion of transmission use of system (TUOS) costs that are postage stamped is too high;
- the current methodology misallocates asset costs between customers and/or leads to cross subsidies between customer groups;
- transmission pricing should be primarily or entirely demand based, rather than energy based;
- transmission pricing should be based on usage at times of system peak demand; and
- TransGrid should be able to provide customers with pricing certainty.

TransGrid also conducted its own assessment of the current pricing methodology and the options for change. TransGrid shared its views with stakeholders in a "provisional views" paper in February 2014,[42] which is available on TransGrid's "Have Your Say" website.

[42] TransGrid, *TransGrid's Provisional Views: Transmission Pricing Consultation*, February 2014.

TransGrid agrees with the concerns raised by stakeholders, with one exception. The exception relates to the percentage of TransGrid's costs that are fixed, and whether the current 50% of TUOS costs recovered on a non-locational (postage stamp) basis is too high. TransGrid's analysis presented in the provisional views paper suggests that this 50% allocation to fixed costs is appropriate.

TransGrid's proposed pricing methodology sets out six changes, as follows:

1. increased flexibility to:
   (a) enable amendment of the pricing methodology following a rule change; and
   (b) introduce the modified CRNP methodology where this approach is likely to result in prices that are more cost reflective;
2. locational pricing is to be more focused on peak demand (initially measured in MW, but moving to MVA after a transition period) by applying the CRNP methodology over the 20 peak days, rather than 12 months;
3. postage stamp prices will be set according to maximum demand (initially measured in MW, but moving to MVA after a transition period), and therefore will no longer apply on an energy basis;
4. for a given maximum demand, annual changes in transmission costs for any TransGrid customer or large distribution customer will be capped at a maximum of CPI + 3%;
5. arrangements are proposed to enable TransGrid to provide pricing certainty for customers including distribution networks; and
6. excess demand charges will be set on a cost reflective basis.

TransGrid's proposed pricing methodology for the upcoming regulatory control period is attached as Appendix AI, and the explanatory statement is attached as Appendix AH.

TransGrid is exploring further changes to make transmission prices more cost reflective that would require a rule change to implement. These potential changes, such as the use of price signals at each connection point that reflect TransGrid's forward-looking investment plan, will be explored through ongoing consultation with customers and key stakeholders.

Revenue Smoothing

At the April 2014 workshops with consumer representatives and large energy users, TransGrid presented its draft revenue and expenditure forecasts for the upcoming regulatory control period. TransGrid proposed to smooth its revenue within the upcoming regulatory control period in line with CPI, that is, constant revenue in real terms.

Some consumers requested that TransGrid consider smoothing its forecast revenue profile to match the forecast energy consumption profile, to achieve a flat price path for consumers in real terms over the period.

TransGrid has considered this approach and has decided to retain the approach of smoothing revenue in line with CPI within the period. This is because forecasts of energy consumption change from year to year, and smoothing forecast revenue to match the current consumption forecasts could actually result in a less smooth price path if the current trend of change in energy consumption continues.

How to Assist Consumers Evaluate the Revenue Proposal

In the consumer forums, TransGrid sought consumers' views on how it could best assist them to evaluate its revenue proposal. The forums explored a range of options, including:

- submitting its proposed expenditure portfolio to external expert review;
- making detailed planning documents available (noting that there are a large number of them); or
- leaving the evaluation of the revenue proposal to the AER.

Other views were also expressed. On balance, consumer representatives requested that TransGrid demonstrate that its plans are consistent with the broader energy environment and potential future energy direction in Australia, as a way of validating the sensibility of the plans. This is covered in Chapter 3 and also discussed in TransGrid's *Network Vision* in Appendix C and *Network Development Strategy* in Appendix E.

At the April 2014 workshops, consumer representatives and large energy users were asked what kind of information TransGrid should make publicly available to allow customers and other stakeholders to review its plans, including ways to manage the confidentiality of sensitive information.

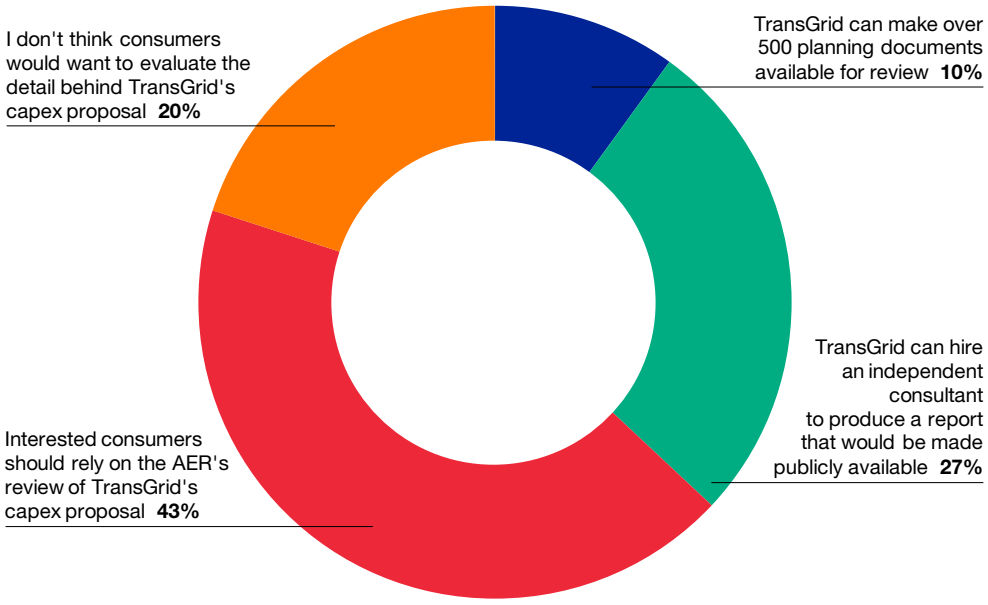
Consumer representatives and large energy users expressed some concerns about the independence of expert reports paid for by TransGrid, and questioned their value. However, they did value the insight provided by benchmarking.

Most supported TransGrid making detailed planning documents available for those who were interested, although they themselves would only have time to read high level summaries. They were keen for TransGrid to produce one or two page summaries on large projects in language that is easy to understand. There was some acknowledgement that there may be some legitimate reasons for commercially sensitive or security-related information to be kept confidential.

Residential and small business consumers were generally happy to leave TransGrid's assessment to the AER, although they placed importance on consumer engagement on the key principles driving the proposal. Around one third supported the use of independent experts.

At the deliberative forums, TransGrid sought the views of the 51 participants on how they would like TransGrid to assist them evaluate the capital expenditure forecasts in the proposal, as the largest area of expenditure. The question asked was:

What is the best way for TransGrid to help interested consumers evaluate its capital expenditure proposal?



Source: Newgate Research. Totals may not add due to rounding.

TransGrid has commissioned an external review of its forecast capital expenditure by GHD, which is attached as Appendix K. It has prepared summaries on large projects that are available for interested consumers to read. It is also encouraging interested consumers to participate in the AER's review of TransGrid's proposal.

3.8 Scenarios Considered in this Proposal

TransGrid develops its network plans taking into account a number of scenarios for the future. In response to its current operating environment and drivers, and recent consultation with consumers, TransGrid has considered a range of scenarios described below.

The scenarios considered in this revenue proposal are significantly different to those considered in TransGrid's last revenue proposal five years ago. Five years ago, the scenarios used in developing the network plans considered electricity demand, changes in interstate electricity transfers, water availability (as large areas of New South Wales were in drought) and the potential introduction of a carbon tax. At the time of TransGrid's last revenue proposal, solar bonus schemes had not yet commenced in New South Wales or the Australian Capital Territory, and energy efficiency measures were in their infancy.

Since then, the changes in the electricity industry environment have created a wider range of scenarios for the future. Forecasts of electricity demand now include projections of demand reduction due to energy efficiency initiatives, domestic solar installations and changes to consumer behaviour. Scenarios now consider the introduction of large scale renewable generation driven by the renewable energy target, potential changes to network planning and reliability standards, and potential developments affecting the future of Australia's electricity industry as a whole.

The scenarios TransGrid has considered in the development of this revenue proposal are as follows.

Planning Scenarios

The primary planning scenarios considered in this proposal are those considered in the development of the New South Wales peak demand forecasts. These include:

- the medium growth forecast of state electricity demand in the *National Electricity Forecasting Report 2013*, with sensitivity checks at low and high growth forecasts;
- moderate growth photovoltaic and energy efficiency scenarios,[43] which are incorporated into the state electricity demand forecast; and
- connection point demand forecasts prepared by distribution network service providers, incorporating photovoltaic and energy efficiency forecasts, with sensitivity checks at the same low and high growth variations as in the state forecasts.

In addition to these scenarios, TransGrid has considered a number of broader scenarios that may affect the future plans of its network.

Negative Demand Growth Scenario

During TransGrid's recent consumer forums, some consumer representatives and large energy users suggested that current demand forecasts will be optimistic if recent changes in consumption patterns continue. This may occur if economic conditions continue to place pressure on Australian manufacturing, or if there is a significant move of consumers "off grid".

In response to these concerns, TransGrid has considered a scenario of negative demand growth and the effect on its capital portfolio, including replacement projects. This is described further in Section 5.7.6.

Future of the Grid Scenarios

In 2013, the CSIRO convened a Future Grid Forum to explore the complex and unprecedented challenges now facing the electricity industry. The forum modelled four scenarios to consider the questions of what Australia's electricity system might look like in 2050, issues and options that might arise along the way, and what the electricity industry and stakeholders can do to effectively plan and respond.

The four scenarios considered were:[44]

1. Set and forget

   Sustained high retail prices, heightened awareness about the issue of peak demand, and new business opportunities lead residential, commercial and industrial customers to adopt peak demand management.

   However, recognising the busy lives of many customers, the demand management systems are designed to be on a "set and forget" basis after customers have decided which level of demand management suits them.

   Measures include building large-appliance control (air conditioning, pumps), on-site storage, specialised industrial demand reduction markets, and electric vehicle charge management, as well as advanced metering and communication to enable these services.

[43] AEMO, *2013 Forecasting Methodology Information Paper*, 2013.
[44] CSIRO, *Change and choice: The Future Grid Forum's analysis of Australia's potential electricity pathways to 2050*, December 2013.

2. Rise of the prosumer

   Continued falling costs of solar photovoltaic panels and other on-site generation technologies, sustained high retail prices, and increasingly innovative financing and product packaging from energy services companies leads to the widespread adoption of on-site generation.

   Residential consumers in particular are empowered by their choice to become more actively engaged in their electricity supply and call themselves "prosumers". Electric vehicle adoption is also popular.

   The use of on-site generation is also strong in commercial and industrial customer sectors, but with a stronger preference for cogeneration or trigeneration technologies. By 2050, on-site generation supplies almost half of all consumption.

3. Leaving the grid

   The continued dominance of volume-based pricing amongst residential and small business consumers encourages energy efficiency without accompanying reductions in peak demand growth. The subsequent declining network utilisation feeds increases in retail prices.

   New energy services companies sensing a market opportunity invite consumers to leave the grid, offering an initially higher cost solution but one that appeals to a sense of independence from the grid. Consumers have already become comfortable using small amounts of storage on-site and in their vehicles, and a trickle of consumers takes up the offer.

   By the late 2030s, with reduced storage costs, disconnection becomes a mainstream option and the rate of disconnection accelerates. Customers remaining on the system are those with poor access to capital and industrial customers whose loads can not be easily accommodated by on-site generation.

4. Renewables thrive

   Confidence in the improving costs of renewable technologies, achieved by combined efforts from government and industry around the world, results in the introduction of a linearly phased 100% renewable energy target by 2050 for centralised electricity generation.

   To shift demand and meet renewable supply gaps, storage technology is enabled to achieve the target at utility, network and consumer sites.

   Some customers maintain on-site backup power for remote and uninterruptible power applications, offsetting their emissions by purchasing credits from other sectors, such as carbon forestry.

   Overall, the renewable share, taken as a share of both centralised and on-site generation, is 86% by 2050.

Importantly, the actual future may include elements of each of the scenarios.

As these scenarios would potentially emerge over some decades, TransGrid has considered them in its long term asset management documents, the *Network Vision* and *Network Development Strategy*.

In the short term, where TransGrid has been able to defer or delay investments beyond the 2014/15 to 2018/19 period it has done so.

Deferral of Investments

All identified needs that may be affected by changes in future demand are reviewed by TransGrid's network planning group before a preferred option is selected or a project initiated. These include significant replacement needs such as transformer or whole substation replacements.

The coordination of identified needs between replacement and planning is an important feature of TransGrid's optimisation of its portfolio from the earliest stages of the planning process.

Over the last few years, TransGrid has:

- deferred the replacement of capacitor banks at Narrabri substation, where spares were no longer available to maintain the banks at their existing capacity into the future, as planning studies found that due to changes in demand the banks could be de-rated, generating spares;
- decommissioned capacitor banks at Wellington and Sydney North substations that were due for replacement, but are no longer required due to the changing environment; and
- decided to decommission, rather than replace, a major power transformer at a substation in the Newcastle area following the closure of the aluminium smelter at Kurri Kurri.

These examples demonstrate the success of TransGrid's *Network Investment Process*, which has also been followed to prepare the forecasts in this proposal.

Transmission Reliability Standards

In November 2013, the AEMC published a new national framework for transmission reliability standards.[45] The framework takes an economic approach to the definition of reliability standards, while enabling standards to be set ahead of investment decisions. This provides transparency and certainty regarding the level of reliability consumers and market participants can expect to receive. Following the publication of the framework, each jurisdiction has the ability to set the standards that will apply under the framework.

For the expenditure forecasts in this proposal, TransGrid has forecast load driven augmentation projects based on the current reliability standards. TransGrid has forecast distribution connection projects using the commissioning dates advised by the distribution network service providers. TransGrid has considered the potential impact of revised standards on its replacement projects, and has proposed that the Powering Sydney's Future project be treated as a contingent project while there is further consideration of the level of replacement capacity required to supply the Sydney inner metropolitan area. A change in reliability standards could change the commissioning date for this project by several years.

Should reliability standards be changed in New South Wales, TransGrid will provide an updated capital expenditure forecast based on the new standards. The change in capital expenditure is likely to be small, given the significantly smaller level of augmentation capital expenditure forecast for the upcoming regulatory control period compared to that for previous periods.

[45] AEMC, *Final Report: Review of the National Framework for Transmission Reliability*, 1 November 2013.

4 Approach to Managing the Network

TransGrid's asset management framework is mature, robust and delivers efficient outcomes.

TransGrid has prudently managed its assets since its inception in 1995 and historically as part of its predecessor organisations. Its asset management practices have been reviewed by independent engineering firms and during previous revenue determination processes, and found to reflect good electricity industry practice.[46]

TransGrid fosters a culture of continuous improvement and innovation. Its staff participate in international asset management forums such as the International Transmission Asset Management Study (ITAMS), CIGRE and the Energy Networks Association Asset Management Committee. These forums provide useful networks that enable TransGrid to stay abreast of continuing developments and innovative approaches amongst its international peers.

4.1 TransGrid's Governance

TransGrid's governance is vested in its Board of Directors, whose role is to provide leadership and direction for the organisation. The responsibilities of the Board include:

- provision of strategic guidance and direction to the organisation;
- review and approval of business plans, budgets and financial plans including capital expenditure;
- oversight and monitoring of organisational performance, progress on major capital expenditure and progress on significant corporate projects;
- monitoring of financial performance; and
- ensuring an effective system of corporate governance.

With regard to TransGrid's asset management, the Board is responsible for the approval of business plans and budgets, and has approved the expenditure forecasts in this proposal.

The Board also sets TransGrid's overall risk tolerance, which informs specific asset management investment decisions.

[46] AER, *Draft Decision: TransGrid Transmission Determination*, 31 October 2008, pp27-28, SKM, *Review of Capital Governance Framework*, 2 June 2008, p10 and GHD, *TransGrid Regulatory Review: Capital Expenditure and Asset Base, Operational Expenditure and Service Standards Final Report*, April 2004, p12.

4.2 TransGrid's Asset Management System

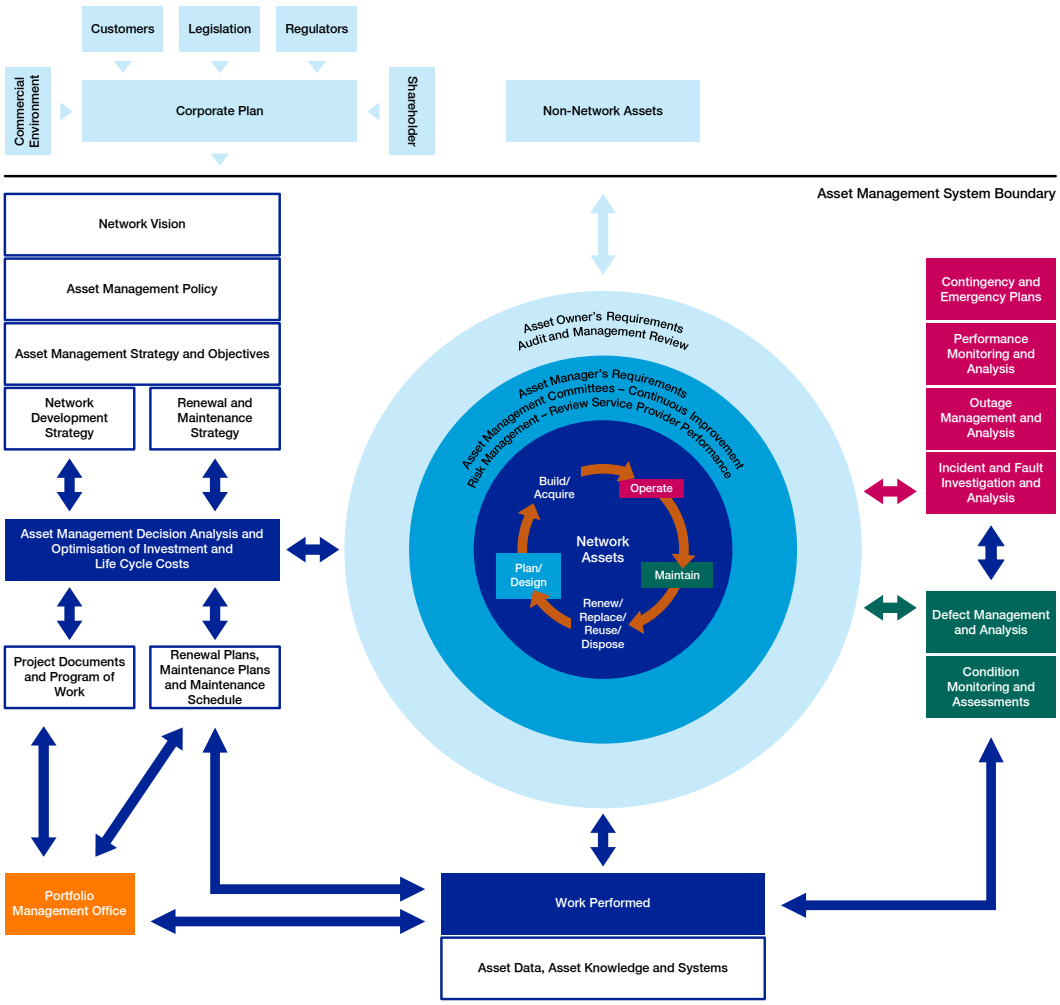
TransGrid's asset management system provides a framework for managing its transmission network assets over their life cycle. It governs the policy, strategies, objectives, plans, structures, processes and activities that apply to the management of network assets. TransGrid has a commitment to continuous improvement, and has continued to develop its asset management system over the current regulatory control period using the PAS 55 specification as the reference for good asset management practice.

The asset management landscape has recently continued to evolve with the release of the new ISO 55001 asset management standard in January 2014, and the pending withdrawal of PAS 55.

Following the publication of ISO 55001, TransGrid commissioned an independent review of its asset management system against the standard. The review found only a small number of minor issues that could be readily addressed, such that TransGrid's asset management system would be ready for full certification to ISO 55001 in the near future. TransGrid intends to seek certification to ISO 55001 towards the end of 2014.

TransGrid's asset management system and its scope are shown in Figure 4.1.

Figure 4.1
Asset Management System



4.2.1 TransGrid's Network Vision

The *Network Vision* sets out TransGrid's perspective on the future of its transmission network, and provides a guiding direction for the long term development of this network. The *Network Vision* is attached as Appendix C.

The *Network Vision* analyses TransGrid's changing environment, including factors affecting both the supply side and demand side of the electricity industry. It sets out TransGrid's 30-year vision in response to the industry environment, and explains the six key objectives TransGrid will apply to network management decisions in order to deliver on the vision.

TransGrid has identified six key objectives for its network of the future:

1. deliver safe, secure, environmentally responsible and cost effective electricity transmission services;
2. meaningfully engage stakeholders and the community to align expectations with its ability to deliver;
3. optimise the network in anticipation of future requirements to ensure value is being delivered;
4. adaptively plan the network to match demand requirements and the changing mix of generation sources;
5. leverage technology and innovation to optimise the capability and capacity of the network; and
6. implement flexible and tailored connection solutions.

The outcomes required from these objectives are shown in Table 4.1.

SF_6 Recycling

SF_6 is a gas used within high voltage substation equipment to insulate and assist the operation of the equipment. While it has excellent technical properties, it is a greenhouse gas with around 23,000 times the impact of carbon dioxide if it escapes to the atmosphere. It must therefore be contained and disposed of using special techniques. Used gas cylinders with small amounts of residual SF_6 must be processed in a particular way to avoid environmental impact.

Processing of used gas cylinders is time consuming and expensive. Various methods have been explored to manage used bottles and excess or contaminated gas, including options to destroy the gas. However, specialised plant is used and significant time required to reach the vacuum levels required to remove all SF_6 from a used bottle.

In 2011, TransGrid became a pilot partner with ABB for a trial of a new process to recycle used or contaminated SF_6 gas for reuse. The new process has significantly improved the management of residual SF_6 in used gas bottles, and SF_6 that has been extracted from equipment during maintenance. This has avoided the use of more time consuming and expensive techniques, and the operating expenditure that would have been incurred as a result.

Table 4.1
Key Objectives and Outcomes

Key Objective	Outcome
Deliver safe, secure, environmentally responsible and cost effective electricity transmission services	The network is operated safely at all times
	TransGrid's business model is continuously refined to adapt to the changing environment
	Reliability and quality of supply are in line with expectations
	Electricity transmission services are cost effective
	Real price increases are minimised
Meaningfully engage stakeholders and the community to align expectations with our ability to deliver	A transparent and consultative planning regime is applied, consistent with the asset strategy and delivering network capability to closely match identified needs
	Customers' needs and preferences are considered in network management decisions
	Engagement with customers confirms that the appropriate trade-offs are being made between performance levels and costs
	TransGrid's social licence to operate critical infrastructure is maintained
Optimise the network in anticipation of future requirements to ensure value is being delivered	Changing load patterns are met by a flexible network
	Options for future choices are accommodated by a "right-sized" network
	Performance levels meet customers' needs
	A transparent pricing methodology is applied
	Transmission services are appropriately priced
	Regulatory and stakeholder requirements are met
Adaptively plan the network to match demand requirements and the changing mix of generation sources	Reliability and resilience are maintained against failures of critical network assets
	Risk management strategies matching the appetite for a major transmission failure are in place
	Constraints and barriers to the connection of new generation sources are minimised
	Non-network solutions (incorporating demand management) are always pursued where economic
	Energy storage is an integral part of the overall solution where economic

Table 4.1
Key Objectives and Outcomes (continued)

Key Objective	Outcome
Leverage technology and innovation to optimise the capability and capacity of the network	Technology and innovation are leveraged to improve the utilisation of individual network assets and reduce overall service costs
	New technology is adopted early
	Enhanced monitoring, control and automation system technologies gather dynamic data about TransGrid's assets
	The skills and capability of the workforce are enhanced to match requirements
Implement flexible and tailored connection solutions	Customer connections are competitively priced
	Value-added solutions are provided for customers
	Diversified business enhances the operation and effectiveness of core activities

TransGrid's *Network Vision* cascades down to its asset management policy, strategies, objectives and plans.

4.2.2 Asset Management Policy

TransGrid's *Asset Management Policy* defines the key principles and requirements TransGrid applies to its network assets to achieve its business objectives and corporate plan. It has a key role in the asset management system and in ensuring a clear "line of sight" between the day-to-day maintenance and construction activities and the corporate plan.

Specifically, it provides key assurance that TransGrid is disseminating its overall corporate plan into an effective asset management plan, and provides the start of the "line of sight" from the corporate plan to the activities on the ground related to network assets. This is a key element of good practice asset management.

TransGrid's *Asset Management Policy* is attached as Appendix D.

4.2.3 Asset Management Strategies, Objectives and Plans

TransGrid has an overall asset management strategy which sets out tiers of asset management strategies, objectives, key performance indicators and enablers.

The overall asset management strategy is to:

- maintain the current levels of network reliability and performance; and
- do this with increasing efficiency; while
- minimising risk exposure.

TransGrid also has a *Network Development Strategy* that takes a long term view of TransGrid's network, to which detailed asset management strategies and plans align. The *Network Development Strategy* is attached as Appendix E.

TransGrid's overall asset management strategy is implemented through detailed core strategies, life cycle strategies, asset strategies and continual improvement strategies. These strategies align with the overall asset management strategy, and provide detail relevant to particular aspects of asset management or asset classes to guide the development of asset management plans.

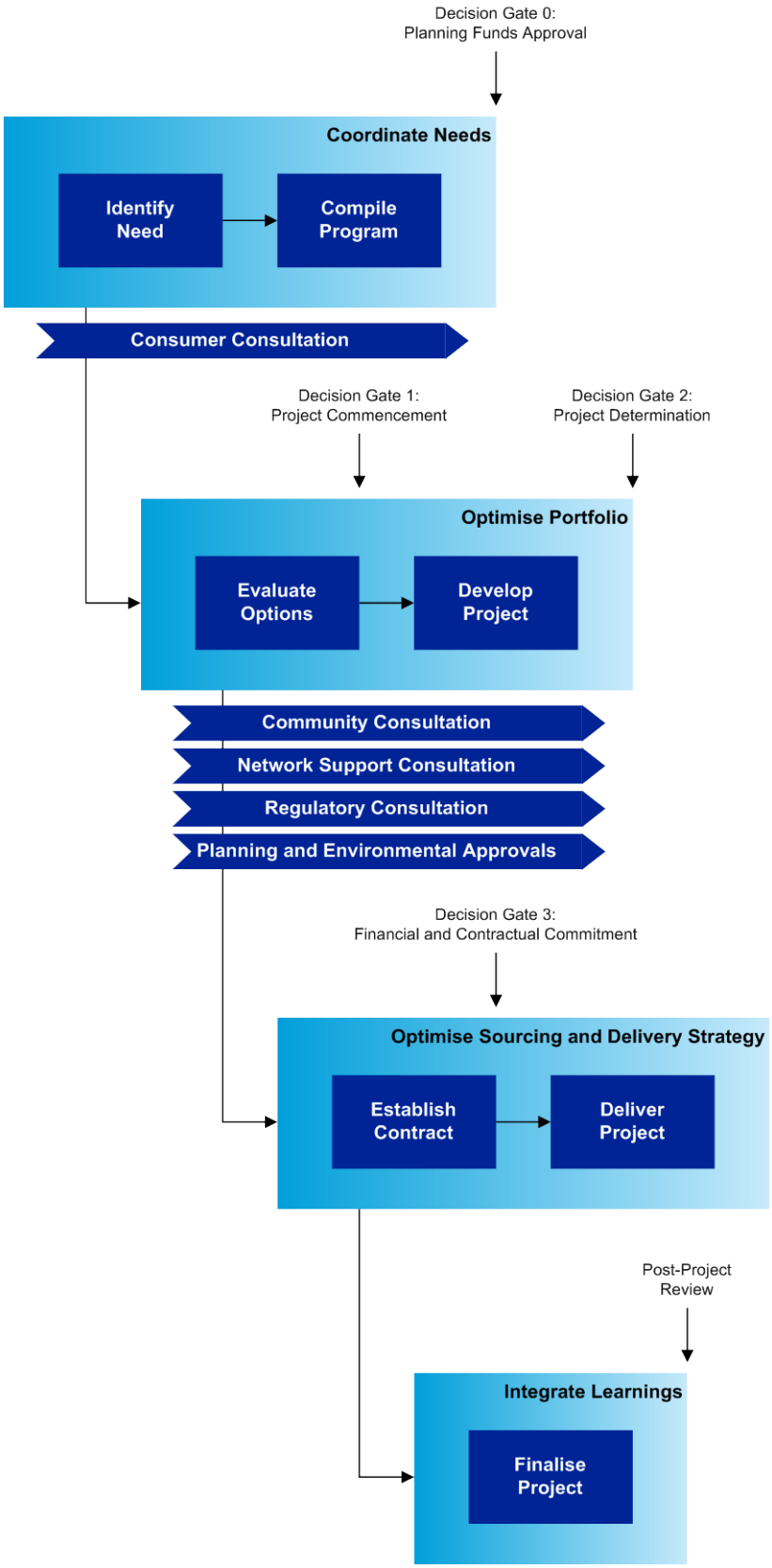
TransGrid has asset management plans specific to each asset class in its network: substations, secondary systems, communications, cables, transmission lines and easements. The asset management plans are developed by TransGrid's asset manager in conjunction with design experts and field staff from internal service providers. The asset management plans take into account National Electricity Rules requirements, industry experience, technology developments, manufacturers' advice, safety standards, environmental policies and good electricity industry practice.

4.3 Network Investment Process

TransGrid has a *Network Investment Process* that is used to develop the capital portfolio relating to the network. The full process as it applies to major capital works is shown in Figure 4.2.

An abridged version of the process applies to minor projects and programs of work.

Figure 4.2
Network Investment Process



The network investment process has seven stages, as described in Table 4.2.

Table 4.2
Network Investment Process Stages

Stage[47]	Description	Optimisation
Identify Need	Identification of needs through processes such as planning studies, asset condition monitoring and customer requests.	Identification of related, pre-requisite and dependent needs.
Compile Program	This stage captures all of the needs in one program of work, evaluates high level risks and sets initial milestone dates.	
Evaluate Options	Identification, initial scoping and economic evaluation of options to address each need. These include operational measures, control schemes, network support options and network options.	Identification and evaluation of options across the whole portfolio, such as options that may satisfy multiple needs.
Develop Project	Develops the most cost effective option into a project. It includes detailed scoping, regulatory and planning approvals.	
Establish Contract	Formal assignment of the project to a project manager following all necessary approvals, and contract establishment.	Selection of the most appropriate sourcing and delivery strategy for each project.
Deliver Project	Construction and commissioning for network projects, or delivery for operational or network support projects.	
Finalise Project	Completion of the project.	Post-project review of outcome against need and key learnings.

The current *Network Investment Process* was adopted in 2011, when TransGrid re-engineered the process to enhance its ability to effectively deliver a large scale capital program and be responsive to the changing needs of stakeholders. The revised process incorporates the following key elements:

- an integrated, whole of business approach to capital program management;
- clear ownership of the process, via the Portfolio Management Office in TransGrid's asset management business unit;
- optimisation of investments, including non-network options, across augmentation and asset replacement/renewal streams;
- early resolution of key risk areas such as environmental approvals, property acquisition and scope definition in the project delivery process;
- structured documentation around options evaluation and project scoping to enhance the transparency of decision making; and

[47] The Identify Need, Compile Program and Evaluate Options stages of the network investment process are operating expenditure. The Develop Project, Establish Contract, Deliver Project and Finalise Project stages are capital expenditure.

- early engagement with stakeholders throughout the investment planning cycle to involve end users and impacted communities in decisions.

These initiatives have required an increase in operating expenditure over the last few years. In its consumer forums, TransGrid sought participants' views on the prudence of this increase in order to make more effective investment decisions. Participants generally supported this change, as discussed in Section 6.8.3.

All future capital projects included in the revenue proposal have been developed to completion of the Evaluate Options stage or beyond. This means that the most cost effective option has been selected for each project, options have been optimised across the portfolio and cost estimates reflect the most likely cost to deliver each project.

All committed capital projects have been developed to completion of the Develop Project stage or beyond. This means that detailed scoping has been completed for each project, and most committed projects are in progress.

The governance that overarches network investments is set out in TransGrid's *Corporate Governance Framework for Expenditure on Major Capital Works Projects*. The framework defines four decision gates (DGs) through which investments pass, as shown in Table 4.3.

Engineering Excellence Awards for TransGrid Projects

In September 2013, TransGrid won the Project Management Category Award at the annual Engineering Excellence Awards run by Engineers Australia Sydney Division.

The award was for the Beaconsfield Redevelopment Project, which was completed in November 2012. This project was the world's first major in-situ replacement of a Gas Insulated Switchgear (GIS) substation, requiring detailed staging of works to retain the extensive cable network supplying the Sydney CBD in service during construction.

The new substation features several innovations in design and construction, and is the largest 132kV GIS substation in the southern hemisphere.

The award follows a similar award in September 2011, when TransGrid and UGL won the Infrastructure Projects Category Award for the Western 500kV Upgrade Project.

The Western 500kV Upgrade Project was New South Wales' largest 500kV development, and was deferred for one year by the largest demand management procurement in the NEM.

Table 4.3
Network Investment Process Decision Gates

Decision Gate	Description
Planning Funds Approval (DG0)	Approval of the need statement and commencement of a range of activities, including development and evaluation of options and consumer consultation.
Project Commencement (DG1)	Following desktop evaluation of network and non-network options, the most efficient and commercially acceptable feasible solution to address the need is selected for more detailed scoping. Possible options include: • non-network options, such as demand management; • transmission network options such as a transmission line, underground cable or substation; and • distribution network options. An initial evaluation of whether to take action is carried out, including a cost/benefit analysis of each option. This initial analysis is used to inform the engagement stage that commences after this decision gate. Where multiple solutions evaluate closely, more than one may be selected for detailed scoping. This decision gate includes approval to progress and commence a range of activities: the applicable regulatory investment test, preliminary design work, community consultation, environmental assessments (if applicable) and any property acquisitions required prior to DG2.
Project Determination (DG2)	Confirms selection of the network or non-network option which has been demonstrated as the most efficient and commercially acceptable feasible solution to address the need. During this phase of the project a stakeholder engagement plan is developed and implemented, including community project updates, community forums, website updates and media releases. This decision gate follows completion of the relevant regulatory tests and environmental approvals where possible, or progression of these activities such that there is a high level of confidence that approvals will be obtained. Scoping of the project, including preliminary design and property investigations, is advanced to a stage that allows reasonable certainty of the scope, cost and timing of the project.
Financial and Contractual Commitment (DG3)	This decision gate commits TransGrid to full funding for the project, which may be either a network or non-network solution. It is done in conjunction with, and prior to, the first major procurement or construction contract on the project.

The Board is the approving authority at DG1, DG2 and DG3 for projects over $15 million, or of high significance for environmental, safety, community or other reasons.

The Managing Director is the approving authority at DG1, DG2 and DG3 for projects between $1 million and $15 million.

Planning funds and projects less than $1 million are approved at the Executive level.

4.4 TransGrid's Other Strategies and Plans

4.4.1 Information Technology

TransGrid has an *Information, Operating and Communications Technology Strategic Plan* (ICT Strategic Plan). The plan sets out the technology initiatives required to enable TransGrid to deliver on strategic objectives and maintain the effective delivery of appropriate information and communications technology services at the lowest long term cost.

The ICT Strategic Plan is linked to the strategic objectives in TransGrid's corporate plan.

TransGrid's strategic technology priorities relevant to the provision of prescribed transmission services over the 2014/15 to 2018/19 period are:

1. extend the benefits from TransGrid's recent enterprise resource planning system upgrade through continued investment in the enterprise resource planning and connected systems;
2. enable advanced asset management through investment in improved access to, and analysis of, information generated by operational equipment;
3. optimise total cost of ownership of ICT service delivery;
4. support improved strategic and operational decision making by expanding and augmenting TransGrid's business intelligence capability;
5. enable improved internal and external collaboration; and
6. improve information capture and access.

These strategic technology priorities reflect TransGrid's commitment to continual, ongoing improvement throughout the business.

4.4.2 Motor Vehicles and Mobile Plant

TransGrid has a *Fleet Management Plan* that describes TransGrid's approach to the management of its motor vehicles and mobile plant. The plan sets out TransGrid's approach to procurement, maintenance and disposal of vehicles and summarises the commercial rationale underpinning TransGrid's approach.

The approach in the *Fleet Management Plan* includes the standardisation of motor vehicles, standardisation of accessories relating to the trades for which the vehicles are used and consolidation of contracts across all TransGrid locations. This has several benefits that have reduced capital and operating costs, improved safety and reduced the environmental footprint.

To ensure that the fleet size is maintained at an optimum level, utilisation is benchmarked against industry standards to ensure the vehicle fleet size and mix are configured to best meet the overall needs of the business. The vehicle fleet is supplemented from time to time by the external hire of vehicles, where this is economic.

Where it is deemed uneconomic to own a specialised mobile plant item, or an additional mobile plant item is required for short term use, TransGrid engages the services of an external hire company to provide the mobile plant item.

4.4.3 Accommodation

TransGrid has an accommodation strategy which has been developed to manage offices and depots in line with industry practice.

The key objectives of this strategy are to:

- develop a well considered initiative for a 10 year, sustainable, overall accommodation strategy that can effectively support TransGrid's office accommodation requirements; and
- examine various potential options and their relative merits and determine the optimal accommodation solution in terms of cost, functional suitability, staff amenities and brand reinforcement.

The strategy will deliver benefits to consumers in the upcoming regulatory control period, through the recent consolidation of TransGrid's Sydney offices to a new office constructed above an existing TransGrid building at Ultimo. This initiative will reduce operating expenditure through avoided rental costs, which outweigh the capital and ongoing operating costs of the new office.

4.4.4 Workforce Planning

TransGrid undertakes a strategic workforce planning process, which is a continuous process that ensures TransGrid's workforce is aligned to business outcomes. The strategic workforce plan is linked to the strategic objectives in TransGrid's corporate plan.

The strategic workforce plan describes TransGrid's approach to the attraction, development and retention of a diverse workgroup with geographical and differing experience and skills needed to support the capability of the network.

TransGrid has a significant ageing workforce, with 20% over 50 years of age and likely to retire in the next 10 years. This reflects a need to focus on knowledge management and plan for replacements. TransGrid is addressing the challenge of an ageing workforce through workforce strategies, including a focus on employee development and succession planning.

TransGrid's strategic workforce initiatives over the 2014/15 to 2018/19 period are to:

- provide focused leadership development to ensure leaders are delivering on the organisation's goals and change agenda;
- align employee arrangements to meet business objectives including aligning leadership for performance management, remuneration and reporting arrangements with the achievement of agreed objectives;
- negotiate an enterprise agreement that reflects and complements TransGrid's future environment;
- continue to embed and action outcomes from the organisational culture and engagement surveys to ensure alignment with corporate objectives;
- align workforce planning with organisational objectives including sourcing, succession and development strategies to ensure change to a more commercial, customer and stakeholder focused culture;

- continue to offer apprenticeships and traineeships across the state, to provide employment opportunities in regional areas and assist future workforce planning requirements;
- implement the "Smart Move" accommodation strategy in greater Sydney, to develop sustainable accommodation that supports business requirements and addresses overall cost, functional suitability and staff amenity objectives; and
- implement programs and initiatives to achieve improved employment outcomes for each identified diversity group, as well as to enhance the culture and outcomes for TransGrid which come from diversity.

These strategic initiatives reflect TransGrid's commitment to continuous improvement throughout the business.

4.4.5 Procurement

TransGrid's procurement framework ensures its procurement activities achieve value for money in support of corporate strategies, while being fair, ethical and transparent.

The following principles govern procurement decision making in TransGrid:

- forward planning for all discretionary expenditure is broken down into four portfolios, each focusing on improving business and market intelligence. The aim of the portfolios is to strategically position TransGrid to take advantage of opportunities and deliver best value for money through category plans, sourcing strategies and procurement business rules;
- sourcing strategies and procurement business rules ensure that TransGrid maximises competition in the market and achieves value for money in all procurement activities, including the consideration of whole of life costs;
- goods and services are sought from suppliers most able to meet TransGrid's requirements and support the achievement of objectives through cooperative relationships and ongoing performance management; and
- all procurement is carried out to a high professional standard and ethical behaviour.

All officers who are responsible for the purchasing, ordering, provision, management and disposal of goods and services for and on behalf of TransGrid are required to carry out these functions in accordance with TransGrid's procurement procedures and the NSW Government *Code of Practice for Procurement*.

TransGrid is committed to pursuing continuous improvement and adaption to change in the markets in which it procures. TransGrid has been focusing on the following areas to continually optimise its procurement approaches:

- category planning and management, which provide better understanding of TransGrid's expenditure, the markets it participates in and how to engage the market and manage the categories of spend more strategically;
- strategic procurement planning, to better understand project forecasts to meet future procurement needs;
- spend and market analysis;
- strategic sourcing, including improvements to process, evaluation and negotiation strategies;

- contractor performance management, to introduce processes and systems to monitor and manage contractor performance across contracts, to improve performance and relationships; and
- collation of cyclical feedback identifying strengths and opportunities throughout the strategic procurement process.

Sourcing Strategies

TransGrid has recently established new sourcing strategies for vegetation maintenance and substations.

The vegetation maintenance sourcing strategy resulted in a commercially superior outcome for TransGrid through the process of clarifying submissions and giving an opportunity for tenderers to improve their pricing, as well as a deeper understanding and evaluation of tenderers' safety and environmental capabilities.

The substations sourcing strategy resulted in a reduction in administration and go-to-market tender time through the establishment of a panel of preferred suppliers with pre-agreed contract terms and engagement conditions. This has resulted in improved engagement with suppliers on key issues, including safety and environmental performance.

These sourcing strategies are examples of how TransGrid's approach to procurement benefits consumers through ensuring value for money from the goods and services TransGrid procures.

4.4.6 Health, Safety and Environment

Health and Safety

TransGrid places safety as its first priority, and is committed to protecting the health and safety of employees, contractors and the public through demonstrated leadership in health and safety.

TransGrid's *Occupational Health and Safety Management System* is certified to Australian Standard AS/NZS 4801. The cornerstone of the system is TransGrid's *Health and Safety Policy*, which includes an overarching commitment to:

- keep our people safe and well;
- continuously improve safety performance; and
- demonstrate compliance to relevant health and safety legislation, codes of practice and industry standards.

TransGrid promotes a positive safety culture in which all employees and contractors are encouraged to actively manage their safety and the safety of others.

Under the *Health and Safety Policy*, TransGrid's health and safety strategies are aimed at ensuring the wellbeing and safety of employees and contractors, and have a dedicated focus on managing all safety risks.

TransGrid develops and implements a corporate health and safety plan and a public electrical safety awareness plan, both of which are based on health and safety risks and key initiatives. Each business unit also develops a customised plan from the corporate health and safety plan which addresses specific health and safety risks related to that business unit.

Contractors performing work on behalf of TransGrid are required to adhere to the same standards of safety and environmental protection as apply to TransGrid staff performing similar work.

Environment

The protection of the environment is one of the fundamental values associated with TransGrid's activities.

TransGrid's *Environmental Management System* has been developed to identify and manage the potential environmental impacts associated with its activities and services, and is certified to ISO 14001.

The *Environment Policy* covers all activities and services undertaken by staff and contractors including the planning, building and operation of infrastructure, ongoing management of assets and their decommissioning. The aim is to enhance TransGrid's systems and processes in a manner that promotes continuous improvement in environmental management, in line with industry best practice.

There is a strong focus on staff training and authorisation that provides staff with skills in the areas of environmental assessment and protection. This is complemented by a range of checks and balances aimed at protecting the environment in which TransGrid operates.

TransGrid's approach to environmental management enables the organisation to continue to operate sustainably and efficiently as it undertakes its activities.

5 Capital Expenditure

Capital expenditure is expenditure on the infrastructure and assets that provide transmission services. These include new assets that increase capacity on the network, replacement of existing assets that are reaching the end of their serviceable lives and minor assets such as information technology and vehicles.

Forecast capital expenditure is significantly different from any period in recent history for TransGrid. Load driven investment is small, reflecting the significant recent change in electricity usage. In contrast, replacement expenditure has increased significantly from that of the last five years, reflecting many of the assets built during the establishment of the transmission network in the 1950s and 1960s reaching the end of their serviceable lives.

The capital expenditure forecasts in this proposal are based on business cases supported by economic justification for each investment. They comprise the efficient costs required to sustainably provide transmission services to New South Wales and the Australian Capital Territory.

This chapter discusses TransGrid's historical and proposed forecast capital expenditure.

Section	Discussion
5.1	National Electricity Rules requirements for forecast capital expenditure.
5.2	TransGrid's capital expenditure categories.
5.3	Forecast capital expenditure for 2014/15 to 2018/19.
5.4	Approach to network support for 2014/15 to 2018/19.
5.5	Approach to forecasting capital expenditure.
5.6	External expert assurance on TransGrid's capital expenditure.
5.7	Efficiency of TransGrid's capital expenditure.
5.8	Historical capital expenditure in 2009/10 to 2013/14.
5.9	Assessment of forecast capital expenditure against the capital expenditure factors in the National Electricity Rules.
5.10	Summary of inputs and assumptions used.

5.1 National Electricity Rules Requirements

5.1.1 Capital Expenditure Objectives

In line with the national electricity objective, the National Electricity Rules set out the capital expenditure objectives that apply to forecast capital expenditure.

The capital expenditure objectives are to:

1. Meet or manage the expected demand for prescribed transmission services over that period
2. Comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services
3. To the extent that there is no applicable regulatory obligation or requirement in relation to:
   (i) the quality, reliability or security of supply of prescribed transmission services; or
   (ii) the reliability or security of the transmission system through the supply of prescribed transmission services,

   to the relevant extent:
   (iii) maintain the quality, reliability and security of supply of prescribed transmission services; and
   (iv) maintain the reliability and security of the transmission system through the supply of prescribed transmission services
4. Maintain the safety of the transmission system through the supply of prescribed transmission services.[48]

The applicable regulatory obligations for the quality, reliability and security of supply that apply to TransGrid are set out in the *Transmission Network Design and Reliability Standard for NSW* published by NSW Trade and Investment. The applicable regulatory obligations for TransGrid's supply to the Australian Capital Territory are set out in the *Disallowable Instrument DI2012-267: Utilities Exemption 2012 (No 3), 2012*, published by the ACT Government.

This chapter sets out the forecast capital expenditure TransGrid considers is required to achieve the capital expenditure objectives and applicable regulatory obligations in the 2014/15 to 2018/19 period.

The AEMC has recently published a new framework for transmission reliability standards.[49] Should changes in transmission reliability standards proceed in New South Wales, there may be some changes to TransGrid's network plans and capital investment portfolio. TransGrid will keep the AER, consumers and stakeholders well informed of developments and revisit affected network plans should the technical standards be changed.

[48] *National Electricity Rules*, Clause 6A.6.7(a).
[49] AEMC, *Final Report: Review of the National Framework for Transmission Reliability*, 1 November 2013.

5.1.2 Capital Expenditure Criteria

The National Electricity Rules require the AER to accept this proposal's forecast capital expenditure if the AER is satisfied that the total forecast capital expenditure reasonably reflects the capital expenditure criteria.

The criteria are:

1. The efficient costs of achieving the capital expenditure objectives
2. The costs that a prudent operator would require to achieve the capital expenditure objectives
3. A realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives.[50]

This chapter substantiates the efficiency of TransGrid's costs in Sections 5.6 and 5.7. The prudence of TransGrid's operations is established by its governance processes and asset management system, which are discussed in Chapter 4. The cost inputs are set out in Section 5.10.

5.1.3 Capital Expenditure Factors

The National Electricity Rules set out the factors to which the AER must have regard when assessing a capital expenditure forecast. These factors can be summarised as:

1. The most recent AER annual benchmarking report and benchmark capital expenditure that would be incurred by an efficient TNSP
2. Actual and expected capital expenditure during preceding regulatory control periods
3. The extent to which the capital expenditure forecast includes expenditure to address the concerns of electricity consumers
4. The relative prices of operating and capital inputs
5. Substitution possibilities between operating and capital expenditure
6. Consistency of the capital expenditure forecast with incentive schemes
7. The extent of capital expenditure to related parties
8. Whether the capital expenditure forecast includes an amount relating to a project that should more appropriately be included as a contingent project
9. The most recent NTNDP and submissions made by AEMO
10. The extent of consideration and provision for non-network alternatives
11. Any relevant project assessment conclusions report
12. Any other factor the AER considers relevant and which the AER has notified the Transmission Network Service Provider in writing prior to the submission of its revised Revenue Proposal.[51]

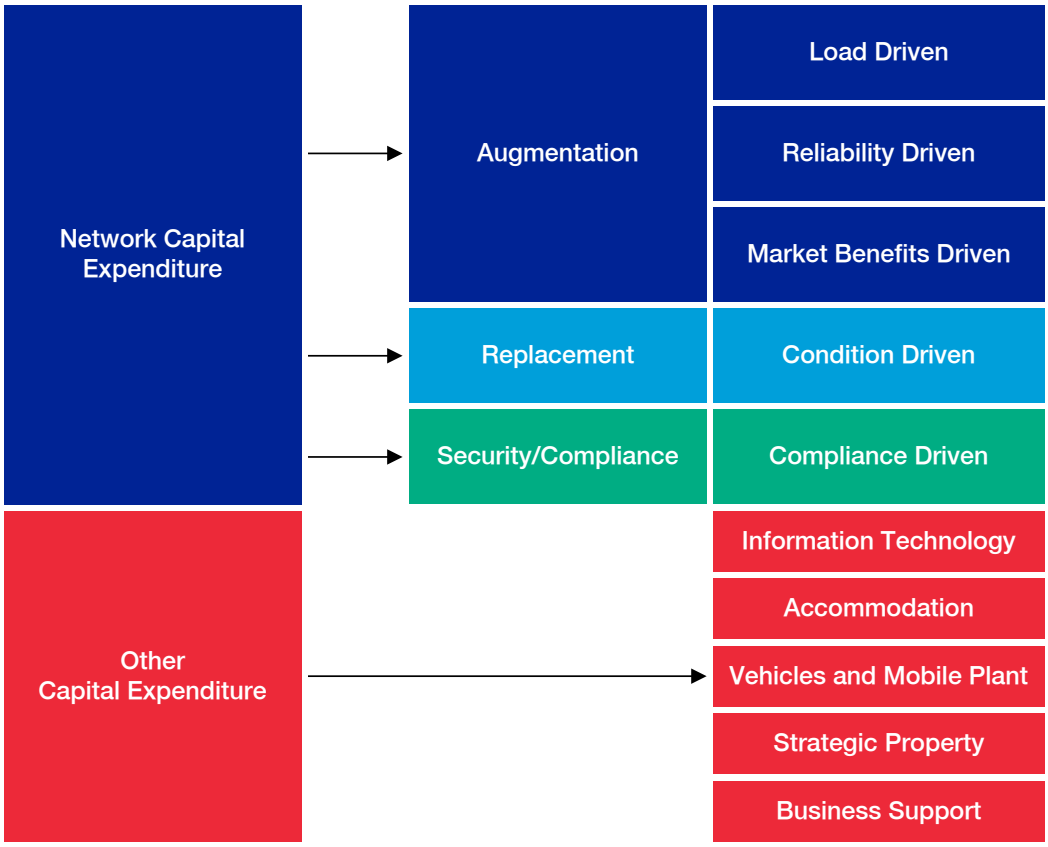
These factors are discussed in relation to TransGrid's forecast capital expenditure in Section 5.9.

[50] *National Electricity Rules*, Clause 6A.6.7(c).
[51] *National Electricity Rules*, Clause 6A.6.7(e), renumbered for ease of reading.

5.2 Categories of Capital Expenditure

The categories of capital expenditure are shown in Figure 5.1.

Figure 5.1
Capital Expenditure Categories



Load driven augmentation projects are required to meet electricity demand. They are developed based on network models and either state demand forecasts prepared by AEMO for the main grid, or connection point forecasts prepared by distribution network service providers for subsystems and connection points.

Reliability driven augmentation projects are required to meet a particular reliability standard. They are specifically requested by jurisdictions where a particular standard is to be applied.

Market benefits driven augmentation projects are investments in transmission capacity that provide greater access to lower cost generation in the wholesale electricity market. These projects result in economic benefits that exceed the project costs, providing a net economic benefit to consumers. In this proposal, market benefits driven projects have been proposed in the NCIPAP which is attached as Appendix AG.

Replacement projects are driven by condition risks of assets that are reaching the end of their serviceable lives. TransGrid has adopted an economic methodology to assess the condition risks of its assets and determine the need for replacement or refurbishment. Assets are not automatically replaced on a like-for-like basis, but are optimally reconfigured for future load requirements and as identified through efficient asset management decisions.

Security/compliance projects are driven by external compliance requirements such as legislation, jurisdictional requirements or particular standards.

Other capital expenditure includes information technology, office accommodation, vehicles and mobile plant, strategic property acquisition and other business support expenditure.

5.3 Forecast Capital Expenditure

Capital expenditure for the 2014/15 to 2018/19 period is significantly different from any period in recent history for TransGrid. In particular, load driven investment is small, reflecting the significant recent change in electricity usage. In contrast, replacement expenditure has increased significantly from that of the current period, reflecting many of the assets built during the establishment of the transmission network in the 1950s and 1960s reaching the end of their serviceable lives.

TransGrid's forecast capital expenditure for the 2014/15 to 2018/19 period is shown in Table 5.1. The total forecast capital expenditure for a four year regulatory control period is $1,507.5 million, and for a five year regulatory control period is $1,762.3 million.

Table 5.1
Forecast Capital Expenditure ($m nominal)

Category	2014/15 Expected	2015/16 Forecast	2016/17 Forecast	2017/18 Forecast	2018/19 Forecast
Augmentation	22.2	6.1	25.7	23.2	0.0
Replacement	235.5	272.3	231.0	245.4	189.7
Security/Compliance	30.8	24.8	31.9	51.3	25.6
Support the Business	**73.9**	**118.2**	**46.6**	**36.0**	**35.1**
Information Technology	19.8	20.7	19.5	23.0	21.5
Accommodation	8.8	11.5	5.2	0.0	0.0
Vehicles	9.2	8.1	10.0	11.7	12.2
Strategic Property	33.5	76.3	10.2	0.0	0.0
Other Business Support	2.6	1.5	1.6	1.3	1.4
Total	**362.4**	**421.4**	**335.2**	**355.8**	**250.3**

Source: TransGrid. Totals may not add due to rounding.

The portfolio for the 2014/15 to 2018/19 period comprises four augmentation projects, 9 distribution network connection projects, 103 replacement projects, 23 security/compliance projects, 83 programs of work for smaller replacement strategies and 7 strategic property acquisitions. In addition, the support the business category includes capital expenditure associated with information technology, vehicles and minor plant.

As the cost of capital investments is recovered over the life of the investments, the cost to consumers of the $1.8 billion of forecast capital expenditure in the 2014/15 to 2018/19 period will be approximately $430 million within the period.[52] The net impact of these capital investments on the regulatory asset base results in an approximate increase of $3 per year for an average residential customer, which is less than CPI.

[52] The cost to consumers of capital investment is the return on capital and regulatory depreciation, which are recovered over the life of the assets.

Getting the Most from TransGrid's Assets

TransGrid completed the replacements of Queanbeyan 132kV substation in 2010 and Wallerawang 132kV substation in 2014. The ages of these substations demonstrate the effectiveness of TransGrid's asset management practices, with Queanbeyan substation having achieved over 50 years' service and Wallerawang over 60 years' service.

The original Queanbeyan 132kV substation was commissioned in 1957, servicing its surrounding area and part of the Australian Capital Territory. An assessment of the substation's condition in 2004 highlighted that the majority of equipment at the substation was showing condition and performance issues indicating the end of its serviceable life.

Options were evaluated, and the preferred option was to rebuild the substation on a new site nearby. When rebuilding, the opportunity was taken to optimise the substation layout, which had developed incrementally over time, with fewer assets to achieve the same capacity. This has resulted in a reduction in maintenance costs, and achieved savings that have been passed on to consumers in this proposal.

The original Wallerawang 132kV substation was commissioned in 1953, servicing its surrounding area and a number of industrial loads. The site had had individual items of equipment replaced gradually as needed, but reached the stage where a range of equipment was showing condition issues and issues with the underlying infrastructure were also starting to emerge.

Options were evaluated, and the preferred option was to rebuild the substation on a new site. Unlike Queanbeyan, the substation had not developed significantly over time and did not have the same opportunities for optimisation of its layout. However, the relocation of the site allowed the decommissioning of two high voltage cables and other legacy equipment, which have also led to a reduction in maintenance costs.

The following sections describe the most material projects that contribute to the forecast capital expenditure.

5.3.1 Load Driven Projects

Reinforcement of Supply to Gunnedah, Narrabri and Moree

Additional network capacity is expected to be required to supply growing mining loads in the Gunnedah area.

In the long term, a new 132kV transmission line to provide additional capacity between Tamworth and Gunnedah is the most likely network solution. The timing of this project is dependent on the timing of actual mine developments in the area and potential changes to transmission reliability standards in New South Wales.

Planning studies have indicated that at the current projections of growth in mining loads, the installation of a phase shifting transformer on the existing transmission line from Tamworth to Gunnedah would defer the need for a new transmission line.

TransGrid proposes the installation of a phase shifting transformer at Tamworth 330kV substation.

The estimated cost of the project is $15.3 million.

Reinforcement of Supply to the Beryl Area

Additional network capacity is expected to be required to supply growing mining loads in Central West New South Wales.

In the long term, a new 330kV substation to provide additional capacity to Beryl is the most likely network solution. The timing of this project is dependent on the timing of actual mine developments in the area and potential changes to transmission reliability standards in New South Wales.

Planning studies have indicated that at the current projections of growth in mining loads, an additional capacitor bank at the existing Beryl 132kV substation is likely to defer the need for the new substation.

TransGrid proposes the installation of an additional capacitor bank at Beryl 132kV substation and has included this in the Network Capability Incentive Parameter Action Plan (NCIPAP) in Appendix AG, as the project meets the requirements for inclusion in the NCIPAP.

The estimated cost of the project is $1.9 million.

5.3.2 Jurisdictional Reliability Standard Driven Projects

Second Supply to the Australian Capital Territory

The Australian Capital Territory has been supplied by TransGrid's network since 1967. The ACT Government has considered its supply requirements and requested TransGrid to provide a second geographically separate supply point to the ACT. This is set out in a statutory obligation.[53]

The provision of a second supply has three stages, of which the first two have been completed. TransGrid is working with the ACT Government to progress the third stage, which is to establish a new switching station and short section of transmission line.

The estimated cost of the project is $31.4 million.

5.3.3 Replacement Projects

Substation Renewal

In recent years, many of TransGrid's substations commissioned in the 1950s and 1960s have shown condition indications of nearing the end of their serviceable lives. TransGrid proposes to renew seven substations in the 2014/15 to 2018/19 period, and there are three further substations for which work will commence in the period, as shown in Table 5.2.

The scope of a renewal comprises the most economically efficient works required to restore the substation's condition. Depending on the particular condition issues at each substation, this may consist of selected plant replacements, in-situ rebuild or rebuild on a different site.

[53] ACT Government, *Disallowable Instrument DI2012-267: Utilities Exemption 2012 (No 3)*, 2012.

Table 5.2
Substation Renewals ($m 2013/14)

Substation	Commissioning Year	Renewal Year	Cost ($m)	Proposed Method
Yanco	1969	2016	19	Selected plant replacement
Cooma	1954	2016	40	Rebuild nearby
Burrinjuck	1950	2017	13	Rebuild in-situ with GIS
Tamworth 132	1961	2017	43	Rebuild adjacent
Orange	1954	2017	24	Rebuild in-situ with GIS
Vales Point	1962	2018	44	Rebuild in-situ
Canberra	1967	2019	58	Selected plant replacement
Wagga 132	1955	2020	52	Rebuild in-situ
Munmorah	1967	2020	30	Rebuild in-situ
Newcastle	1969	2021	51	Selected plant replacement

Source: TransGrid. Costs reflect the total cost of each project, including costs that fall outside the upcoming regulatory control period.

Secondary System Renewal

Secondary systems comprise control, metering and protection systems that enable monitoring, automation and manual control of the network.

The technology used in secondary systems has changed significantly over the last 30 years. The original secondary systems used in TransGrid's network were electromechanical relay-based systems. In the 1970s, the available technology for new secondary system devices moved to solid-state systems, and more recently the technology has shifted again to microprocessor-based systems.

Microprocessor-based secondary systems have many advantages compared to earlier technologies, including increased functionality, accuracy, flexibility, and the ability for multiple electromechanical relays to be replaced with one microprocessor-based relay. However, as for most microprocessor-based devices, they have a shorter life cycle and support cycle and reach de-support and obsolescence sooner than earlier technologies. Whereas electromechanical relays could remain in service for over 40 years, the serviceable life of microprocessor-based systems is 15 years or less. In addition, older electromechanical and solid-state devices are no longer available and lack availability of spare parts, and microprocessor-based systems are now industry standard.

The proposed secondary system renewals are shown in Table 5.3.

Table 5.3
Secondary System Renewals ($m 2013/14)

Secondary System	Year	Cost ($m)
Tumut	2015	16
Kangaroo Valley	2016	6
Balranald	2016	5
Albury	2016	11
Sydney West	2016	40
Griffith	2016	19
Hume	2017	4
Deniliquin	2018	6
ANM	2018	5
Haymarket	2018	9
Taree	2018	26
Sydney North	2019	42
Armidale	2019	15
Murrumburrah	2019	5
Buronga	2020	4
Beryl	2020	6
Liddell	2020	22
Avon	2021	6
Sydney South	2022	43

Source: TransGrid. Costs reflect the total cost of each project, including costs that fall outside the upcoming regulatory control period.

Transmission Line Life Extension

The vast majority of TransGrid's "main grid" transmission lines, operating at 500kV, 330kV and 220kV, are constructed with steel towers. In coastal or polluted areas, corrosion of these towers occurs more quickly than in inland or drier areas. Older lower voltage transmission lines, operating at 132kV, are constructed with wood poles. These poles deteriorate over time.

TransGrid has assessed the condition of a number of coastal steel tower transmission lines as requiring renewal. The most efficient option is to undertake life extension works on towers, which involves either corrosion treatment and painting or in some cases replacement of towers. On average, it is expected that this work will extend the life of these assets by 25 years.

TransGrid has also assessed the condition of a number of wood pole transmission lines as requiring renewal. These will typically be addressed by replacement of the wood poles with

concrete poles while retaining existing conductors, or reconstruction of the transmission line including replacement of conductors. Concrete poles have a longer life than that of wood poles, and can be more readily transported and erected.

The transmission lines for which renewals and life extension works are proposed are shown in Table 5.4.

Table 5.4
Transmission Line Renewals and Life Extensions ($m 2013/14)

Transmission Line	Year	Cost ($m)
Line 21 Sydney North to Tuggerah life extension	2015	5
Line 24 Vales Point to Eraring life extension	2016	3
Line 970 Yass to Burrinjuck pole replacement	2016	13
Line 96H Coffs Harbour to Koolkhan pole replacement	2016	14
Line 8 Dapto to Marulan life extension	2016	3
Line 11 Dapto to Sydney South life extension	2017	3
Line 18 Dapto to Kangaroo Valley life extension	2017	2
Line 22 Vales Point to Sydney North life extension	2017	9
Line 99J Yanco to Griffith rebuild	2018	13
Line 99F Yanco to Uranquinty pole replacement	2018	27
Line 17 Avon to Macarthur life extension	2018	1
Line 23 Munmorah to Vales Point life extension	2019	2
Line 26 Sydney West to Vales Point life extension	2019	2
Line 959/92Z Sydney North to Sydney East life extension	2019	8
Line 10 Avon to Dapto life extension	2019	2
Line 2M Munmorah to Tuggerah life extension	2019	1
Line 16 Avon to Marulan life extension	2019	2
Line 93 Eraring to Newcastle life extension	2021	1
Line 90 Eraring to Newcastle life extension	2022	2

Source: TransGrid. Costs reflect the total cost of each project, including costs that fall outside the upcoming regulatory control period.

Underground Cable Remediation

The Sydney inner metropolitan area and CBD are presently supplied by two 330kV cables in TransGrid's network supported by a number of 132kV cables in Ausgrid's highly integrated underlying network.

In recent years, measurement of higher soil temperatures and changes to the condition of the bedding and backfill along the cable route have led to a reduction in the rating of the older of the two 330kV cables, 41 cable. The reduced rating assumes ongoing weather conditions with sufficient rainfall to keep the backfill moist. However, in the event of

extended dry weather, the cable rating will need to be reviewed and potentially reduced further to avoid damage to the cable.

Localised point temperature monitoring has been installed on 41 cable and is providing data on the cable surface and backfill temperatures. However, the ability to better ascertain the internal condition of the cable will require the destructive testing of a section of cable. TransGrid has proposed operating expenditure in this proposal to remove and replace a section of cable for destructive testing, as a major operating project.

TransGrid has also investigated a number of options to manage the risk of a further reduction in the rating of 41 cable, which may eventuate under extended dry weather conditions. The preferred option is the remediation of the backfill along the cable route with new backfill material, at an estimated cost of $24.7 million.

Given the change in the ratings of 41 cable and some other cables in the underlying 132kV network, there is a need to adjust the sharing of power flows between the cables. This proposal includes forecast expenditure to change the configuration of series reactors that connect to the cable, at an estimated cost of $8.6 million.

Successful completion of this suite of projects will allow TransGrid to manage its existing cable assets prudently and maximise the utilisation of 41 cable over its remaining life.

TransGrid's intention is to defer the need to pursue higher cost options, such as the installation of a new cable, through these lower cost options to retain 41 cable in service.

If the condition of 41 cable is found to be worse than expected while carrying out the above projects, TransGrid may need to retire the cable. TransGrid has included a contingent project in this proposal for the installation of a new cable, Powering Sydney's Future, that includes the retirement of existing cables as part of the trigger. The contingent project is described in Section 5.3.7.

Communications Upgrade and Replacement

In the current regulatory period TransGrid has delivered a communications upgrade and replacement project (CUARP), to upgrade communications networks to facilitate an increasing use of IT systems in place of traditional systems and ensure compliance with AEMO's Power System Data Communications Standard.

TransGrid has reviewed its communications needs in the context of increasing use of IT systems, operational technologies and future requirements.

TransGrid's communications network needs to support the communications requirements of the technologies being introduced within the substation environment. These include secondary systems technologies that provide comprehensive information on the operation of the network, online condition monitoring on high voltage equipment and field systems such as portable field switching tablets. Further, many of TransGrid's corporate systems that manage drawings, protection relay settings, work management and enterprise resource planning are the primary sources of this data and require access from the field.

TransGrid proposes to continue to establish improved communications networks in the upcoming regulatory control period, with 11 communications upgrade and replacement projects. These are shown in Table 5.5.

Table 5.5
Communications Upgrades and Replacements ($m 2013/14)

Communications Network	Year	Cost ($m)
Northern Microwave Loop	2016	18.0
Lismore to Coffs Harbour	2016	13.9
Wallerawang to Orange North	2016	10.6
Williamsdale to Cooma	2016	6.8
Wollar to Beryl	2017	1.7
Coffs Harbour to Port Macquarie	2017	12.7
Wellington to Orange North	2017	8.2
Port Macquarie to Stroud	2018	14.8
Parkes to Cowra	2018	10.0
Uranquinty to Griffith	2019	12.8
Yass to Wagga	2019	11.8

Source: TransGrid. Costs reflect the total cost of each project, including costs that fall outside the upcoming regulatory control period.

5.3.4 Security/Compliance Projects

Transmission Line Low Spans

In recent years, technologies such as aerial laser surveys have become commercially viable. These technologies provide accurate measurement of transmission line clearances and vegetation growth, with greater accuracy and less effort than previous manual techniques.

TransGrid has conducted aerial laser surveys of all transmission lines. The surveys have identified a number of spans that, based on accurate measurement, do not meet their original design clearances between the transmission line conductors and ground.

TransGrid has commenced remedial work on the highest priority transmission lines to increase the clearances between the conductors and ground. It has also implemented interim risk management measures on spans on other lines, such as warning signs and installation of access barriers.

The forecast capital expenditure in this proposal includes projects to address low spans on the next priority lines. These projects have led to an increase in expenditure in the security/compliance category compared to that in previous regulatory control periods.

5.3.5 Strategic Property Acquisition

Strategic property acquisition is the acquisition of land or easements for future use, that is, for projects beyond the regulatory control period in which they are acquired.

A prudent strategic property acquisition plan enables the securing of land and easements to meet the future development needs of the network, and help ensure that prudent and efficient options are not excluded due to required sites being unavailable.

At a time when expectations of the transmission network are changing rapidly, strategic property acquisition allows TransGrid to be more responsive in its project initiation and delivery by avoiding undue delays that can arise from difficulties in property acquisition.

TransGrid considers a number of factors when considering a strategic property acquisition:

- the nature of the network need, in terms of drivers and alignment with TransGrid's *Network Development Strategy*;
- the timing of the network need, that may be a range of potential scenarios;
- current and proposed land use, urban development and zoning;
- other strategic planning instruments or development plans that involve land use for gas pipelines, water pipes, roads and highways;
- the consequences of not acquiring the property;
- the consequences of a future decision not to proceed with the ultimate project; and
- an economic assessment that considers the cost of the property, benefits of avoided higher costs, option value and potential sale value of the land if it is later found not to be required.

TransGrid's proposed property acquisitions, both strategic and for current projects, are shown in Table 5.6.

Table 5.6
Proposed Property Acquisitions ($m 2013/14)

Property	Year	Cost ($m)
Property acquisition for Western Sydney Supply Project at Sydney West substation	2015	36.9
Strategic property acquisition at Beryl	2015	1.0
Strategic property acquisition at Maraylya	2016	8.3
Strategic property acquisition at Surry Hills	2016	47.0
Extension of an existing property at Richmond Vale	2016	2.0
Strategic property acquisition for Powering Sydney's Future project	2017	20.5
Easement acquisition for existing transmission lines in the Australian Capital Territory	2017	9.8

Source: TransGrid. Costs reflect the total cost of each project, including costs that fall outside the upcoming regulatory control period.

Of these acquisitions, the property acquisition for Western Sydney Supply Project and easement acquisition for existing transmission lines in the Australian Capital Territory are required for existing projects and assets.

Strategic property acquisitions at Beryl and for Powering Sydney's Future are for projects that are likely to be required within approximately 10 years.

Strategic property acquisitions at Surry Hills and Maraylya are for projects that are likely to be beyond 10 years. The property at Surry Hills has become available to TransGrid on an opportune basis, and is one of the last undeveloped sites in the Sydney inner metropolitan

area. Should TransGrid forgo the opportunity to purchase this property, it would most likely be developed for alternative purposes. This would significantly increase the uncertainty and risk of future property acquisition in the inner metropolitan area. At Maraylya, the likely encroachment of urban development would sterilise land options in this area. The strategic acquisition of the property prior to this development will maintain TransGrid's ability to pursue efficient options in the future and provide certainty for other urban developments regarding future use of this land.

5.3.6 Cost Escalation

Labour Cost Escalation

TransGrid faces cost pressures above the consumer price index (CPI). For capital expenditure, this includes labour rate escalation, escalation of commodities from which equipment is manufactured and property escalation.

TransGrid considers that Average Weekly Earnings (AWE) is the labour escalator that most closely reflects the actual labour costs facing the business. However, the AER has expressed a preference for the use of the Wage Price Index (WPI) as a more stable indicator over time than AWE.

In this proposal, TransGrid has escalated labour costs based on:

- its employee agreement for committed projects; and
- the WPI for future projects.

TransGrid engaged BIS Shrapnel to provide forecasts of the WPI for the Electricity, Gas, Water and Waste Services (EGWWS) sector in New South Wales. The report from BIS Shrapnel is attached as Appendix H.

The labour rate escalation used in this proposal is shown in Table 5.7.

Table 5.7
Labour Rate Escalation (Nominal)

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Labour for committed projects (TransGrid employee agreement until 1 December 2016, then BIS Shrapnel EGWWS WPI)	2.5%	2.9%	3.6%	4.1%	4.5%	4.7%
Labour for future projects (BIS Shrapnel EGWWS WPI)	3.8%	4.0%	4.1%	4.1%	4.5%	4.7%

Source: TransGrid and BIS Shrapnel.

Commodity Escalation

Equipment used in capital projects is manufactured from commodities such as copper, aluminium, steel and oil (including oil products such as plastics). These commodities are traded on international markets, and TransGrid is a price taker of movements in commodity prices, which can vary from CPI.

Capital projects are also subject to construction costs, which are affected by a range of industries, of which the energy industry is only one.

TransGrid engaged SKM to provide forecasts of commodity escalation. The report from SKM is attached as Appendix I.

The commodity escalation used in this proposal is shown in Table 5.8.

Table 5.8
Commodity Escalation (Nominal)

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Aluminium	3.5%	7.9%	7.9%	5.9%	7.3%	5.9%
Copper	2.8%	2.7%	2.8%	1.3%	2.3%	1.0%
Steel	10.7%	5.8%	5.2%	2.3%	3.0%	1.5%
Oil	21.8%	-2.4%	1.8%	3.3%	4.4%	3.0%
Construction	4.1%	5.1%	4.9%	4.8%	4.7%	4.7%

Source: SKM.

Property Escalation

TransGrid procures land and easements for its capital projects. The costs associated with this are affected by movements in property markets, which can vary from CPI.

TransGrid engaged BIS Shrapnel to provide forecasts of property escalation. The report from BIS Shrapnel is attached as Appendix J.

The property escalation used in this proposal is shown in Table 5.9.

Table 5.9
Property Escalation (Nominal)

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Residential	8.5%	9.2%	7.9%	3.8%	1.9%	3.8%
Industrial	0.0%	2.0%	2.5%	3.5%	4.9%	5.3%
Rural	7.4%	7.4%	6.6%	4.2%	3.6%	5.2%
Agricultural	1.6%	1.6%	2.4%	1.8%	4.6%	4.0%

Source: BIS Shrapnel.

5.3.7 Proposed Contingent Projects

A contingent project is a project that is reasonably necessary to meet any of the capital expenditure objectives, subject to the occurrence of a specific trigger event. However, the

inclusion of the project in forecast capital expenditure would not be appropriate because either the occurrence of the trigger event is not sufficiently certain, or the cost of responding to the trigger event is not sufficiently certain.

TransGrid proposes two contingent projects in this revenue proposal: Powering Sydney's Future and the Reinforcement of Capacity in Southern New South Wales. The projects are summarised below and set out in more detail in Appendix L.

Powering Sydney's Future

The Sydney inner metropolitan area and CBD are presently supplied by two 330kV cables in TransGrid's network, supported by a number of 132kV cables in Ausgrid's highly integrated underlying network.

Recently, several factors have arisen that impact the ability of this network to reliably supply the forecast demand in this area. These are:

- a decrease in the ratings of TransGrid's 41 cable and a number of Ausgrid 132kV cables, due to higher soil temperatures and changes to the condition of the bedding and backfill along their routes;
- increasing reliability, environmental and other risks as a number of 132kV cables approach the end of their serviceable lives; and
- demand forecasts for the Sydney inner metropolitan area.

TransGrid and Ausgrid undertake regular joint planning that considers the combined network to develop the most prudent and efficient planning outcomes.

Based on joint planning outcomes, there is a need to provide replacement capacity to the area in summer 2018/19 to enable retirement of some Ausgrid 132kV cables, based on the current jurisdictional planning standard of 'modified n-2'.

Powering Sydney's Future is a current TransGrid project to investigate the underlying factors that may drive the need to reinforce supply capacity to the Sydney inner metropolitan area and CBD in the near future. This forms part of a broad stakeholder consultation strategy around the most appropriate ways to ensure the electricity network meets future needs.

The streams of investigation are:

- consultation with the community in the Sydney CBD and surrounding affected area on their views on the need for the project;
- examination and discussion of the risks posed by the deterioration in condition of existing cables;
- consideration of the range of options for ensuring risks are managed and supply reliability expectations are met;
- consideration of alternative reliability standards and the impact on the timing of works;
- assessment of potential for demand management to form part of the solution, noting that TransGrid procured 35MW of demand response in the Sydney inner metropolitan area in summer 2012/13; and
- assessment of the impact on electricity demand of energy efficient appliances, energy efficiency initiatives, potential growth in electric vehicles and long term demographic trends in Sydney.

At this stage, there is still some uncertainty regarding the timing and extent of the need to manage these risks, and the works that may be needed to address this need.

Given this uncertainty and the successful procurement of demand response in the Sydney inner metropolitan area in summer 2012/13, TransGrid considers that there is potential for sufficient network support to form part of the solution and potentially defer the need for a major network investment.

The use of network support, which can provide a more granular response to meet the need for capacity, would enable TransGrid to wait until the latest possible time to trigger a network investment, if one is required. However, based on current forecasts, the amount of network support required to defer the network project is significantly greater than the amount TransGrid has previously procured and is likely to be challenging to secure. TransGrid therefore proposes the procurement of pre-emptive network support to build the capability of the market, in advance of the need.

This proposal therefore includes:

- the remediation of backfill along the 41 cable route, to retain the rating of this cable;
- reconfiguration of series reactors at Sydney South to adjust sharing of power flows between cables;
- network support to attempt to defer the timing of new network investment, including pre-emptive network support to build the capability of the market, as described in Section 5.4;
- strategic route acquisition for a new 330kV cable route from its closest bulk supply point to the Sydney inner metropolitan area in forecast capital expenditure, so that TransGrid is able to respond as quickly as possible to install a new 330kV cable should a network investment be required; and
- a contingent project to install a new cable.

TransGrid proposes the installation of a new cable to the Sydney CBD as a contingent project with the following trigger:

1. demand forecasts that draw on external sources (such as Ausgrid and/or AEMO connection point forecasts), including the economic application of demand reduction initiatives and taking into consideration the scheduled retirement of cables within the area, resulting in the loading of the defined constraint cut-set exceeding its contingent MVA rating (based on the applicable reliability criteria at the time) within the next four years; and
2. successful completion of the RIT-T including a comprehensive assessment of credible options showing that an investment is justified; and
3. TransGrid Board commitment to proceed with the project subject to the AER amending TransGrid's revenue determination pursuant to the Rules.

The trigger is specific and capable of objective verification, relates to a specific location or locations, and is probable but too uncertain to include the proposed contingent project in the forecast capital expenditure in this proposal.

The project has an estimated cost of $430 million, which exceeds the applicable contingent project threshold of $46.6 million.[54]

Reinforcement of Capacity in Southern New South Wales

TransGrid has received a number of enquiries for the connection of new generation in southern New South Wales. Some new generation has recently been commissioned or is at an advanced design stage, and further new generation is forecast to be commissioned towards the end of the next regulatory control period.

The project is contingent on the generation developments in the regions south of Sydney. In order to assess the adequacy of the augmentation options, the generation development is assumed to take place over time and require transmission augmentation in three stages:

- stage 1: upgrade of the 330kV transmission lines between Snowy and Yass/Canberra, Yass and Marulan, and installation of phase shifting transformers to control power flows at Bannaby and Marulan;
- stage 2: construction of a new 330kV single circuit transmission line between Yass and Bannaby; and
- stage 3: reinforcement of southern supply to the Newcastle – Sydney – Wollongong area by increasing the capacity of the Bannaby to Sydney West transmission line through minor works.

TransGrid proposes this project as a contingent project with the following trigger:

1. AEMO classification of generation developments as being at the 'committed' stage of development on their 'Generator Information' webpage:
   (i) exceeding 350 MW;
   (ii) in southern New South Wales around Yass/Canberra/Marulan area, or any additional connection points established in this vicinity; and
2. successful completion of the RIT-T, including a comprehensive assessment of credible options showing a transmission investment is justified; and
3. TransGrid Board commitment to proceed with the project subject to the AER amending the revenue determination pursuant to the Rules.

The trigger is specific and capable of objective verification, relates to a specific location or locations, and is probable but too uncertain to include the proposed contingent project in the forecast capital expenditure in this proposal.

The project has an estimated cost of $308.9 million, which exceeds the applicable contingent project threshold of $46.6 million.[55]

[54] The applicable contingent project threshold is the larger of either $30 million or 5% of the maximum allowed revenue in the first year of the regulatory control period. In this proposal, 5% of the proposed maximum allowed revenue in 2014/15 is $46.6 million.
[55] The applicable contingent project threshold is the larger of either $30 million or 5% of the maximum allowed revenue in the first year of the regulatory control period. In this proposal, 5% of the proposed maximum allowed revenue in 2014/15 is $46.6 million.

5.4 Network Support

Network support refers to alternatives to network investment that can meet supply requirements, and defer or avoid the need for network investment. Network support is a broad term that includes:

- demand management, which refers to consumers agreeing to switch off part or all of their electrical loads at times of peak; and
- distributed generation, which is the connection of generation close to electrical loads that reduces the need for transmission network capacity.

TransGrid continues to proactively pursue network support options as an alternative to network investment. Under the network investment process described in Section 4.3, network support options are considered for all network needs.

TransGrid has two forecast projects for which it has identified potential network support solutions: Powering Sydney's Future and the Reinforcement of Supply to Gunnedah, Narrabri and Moree.

In recent revenue determinations, the AER has required network support contracts to have been entered into or a Regulatory Investment Test for Transmission (RIT-T) to have been completed in order to include network support in the proposal as an alternative to the network solution.[56]

TransGrid has no active network support contracts or completed RIT-Ts for the projects described below. However, given the potential for network support in the Sydney inner metropolitan area, TransGrid has proposed network support expenditure to defer a capital network investment as part of the Powering Sydney's Future project. For the Reinforcement of Supply to Gunnedah, Narrabri and Moree, TransGrid has included a network project in the forecast capital expenditure in this proposal and will seek network support during regulatory consultation.

5.4.1 Powering Sydney's Future

Powering Sydney's Future is a project to ensure sufficient capacity to supply the Sydney inner metropolitan area, as described in Section 5.3.7.

At this stage, there is still some uncertainty regarding the timing and extent of the capacity shortfall and the works that may be needed to address this need. Given this uncertainty, and the successful procurement of demand response in the Sydney inner metropolitan area in summer 2012/13, TransGrid considers it likely that sufficient network support would be available in the area to defer a network project. The use of network support, which can provide a more granular response to meet the need for capacity, would enable TransGrid to wait until the latest possible time to trigger a network investment, if one is required.

To succeed in deferring network investment by use of a network support alternative, TransGrid considers it essential that "pre-emptive" network support be included in the operating expenditure allowance from summer 2014/15 to summer 2017/18, to develop the network support market in the area.

As well as providing a more granular response to meet the need for capacity, and potentially allowing the deferral of network investment, the proposed network support has been

[56] AER, *Draft Decision: Powerlink Transmission Determination 2012-13 to 2016-17*, November 2011, p199.

assessed as being more cost effective as the currently preferred network option for the period from 2014/15 to 2021/22.

The Need for Market Development

TransGrid has previously contracted 35 MW of network support to address operational constraints in the Sydney inner metropolitan area for the summer of 2012/13. TransGrid's methodology has been to approach the market close to the time of a specific need. However, it is difficult to anticipate precisely the level of network support that might be available in 2018/19. Experience suggests that more network support is likely to be available in the market now and into the future.

The network support required to address the forecast shortfall of capacity to the area could be around 170 MW. This indicates the need for market development. To better inform this understanding, TransGrid has commissioned a desktop study of demand response potential in the area from 2015 to 2025.

Intended Outcomes of Pre-emptive Network Support

TransGrid anticipates that well targeted procurement of pre-emptive network support will facilitate the later availability of network support for the Powering Sydney's Future project by delivering four key outcomes. Where network support can provide a cost-effective non-network alternative to network investment, electricity consumers will benefit through lower transmission network charges. The outcomes are:

1. Take out an option

   The portfolio of demand response agreements for the pre-emptive network support could include a number of agreements designed to take out an option on particular providers in future years, for example by structuring to cover availability in future years as well as the initial year of procurement.

2. Grow the market

   The portfolio could also include a number of agreements made purely to grow the number of demand response providers available in the project area. This could be done by focusing on engaging a different group of providers during each year of the pre-emptive network support period or by specifying that particular portions of the portfolio must be met by different types of demand response mechanisms.

3. Market understanding

   By their nature, research projects and surveys of potential demand response providers stop short of unveiling the true nature of the demand response market. Pre-emptive network support procurement would allow TransGrid to gain a clear understanding of the available supply and market prices. This would serve both to reduce the risk of relying on an unrealistic network support expectation to limit exposure to capacity shortfall in the future, and allow for more accurate cost comparisons between network and non-network options to address the Powering Sydney's Future network need.

4. Facilitate development of complex demand response portfolios

   Pre-emptive network support could be designed to encourage more complex and deep network support portfolios. Traditionally, network support agreements have been made up of portfolios of larger electricity customers making a firm

commitment to reduce load or increase generation in return for payment. However, there are other options that could be explored and in turn deliver larger portfolios, including:

- a larger portfolio including 'non-firm' participants;
- an aggregated set of agreements with small consumers (for example through pool pump and/or air conditioner control); and
- agreements with consumers to undertake energy efficiency measures to cut the peak well ahead of it occurring, rather than a demand response agreement for a particular time (also thought of as "opportunistic demand management").

The proposed pre-emptive network support costs for Powering Sydney's Future are shown in Table 5.10, and the estimated costs for network support for the first four years of the expected capacity shortfall in Table 5.11. TransGrid proposes the inclusion of these costs in its operating expenditure allowance as network support. This is set out in Section 6.3.5.

Table 5.10
Proposed Pre-emptive Network Support ($m nominal)

	2014/15	2015/16	2016/17	2017/18
Support procured (MW effective)	34	69	103	138
Estimated cost	5.5	6.6	7.8	8.7

Source: TransGrid.

Table 5.11
Proposed Network Support ($m nominal)

	2018/19	2019/20	2020/21	2021/22
Support procured (MW effective)	172	193	209	228
Estimated cost	9.6	10.0	10.3	10.7

Source: TransGrid.

Under Clause 6A.7.2 of the Rules, network support costs are a pass through. This means that if TransGrid's actual expenditure on network support varies from this forecast, unused amounts of the allowance will be refunded to consumers or additional requirements passed through to consumers.

5.4.2 Reinforcement of Supply to Gunnedah, Narrabri and Moree

In 2011, TransGrid issued a Request for Proposals for network support as an option for supply to the Gunnedah, Narrabri and Moree area. One proposal was received. The need to augment supply to the area was then deferred due to a moderation in demand growth.

TransGrid has included a network project to meet this need in this proposal, as described in Section 5.3.1. However, TransGrid will seek network support alternatives during regulatory consultation and procure network support if a suitable network support solution is offered and economic.

5.5 Approach to Forecasting

TransGrid's capital expenditure is forecast as a bottom-up build up of projects and programs of work. Projects are individually scoped to meet specific network needs, such as needs to augment the network or replace assets reaching the end of their serviceable lives. Programs of work are groups of similar minor projects, such as replacement of a particular model of equipment that exhibits consistent issues across the network.

Projects and programs of work are justified based on technical requirements and cost/benefit evaluation.

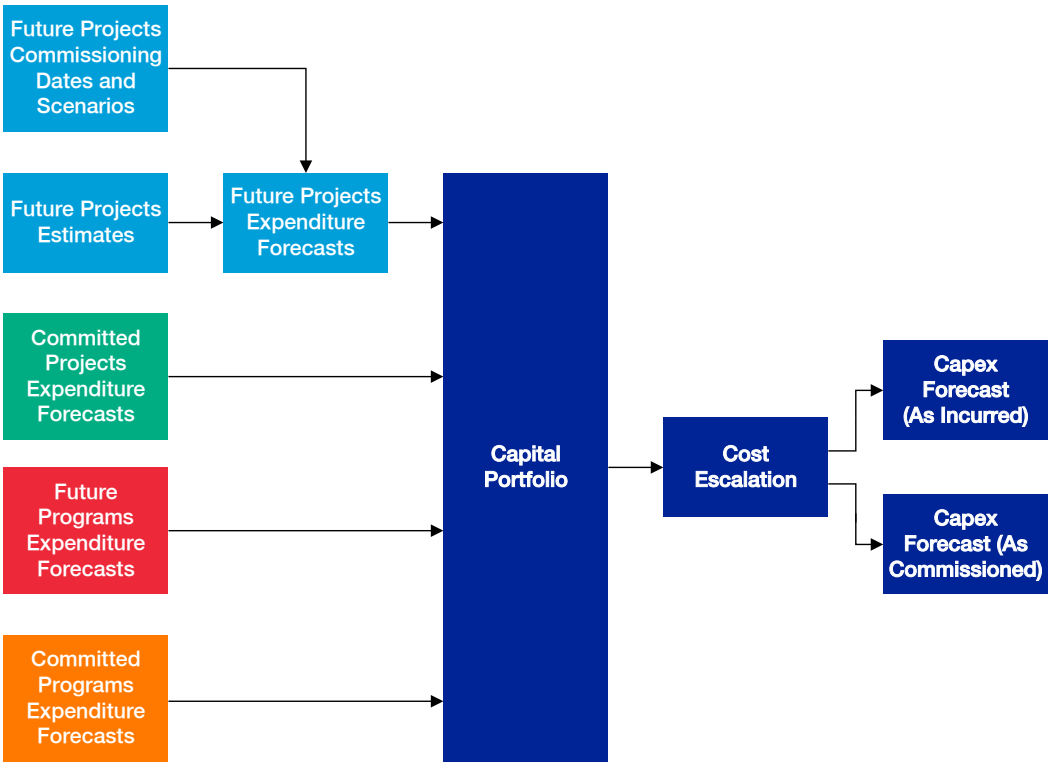
The projects and programs of work are compiled in the capital accumulation model. The model aggregates the expenditure profiles of individual projects, applies escalation for labour, commodities and property, and allows for expenditure profiles to be considered for future projects under a number of scenarios such as market and demand scenarios. Projects are costed in 2013 year dollars and escalation is applied to reflect the relevant timing of the expenditure within the regulatory control period.

At a portfolio level, the capital expenditure allowance is prepared to represent the most likely, or "P50", cost of delivery. The cost of delivering a project will vary due to a number of factors. However, the "P50" cost estimates reflect the expected average cost of delivery across the portfolio. That is, the actual costs of delivering projects are expected to fall equally higher and lower than the estimates, so the total capital expenditure forecast reflects the most likely cost of delivery of the portfolio.

The capital accumulation model has the option to apply a cost estimating risk factor to projects according to their type, such that the forecast expenditure represents the most likely, or "P50", cost of delivering the portfolio. TransGrid does not propose the use of a portfolio level cost estimating risk factor in this revenue proposal, as its cost estimating methodology produces project estimates that are already the most likely cost. TransGrid's cost estimating methodology has been reviewed by Evans & Peck, who found it to be in accordance with what it considers "best practice estimating". The full report by Evans & Peck is attached as Appendix M.

The capital accumulation model methodology is shown in Figure 5.2.

Figure 5.2
Capital Accumulation Model Methodology



5.5.1 Estimating Process

TransGrid prepares estimates for projects and programs of work as follows.

Future Projects

A future project is a project that is prior to Decision Gate 2 – Project Determination in the *Network Investment Process*.

The cost estimates for future projects are based on a desktop engineering assessment of the project option, expected delivery method and time for the project. The scope determined from this assessment is used to develop an estimate of the project cost.

Estimates for future projects are prepared using the Success Enterprise estimating system. They comprise a base cost estimate for major scope components and an allocation of allowances:

- the base cost estimate is developed based on the major scope components. It is built from standard market costs for equipment and materials and cost factors for design, commissioning and other works. It does not include allowances for risk, cost escalation or contingency; and
- the allocation of allowances is a costed value for project variables required to deliver the project scope. It is developed based on expected scope costs that are not able to be fully defined at this stage of the project. This is based on an assessment of occurrence in past projects.

The cost estimating methodology for future projects produces estimates that reflect the most likely cost of delivery. The standard market costs used to develop estimates are derived from competitive tender costs, ensuring that the estimates reflect the efficient costs to deliver the project scope.

Cost escalation is applied to future projects in the capital accumulation model to accommodate expected changes in labour, commodity and property prices.

Committed Projects

A committed project is a project that has passed Decision Gate 2 – Project Determination in the *Network Investment Process*.

For committed projects, the expected cost for the project is used for the expenditure forecast. The expected cost is the most recent estimate of the cost to complete the project and is determined from committed contract costs, funding approval or detailed project scope depending on the stage in project delivery.

Cost escalation is not applied to committed projects in the capital accumulation model, as it is not required once contracts are established and variations in major plant costs can be mitigated through hedges.

Future and Committed Programs

A program of work is a group of similar minor projects that often relate to a particular family of equipment that exhibits condition issues. These include a particular model of circuit breaker, type of protection relay or model of communication device.

Estimates for programs of work are based on standard costs for each activity. These are comprised of standard market costs for equipment and standard labour rates.

5.5.2 Reliability Augmentations

The reliability augmentations in this proposal comprise:

- the load driven projects identified in Section 5.3.1;
- the jurisdictional reliability standard driven project identified in Section 5.3.2;
- the distribution network connection projects, of which there are nine projects with a total value of $10.7 million; and
- three security/compliance projects to address voltage unbalance, protection against multiple contingencies and quality of supply monitoring, with a total value of $11.2 million.

5.5.3 Cost Allocation and Relationship with Incentive Schemes

The forecast capital expenditure in this revenue proposal is for the provision of prescribed transmission services only. The allocation of costs is done in accordance with TransGrid's cost allocation methodology, approved by the AER in 2008.[57]

Expenditure has been allocated to capital and operating expenditure in accordance with TransGrid's *Expenditure Capitalisation* procedure. This procedure is provided as a supporting document to this proposal.

Material assets proposed in the upcoming regulatory control period are listed in Section 5.3. Additionally, a new substation at Rookwood Road has been substantially completed in the current regulatory control period as final stage of the Western Sydney Supply Project and will be commissioned in 2014/15. The substation has a total cost of $121 million, of which 90% has been incurred in the current regulatory control period.

The proposed material assets are shown on the map of the network in Appendix P.

With the exception of Munmorah substation, the proposed material assets provide only prescribed transmission services. Munmorah substation provides both prescribed transmission services and negotiated transmission services. The negotiated transmission services are for the connection of the Colongra gas turbine generators.

The in-situ rebuild of Munmorah substation comprises the removal of the switchbays associated with the connection of the now decommissioned Munmorah Power Station and replacement of the remaining busbars and switchgear, with exception of the switchbays and associated equipment used for the connection of the Colongra gas turbine generators. As well as its main grid connections within the transmission network. Munmorah substation continues to provide prescribed connection services to Ausgrid's distribution network.

The forecast capital expenditure in this proposal does not include expenditure to improve performance under the Service Target Performance Incentive Scheme or for projects included in the NCIPAP.

5.6 Assurance on Capital Expenditure

TransGrid has commissioned expert advice from leading Australian technical experts and independent advisers to provide external inputs and assurance reviews to support the capital expenditure forecast. The key advisers are listed in Table 5.12.

[57] AER, *Final Decision: TransGrid Transmission Determination 2009-10 to 2013-14*, 28 April 2009, p98.

Table 5.12
Key External Advisers for Capital Expenditure Forecast

Adviser	Input or Assurance Advice
BIS Shrapnel	Labour cost escalation, being Wage Price Index for the NSW Electricity, Gas, Water and Waste Services sector
SKM	Commodity cost escalation
BIS Shrapnel	Property cost escalation
GHD	Review of capital program
Evans & Peck	Review of cost estimating process and advice on treatment of cost estimating risk
SKM, PB and Aurecon	Cost estimate comparisons to externally test efficiency of capital project estimates
SKM	Review of capital project estimating database for efficiency
NERA	Advice on contingent project triggers
NERA	Advice on strategic property acquisitions

5.7 Efficiency of Capital Expenditure

TransGrid primarily assesses the efficiency of its capital expenditure through external assurance reviews and the comparison of cost estimates to comparable estimates prepared externally.

TransGrid has also prepared some key aggregate and industry benchmarks on its capital expenditure. These benchmarks show that TransGrid's capital expenditure is in line with or below that of its peers, both internationally and within Australia.

The outcomes of the benchmarking studies are summarised in Table 5.13.

Table 5.13
Benchmarking Outcomes for Capital Expenditure

Study Undertaken	Outcome
Replacement capital expenditure	TransGrid's replacement capital expenditure as a proportion of regulatory asset base is at the median amongst Australian and international peers
International comparison of capital project estimates	TransGrid's estimates are lower than average amongst Australian and international peers
Cost estimate comparisons	TransGrid's estimates are generally average or slightly lower than external estimates
Cost estimating database review	TransGrid's unit costs are generally average or slightly lower than external unit costs

The benchmarks in this section confirm the efficiency of TransGrid's capital expenditure and substantiate the efficiency of the unit rates and scopes of the projects that comprise the capital expenditure forecasts in this proposal.

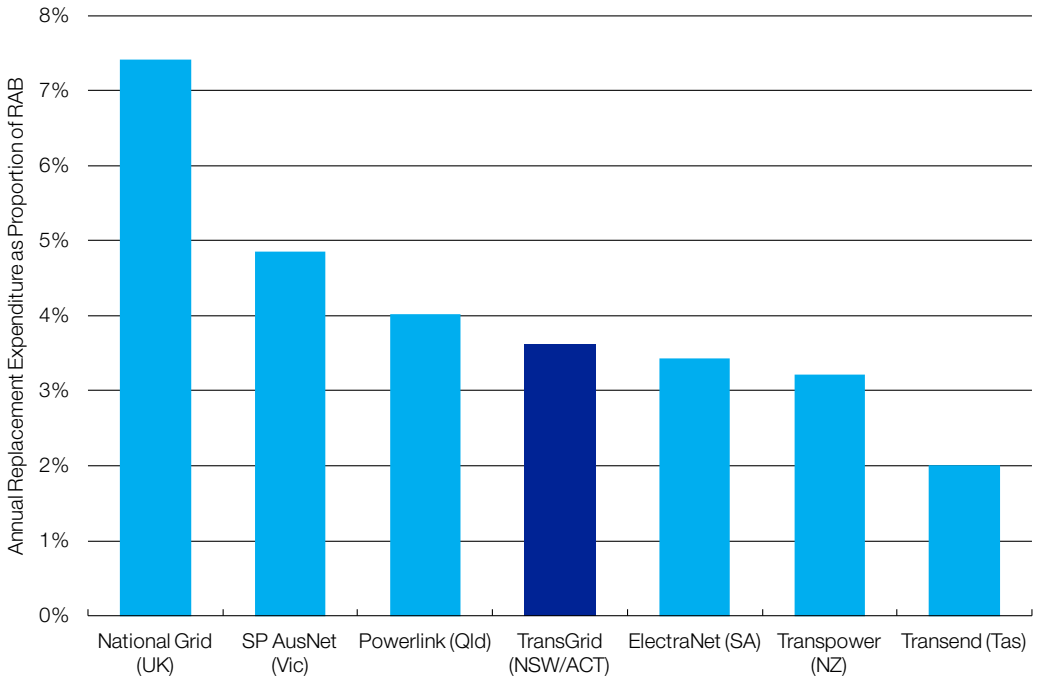
As a reasonableness check on its forecast replacement capital expenditure, TransGrid has estimated the effect on the age profile of TransGrid's network. This is discussed below.

In response to feedback from consumer representatives, TransGrid has also assessed its forecast capital expenditure against a scenario of falling peak demand. The results of this assessment are described below.

5.7.1 Aggregate Capital Expenditure Benchmarks

Figure 5.3 shows a comparison of annual replacement capital expenditure as a proportion of the regulatory asset base for Australian and international networks with a similar asset maturity to that of TransGrid. TransGrid's replacement capital expenditure as a proportion of the regulatory asset base is at the median amongst its peers, providing high level validation that TransGrid's proposed level of replacement capital expenditure is reasonable.

Figure 5.3
Replacement Expenditure as Proportion of Regulatory Asset Base



Source: TransGrid. Comparison is based on average annual forecast replacement capital expenditure in the most recent revenue determination or proposal, as a proportion of opening regulatory asset base.

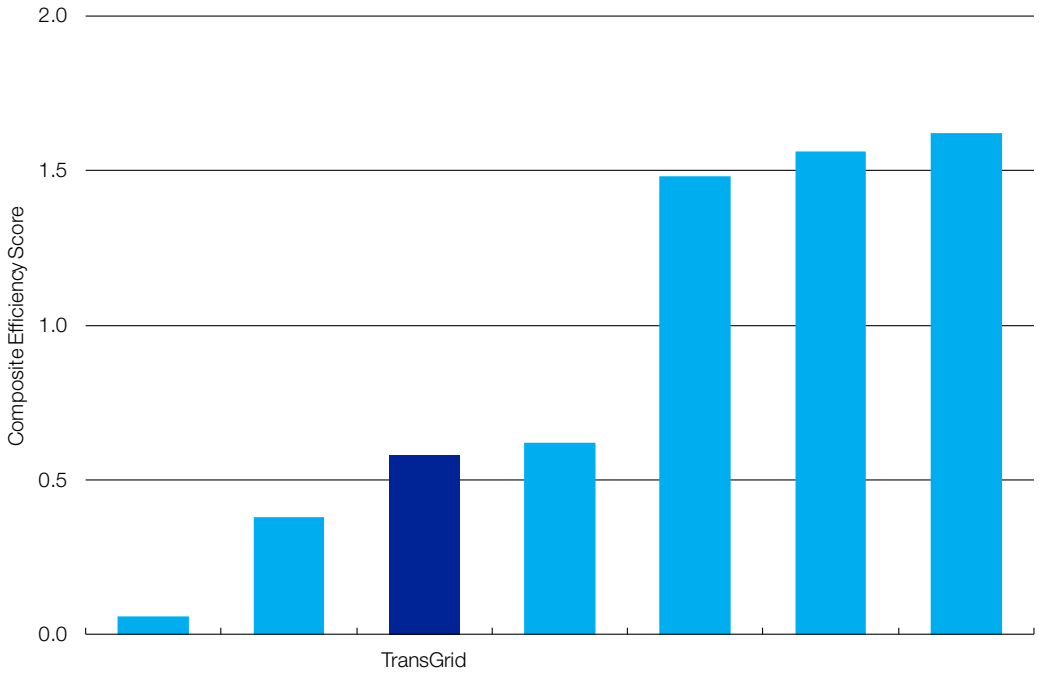
5.7.2 Industry Capital Expenditure Benchmarks

In 2014, TransGrid commissioned UMS to undertake a benchmarking study of capital project estimates amongst a sample of international peers. Seven TNSPs from Australia, the UK, Europe and North America participated in the study.

The study required participants to prepare project estimates for seven sample projects. The results were aggregated into composite efficiency scores for each TNSP, shown in Figure 5.4, where a lower score reflects lower cost estimates.

The results indicate that based on the sample projects in the study, TransGrid's project estimates are more efficient than the average of those of the study participants.

Figure 5.4
International Capital Expenditure Efficiency Benchmarks



Source: UMS.

5.7.3 Cost Estimate Comparisons

TransGrid has benchmarked estimates from its Success cost estimating database against estimates prepared independently by several engineering firms.

To undertake the benchmarking, TransGrid provided project scopes without cost estimates to three engineering firms: SKM, PB and Aurecon. Each firm was required to develop cost estimates for the project scopes it was provided. The independently prepared estimates were compared with the corresponding project cost estimates from Success.

In terms of the total value of the projects assessed, the total difference between TransGrid's estimates and the independent estimates was -0.2% ($1.2 million in a total of $482 million). The estimates prepared using TransGrid's cost estimating database generally fell within a ±10% range of the independent estimates.

This level of correlation with the independent estimates is considered acceptable for the estimate uncertainty at the pre-DG1 stage of the network investment process, which is ±25%.

The level of accuracy of the estimates corroborates the findings of a separate review by Evans & Peck of TransGrid's actual project costs against estimates in the current regulatory period.

The report on the cost estimate comparisons is attached as Appendix O.

5.7.4 Cost Estimating Database Review

In 2013, TransGrid engaged SKM to review its cost estimating database, to evaluate:

- the reasonableness of the base unit cost data and its comparability with recent costs applied in the electricity utility industry; and
- the operation of the database with respect to the use of the unit cost data to generate project cost estimates.

SKM reviewed the unit cost values by comparing them against independent cost information for the same items. Independent estimates were sourced from actual projects, multi-utility price surveys, equipment manufacturers and the Rawlinson Construction Handbook 2013.

SKM found that:

> Based on the review of sample unit cost items and sample of diverse range of project estimates, SKM concludes that the cost estimate for unit items contained in TransGrid capital cost estimating database is reflective of efficient prices for an Australian electricity network business. Similarly, the functioning of the Success Estimator™ tool to generate project cost estimate is accurate and free of material error.[58]

The full report is attached as Appendix N.

5.7.5 Effect on Age Profile of TransGrid's Network

TransGrid's replacement capital expenditure is based on asset condition assessments and assessment of the risks that emerge when an asset reaches the end of its serviceable life.

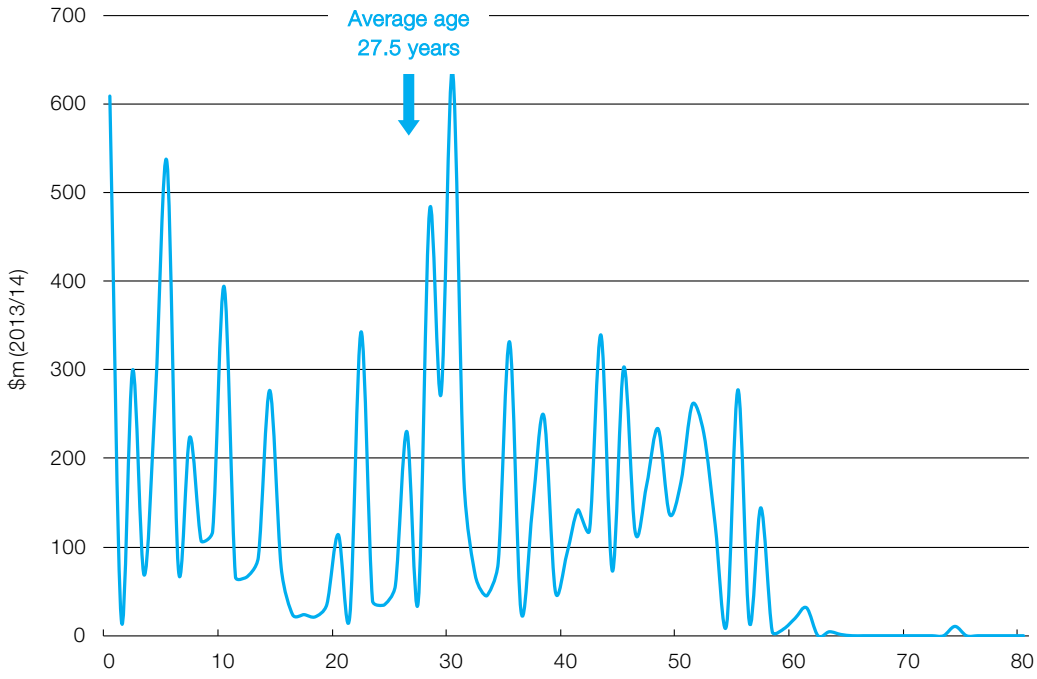
TransGrid's network has reached a life cycle stage of ongoing replacement, as many of the assets built during the establishment of the transmission network in the 1950s and 1960s are reaching the end of their serviceable lives.

TransGrid has considered the effect of forecast capital expenditure on the age profile of its network over the next five years. The expected age profile by replacement value at 30 June 2014 is shown in Figure 5.5, and the forecast age profile at 30 June 2019 in Figure 5.6.

The age profiles indicate that the average age of the network is consistent over the next five years, increasing slightly from 27.5 years at 30 June 2014 to 27.9 years at 30 June 2019.

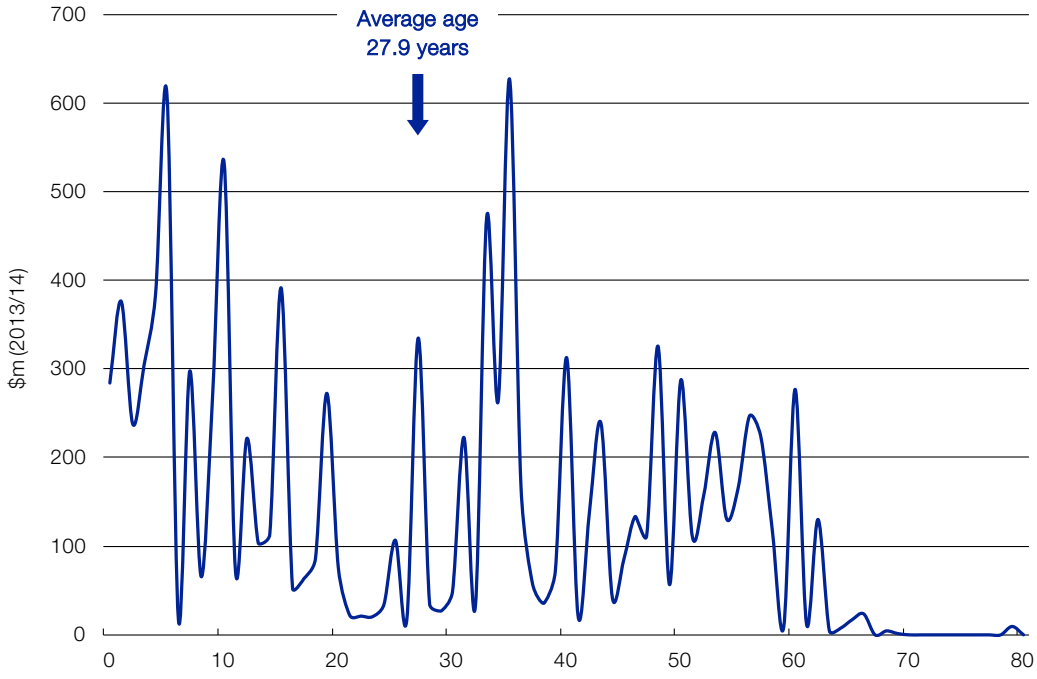
[58] SKM, *Capital Cost Estimating Review*, 31 March 2014, p12.

Figure 5.5
Expected Age Profile of TransGrid's Network at 30 June 2014



Source: TransGrid.

Figure 5.6
Forecast Age Profile of TransGrid's Network at 30 June 2019



Source: TransGrid.

5.7.6 Assessment Against a Scenario of Falling Peak Demand

At TransGrid's recent consumer engagement workshops, large energy users raised concerns that demand forecasts may be optimistic and may not sufficiently take into account the challenges facing the manufacturing sector at the present time. In response, TransGrid undertook to assess its capital portfolio, including replacement capital expenditure, against a scenario of falling peak demand.

TransGrid has assessed the most material projects, listed in Section 5.3, against a scenario of falling peak demand.

Substation Renewals

For substation renewals, TransGrid considered the change in peak demand that would be required to be able to reduce the capacity of substations that supply customers and considered published generation retirements for substations that connect generators.

Transmission substations supply large areas, such as regional centres and large collections of suburbs in urban areas. A reduction in peak demand may affect a substation in two main ways:

- a reduction in demand across several connection points at the substation, which would allow a reduction in overall capacity; or
- a complete reduction in demand at a single connection point at the substation, which would allow removal of the connection assets associated with that connection point.

TransGrid procures equipment in standard capacity sizes to allow interchangeability of equipment and minimise spare parts inventory. Where relevant, these sizes align with international manufacturing standards. In considering the potential for a reduction in overall capacity, TransGrid considered the fall in peak demand that would be required and cost reduction achieved if the next lowest standard size of equipment were used.

The review found that:

- at Tamworth 132 and Wagga 132 substations, a reduction in demand of around 40% would be required before the substation could be replaced with the next lowest standard capacity, and this would reduce the project costs by around 2%;
- at Yanco, Cooma and Orange substations, the proposed replacement already reflects the lowest standard capacity;
- at Canberra substation, TransGrid had already identified one transformer to be decommissioned and not replaced following the commissioning of Williamsdale substation;
- at Munmorah substation, the piecemeal renewal option proposed retains the use of the existing single transformer at the site, which forms part of the supply to the Central Coast and is still required;
- at Newcastle substation, TransGrid had already identified one transformer to be decommissioned and not replaced following the closure of Kurri Kurri aluminium smelter; and

- the renewal of Vales Point and Burrinjuck substations primarily affects the main network flow paths and generator connection assets, and there are no published plans to retire these generators.[59]

In considering the potential for a complete reduction in demand at a single connection point, TransGrid notes that it has not been approached at this time by all customers at a connection point to disconnect from that connection point.

Therefore, TransGrid has not made a change to the substation renewals portfolio.

Secondary System Renewals

Secondary systems are the systems that control substations and provide information on power flows and the operation of the substation. In general, the extent of secondary systems at a substation would be reduced if a connection point or other transmission asset was no longer required and could be removed.

TransGrid has identified no connection points or other assets that can be removed. Therefore, it has not made a change to the secondary system renewals portfolio.

Communications Upgrades and Replacements

Communications networks are driven by the topology of TransGrid's electricity network and the need to provide communications to TransGrid sites for operational purposes.

TransGrid has identified no sites that can be removed. Therefore, it has not made a change to the communications upgrades and replacements portfolio.

Transmission Line Renewals

TransGrid has identified that, in general, the transmission lines on which renewals or life extension works are proposed are still required on its network.

However, based on the most recent demand forecasts for the Central West, TransGrid is able to decommission Line 944 Wallerawang 132 to Orange North and replace it with lower cost substation equipment, rather than rebuilding the line. This is reflected in the expenditure forecasts in this proposal, and discussed in Section 5.9.4.

Underground Cables

For underground cables, TransGrid has comprehensively considered the requirement for cable capacity as part of the Powering Sydney's Future project, discussed in Section 5.3.7.

5.8 Historical Capital Expenditure

This section reports on TransGrid's historical capital expenditure in the 2009/10 to 2013/14 period and summarises TransGrid's response to its changing environment.

5.8.1 Expenditure Trends

TransGrid's actual and expected historical capital expenditure is shown in Table 5.14. A comparison of historical capital expenditure and the forecast capital expenditure in this proposal is shown in Figure 5.7.

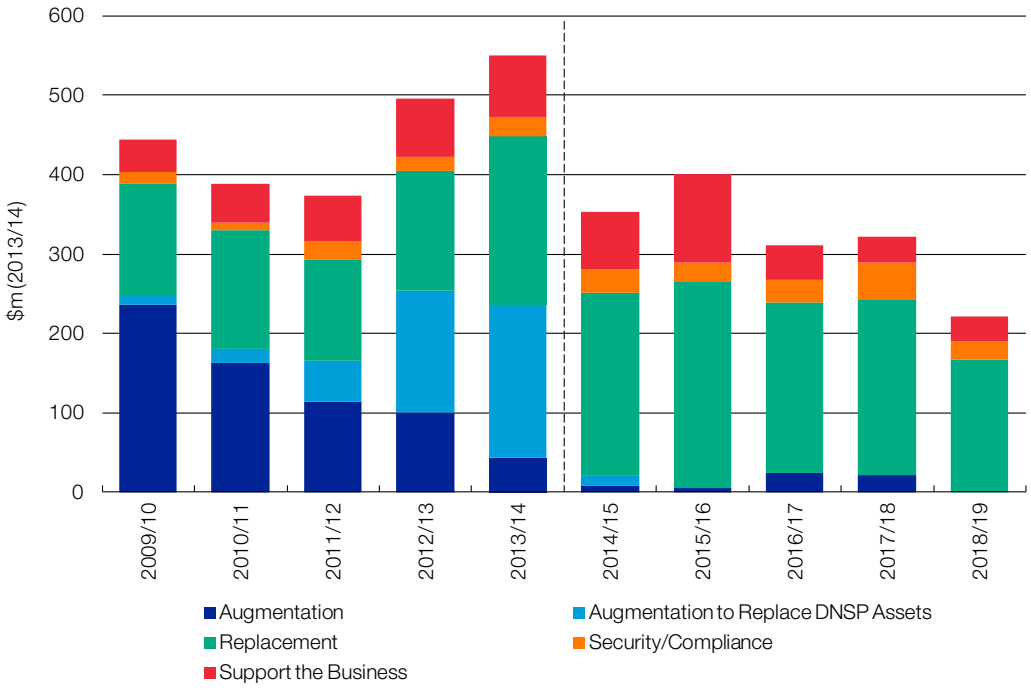
[59] AEMO, *Generation Information NSW*, 28 February 2014.

Table 5.14
Historical Capital Expenditure ($m nominal)

Category	2009/10 Actual	2010/11 Actual	2011/12 Actual	2012/13 Actual	2013/14 Expected
Augmentation	231.8	176.9	167.8	248.3	235.7
Replacement	96.6	127.6	126.7	139.5	212.7
Security/Compliance	13.2	3.3	2.5	6.1	24.3
Support the Business	**63.5**	**56.1**	**59.1**	**90.7**	**77.3**
Information Technology	8.9	14.6	19.0	24.2	20.9
Accommodation	2.9	4.1	11.9	20.4	37.7
Vehicles	11.1	7.2	9.4	8.2	13.5
Strategic Property	39.6	17.0	15.2	36.3	3.1
Other Business Support	1.0	2.5	3.6	1.6	2.1
Total	405.1	363.9	356.1	484.6	550.0

Source: TransGrid. Excludes capitalised interest. Totals may not add due to rounding.

Figure 5.7
Historical and Forecast Capital Expenditure Trend ($m 2013/14)



Source: TransGrid.

5.8.2 Explanation of TransGrid's Historical Capital Expenditure

The five years since TransGrid's last revenue proposal have seen a time of unprecedented change in the electricity industry, including marked changes in trends of peak demand across New South Wales and the Australian Capital Territory. This has largely been driven by consumer response to energy efficiency policies, green energy policies, the impact of global economic conditions on major industry and consumer confidence, and electricity price increases.

TransGrid has responded to the change in forecast peak demand in the last few years by deferring over $600 million of projects where the need has been pushed out to a later date and cancelling projects that are no longer necessary. Consumers benefit from this responsive behaviour directly from the start of the following regulatory control period, through a lower opening regulatory asset base for the period and consequent reduction in forecast revenue of some $230 million over five years.

Significant projects that have been deferred out of the current regulatory control period include:

- Bannaby to South Creek 500kV transmission line;
- Dumaresq to Lismore 330kV transmission line;
- Tomerong 330kV substation;
- Beaconsfield 330kV busbar;
- Stroud to Taree 132kV transmission line; and
- Kemps Creek to Liverpool 330kV transmission line.

5.8.3 Historical Contingent Projects

In its revenue determination for the 2009/10 to 2013/14 regulatory control period, the AER accepted 15 projects TransGrid had proposed as contingent projects.

TransGrid has not triggered any of these projects during the current regulatory control period, as the triggers have not eventuated following the moderation in peak demand.

5.9 Assessment against Capital Expenditure Factors

5.9.1 Benchmarking

As discussed in Section 5.7, TransGrid has undertaken some high level benchmarks of capital expenditure, and commissioned UMS to benchmark TransGrid's capital costs relative to those of transmission network service providers internationally.

The AER is required to publish its first annual benchmarking report by September 2014. However, at the time of submission of this proposal, the report has not been published. TransGrid will review and respond to the report when published.

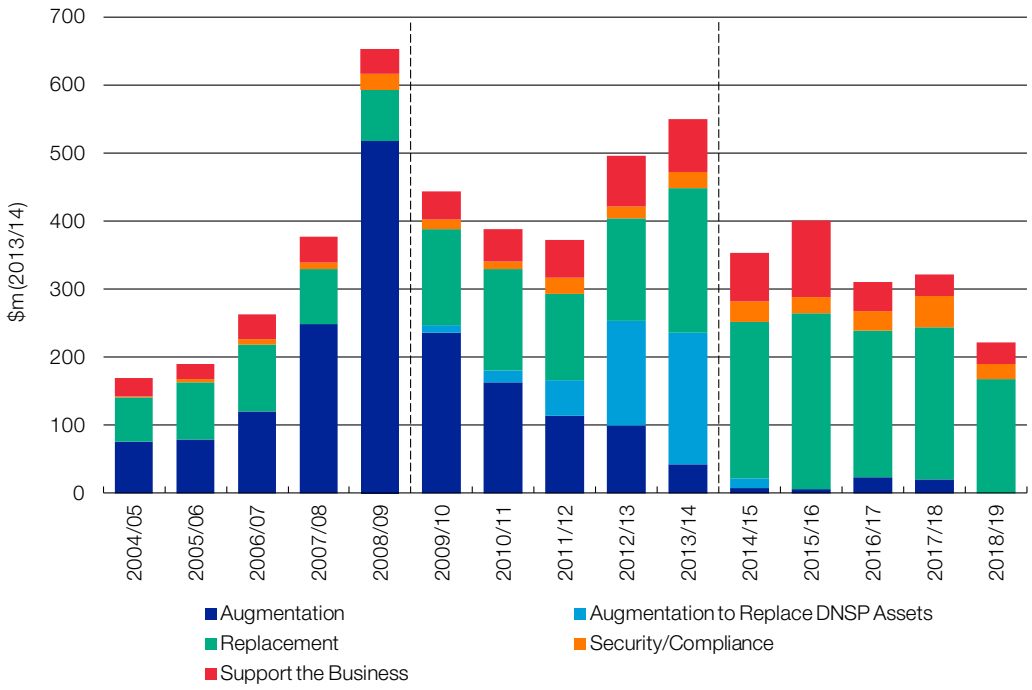
5.9.2 Historical Actual and Expected Capital Expenditure

A comparison of TransGrid's forecast capital expenditure with the actual and expected capital expenditure in the preceding regulatory control periods is shown in Figure 5.8.

The expenditure in 2008/09 includes the Western 500kV Upgrade Project, and the expenditure in 2013/14 includes the Western Sydney Supply Project. Both of these projects were deferred by one year by the procurement of network support.

The change in the mix of capital expenditure between categories reflects the changing drivers on TransGrid over time.

Figure 5.8
Historical and Forecast Capital Expenditure Trend ($m 2013/14)



Source: TransGrid.

Schedule S6A.1.1(6) of the Rules requires the revenue proposal to show the capital expenditure for each of the past regulatory years of the previous regulatory control period. This is shown in Table 5.15.

Table 5.15
Previous Capital Expenditure ($m nominal)

Category	2004/05 Actual	2005/06 Actual	2006/07 Actual	2007/08 Actual	2008/09 Actual
Augmentation	49.8	54.9	64.8	182.9	439.1
Replacement	49.9	66.8	79.3	67.7	64.5
Security/Compliance	0.8	3.2	7.4	8.2	19.9
Support the Business	**30.0**	**25.8**	**61.8**	**58.5**	**43.4**
Information Technology	10.6	14.0	9.8	16.4	17.1
Accommodation	1.4	1.0	10.3	8.8	9.2
Vehicles	5.8	2.6	7.1	5.8	4.3
Strategic Property	9.0	7.4	33.0	25.4	11.1
Other Business Support	3.2	0.8	1.6	2.1	1.7
Total	**130.6**	**150.7**	**213.4**	**317.3**	**567.0**

Source: TransGrid. Excludes capitalised interest. Totals may not add due to rounding.

5.9.3 Concerns of Electricity Consumers

TransGrid sought feedback on its capital expenditure forecasts during consultation with residential, small business and large energy users and consumer group representatives. Further details on this engagement are provided in Section 3.7.1 and the outcomes in Section 3.7.2.

The summary of consultation report summarises consumers' responses to TransGrid's capital expenditure proposal, as follows.

> For Consumer Advisory Workshop and Large Energy User Roundtable participants, capital investment was seen as very clearly related to the rate of return TransGrid receives on that investment and its ultimate impact on prices.
>
> Many commented that TransGrid appears to have a clear incentive to build and, as previously noted, asked how it was possible for it to really test the rigor of the proposal and decide that the needs stated are genuine. There was also some discussion among large users about how TransGrid decides a certain piece of infrastructure must be built or replaced. Related to this, there were questions about TransGrid's recent under-spending on capital investment and what happens to unused funds.
>
> > *I'm interested in the business model – if we get less infrastructure and use less, who pays? Do taxpayers pay? It's an interesting point for the regulatory reset. (November 2013 Consumer Advisory Workshop)*
> >
> > *Penalties and incentives for TransGrid should be symmetrical rather than asymmetrical to ensure responsibility is taken. (November 2013 Consumer Advisory Workshop)*
>
> Both consumer representatives and large energy users were mildly concerned that such a large proportion of the augmentation spend in the first draft of the proposal in November 2013 was to facilitate the direct connection of coal mines and questioned whether the companies should be covering more of these costs rather than effectively being subsidised by other consumers. This concern appeared to be exacerbated by the fact that these customers are coal companies when

they see the grid changing away from its traditional reliance on coal-fired generation. The proposed spend on direct connections to coal mines were scaled back considerably in the full proposal due to updated forecasts indicating a deferral of electricity demand growth driven by mine development.

There was also some mild concern, particularly among large energy users in the first Roundtable, about TransGrid investing in interconnector upgrades (in particular the QNI upgrade), with some questioning whether Queensland consumers may in fact be the ones to benefit. While this issue is being addressed by the introduction of inter-regional pricing, after further testing by TransGrid this proposed investment was withdrawn and is no longer part of TransGrid's proposal.

In the second Consumer Advisory Workshop and Large Energy User Roundtable, participants were shown a revised capital investment proposal and the majority commented that they were pleased to see the proposed spend drop.

In these second sessions participants were asked for initial feedback on whether they would support TransGrid's acquiring some inner Sydney land from Ausgrid for future use. While there was some in principle support for this strategic land acquisition, there was also concern about the plan in the context of falling forecasts of energy consumption and because it would effectively mean that consumers today would be subsidising consumers in the future. Some felt that consumers should not pay the full cost of the acquisition, particularly those in other parts of the state who would not benefit from it. Ultimately participants wanted to see the result of economic modelling to assess its viability, including a potential alternative use for the land in the period before its required to offset consumer funding. Some suggested that TransGrid should discuss this issue with the NSW Government to see if the land could be set aside. Some also acknowledged that it would be acceptable if TransGrid could come up with an alternative use for the land in the period before it is required if it offset consumers funding the full return on investment.

> *It's good to keep the high energy area in a community in the same space. If you come back later you might have more of an impact. (April 2014 Consumer Advisory Workshop)*

> *What would the State Government's view be on you investing in property? I suggest you talk to the Finance Minister and see if you can park it outside their regulatory framework. I'm not suggesting it's a foolish idea but it's the regulatory impost. (April 2014 Large User Roundtable)*

Participants in the second Large Energy User Roundtable in particular asked for clarity around strategies for extending infrastructure life and condition based maintenance response.

> *We have to show stakeholders we have considered every alternative and I'd like to see that from you guys. You've evaluated the outcomes and you think this is best. The trouble is I don't know that so I don't have that comfort. You can use analytics to show if you need to do maintenance in the next six months or if it can be pushed back. (April 2014 Large Energy User Roundtable)*

Residential and small businesses consumers reacted positively to hearing about TransGrid's efforts to find the optimal balance to conflicting priorities by having customers' interests in mind and the prospect of a much lower capital expenditure spend than in the previous five year period. Despite this, some were concerned about whether the forecasts on which this lower spend were predicated were accurate and were worried about a potential impact on reliability, and possibly pricing, in future. Some also questioned TransGrid's ability to respond quickly if demand lifts faster than anticipated.

When asked to rate the acceptability of TransGrid's proposal for capital investment on a scale of 0 to 10 where 0 means not at all acceptable and 10 extremely acceptable, residential and small businesses forum participants gave it an average score of 7.2.[60]

[60] Newgate Research, *Summary of Consultation on Five Year Plan*, 15 May 2014, pp12-13.

Consumers' responses are discussed further in the summary of consultation attached as Appendix F and qualitative research report attached as Appendix G. TransGrid's responses to the specific concerns raised above are as follows.

Justification of Investment Needs

With regard to the demonstration of rigour and justification of investment needs, TransGrid has offered four options to consumers and sought views on which they would most prefer. The options are:

- submitting its proposed expenditure portfolio to external expert review;
- making its detailed planning documents available (noting that there are a large number of them); or
- leaving the evaluation of the revenue proposal to the Australian Energy Regulator.

TransGrid has submitted its proposed expenditure portfolio to external expert review by GHD. Following a rigorous and challenging review, GHD provided an unqualified endorsement of the reviewed documents. The report from GHD is attached as Appendix K.

TransGrid has made its detailed planning documents available to the AER, to assist with the assessment of this proposal.

Some consumer representatives also requested that TransGrid demonstrate that its plans are consistent with the broader energy environment and potential future energy direction in Australia, as a way of validating the sensibility of the plans. TransGrid's operating environment, which has shaped TransGrid's current business practices such as the development of agile network planning and investment processes, has been taken into account in the development of TransGrid's plans. This operating environment is described in Chapter 3 and TransGrid's evolving asset management practices in response to this environment are set out in Chapter 4.

Funding of Network Augmentations and Equity of Interconnector Upgrades

Two of the matters raised in relation to capital expenditure relate to the regulatory framework. The extent to which network augmentations are funded by new large customers is determined in the Rules and primarily depends on whether the investment is part of the shared network or a dedicated connection asset for a particular customer. Similarly, the question of equity in benefits and costs of interconnector upgrades is presently being addressed through a rule change to introduce inter-regional TUOS charging.[61] TransGrid is open to further discussion with consumers regarding these concerns, but notes that they would need to be addressed at an industry level and may require changes to the National Electricity Rules.

Response to Changes in Demand

Some residential consumers were unaware of the recent moderation in peak demand and questioned TransGrid's ability to respond quickly if demand lifts faster than anticipated so that reliability issues could be avoided. TransGrid has made a number of improvements to

[61] The Queensland to New South Wales interconnector upgrade project, which was included in TransGrid's transitional revenue proposal in January 2014, was the main project that generated this discussion and has been removed from the capital portfolio. Upon completion of the modelling, TransGrid and Powerlink found that the ranking of credible options was inconsistent across the reasonable scenarios. Further, many credible options were found to have negative net market benefits under a number of scenarios and hence ranked below the 'do nothing' option.

its processes for delivery of capital projects that will enable it to better respond to the changing electricity industry environment, including higher than forecast demand growth.

Conversely, at the November 2013 large energy users workshop, concern was raised that demand forecasts may not sufficiently take into account the challenges facing the manufacturing sector at the present time and may be optimistic. Given the level of uncertainty regarding demand forecasts, TransGrid has assessed its capital portfolio against a scenario of falling peak demand. The outcomes of this assessment are discussed in Section 5.7.6.

Strategic Property Acquisition

At the April 2014 workshops with consumer representatives and large energy users, TransGrid sought participants' views on the strategic property acquisition at Surry Hills. This property acquisition has been proposed because an opportunity has arisen to purchase the property on an opportune basis, and the property is ideally situated for the development of electricity infrastructure in an already highly developed area.

At the workshop with consumer representatives, there was some in-principle support for this strategic land acquisition. In particular, the property is adjacent to a recently established substation owned by Ausgrid and it was seen as desirable to keep large infrastructure in one precinct from an urban development perspective. However, there was also concern about the plan in the context of moderating energy consumption and because it would effectively mean that consumers today would be subsidising consumers in the future.

Participants raised the question of whether the cost impact on consumers could be mitigated by the land being used for another purpose and earning non-regulated income in the years before it is used, and whether it could be sold in the future at a profit if the land is ultimately not required. The AER's new *Shared Assets Guideline* provides a mechanism for the cost impact to be offset by non-regulated income if TransGrid is able to secure non-regulated income from the land.

At the workshop with large energy users, participants also raised concerns about the allocation of revenue from the property in transmission prices. The concern was particularly that the property would benefit electricity consumers in the Sydney inner metropolitan area, and the price impact of the property should be borne by those consumers who will benefit from the purchase of the property. TransGrid is exploring the possibility of making this type of allocation under its pricing methodology.

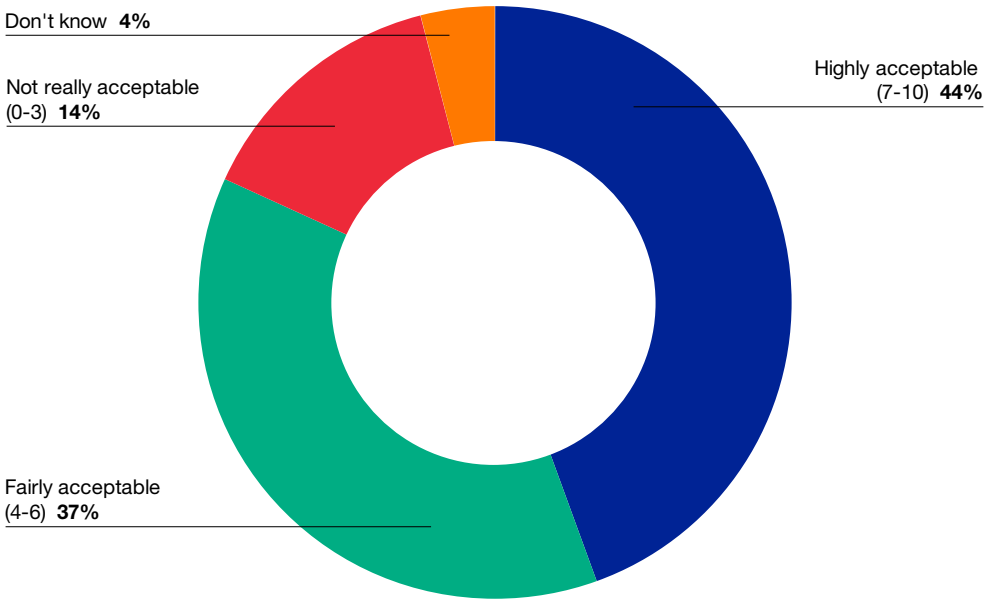
Acceptability of Forecast Capital Expenditure

At the deliberative forums, participants were shown a 20 minute presentation that covered the breakdown of TransGrid's proposed capital expenditure for the next five years with commentary on capital investment, peak demand, replacement needs, proposed replacement and market benefits.

At the end of each forum, participants were asked to rate TransGrid's proposed plan for capital expenditure overall. Of the 59 participants, around three quarters (76%) rated its acceptability between six and 10 out of 10 (where 10 was extremely acceptable), with 51% giving it a score of between 8 and 10.

The quantitative survey included brief background information on TransGrid's role, operations and plans and sought participants' feedback on the acceptability of its forecast capital expenditure. A key question asked was:

> How acceptable to you is TransGrid's proposal to increase its spending on capital investment roughly in line with inflation, to fund the replacement of ageing infrastructure so that it can maintain current service levels and continue to meet consumer demand? Scale: 0 – not at all to 10 – totally acceptable.
>
> This equates to an extra $1.16 in an average household's quarterly bill in the first year, $2.31 per quarterly bill in the second year, and so on, rising to $5.78 per quarterly bill in the fifth year of the plan.



Source: Newgate Research. Totals may not add due to rounding.

The results reflect that the majority of the 650 respondents consider TransGrid's proposed forecast capital expenditure highly acceptable or fairly acceptable.

5.9.4 Relative Prices of Operating and Capital Inputs and Substitution Possibilities Between Operating and Capital Expenditure

TransGrid considers the relative prices of operating and capital inputs and possibilities for substitution between operating and capital expenditure in the option identification and economic evaluation for each capital project.

When planning an investment, low cost operating and capital options to defer large capital expenditure are considered and implemented where feasible. These include load transfers, de-rating of equipment, network support, and the use of low cost equipment such as reactive plant.

TransGrid has completed the evaluation of options for all projects included in the expenditure forecasts, and has considered substitution possibilities between operating and capital expenditure as part of the option evaluation.

There are two projects in the expenditure forecasts for which the most efficient option has a substantial operating expenditure component.

To meet supply requirements to the Sydney CBD and inner metropolitan area, TransGrid is proposing the use of network support to defer new network investment as part of the Powering Sydney's Future project, described in Section 5.3.7. This is a lower cost option than a network investment alone.

Line 944 Wallerawang to Orange North was scheduled for replacement based on condition. However, the most recent demand forecast for the Central West allows for the line to be decommissioned and replaced by reactive plant to increase the capacity of other transmission lines to the area. This is a lower cost option than rebuilding the line. The decommissioning of the transmission line is operating expenditure and the installation of new reactive plant is capital expenditure.

Decommissioning of Line 944 Wallerawang to Orange North

In its annual planning review in 2014, TransGrid noted a moderation of demand growth in the Central West region, compared to previous years' forecasts.

TransGrid had previously proposed to replace Line 944 Wallerawang to Orange North, based on indication from its condition that it was reaching the end of its serviceable life. However, based on the most recent forecast, it is possible to decommission the line and replace it with substation reactive plant that will increase the capacity of other transmission lines to the area. This is expected to meet demand in the area over the annual planning outlook, and is a lower cost option than rebuilding the line.

Demand in the Central West is driven partly by mining loads and developments. If there is an upturn in mining activity in the future, an increase in capacity may then be required. TransGrid intends to retain the easements after the line is decommissioned, such that it will be able to respond to establish a transmission line in the future, if required.

5.9.5 Consistency with Incentive Schemes

The capital expenditure forecast in this proposal is consistent with the related incentive schemes, being the capital expenditure sharing scheme and service target performance incentive scheme. There is no capital expenditure in this proposal specifically to improve performance under the service target performance incentive scheme.

5.9.6 Related Parties

TransGrid has no related parties in relation to capital expenditure.

5.9.7 Contingent Projects

The forecast capital expenditure in this proposal does not include any proposed contingent expenditure, either in part or in whole, as required by Clause 6A.8.1(b)(2)(i) of the National Electricity Rules.

5.9.8 Most Recent National Transmission Network Development Plan

The National Transmission Network Development Plan (NTNDP) is a plan published annually that considers the capability of the national transmission grid and developments of national transmission flow paths.[62] The most recent NTNDP at the time of lodgement of this proposal is the 2013 NTNDP.

The 2013 NTNDP lists committed main transmission projects, transmission limitations and potential economic dispatch limitations. This revenue proposal generally aligns with the NTNDP for those projects that are within its scope, with two exceptions:

- TransGrid proposes to defer the construction of a new supply to Beaconsfield West substation, Powering Sydney's Future, using network support (L-N1) and has proposed it as a contingent project; and
- TransGrid does not consider the reinforcement of capacity between the Hunter Valley and Newcastle (L-N2) likely to be required during 2014/15 to 2018/19.

The 2013 NTNDP also considers other limitations identified in the 2013 Transmission Annual Planning Report (TAPR) against the NTNDP scenarios. This proposal aligns with the NTNDP's assessment of the TAPR projects.

A comparison of the 2013 NTNDP projects relevant to New South Wales and this proposal is shown in Table 5.16.

[62] *National Electricity Rules*, Clause 5.20.2.

Table 5.16
Comparison of NTNDP and Revenue Proposal

Category	Ref	Project or Limitation	Revenue Proposal
Committed main transmission projects	C-N1	Armidale SVC power oscillation damper	Included
	C-N2	Western Sydney Supply Project (Holroyd and Rookwood Road)	Included
	C-N3	Second supply to ACT (Wallaroo)	Included
	C-N4	Beaconsfield West to Haymarket 330kV cable (initially operated at 132kV)	Included
	C-N5	New reactors	Not included, as non-prescribed service
Transmission limitations	L-N1	New supply to Beaconsfield West substation from second supply point (2013/14 to 2017/18)	Deferred with network support and proposed as contingent project
	L-N2	Reinforcement of capacity between the Hunter Valley and Newcastle (2013/14 to 2017/18)	Not included, as the limitation would only occur as a result of large scale generation retirement in the Newcastle area, which TransGrid considers unlikely during 2014/15 to 2018/19
	L-N3	Reinforcement of supply to Far North Coast (2023/24 to 2027/28)	Not included, as beyond 2018/19
Potential economic dispatch limitations	M-N1	Reinforcement of capacity between Yass/Canberra and Sydney areas	Proposed as contingent project

5.9.9 Non-Network Alternatives

TransGrid considers non-network, or network support, alternatives for all network needs under its *Network Investment Process*. TransGrid notifies interested parties of proposed network investments in its TAPR each year, and seeks network support as part of the regulatory consultation process and through requests for proposals.

TransGrid has two forecast projects for which it has identified potential network support solutions: Powering Sydney's Future and the Reinforcement of Supply to Gunnedah, Narrabri and Moree.

TransGrid's approach to network support for these projects in this proposal is described in Section 5.4.

5.9.10 Regulatory Investment Test for Transmission

At the time of submission of this proposal, TransGrid has not completed a Project Assessment Conclusions Report relating to forecast expenditure in the proposal. With the significant reduction in augmentation expenditure compared to that in previous regulatory control periods, few projects in the 2014/15 to 2018/19 period will require the Regulatory Investment Test for Transmission (RIT-T).

5.9.11 Other Factors

At the time of submission of this proposal, the AER has not advised TransGrid of additional capital expenditure factors.

The National Electricity Rules allow the AER to advise of additional capital expenditure factors up to the submission of the revised revenue proposal. TransGrid will address additional factors if and when the AER advises of them.

5.10 Inputs and Assumptions

A summary of the inputs and assumptions TransGrid has used to forecast capital expenditure is shown in Table 5.17.

Table 5.17
Summary of Capital Expenditure Inputs and Assumptions

Category	Assumption
Standards	Asset management, replacement and refurbishment performed as set out in TransGrid's Network Management Plan and related asset management procedures
	Transmission reliability standards as set out in the National Electricity Rules and the *Transmission Network Design and Reliability Standard for NSW*
	Compliance with legislative obligations
	Compliance with Australian standards
	Application of good electricity industry practice
Forecasts	New South Wales state demand forecasts as set out in the *National Electricity Forecasting Report 2013* published by AEMO[63]
	Connection point demand forecasts as advised by NSW and ACT distribution network service providers and published in TransGrid's TAPR[64]
	Inflation based on geometric average of Reserve Bank of Australia *Statement on Monetary Policy* for two years and the midpoint of its target range for eight years
	Labour cost escalation for committed projects based on TransGrid's employee agreement for the duration of the agreement and Wage Price Index (WPI) forecasts for the NSW Electricity, Gas, Water and Waste Services (EGWWS) sector by BIS Shrapnel thereafter
	Labour cost escalation for forecast projects based on WPI forecasts for the NSW EGWWS sector by BIS Shrapnel
	Cost escalation for market-based commodities externally forecast by SKM
	Property escalation externally forecast by BIS Shrapnel
Models	TransGrid's capital accumulation model
	Network models for network planning
	Market models for market benefits modelling
Key Inputs	Individual project and program scopes developed to meet augmentation, replacement, security/compliance and other requirements
	Cost estimates developed as described in Section 5.5

[63] The New South Wales state demand forecast is prepared in accordance with the *2013 Forecasting Methodology Information Paper*, published by AEMO.
[64] Connection point demand forecasts are advised by distribution network service providers, as set out in Appendix 3 of the TAPR. TransGrid aggregates the forecasts using the methodology set out in Section 4.4 of the TAPR.

6 Operating Expenditure

Operating expenditure is the ongoing expenditure required to provide transmission services. This includes planning the network, managing assets, 24 hour monitoring and operation of the network, maintenance and business activities.

TransGrid is efficient relative to its Australian and international peers. This has been demonstrated through a number of benchmarking studies of the most material categories of TransGrid's operating expenditure, in which TransGrid has performed consistently well over time.

TransGrid has also responded to the incentives established by the Australian Energy Regulator. In the current regulatory control period, TransGrid has undertaken a thorough review of its business activities and made a number of sustainable changes resulting in efficiencies. These initiatives will benefit consumers directly through lower ongoing expenditure requirements.

The operating expenditure forecasts in this proposal comprise the efficient costs required to sustainably provide the transmission services on which the people of New South Wales and the Australian Capital Territory depend.

This chapter discusses TransGrid's historical and proposed future operating expenditure.

Section	Discussion
6.1	National Electricity Rules requirements for forecast operating expenditure.
6.2	TransGrid's operating expenditure categories.
6.3	Forecast operating expenditure for 2014/15 to 2018/19.
6.4	Approach to forecasting operating expenditure.
6.5	External expert assurance on TransGrid's operating expenditure.
6.6	Efficiency of TransGrid's operating expenditure.
6.7	Historical operating expenditure in 2009/10 to 2013/14.
6.8	Assessment of forecast operating expenditure against the operating expenditure factors in the National Electricity Rules.
6.9	Summary of inputs and assumptions used.

6.1 National Electricity Rules Requirements

6.1.1 Operating Expenditure Objectives

In line with the national electricity objective, the National Electricity Rules set out the operating expenditure objectives that apply to forecast operating expenditure.

The operating expenditure objectives are to:

1. Meet or manage the expected demand for prescribed transmission services over that period
2. Comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services
3. To the extent that there is no applicable regulatory obligation or requirement in relation to:
   (i) the quality, reliability or security of supply of prescribed transmission services; or
   (ii) the reliability or security of the transmission system through the supply of prescribed transmission services,

   to the relevant extent:
   (iii) maintain the quality, reliability and security of supply of prescribed transmission services; and
   (iv) maintain the reliability and security of the transmission system through the supply of prescribed transmission services
4. Maintain the safety of the transmission system through the supply of prescribed transmission services.[65]

The applicable regulatory obligations for the quality, reliability and security of supply that apply to TransGrid are set out in the *Transmission Network Design and Reliability Standard for NSW* published by NSW Trade and Investment. The applicable regulatory obligations for TransGrid's supply to the Australian Capital Territory are set out in the *Disallowable Instrument DI2012-267: Utilities Exemption 2012 (No 3), 2012*, published by the ACT Government.

This chapter sets out the forecast operating expenditure TransGrid considers is required to achieve the operating expenditure objectives and applicable regulatory obligations in the 2014/15 to 2018/19 period.

6.1.2 Operating Expenditure Criteria

The National Electricity Rules require the AER to accept this proposal's forecast operating expenditure if the AER is satisfied that the total forecast operating expenditure reasonably reflects the operating expenditure criteria. The criteria are:

1. The efficient costs of achieving the operating expenditure objectives
2. The costs that a prudent operator would require to achieve the operating expenditure objectives
3. A realistic expectation of the demand forecast and cost inputs required to achieve the operating expenditure objectives.[66]

[65] *National Electricity Rules*, Clause 6A.6.6(a).
[66] *National Electricity Rules*, Clause 6A.6.6(c).

This chapter substantiates the efficiency of TransGrid's costs in Sections 6.5 and 6.6. The prudence of TransGrid's operations is established by its governance processes and asset management system, which are discussed in Chapter 4. The cost inputs are set out in Section 6.9.

6.1.3 Operating Expenditure Factors

The National Electricity Rules set out the factors to which the AER must have regard when assessing an operating expenditure forecast. These factors can be summarised as:

1. The most recent AER annual benchmarking report and benchmark operating expenditure that would be incurred by an efficient TNSP
2. Actual and expected operating expenditure during preceding regulatory control periods
3. The extent to which the operating expenditure forecast includes expenditure to address the concerns of electricity consumers
4. The relative prices of operating and capital inputs
5. Substitution possibilities between operating and capital expenditure
6. Consistency of the operating expenditure forecast with incentive schemes
7. The extent of operating expenditure to related parties
8. Whether the operating expenditure forecast includes an amount relating to a project that should more appropriately be included as a contingent project
9. The most recent NTNDP and submissions made by AEMO
10. The extent of consideration and provision for non-network alternatives
11. Any relevant project assessment conclusions report
12. Any other factor the AER considers relevant and which the AER has notified the Transmission Network Service Provider in writing prior to the submission of its revised Revenue Proposal.[67]

These factors are discussed in relation to TransGrid's forecast operating expenditure in Section 6.8.

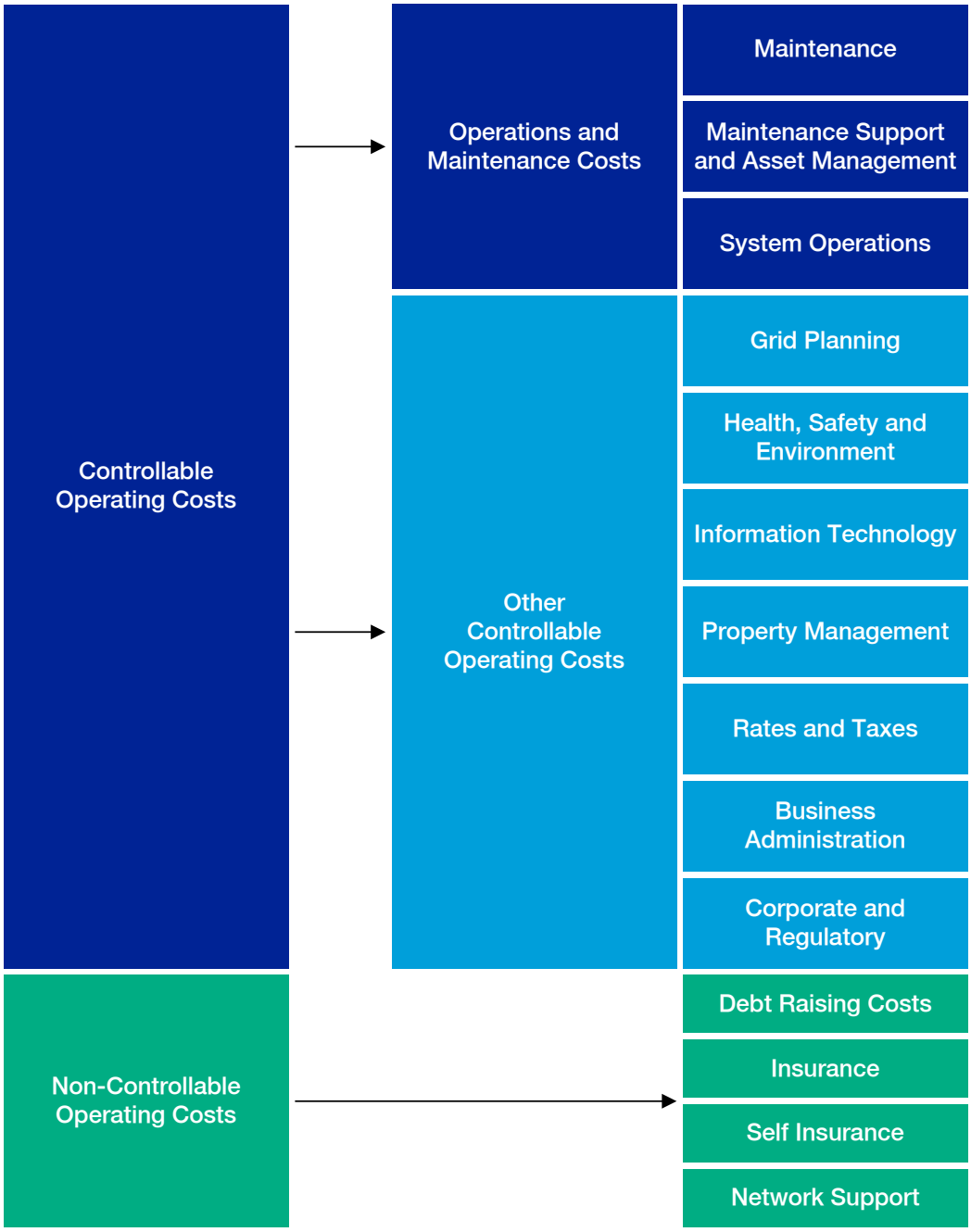
6.2 Categories of Operating Expenditure

The activities involved in the provision of transmission services that are operating expenditure include network planning, asset management, operation of the network, maintenance and business activities. These are further disaggregated into categories for forecasting purposes.

The categories of operating expenditure are shown in Figure 6.1.

[67] *National Electricity Rules*, Clause 6A.6.6(e), renumbered for ease of reading.

Figure 6.1
Operating Expenditure Categories



The categories of maintenance activities are described in Table 6.1.

Table 6.1
Categories of Maintenance Activities

Category	Description
Preventative Maintenance and Inspections	Maintenance inspections and routine preventative maintenance tasks are scheduled in accordance with the maintenance requirements set out in TransGrid's maintenance policies. These maintenance tasks are scheduled based on time intervals or operations-based triggers. Where possible, TransGrid seeks to minimise intrusive maintenance activities. Therefore, preventative maintenance and inspections primarily relate to diagnostic testing and inspection or measurement of equipment condition, which is used to assess the need for further maintenance, refurbishment or replacement.
Condition-Based Maintenance	Condition-based maintenance is triggered by particular condition readings that exceed set thresholds. It may include more regular diagnostic testing or scheduling of maintenance tasks according to condition.
Corrective Maintenance	Corrective maintenance is maintenance to address defects and out of tolerance equipment condition. It includes repairs and other actions to prevent recurrence, and returns equipment to a satisfactory operating condition.
Major Operating Projects (MOPS)	Major operating projects (MOPS) are asset refurbishment and small replacement projects. They often relate to particular families of equipment that exhibit condition issues, such as a model of transformer bushing or type of transmission line insulator.

The categories of non-maintenance activities are described in Table 6.2.

Table 6.2
Categories of Non-Maintenance Activities

Category	Description
Maintenance Support and Asset Management	This category includes the following activities: • development of asset management plans, maintenance policies and service provider performance reviews; • management of field maintenance teams including resource management and work scheduling; • administration of information systems that directly support field maintenance activities; and • fleet, warehousing and supply management.
System Operations	24 hour network control room operations, outage planning, technical studies to support the operation of the system and management of the SCADA system.
Grid Planning	Planning the development of the transmission network, capital portfolio management and development of network support options for deferring or avoiding capital expenditure.[68]
Rates and Taxes	Municipal and utility rates, and taxes other than corporate income tax.
Property	Ongoing management of property, easements, buildings and related issues including acquisitions, disposals, surveys and management.
Health, Safety and Environment	Management of TransGrid's health, safety and environmental management systems.
Information Technology	Management of information technology systems including networks, hardware, software and office telephone systems.
Business Administration	Finance, human resources and payroll functions.
Corporate and Regulatory Management	Corporate activities including legal, audit, customer relations and regulatory functions. This category includes revenue reset.

[68] The Grid Planning category includes the Identify Need, Compile Program and Evaluate Options stages of the *Network Investment Process* described in Section 4.3, which are operating expenditure.

The categories of non-controllable operating expenditure are described in Table 6.3.

Table 6.3
Categories of Non-Controllable Operating Expenditure

Category	Description
Debt Raising Costs	Forecast as the debt raising costs facing a benchmark efficient firm, consistent with the approach to determining the allowed rate of return.
Insurance	Costs associated with the insurance of TransGrid's assets and operations.
Self Insurance	Costs associated with self insurance, where this is more economic than insurance procured from an external insurance company or where procured insurance is not available.
Network Support	Procurement of network support to avoid or defer capital expenditure, where this is known at the time of the revenue proposal. This is forecast as specific projects that are required to meet network needs.

6.3 Forecast Operating Expenditure

Operating expenditure trends at around 1.3% above CPI on average over the period. The first year's increase is primarily driven by enhanced consumer and community engagement, regulatory obligations arising from new guidelines issued by the AER and a more proactive approach to demand management innovation. Forecast increases in labour costs and major operating projects primarily account for the trend in later years.

TransGrid's forecast operating expenditure for the 2014/15 to 2018/19 period is shown in Table 6.4. The total forecast operating expenditure for a four year regulatory control period is $835.7 million, and for a five year regulatory control period is $1,062.4 million.

Table 6.4
Forecast Operating Expenditure ($m nominal)

Category	2014/15 Expected	2015/16 Forecast	2016/17 Forecast	2017/18 Forecast	2018/19 Forecast
Maintenance	**78.5**	**87.8**	**93.5**	**86.1**	**90.0**
Maintenance	69.4	75.6	79.4	79.9	83.8
Major Operating Projects	9.1	12.1	14.0	6.2	6.2
Maintenance Support and Asset Management	11.4	11.8	12.3	12.9	13.4
System Operations	9.3	9.7	10.1	10.6	11.1
Grid Planning	10.1	10.5	11.0	11.5	12.0
Rates and Taxes	5.6	5.9	6.1	6.4	6.6
Property	3.4	1.5	1.5	1.6	1.7
Health, Safety and Environment	3.7	3.9	4.1	4.2	4.4
Information Technology	14.1	14.6	15.1	15.7	16.3
Business Administration	12.1	12.6	13.1	13.7	14.3
Corporate and Regulatory Management	25.0	26.9	28.3	30.3	29.0
Total Controllable Operating Expenditure	**173.2**	**185.1**	**195.2**	**192.9**	**198.9**
Debt Raising Costs	7.4	7.8	8.2	8.4	8.7
Insurance	6.1	6.8	7.6	8.5	9.5
Self Insurance	0.0	0.0	0.0	0.0	0.0
Network Support	5.5	6.6	7.8	8.7	9.6
Total	**192.2**	**206.3**	**218.7**	**218.5**	**226.7**

Source: TransGrid. Totals may not add due to rounding.

6.3.1 Maintenance Forecasts

Forecasting Approach

Routine preventative maintenance and inspection tasks are scheduled by TransGrid's enterprise resource planning system in accordance with the maintenance requirements set out in TransGrid's maintenance policies. Condition-based maintenance and corrective maintenance by their nature cannot be scheduled into the future, and are modelled as a ratio to preventative maintenance and inspection effort. Maintenance unit rates from the base year, 2012/13, are applied to the forecast effort to provide forecast cost. This approach is a variation on the efficient base year approach, and is explained in more detail in Section 6.4.1.

In 2013, TransGrid engaged SKM to review the effort allocated to its standard tasks for preventative maintenance and inspections. From a review of a representative sample of tasks, SKM considered that TransGrid's forecast effort is reasonable and efficient. The report from SKM is attached as Appendix Q.

Easement maintenance contract work is forecast using a zero-based approach based on forecast workload.

Major operating projects (MOPS) are forecast using a zero-based portfolio approach. This is the most appropriate forecasting approach, as major operating projects are more similar in nature to capital projects than operating expenditure and tend to be "lumpy" rather than recurrent in nature. An alternative approach, the use of a trend based on historical expenditure, would be less well suited to taking into account the "lumpy" nature of the expenditure and distinct needs that drive it. Accordingly, TransGrid has not used this approach as it may under or over forecast the efficient costs required to meet the operating expenditure objectives.

Maintenance forecasts are based on the existing network size. Therefore, escalation is applied for forecast growth in the network size taking into account economies of scale. The economies of scale factors are listed in Section 6.3.6.

Easement Maintenance

TransGrid's easement maintenance costs in the base year were lower than the sustainable ongoing costs of maintaining its easements.

In 2012/13, TransGrid responded to a significant issue with the safety performance of an easement maintenance contractor. While TransGrid attempted to work with the contractor to resolve the issue, this was not successful and eventuated in the termination of the contract. TransGrid subsequently established a new easement maintenance contract. However, the time required to establish the new contract led to an unavoidable eight month break in easement maintenance in one region.

The response to the safety performance issue meant that $2 million of easement maintenance was not completed in 2012/13. TransGrid proposes to make an adjustment to reinstate the uncompleted maintenance, for the purpose of establishing an efficient base year. In addition, additional expenditure has had to be included in zero-based forecasts over the following three years to catch up on this essential activity.

The reinstated $2 million for the uncompleted easement maintenance in 2012/13 is accompanied by a commensurate reduction in the 2012/13 savings under the efficiency benefit sharing scheme, to ensure that there is no double-recovery of this adjustment. TransGrid also proposes to include the incremental cost of the catch-up above the usual level of easement maintenance as a step change in expenditure, to allow the catch up to be predominantly completed over the routine easement maintenance cycle in 2014/15 and 2015/16.

Easement Maintenance

An easement is the corridor of land along which a transmission line runs. Easement maintenance refers to the clearing and trimming of vegetation under and around transmission lines and structures, including maintenance of access tracks, to ensure staff are able to access the transmission line when required for maintenance and incident response.

Easement maintenance ensures that vegetation is kept below the height that could encroach on transmission line conductors. It maintains the reliability of the network by avoiding interruptions to transmission line availability, and significantly reduces the risk of starting a bushfire.

There are a number of inherent hazards associated with easement maintenance work. TransGrid's easements that require vegetation management are generally over steep and uneven terrain, including the Snowy Mountains, Blue Mountains, and other national parks. Vegetation clearing requires workers to use chainsaws, brushcutters and machinery to manage the vegetation within strict environmental constraints. Because of the significant hazards, effective work health and safety practices are paramount while undertaking these activities. TransGrid does not compromise on the safety of its workers or contractors.

Major Operating Projects

Major operating projects (MOPS) are asset refurbishment and small replacement projects. They often relate to particular families of equipment that exhibit condition issues, such as a model of transformer bushing or type of transmission line insulator. Because they are similar in nature to minor capital projects, the expenditure trend can vary considerably over time.

The MOPS forecast includes programs of work, such as:

- refurbishment of power transformers;
- replacement of bushings with a type fault;
- replacement of corroded bolts in steelwork and support structures;
- refurbishment or replacement of minor equipment exhibiting condition or reliability issues; and
- refurbishment of ancillary services buildings at substations.

It also includes one-off projects, the most material of which are shown in Table 6.5.

Table 6.5
Material Major Operating Projects ($m 2013/14)

Project	Year	Cost ($m)
Decommissioning of Line 944 Wallerawang to Orange North	2017	5.3
Decommissioning of proprietary electronic control modules at Haymarket substation	2015 to 2018	4.4
Replacement of wood poles on Lines X2 Buronga to Broken Hill and X5/1 Darlington Point to Balranald	2016	3.8
Replacement of mid-span joints on aluminium conductor	2015 to 2019	3.0
Sampling and testing of 41 cable to determine internal condition	2015	2.1

Source: TransGrid.

The decommissioning of Line 944 Wallerawang to Orange North is part of an alternative option to rebuilding the line. The line has reached the end of its serviceable life, however the most recent demand forecasts for the Central West allow for the line to be decommissioned and replaced by substation equipment that will redistribute power flows and meet the required capacity over the outlook of TransGrid's annual planning review. This is a lower cost option than rebuilding the line. TransGrid will retain the easement in case the line is required to be rebuilt in the future.

The decommissioning of proprietary electronic control modules at Haymarket substation is required due to the unreliability of these modules and unavailability of a suitable supported replacement. The preferred option is to remove and bypass the modules through changes to the existing control systems at the substation.

The replacement of wood poles on sections of Lines X2 Buronga to Broken Hill and X5/1 Darlington Point to Balranald is proposed. Wood poles were installed after severe storms that damaged the steel towers on small sections of the lines. Replacement of the wood poles with steel towers will restore the design capabilities of these structures.

The replacement of mid-span joints on aluminium conductor is required following the failure of a mid-span joint of that type, which led to transmission line conductors falling to the ground. TransGrid has already replaced most mid-span joints of this type to mitigate the safety and bushfire risks, however some remain that require replacement or reinforcement over the next five years. The remaining joints are situated over terrain areas that are inaccessible from the ground, and new specialised access methods will need to be developed to carry out this work.

The sampling and testing of cable 41 to determine its internal condition is required following changes to the condition of the bedding and backfill along the cable route, in conjunction with higher soil temperatures that those for which the cable was originally designed. It will improve the condition information available on the cable, thereby allow TransGrid to better manage the cable over its remaining life.

6.3.2 Other Controllable Operating Expenditure Forecasts

Forecasting Approach

Controllable operating expenditure forecasts for categories other than maintenance are scheduled using a base – step – trend approach. This approach selects an efficient base year, considers step changes where there are clear changes to the cost base that are not reflected in the base year, and applies escalation to reflect forecast changes in input costs (such as inflation and labour costs) and growth in the size of the network. This approach is explained in more detail in Section 6.4.2

While growth in the size of the network is taken into account, economies of scale reduce the cost impact as it is understood that costs will not increase on a one-to-one basis. The economies of scale factors are listed in Section 6.3.6.

Selection of Base Year

TransGrid proposes the use of 2012/13 as the base year for this proposal, subject to adjustment for easement maintenance costs as described above. 2012/13 is the most recent year for which audited actual expenditure is available.

TransGrid regards 2012/13 as an efficient base year, because:

- the regulatory framework provides incentives to minimise costs in this year (the "revealed costs" approach); and
- through rigorous use of benchmarking, TransGrid has confirmed that its costs compare favourably with those of its peers in Australia and overseas.

Step Changes

TransGrid has responded to the commercial drivers for cost control and the incentives within the regulatory framework in the National Electricity Rules. As a commercial and efficient business, TransGrid continually reviews its business model, strategies and processes and pursues opportunities to improve its business operations. The results of these efforts are evident under the efficiency benefit sharing scheme.

Many of the efficiency improvements TransGrid has made in the current regulatory control period were completed prior to the base year of 2012/13, and are therefore already reflected in the revealed costs in the base year. These include:

- a move to SICorp, the NSW Government self insurer, for insurance;
- reduction in the cost of staff travel following the introduction of videoconferencing;
- savings from IT outsourcing contract negotiation;
- consolidation of warehousing functions across regions; and
- transition to a cosourcing arrangement for the internal audit function.

There are three efficiency improvements that will take effect during or after the base year. The cost savings realised by these efficiencies are therefore not already included in base year costs, and are manually adjusted out of the base year. These cost adjustments are summarised in Table 6.6 and described as follows.

Table 6.6
Operating Expenditure Step Decreases ($m 2013/14)

Step Change and Driver	2014/15	2015/16	2016/17	2017/18	2018/19
Change to Sydney office accommodation (Accommodation strategy)	-0.2	-2.1	-2.1	-2.1	-2.1
Payroll efficiencies (Improvements in IT systems to automate payroll functions)	-0.6	-0.6	-0.6	-0.6	-0.6
Closure of Yass control room (Efficiency improvements to control room rosters)	-0.1	-0.1	-0.1	-0.1	-0.1

Source: TransGrid.

Change to Sydney Office Accommodation

In 2011, TransGrid reviewed its office accommodation arrangements in Sydney. The existing office accommodation at the time comprised leased office space in the Sydney CBD and owned offices at Surry Hills and near Eastern Creek in Western Sydney.

The accommodation review considered a number of options to consolidate office space and provide more economic accommodation arrangements. The preferred option was the construction of a new office building above an existing TransGrid building at Ultimo.[69]

Construction of the new building was recently completed and TransGrid relocated its Sydney staff in February 2014.

The base year operating expenditure includes lease expenses for the previous Sydney CBD accommodation of $2.6 million. From 2014, TransGrid will incur outgoings for the TransGrid occupied portion of the new building, forecast at $464,000 plus escalation per year. This step change comprises the removal of the former lease expense from the base year, addition of annual outgoings to forecast expenditure, and addition of specific costs associated with the termination of the lease for the previous accommodation in 2014/15 only.

Payroll Efficiencies

In 2013, TransGrid implemented a number of process changes to streamline its payroll administration. The changes were rolled out in conjunction with improvements to the software used to process payroll, and were streamlined through the replacement of paper forms with an online approval system.

TransGrid has forecast a cost reduction in this function going forward. As this reduction had not happened in the base year, a step decrease in costs for future years has been applied to the forecasts in this proposal.

[69] The building at Ultimo has been apportioned such that only the floors occupied by TransGrid are in the regulatory asset base, in accordance with TransGrid's cost allocation methodology.

Closure of Yass Control Room

The step decrease for the closure of the Yass control room reflects only the costs that remained in the base year. Most of the efficiency improvements associated with this transition were realised before the base year through changes to control room shift arrangements outlined in Section 6.7.3.

New Obligations and Social Responsibilities

TransGrid is also subject to a number of new obligations that will commence after the base year. Seven step changes have been applied to the forecast expenditure, where there are clear changes to the cost base that are not reflected in the base year.

These are listed in Table 6.7 and described as follows.

Table 6.7
New Obligations and Social Responsibilities ($m 2013/14)

Step Change and Driver	2014/15	2015/16	2016/17	2017/18	2018/19
Rental fees for communication towers on crown lands (IPART review of rental arrangements and fee schedules)	0.1	0.1	0.1	0.2	0.2
Ongoing requirements arising from the AER's new regulatory guidelines (New regulatory obligations)	0.6	0.6	0.6	0.6	0.6
Transfer of AEMO system operator functions (New regulatory obligations)	0.9	0.9	0.9	0.9	0.9
Easement maintenance (Catch up after response to safety obligations and cost escalation)	2.9	2.2	0.6	0.7	0.3
Consumer engagement program (New regulatory obligations and to meet changing consumer expectations)	2.3	2.2	2.1	2.2	2.2
Increase in demand management innovation allowance (Proactive approach to encouraging demand management)	1.1	2.3	3.3	3.6	2.6
Revenue reset (Regulatory obligation)	-0.1	0.5	0.9	0.1	-0.1

Source: TransGrid.

Rental Fees for Communication Towers on Crown Lands

In July 2013, the Independent Pricing and Regulatory Tribunal (IPART) completed a review into rental fees for Crown Land communication tower sites in New South Wales.[70] The review included an update to the rental fee schedule.

TransGrid has 41 communication tower sites on Crown Lands. This step change comprises the increase in rental fees arising from the update to the rental fee schedule.

Ongoing Requirements Arising from the AER's New Regulatory Guidelines

In late 2013, the AER published seven new guidelines, as required by the AEMC's *Economic Regulation of Network Service Providers* rule change in November 2012.

The new guidelines and associated regulatory information instruments impose significant and ongoing information provision requirements on transmission network service providers, well in excess of those under the AER's previous guidelines and regulatory approach.

TransGrid has incurred the cost of the initial responses to the information requests in 2013/14, as these have been required to be prepared and lodged concurrently with this proposal. However, the significant effort required to comply with the AER's extensive information requirements will cause a step increase in costs for TransGrid over and above the historical rate of regulatory change.

TransGrid has estimated the ongoing cost to comply with the AER's new requirements. This includes additional effort to comply with new requirements for maintaining and reporting information on shared assets, economic benchmarking and category analysis. It includes the cost of responding to regulatory information notices (RINs) issued to TransGrid by the AER, and the necessary audits of this data required by the RINs.

Transfer of AEMO System Operator Functions

Since 2004, TransGrid has had an operating agreement in place with AEMO,[71] under which AEMO delegated a number of its functions to TransGrid as a system operator in New South Wales. TransGrid has provided this service to AEMO as a non-regulated activity.

In January 2014, the operating agreement concluded and AEMO and TransGrid established an instrument of delegation under Clause 4.3.3 of the National Electricity Rules. The instrument of delegation sets out the functions AEMO delegates to TransGrid, which are provided as prescribed services to meet the obligations delegated to TransGrid under Clause 4.3.3.

This step change comprises the addition of costs for the provision of TransGrid's prescribed functions as a system operator under the instrument of delegation.

Easement Maintenance

In 2012/13, TransGrid responded to a significant issue with the safety performance of an easement maintenance contractor, as discussed in Section 6.3.1. This led to an eight month break in easement maintenance in one region, and additional expenditure has been included over the subsequent three years to catch up on this essential activity.

This step change includes additional expenditure in 2014/15 and 2015/16 to allow the catch up to be completed over the routine easement maintenance cycle.

[70] IPART, *Review of Rental Arrangements for Communication Towers on Crown Lands*, 24 July 2013.
[71] The operating agreement in 2004 was established with NEMMCO, which was a predecessor to AEMO.

In addition to the catch up work, there are three cost drivers that have led to a slight increase in easement maintenance costs going forward:

- work health and safety legislation – new health and safety laws have resulted in more stringent requirements on health and safety systems including induction, training, pre-work assessments and compliance auditing. For example, the strengthening of requirements for working at heights has resulted in work traditionally performed by climbers now being performed from elevating work platforms or mechanical pruners;
- vegetation contract rates – in response to the safety performance issue, TransGrid strengthened the requirements in its vegetation maintenance contracts for health, safety and environmental management systems. As a consequence, the rates in TransGrid's new competitively sourced contracts established in 2013 have increased beyond previous contract rates; and
- community expectations – these include additional consultation and changes to work practices. For example, fallen debris has traditionally been left on the ground to decompose but is now being chipped, resulting in additional work.

TransGrid has responded to these drivers in its easement maintenance practices, and has taken them into account in its forecast easement maintenance costs.

Consumer Engagement Program

The energy industry is in a time of change, and TransGrid is responding to effectively and efficiently adapt to this changing environment. One aspect of the change in the operating environment is a shift in the way TransGrid plans its operations and projects, and the way in which it communicates with stakeholders.

TransGrid has committed to a stakeholder engagement process that is proactive, transparent and underpinned by a genuine desire to inform, consult and collaborate effectively with interested parties. TransGrid has traditionally taken a low key approach to engaging with the general public and has instead focused on communicating with impacted communities. Research has shown that this model is no longer relevant to today's environment, and that TransGrid needs to be openly accountable for its share of the end users' bill, albeit small.

During the preparation of this revenue proposal, TransGrid engaged with energy consumers in New South Wales to understand their levels of interest in its business, the elements of the business that are most important to them, and how to more effectively engage with the average consumer. The themes emerging from these conversations have been clear:

- TransGrid needs to educate energy consumers about its business and its place in the energy supply chain;
- messages need to be targeted to specific audiences (technical and non-technical), and a broad range of communications media utilised;
- TransGrid needs to help rebuild trust in the energy industry, which has attracted concerns such as rising bills and infrastructure disputes in recent years, and electricity transmission in particular;
- TransGrid needs to do a much better job at listening to the views of the community about the energy industry and impacts of its operations, as well as communicating what it does, how it manages the business and the challenges it faces; and

- TransGrid must continue to improve its engagement practices to ensure that the community knows the part it can play as TransGrid delivers an essential service to New South Wales and the Australian Capital Territory.

TransGrid recognises the importance of implementing real change within the business to improve engagement practices and the broader understanding of its business. A consequence of this is that TransGrid must appropriately resource its business to achieve effective and efficient consultation practices, and satisfy the community's expectations of being consulted on TransGrid's operations.

TransGrid has embarked on a new approach to stakeholder engagement that takes into account consumers' concerns, and reflects its commitment to better understand consumers' needs and work with them to find effective solutions to their energy requirements. Doing so requires not just new and innovative ways of engaging with consumers, but also changing the way the organisation works day to day.

To begin implementing this change, TransGrid is creating new channels for conversation and engagement and a shift towards clearer and more approachable messaging.

Recent initiatives TransGrid has commenced include:

- establishment of a new Executive role responsible for stakeholder engagement;
- increased resources within TransGrid to manage all communication processes, including those relating to major projects, with consumers, communities and other stakeholders;
- initiation of an internal stakeholder committee to improve TransGrid's community engagement throughout the business;
- preparation of a stakeholder engagement plan setting out the new approach;
- initiation of engagement with consumer advocates to help advise TransGrid on how to adapt its planning, project development and operational practices;
- roundtables with large energy users, consumer representatives and thought leaders to gain feedback on the business plan and revenue proposal; and
- a new engagement website – www.yoursaytransgrid.com.au.

These initiatives were commenced in 2013/14, and as such, are not in TransGrid's base year.

Further initiatives TransGrid proposes to improve engagement practices include:

- expansion of its communication activities and capabilities;
- creation of effective communication tools, such as a user friendly website and active social media presence;
- development of a suite of communication materials targeted at energy consumers and explaining key elements of the electricity network, including a range of fact sheets, newsletters and videos;
- development of clear and approachable messaging for all TransGrid external publications and documents;
- further development of the dedicated feedback and consultation website, including the capacity for online conversations and forums;

- targeted communications and advertising campaigns;
- administration of new channels for conversation and engagement;
- further surveys and deliberative forums;
- establishment of a formal Consumer Advisory Panel and Large Energy User Roundtable to provide stakeholder feedback and advice on an ongoing basis;
- development of relationships to create partnerships with consumer advocacy groups and regularly consult on TransGrid operations;
- regular and targeted roundtables, workshops and forums with stakeholder groups;
- individual engagement strategies for each new project based on reach and confirming need identification;
- integration of external communications strategies into regular business operations; and
- creation of targets and effective measures of engagement success.

To successfully implement these initiatives, TransGrid is proposing to expand the resources allocated to effective stakeholder engagement. The initiatives are set out in detail in the Stakeholder Engagement Plan attached as Appendix S, and a summary is shown in Table 6.8.

Table 6.8
Proposed Consumer Engagement Activities

Initiative	Activities
Consumer participation, education and expert input in business planning, long term network design and revenue proposal	Consumer Advisory Panel workshops
	Large Energy User roundtables
	Customer relationship management system maintenance and licensing
	Consultant research and reports
	Industry conference attendance and presentations
	Topic-specific workshops
	Transmission Annual Planning Report consultation
	Consumer surveys
	Consultation for revenue reset (during preparation of proposal)
	Internal labour step change to enable improved engagement activities
Community consultation on project need, options to defer capital projects and community impact	Consultation on Powering Sydney's Future
	Early consultation on project needs
	Consultation Manager system maintenance and licensing
	Internal labour step change to enable improved engagement activities
Building consumer awareness and internal capabilities	Advertorials
	Fact sheets
	Corporate profile document
	Website maintenance and licensing
	Social media activities
	Brand refresh
	Media training
	Expert presentations at managers' forums and seminars on business alignment to new processes
	Internal labour step change to enable improved engagement activities

Increase in Demand Management Innovation Allowance

In the consumer forums in 2013, TransGrid presented its approach to demand management to participants and sought feedback on the extent to which it should proactively pursue demand management as an alternative to network investments. Consumers generally considered that TransGrid should be more proactive in this area, subject to a value proposition.

In the current regulatory control period, TransGrid has had a demand management innovation allowance of $1 million per year. It has used this allowance to undertake a broad range of projects, partnering with universities to understand consumer behaviour and distribution businesses to test broad-based demand management projects with residential consumers and small and medium businesses. TransGrid also developed its own demand management project, iDemand, to educate consumers about the importance of reducing peak demand and contribute to wider demand management research.

TransGrid is seeking to build on its foundational demand management innovation work, proposing an increased demand management innovation allowance for 2014/15 to 2018/19 to develop the demand management market to provide greater benefit to consumers.

TransGrid's demand management innovation activities will work towards the following key objectives:

- facilitate a flexible demand management marketplace;
- develop and grow the demand management market;
- pinpoint key drivers of peak demand in New South Wales in order to better source demand response;
- understand the electricity use and behaviour of large consumers, in order to surface their potential to provide demand management;
- test and apply large scale demand management tools and techniques; and
- identify and leverage the transmission-specific contribution to the demand management ecosystem.

To meet these objectives, TransGrid proposes projects in three key focus areas:

- Collaboration: TransGrid proposes projects to improve consumer understanding of demand management, to capture synergies across different industry participants' demand management activities, and to reduce regulatory barriers to demand management uptake. TransGrid's role in the supply chain means that TransGrid has close relationships with the market operator, generators, distributors and large electricity consumers as well as a unique, holistic view of the New South Wales electricity network itself. As such, TransGrid is well placed to provide industry leadership on demand management collaboration;
- Market understanding and development: The demand management market is still maturing. To improve understanding of the market, TransGrid proposes projects such as analysis of key drivers of peak demand, and surveys of businesses' energy behaviour and demand response capacity. To help develop the market, TransGrid proposes a number of projects, the cornerstone of which is a geospatial integration of demand response and network constraints. This project would bring together potential demand management providers and anticipated network constraints over the planning horizon in a map-style format. TransGrid considers that this service

would go some way to addressing the informational barriers to uptake of demand management in New South Wales, as well as facilitating an automated demand response mechanism; and

- Technology trialling: Overcoming practical barriers to application of demand management tools and technologies is the final key focus area of TransGrid's demand management innovation allowance proposal. Proposed projects range from capturing the untapped energy efficiency potential in large businesses' space heating and cooling systems to trialling large scale storage solutions. In particular, TransGrid proposes focusing on larger consumers and grid scale solutions to capture the latent demand response capability in both areas and to best leverage TransGrid's position in the electricity supply chain.

TransGrid's Demand Management Innovation Strategy is attached as Appendix R.

Revenue Reset

Revenue Reset expenditure comprises the activities associated with preparing, lodging and participating in the AER's review of TransGrid's revenue proposal. By its nature it is a periodic expense.

The forecast operating expenditure for revenue reset has been prepared by forecasting the costs for the next revenue reset relative to expenditure on the revenue reset in the base year. The forecast costs are slightly higher than the base year costs, due to the more stringent information requirements in the AER's revenue reset RIN compared to the former *Submission Guidelines*.

6.3.3 Debt Raising Costs

The provision of allowances to compensate for the incurring of costs associated with debt financing has been a feature of Australian regulatory practice for more than a decade. In 2004, the Australian Competition and Consumer Commission (ACCC) adopted a methodology for the estimation of debt raising transaction costs, which was based on a study by Allen Consulting Group (ACG), and since that time the ACCC and AER have provided in the range of 8.0 to 10.4 basis points for these costs.[72] These are the costs that are incurred by issuers of corporate bonds, who pay fees to investment banks, lawyers and credit rating agencies in order to facilitate the sale of the bonds to investors.

However, the total debt financing operating costs incurred by a benchmark electricity transmission network in the course of a regulatory control period exceed the debt raising transaction costs that the AER has provided compensation for in the past. These additional operating costs were recently researched by PricewaterhouseCoopers (PwC).[73] TransGrid has engaged Incenta Economic Consulting (Incenta) to review the PwC report, and to assess the benchmark total debt raising cost applicable to TransGrid's circumstances.[74] The Incenta report is attached as Appendix U.

Based on TransGrid's post-tax revenue model (PTRM) numbers, Incenta found a benchmark total debt raising operating cost of 20.2 basis points, comprised of:

- 9.9 basis points for the costs of issuing the bonds in an assumed debt portfolio of $3.69 billion (that is, RAB debt);

[72] ACG, *Debt and Equity Raising Transaction Costs – Final Report, Report to the Australian Competition and Consumer Commission*, December 2004.
[73] PwC, *Energy Networks Association: Debt Financing Costs*, June 2013.
[74] Incenta, *Debt Raising Transaction Costs – TransGrid*, May 2014.

- 4.9 basis points to establish a bank facility for, and pay commitment fees on, between $186 million and $269 million in undrawn committed bank lines in order to satisfy Standard & Poor's liquidity requirement (that is, achieving a liquidity ratio of at least 1.1 times, and ensuring that forecast cash sources are equal to cash uses over a six month horizon in the event of a 15% decline in EBITDA); and
- 5.4 basis points to compensate for the fact that Standard & Poor's requires businesses to refinance debt three months ahead of the actual refinancing date.

Incenta has used the Standard & Poor's methodology as the basis for the study. However, TransGrid has confirmed through discussions with three investment banks that Standard & Poor's methodology reflects the minimum benchmark that a commercial business would apply when managing its debt. In practice, commercial businesses would refinance earlier than three months ahead and hold a larger liquidity reserve. In effect, Incenta's calculation of these debt management costs is conservative, nevertheless it offers the AER a transparent and useful framework with which to assess these costs.

Allowance for Debt Raising Transaction Costs relating to the Debt Component of the Regulatory Asset Base

Taking the market research results of the recent PwC study of debt raising transaction costs relating to the RAB debt, Incenta calculated a 9.9 basis points allowance for TransGrid based on the opening RAB debt level of $3,688 million. The main component of this cost is an 8.5 basis point per annum arrangement fee cost, which has been estimated based on the costs revealed in prospectuses provided to investors in Australian bonds that are issued in the US. The remainder of the costs are based on PwC's interviews with investment bankers, lawyers and credit rating agencies. The composition of the 9.9 basis points, based on an assumed 15 standard bond issues of $250 million each, is shown in Table 6.9.

Table 6.9
TransGrid Benchmark Debt Raising Transaction Costs (bppa)

Number of Bonds	Value	1 Bond Issued	15 Bonds Issued
Amount raised		$250 million	$3,750 million
Arrangement fee		8.51	8.51
Bond Master Program (per program)	$56,250	0.33	0.02
Issuer's legal counsel	$15,625	0.09	0.09
Company credit rating	$77,500	0.46	0.03
Annual surveillance fee	$35,500	0.14	0.01
Up-front issuance fee	5.20 bp	0.77	0.77
Registration up-front (per program)	$20,850	0.12	0.12
Registration – annual	$7,825	0.31	0.31
Agents' out-of-pockets	$3,000	0.02	0.02
Total		10.8	9.9

Source: Incenta analysis based on PwC (2013), p19.

Allowance for Costs associated with Standard & Poor's Liquidity Requirement

In the past, the term "indirect costs" has been used to describe finance-related operating costs incurred in the maintenance of a liquidity reserve, but they are clearly direct costs. As explained in its practice notes on the subject, Standard & Poor's established the requirement for a liquidity reserve to ensure that in the event of debt markets being shut down for a time, rated firms have the ability to repay expiring existing debt.[75] Based on its interview with Standard & Poor's, Incenta has reported that in the opinion of Standard & Poor's, almost all regulated energy businesses are likely to require a liquidity reserve, and that this is a direct cost of their operations.

PwC and Competition Economists Group (CEG) examined the balance sheets of regulated businesses and estimated that the liquidity reserve required to maintain an investment grade rating is between 8.8% and 14% of the outstanding RAB debt.[76] However, their approach was indirect, and subject to estimation error due to the specific circumstances of individual firms in the sample, which may not match benchmark behaviour. Incenta has instead adopted a benchmark approach that proceeds from the first principles that are established in Standard & Poor's practice notes on the subject. This approach relies on cash flow forecasts taken from TransGrid's proposed PTRM and calculates the levels of undrawn committed bank lines that are necessary to achieve:

- a cash flow sources/uses ratio of 1.1 times during the first six months of each year of the upcoming regulatory control period;[77] and
- sources of cash at least equal to uses of cash during the first six months of each year of the upcoming regulatory control period assuming a 15% decline in EBITDA.

Six month ahead modelling was applied by Incenta, as Standard & Poor's is likely to consider a benchmark regulated energy transmission business to display "strong credit characteristics". Incenta was informed by Standard & Poor's that a utility must maintain a sources/uses ratio of 1.1 times in order to achieve a liquidity rating of "adequate", which is necessary to support its current credit rating.

A key assumption in this analysis is the amount of debt that is assumed to be maturing during the six month forward modelling period. Given a 10 year debt issuance term assumption, for a growing business the assumption that 10% of the current stock of debt would be retired is likely to over-estimate the level of debt retirement, and therefore, the level of the liquidity reserve requirement. Instead, Incenta adopted an assumption that the quantum of debt to be refinanced in regulatory year *t* is equal to the average provided by two proxies:

- the sum of the new debt raising in year *t-10* (that is, based on the capital expenditure and net change in the RAB in that year) and 10% of the opening RAB debt for that year, and
- 10% of the closing RAB debt for year *t-10*.

The RAB values for *t-10* were sourced from the AER's April 2009 final decision on TransGrid.[78] Applying this methodology, which follows the approach applied by Standard & Poor's, Incenta found that the required undrawn committed bank lines ranged in value

[75] Standard & Poor's, *Methodology and Assumptions: Liquidity Descriptors for Global Corporate Issuers*, 26 September 2011 and Standard & Poor's, *Methodology and Assumptions: Liquidity Descriptors for Global Corporate Issuers*, 2 January 2014.
[76] ENA, *Response to the Draft Rate of Return Guideline of the Australian Energy Regulator*, 11 October 2013, p76.
[77] For non-utilities, this benchmark is 1.2 times for businesses with "strong credit characteristics".
[78] See AER, *Final Decision: TransGrid 2009-14 Roll Forward Model*, April 2009.

between $186 million and $269 million based on the binding constraint, which is to maintain sources-equals-uses in the event of a 15% decline in EBITDA. Incenta calculated that the levelised cost of maintaining the banking facility for this level of liquidity cover is 4.9 basis points per annum.[79] The undrawn committed bank lines were found to range between 5.0% and 6.4% of the RAB debt, which is slightly below the empirical level of 8.8% of RAB debt observed by PwC on the basis of the accounting reports of regulated energy businesses.

Allowance for Costs associated with Standard & Poor's Requirement to Finance Three Months Ahead

Standard & Poor's also requires that investment grade issuers refinance their outstanding bonds three months ahead of maturity. Incenta concurs with the PwC report, which found that the AER had misunderstood the meaning of the term "underwriting costs" when it considered ETSA Utilities' 2010 submission on the question of three months ahead refinancing.[80] The AER had maintained that debt raising transaction costs had already been included as a component of "underwriting costs", and that providing an allowance for three months ahead financing would result in double counting.[81] PwC's discussion of the issue demonstrated that there is no double counting, since the ACG report that had been relied upon by the AER made it clear that the "underwriting" fees referenced by it were in fact "arrangement fees", that is, fees paid to investment banks to compensate for the cost of selling the bonds, and not for taking on any risk that the bonds might not be sold (ie, the traditional meaning of the term "underwriting").[82]

Incenta has applied PwC's approach to estimating the cost of refinancing three months ahead, which was to calculate the cost based on the difference between the benchmark firm's cost of debt, and the value that can be obtained by investing these funds for three months in bonds that have the same credit risk as the benchmark business. Using TransGrid's cost of debt assumption of 7.72%, and assuming reinvestment for three months in a BBB rated bond at 3.7% (which has been sourced from the Bloomberg fair value curve for the last 20 days to 20 March 2014), Incenta has estimated a levelised early refinancing cost of 5.4 basis points per annum.[83]

[79] The levelised cost was calculated by calculating the net present value (NPV) of the costs relative to the NPV of the RAB debt in each year using a 10% discount rate. Since the same discount rate is applied to both the numerator and denominator, the levelised result is not very sensitive to the choice of discount rate.
[80] Incenta (April 2014), p18; PwC (February 2010), *ETSA Utilities – Distribution Network Service Provider Refinancing Costs, Final Report*, p.5.
[81] AER, *South Australia Distribution Determination 2010-11 to 2014-15*, May 2010, p384.
[82] PwC, *Energy Networks Association: Debt Financing Costs*, June 2013, pp vii-viii.
[83] The date of 20 March 2014 was chosen by Incenta as this is the date up to which TransGrid has calculated its trailing average cost of debt of 7.72%.

Table 6.10
Adequate Liquidity Requirements ($ million)

PTRM Outputs	2014/15	2015/16	2016/17	2017/18	2018/19
Revenue (Smoothed)	464.9	476.6	488.6	501.0	513.6
Operating Costs	102.9	105.3	112.5	116.8	109.0
EBITDA	362.0	371.3	376.1	384.2	404.6
(A) Sources					
EBITDA	362.0	371.3	376.1	384.2	404.6
Less: Cash Taxes	29.7	32.1	45.3	46.4	48.6
Less: Interest Paid	133.3	138.7	144.9	145.8	146.9
Funds from Operations	199.0	200.5	185.8	192.0	209.2
Plus: Proceeds of Asset Sales	1.5	1.4	1.4	1.5	1.5
Total Sources (not including committed but unused bank lines)	**200.5**	**201.8**	**187.3**	**193.5**	**210.7**
Total Sources (not including committed but unused bank lines) EBIT falls 15%	**147.7**	**147.6**	**132.3**	**137.3**	**151.5**
(B) Uses					
Expected Capital Spending	181.2	210.7	167.6	177.9	125.2
Plus, Debt Repayments	104.1	111.9	122.2	152.5	188.8
Plus, Dividend Payments	48.6	52.4	74.0	75.8	79.4
Total Uses	**333.8**	**375.0**	**363.9**	**406.3**	**393.3**
Undrawn Committed Bank Lines for A/B = 1.1 times[84]	166.8	210.6	213.0	253.4	222.0
Undrawn Bank Lines as % of Debt	4.5%	5.5%	5.3%	6.1%	5.1%
Undrawn Committed Bank Lines for A-B = 0 when EBITDA falls 15%[85]	186.2	227.4	231.6	268.9	241.9
Undrawn Committed Bank Lines as % of Regulatory Debt	5.0%	5.9%	5.7%	6.4%	5.6%

Source: Standard & Poor's methodology, TransGrid PTRM and AER data, and Incenta analysis.

[84] The undrawn committed bank lines numbers are calculated to generate an A/B ratio of 1.1 times.
[85] The undrawn committed bank lines numbers are calculated to generate A-B = 0.

6.3.4 Insurance and Self Insurance

Insurance costs are based on external insurance estimates from TransGrid's insurance provider, SICorp, through the Treasury Managed Fund (TMF), which is the self insurance fund of the NSW Government. TransGrid switched from the commercial insurance market to SICorp in 2012/13 when access to TMF cover was made available to TransGrid. SICorp and TMF offer a more comprehensive level of insurance cover than that which TransGrid would be able to secure in the commercial market, at a lower cost.

To ensure this approach remains the most cost-effective going forward, TransGrid has sought estimates for insurance coverage from the commercial market for 2014/15 to 2018/19. These estimates were sourced from Marsh, an independent expert in insurance cover, and are attached in Appendix T. The savings for consumers of TMF cover compared to market estimates amount to $33 million over this time.

Self insurance costs are based on independent, actuarially assessed self insurance premiums from Marsh. However, as SICorp coverage is relatively comprehensive, TransGrid has not included self insurance costs in the revenue proposal.

TransGrid notes that in the event it is no longer able to access TMF insurance cover, its insurance and self insurance costs would increase by approximately $6.5 million per year, based on the commercial market and actuarially assessed self insurance forecasts from Marsh.

6.3.5 Network Support

As outlined in Section 5.4.1, TransGrid proposes to procure pre-emptive network support for the Powering Sydney's Future project from 2014/15 to 2017/18, with a view to promoting the demand response market in the project area. TransGrid then proposes the use of network support to defer capital investment from 2018/19 onwards.

The proposed network support costs for Powering Sydney's Future for 2014/15 to 2018/19 are shown in Table 6.11.

Table 6.11
Proposed Network Support ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19
Support procured (MW effective)	34	69	103	138	172
Estimated cost	5.5	6.6	7.8	8.7	9.6

Source: TransGrid.

Under Clause 6A.7.2 of the Rules, network support costs are a pass through. This means that if TransGrid's actual expenditure on network support varies from this forecast, unused amounts of the allowance will be refunded to consumers or additional requirements passed through to consumers.

6.3.6 Cost Escalation

Labour Cost Escalation

TransGrid faces cost pressures above CPI. For operating expenditure, the main cost pressure is labour rate escalation.

TransGrid considers that average weekly earnings (AWE) is the labour escalator that most closely reflects the actual labour costs facing the business. However, the AER has expressed a preference for the use of the wage price index (WPI) as a more stable indicator over time than AWE.

In this proposal, TransGrid has escalated labour costs based on:

- its employee agreement, for internal labour during the period covered by the agreement; and
- the WPI for internal labour after the period covered by the employee agreement and for all external labour.

TransGrid engaged BIS Shrapnel to provide forecasts of the WPI for the Electricity, Gas, Water and Waste Services (EGWWS) sector in New South Wales. The report from BIS Shrapnel is attached as Appendix H.

The labour rate escalation used in this proposal is shown in Table 6.12.

Table 6.12
Labour Rate Escalation (Nominal)

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Internal labour (TransGrid employee agreement until 1 December 2016, then BIS Shrapnel EGWWS WPI)	2.5%	2.9%	3.6%	4.1%	4.5%	4.7%
External labour (BIS Shrapnel EGWWS WPI)	3.8%	4.0%	4.1%	4.1%	4.5%	4.7%

Source: TransGrid and BIS Shrapnel.

Productivity Adjustment

In its *Expenditure Forecast Assessment Guideline*, the AER contemplates the application of a pre-emptive productivity adjustment to operating expenditure. TransGrid considers that any pre-emptive productivity adjustment should be limited to efficiencies that are exogenous to the business and do not derive from management effort.

This is consistent with the inclusion of the efficiency benefit sharing scheme (EBSS) in Chapter 6A of the National Electricity Rules, which is to provide fair sharing of efficiency gains or losses between TNSPs and network users.[86] In developing and implementing the EBSS, the AER must have regard to the desirability of both rewarding TNSPs for efficiency gains and penalising TNSPs for efficiency losses.[87]

The application of a pre-emptive productivity adjustment could have the effect that TNSPs are not fairly rewarded under the EBSS for efficiency gains, or could be penalised even when they do not make efficiency losses.

[86] *National Electricity Rules*, Clause 6A.6.5(a).
[87] *National Electricity Rules*, Clause 6A.6.5(b)(2).

TransGrid's position is consistent with that expressed by Grid Australia in its submission in response to the draft *Expenditure Forecast Assessment Guideline*.[88] It is also consistent with the expert opinions expressed by NERA Economic Consulting[89] and Incenta Economic Consulting.[90]

TransGrid has recognised scale economies through the application of economy of scale factors, as discussed below.

Materials Escalation

TransGrid has continued to use CPI for cost increases in materials, consistent with its approach in the 2009/10 to 2013/14 revenue proposal.

Network Growth

TransGrid has included expenditure for growth in the size of the network, reflecting the increase in maintenance requirements arising from this growth and subsequent increase in other activities. The method used to calculate network growth is discussed in Section 6.4.1.

TransGrid has applied economy of scale factors to network growth, to reflect that an increase in network size will not result in a one-for-one increase in operating costs. The economy of scale factors are those that have been accepted by the AER in previous revenue determinations over the last five years, and are shown in Table 6.13.

Table 6.13
Economy of Scale Factors

Expenditure Category	Scale Factor for Labour	Scale Factor for Materials
Maintenance	95%	95%
Maintenance Support and Asset Management	25%	25%
System Operations	25%	25%
Grid Planning	25%	25%
Rates and Taxes	10%	100%
Property	25%	25%
Health, Safety and Environment	25%	25%
Information Technology	10%	10%
Business Administration	10%	10%
Corporate and Regulatory Management	10%	10%

Source: TransGrid.

[88] Grid Australia, *Submission in Response to Draft Expenditure Forecast Assessment Guideline*, September 2013, p15.
[89] NERA, *Holistic Economic Benchmarking: A Report Prepared for Grid Australia*, 20 September 2013, p31.
[90] Incenta, *Advice on Certain Issues in Relation to the Draft Expenditure Forecast Assessment and Efficiency Benefit Sharing Scheme Guidelines*, 20 September 2013, pp10-13.

6.3.7 Employee Entitlements

In recent revenue determinations, the AER has indicated a preference to base operating expenditure forecasts on the cash costs paid for employee entitlements such as long service leave and contributions to certain superannuation schemes, rather than the methodology used in the financial accounts of "provisions" to recognise the value of employee entitlements earned in the period.

Employee entitlements in TransGrid's operating expenditure allowance for the 2009/10 to 2013/14 regulatory control period were based on a provisions approach. While a provisions approach aligns with the methodology used in the financial accounts, TransGrid has forecast operating expenditure for employee entitlements in this proposal based on cash costs paid, in line with the approach taken by the AER in recent revenue determinations.

Mercer, as the actuary for the Energy Industries Superannuation Scheme, has provided forecast costs on both cash and provisions bases for TransGrid's defined benefits superannuation liabilities.

TransGrid has also engaged KPMG to provide an actuarial assessment of its long service leave liabilities on both cash and provisions bases.

Employee Entitlements

Employee entitlements are accrued employee benefits TransGrid is required to recognise as current liabilities in its financial accounts, in accordance with the accounting standards with which TransGrid is required to comply. These include provisions for long service leave entitlements and defined benefit superannuation schemes that are long term in nature.

Because of their future long term nature, movements in long service leave and defined benefit superannuation provisions are subject to prevailing discount rates at each financial reporting date and determined annually by actuarial assessment. This has led to significant variation between years, notably during the global financial crisis, as reflected in operating expenditure accounts.

6.4 Approach to Forecasting

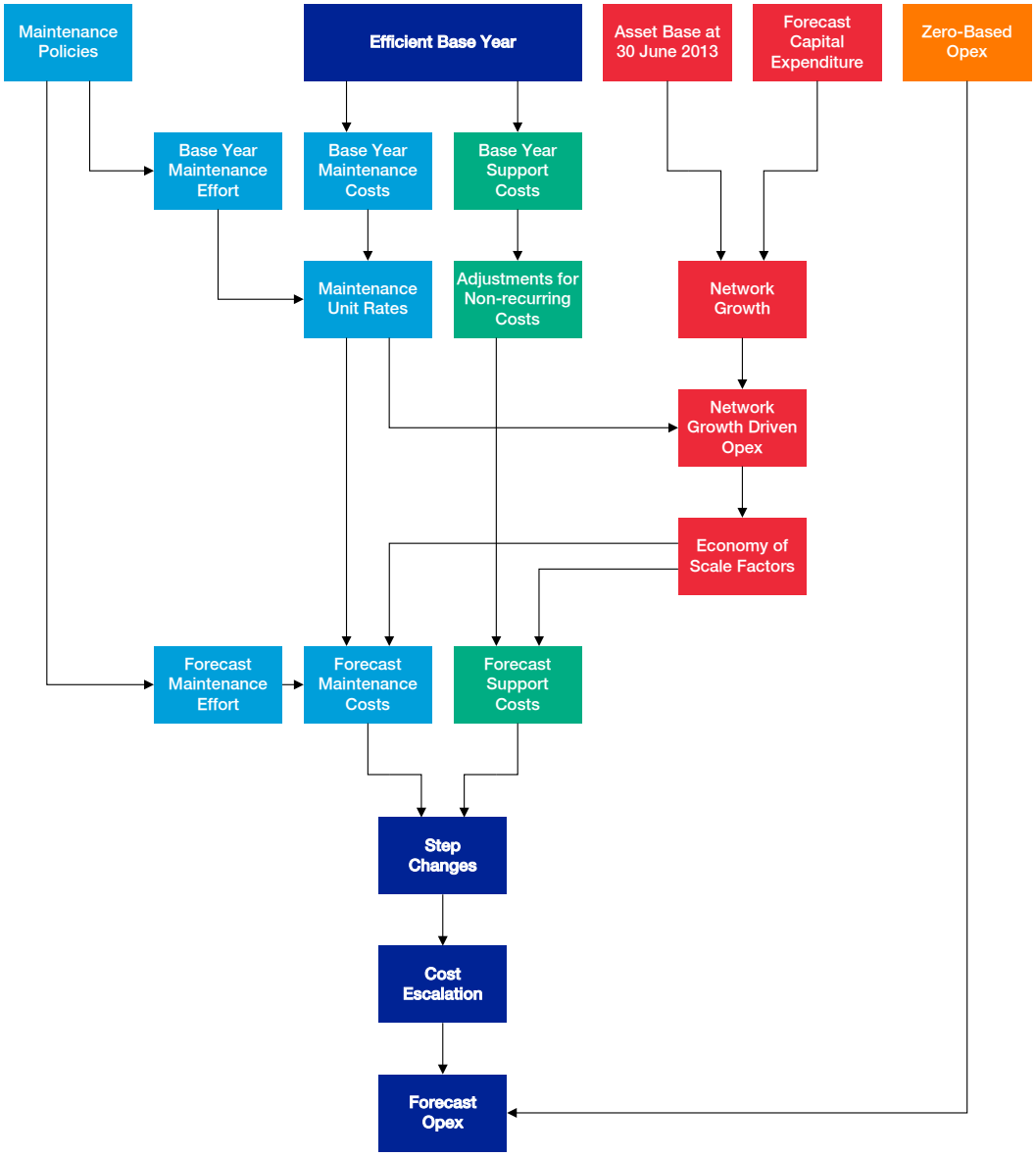
TransGrid uses an operating expenditure model to forecast operating expenditure.

The model predominantly uses a base – step – trend approach to forecasting operating expenditure, particularly where historical expenditure provides a realistic expectation of forecast expenditure. This approach is most commonly suited to expenditure which is recurrent in nature. A variation on the approach is used for maintenance work.

For a small number of categories of expenditure, forecasts are zero-based. This approach is used for categories that comprise specific projects or where market rates provide the best expectation of forecast expenditure.

The operating expenditure forecasting methodology is shown in Figure 6.2.

Figure 6.2
Operating Expenditure Methodology



The application of the methodology to the operating expenditure categories is as follows.

6.4.1 Maintenance Activities

The types of activities involved in maintenance of the transmission network include:

- preventative maintenance and inspections;
- condition-based maintenance;
- corrective maintenance; and
- major operating projects (MOPS).

These types of activities are forecast for each major asset category: transmission lines, substations, secondary systems, communications and easements.

The forecasting approach for each type of activity is as follows.

Preventative Maintenance and Inspections

Preventative maintenance and inspection tasks are scheduled by TransGrid's enterprise resource planning system in accordance with the maintenance requirements set out in TransGrid's maintenance policies. Maintenance intervals or operations-based triggers are defined based on manufacturers' advice, TransGrid's experience and good electricity industry practice. It should be noted that these intervals are generally longer than one year, and therefore, there can be some cyclical variation in effort from year to year.

Forecast maintenance costs are based on forecast effort for each particular year from the enterprise resource planning system (in employee hours) and hourly maintenance unit rates from the base year. The forecast effort reflects the effort required to maintain the network that existed at the time of the base year. However, it does not include the maintenance of new network elements that are commissioned in the upcoming regulatory control period. Therefore, an allowance for growth in the size of the network is applied to reflect the increase in maintenance requirements arising from this growth. Network growth is calculated as:

$$\textit{Network growth} = \frac{\textit{Forecast capital expenditure resulting in a change to network size}}{\textit{Replacement value of network}}$$

Notably, the growth calculation incorporates forecast capital expenditure that decreases the size of the network as well as that which increases the size of the network. In some cases, where part of the network has grown economically over time through incremental increases in capacity, a replacement project can provide an opportunity to replace existing assets with fewer, larger assets. This results in reduced maintenance requirements, and is included in the calculation as negative growth.

Similarly, where changes to demand patterns result in a decrease in electricity demand in a particular area, existing assets may be redeployed to other locations if they are in serviceable condition or decommissioned if they are reaching the end of their serviceable lives. These are also included in the network growth calculation as negative growth. For example, following the closure of the Kurri Kurri aluminium smelter in 2012, TransGrid decided to decommission a large power transformer that would otherwise have required replacement.

An economy of scale factor is applied to network growth, to reflect the scale efficiencies that can be achieved when maintaining a larger network. This limits the effect of network growth on forecast operating expenditure.

Network growth is calculated for each major asset category and for the network as a whole.

Condition Based-Maintenance and Corrective Maintenance

Condition based-maintenance and corrective maintenance are scheduled as needed based on equipment condition. It is therefore not practicable to schedule specific maintenance tasks in these categories beyond the immediate future.

TransGrid's maintenance policies have remained stable over a number of years. Therefore, condition-based maintenance and corrective maintenance effort can be modelled as a ratio to preventative maintenance and inspection effort. These categories are forecast based on

an historical average ratio of their hours to scheduled preventative maintenance and inspection hours.

As network growth is applied to scheduled preventative maintenance and inspections, it is also applied to condition-based maintenance and corrective maintenance.

Major Operating Projects

Major operating projects (MOPS) are asset refurbishment and small replacement projects. They often relate to particular families of equipment that exhibit condition issues, such as a model of transformer bushing or type of transmission line insulator. They are more similar in nature to capital projects than operating expenditure, and tend to be "lumpy" rather than recurrent in nature. TransGrid estimates them accordingly using a zero-based portfolio approach.

An alternative approach, the use of a trend based on historical expenditure, would be less well suited to taking into account the "lumpy" nature of the expenditure and distinct needs that drive it. Accordingly, TransGrid has not used this approach as it may under or over forecast the efficient costs required to meet the operating expenditure objectives.

6.4.2 Other Controllable Activities

Base – Step – Trend Approach

Expenditure for the majority of non-maintenance activities is forecast using the base – step – trend approach, which is as follows.

1. The base – step – trend approach forecasts expenditure from a base year that reflects an efficient level of operating expenditure. This is generally the most recent year for which audited actual expenditure is available, subject to adjustment of abnormal costs in that year. The approach provides for specific adjustments to expenditure through the inclusion of step changes. These include adjustments for abnormal costs in the base year, the addition of new obligations that commence after the base year and the removal of costs that cease after the base year.
2. The approach then applies trends for cost pressures above CPI. These include growth in the network, which increases the number of assets to be maintained, and labour rate increases.

Economy of scale factors relevant to each activity are applied to network growth, to reflect the scale efficiencies that can be achieved when managing a larger network. This limits the effect of network growth on forecast operating expenditure.

Zero-Based Approach

TransGrid uses a zero-based approach for expenditure categories where it provides a more reasonable forecast than historical costs. A zero-based approach uses an external estimate or bottom-up cost build-up to estimate the total cost of a particular activity.

6.4.3 Fixed and Variable Costs

In the short term, operating expenditure can be regarded as variable. However, in the medium to long term, the cost of sustainably managing high value, long life assets is more appropriately regarded as fixed, relative to a particular asset base.

6.4.4 Cost Allocation and Relationship with Incentive Schemes

The forecast operating expenditure in this revenue proposal is for the provision of prescribed transmission services only. The allocation of costs is done in accordance with TransGrid's cost allocation methodology, approved by the AER in 2008.[91]

The forecast operating expenditure in the proposal does not include expenditure to improve performance under the Service Target Performance Incentive Scheme or for projects included in the NCIPAP.

6.5 Assurance on Operating Expenditure

TransGrid has commissioned expert advice from leading Australian technical experts and independent advisers to provide external inputs and assurance reviews to support the operating expenditure forecast. The key advisers are listed in Table 6.14.

Table 6.14
Key External Advisers for Operating Expenditure Forecast

Adviser	Input or Assurance Advice
BIS Shrapnel	Labour cost escalation, being Wage Price Index for the NSW Electricity, Gas, Water and Waste Services sector
SKM	Review of standard maintenance effort for efficiency
SICorp	Forecast of insurance premiums
Marsh	Forecast of market insurance premiums and self insurance allowances
Mercer	Actuarial advice on superannuation contributions
Incenta Economic Consulting	Benchmark debt raising costs

6.6 Efficiency of Operating Expenditure

TransGrid participates in a number of industry benchmarking studies in order to understand the efficiency of its costs, as part of its commitment to continuous improvement and to stay at the frontier of good electricity industry practice.

In its *Expenditure Forecast Assessment Guideline*, the AER has also established an approach to benchmarking categories of expenditure, which is considered here.

Importantly, the benchmarks considered here do not attempt to establish an efficiency frontier. However, taken together, they provide an indication of TransGrid's performance across the various categories of operating expenditure. TransGrid has therefore compared its performance to the average on each benchmark, recognising that this is an appropriate level at which to regard the benchmarks.

TransGrid has not attempted high level economic benchmarking, as the small number of TNSPs in the NEM, the lumpiness of capital expenditure and difficulties in measuring outputs are material issues with respect to the application of benchmarking to TNSPs.[92]

[91] AER, *Final Decision: TransGrid Transmission Determination 2009-10 to 2013-14*, 28 April 2009, p98.

Many of the benchmarks below show that TransGrid's costs are in line with or below its peers, both internationally and within Australia. There are three areas in which TransGrid's costs benchmark higher than those of its peers: the administration of payroll, corporate support and management of work health and safety. TransGrid has already included step decreases in costs for the administration of payroll and corporate support in this proposal. It does not propose a change in work health and safety costs, for the reasons described below.

The benchmarks in this section demonstrate the efficiency of TransGrid's operating expenditure and substantiate the use of actual costs in 2012/13 as the starting point for an efficient base year.

6.6.1 Industry Benchmarks

TransGrid has participated in benchmarking studies covering the majority of its operating expenditure. The outcomes are summarised in Table 6.15 and detailed below.

Table 6.15
Benchmarking Outcomes for Operating Expenditure

Category	Studies Undertaken	Outcome
Maintenance	ITOMS	Lower than average cost
Asset Management	ITAMS	Average effort
IT	Mercer, UMS	Lower than average cost
Human Resources	Mercer, UMS	Average cost
Payroll Administration	Mercer, UMS	Higher than average cost (addressed by efficiency initiative)
Training	Mercer	Slightly lower than average cost
Work Health and Safety	Mercer	Higher than average cost
Finance and Management Support	UMS	Average cost
Property Management	UMS	Lower than average cost
Fleet Management	UMS	Average cost
Corporate Support	UMS	Higher than average cost (addressed by accommodation strategy)

Maintenance

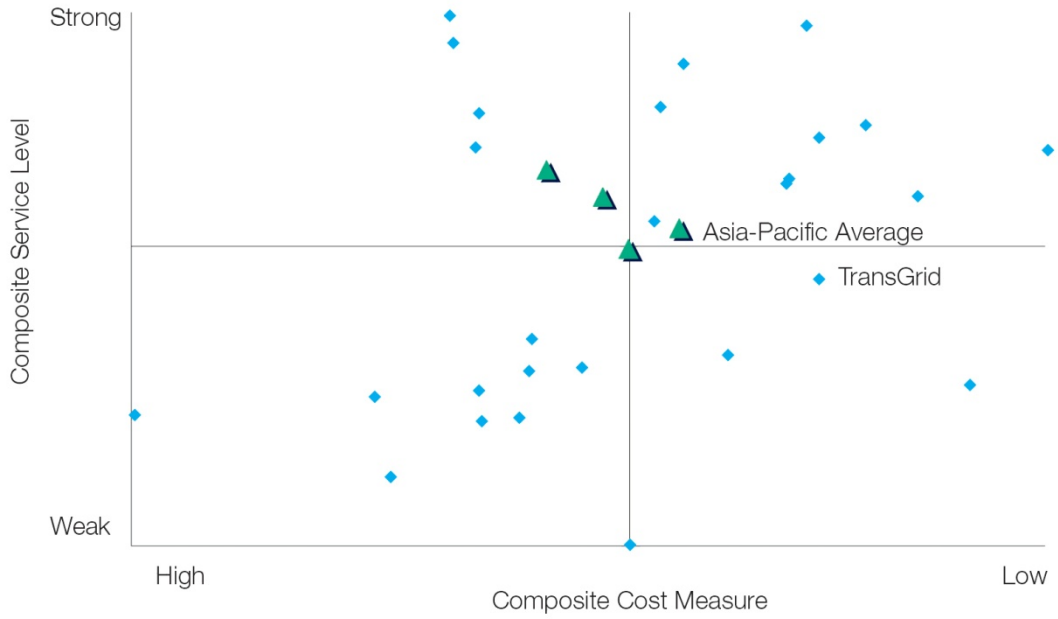
TransGrid has participated in the International Transmission Operations and Maintenance Study (ITOMS) since its inception in 1995. In the early years of participating, TransGrid made a number of changes to its maintenance plans as a result of the benchmarking. More recently, the study has confirmed TransGrid's ongoing efficiency and provided a forum

[92] Grid Australia, *Submission in Response to Draft Expenditure Forecast Assessment Guideline*, September 2013, pp7-8.

through which TransGrid can remain abreast of current electricity industry practice amongst its peers.

The most recent ITOMS results, from ITOMS 2013, are shown in Figure 6.3. The centre of the cross hairs is the average performance of the international peers. The Asia-Pacific Average triangle shows the average performance of those participants in the Asia-Pacific region, which includes Australia.

Figure 6.3
ITOMS 2013 Overall Composite Result



Source: ITOMS 2013.

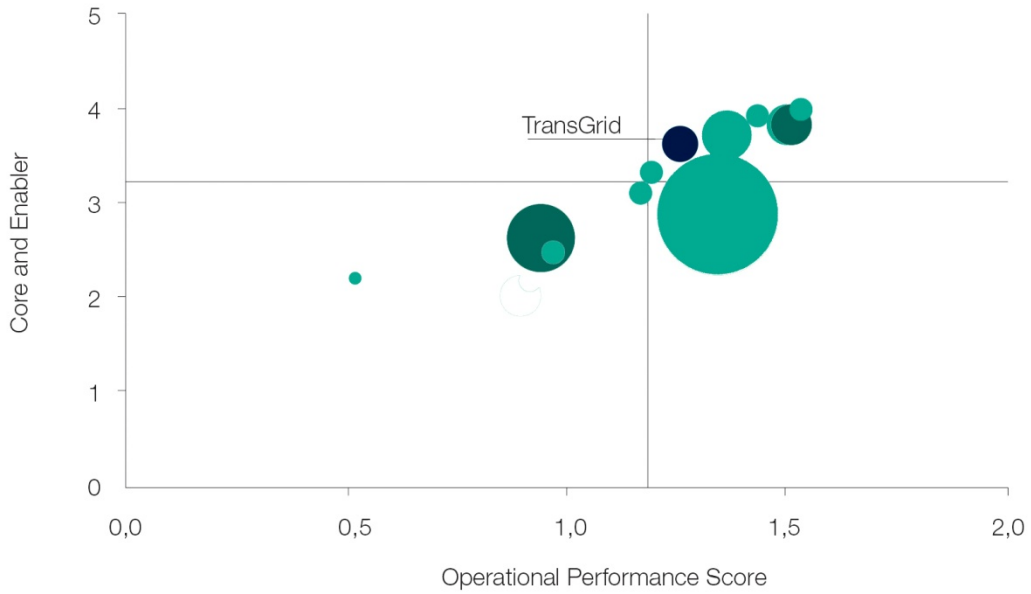
Over the last 15 years TransGrid has consistently performed at lower maintenance cost than the average of both Asia-Pacific and international peers (indicated by results to the right of the vertical cross hair in Figure 6.3). TransGrid's composite service level, according to the ITOMS measure, is approximately in line with the average of its peers.

Asset Management and Grid Planning

TransGrid has participated in the International Transmission Asset Management Study (ITAMS) since its inception in 2010. The study compares asset management practices amongst participants, and includes some simple measures of the effort of participants' asset management activities (which include grid planning).

The most recent ITAMS results, from ITAMS 2012, are shown in Figure 6.4. The centre of the cross hairs is the average performance of the international peers. The sizes of the circles relate to the sizes of each company's investment portfolio.

Figure 6.4
ITAMS 2012 Overall Result

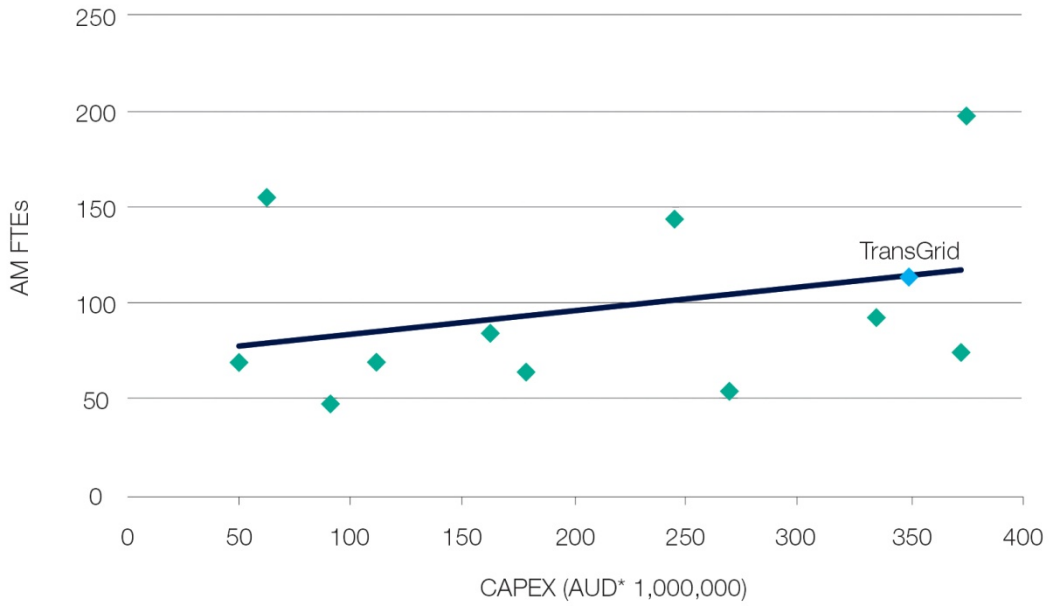


Source: ITAMS 2012.

TransGrid has performed consistently in the best performing quadrant of the overall ITAMS results. This means that TransGrid's asset management practices and performance are above the average capability of its international peers.

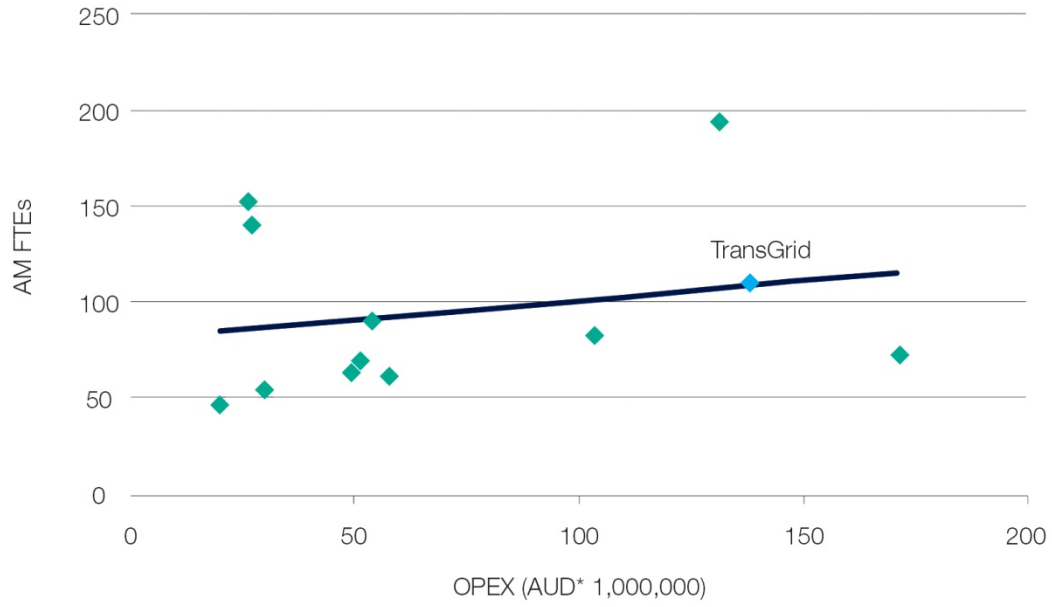
TransGrid's performance on the effort measures is shown in Figures 6.5 and 6.6. The measures show the number of full time equivalent staff (FTEs) performing the asset management function (including grid planning) in TransGrid relative to total capital expenditure and total operating expenditure, respectively. The effort in performing this function in TransGrid is in line with that of its international peers.

Figure 6.5
Asset Management FTEs Compared to Total Capital Expenditure



Source: ITAMS 2012.

Figure 6.6
Asset Management FTEs Compared to Total Operating Expenditure



Source: ITAMS 2012.

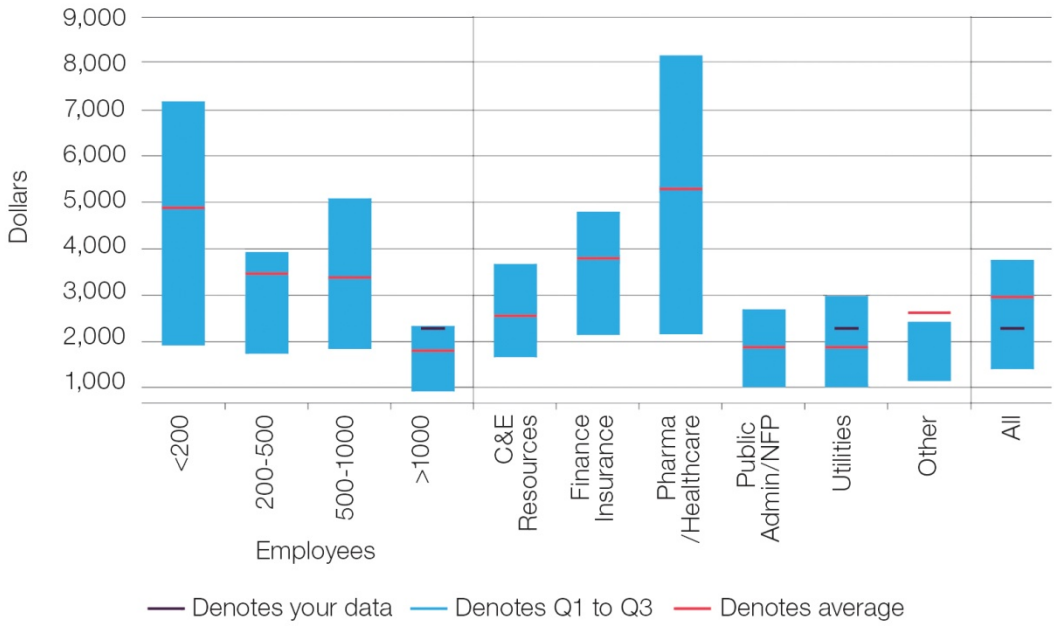
Human Resources

In 2012, TransGrid participated in the Mercer *Human Resource Effectiveness Monitor* benchmarking study. The study benchmarks organisational and human resource performance indicators.

The indicators included in the study relate to human resources, payroll, training, occupational health and safety, and IT.

TransGrid's human resources cost per full time employee is within the range of companies that participated in the study, as shown in Figure 6.7.

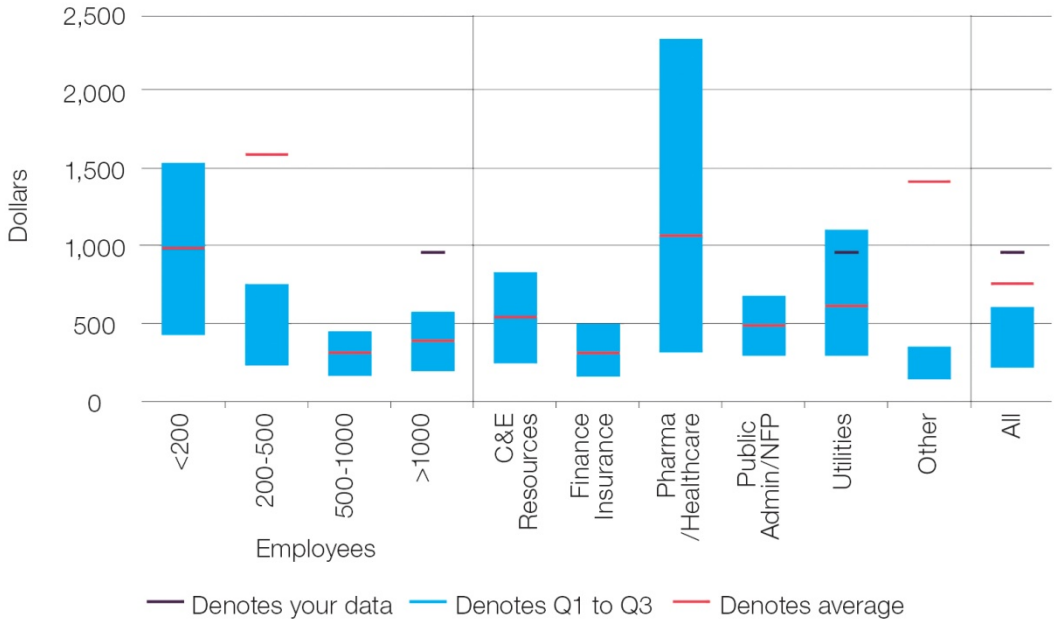
Figure 6.7
Human Resources Cost Per Full Time Employee



Source: Mercer.

TransGrid's cost of administering the payroll function per full time employee is at the upper end compared to that of similar companies, as shown in Figure 6.8. TransGrid has already taken steps to streamline its payroll function, including automation of some activities, and has forecast a cost reduction going forward. As this reduction had not happened in the base year, an adjustment to future years' expenditure has been included in the forecasts in this proposal.

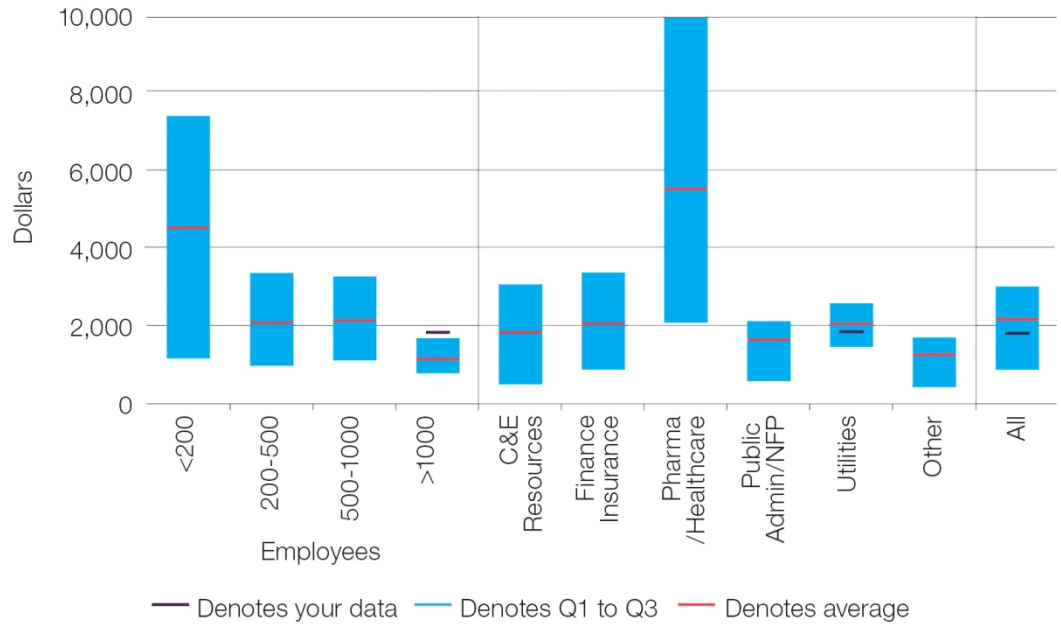
Figure 6.8
Payroll Cost Per Full Time Employee



Source: Mercer.

TransGrid's cost of administering the training function per full time employee is within the range of that of companies that participated in the study, as shown in Figure 6.9.

Figure 6.9
Training Cost Per Full Time Employee

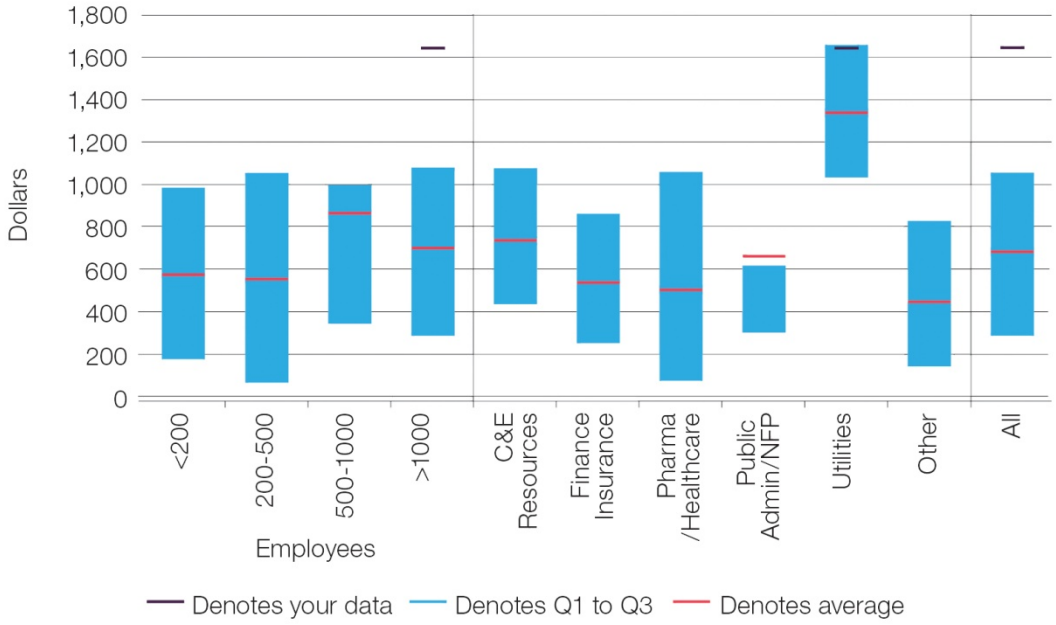


Source: Mercer.

TransGrid's cost of administering the work health and safety function per full time employee is at the upper end compared to that of similar companies, as shown in Figure 6.10. Given the significant health and safety risks inherent in the operation of an electricity network, TransGrid's costs would be expected to be higher than other companies, including other utilities.

TransGrid has achieved a strong record of safety performance in recent years for internal staff. However, the safety performance of contractors has not been as strong and will require ongoing attention to improve and manage. Accordingly, this proposal forecasts health and safety expenditure to continue at similar levels as in the current regulatory control period, to allow TransGrid to maintain its focus on safety.

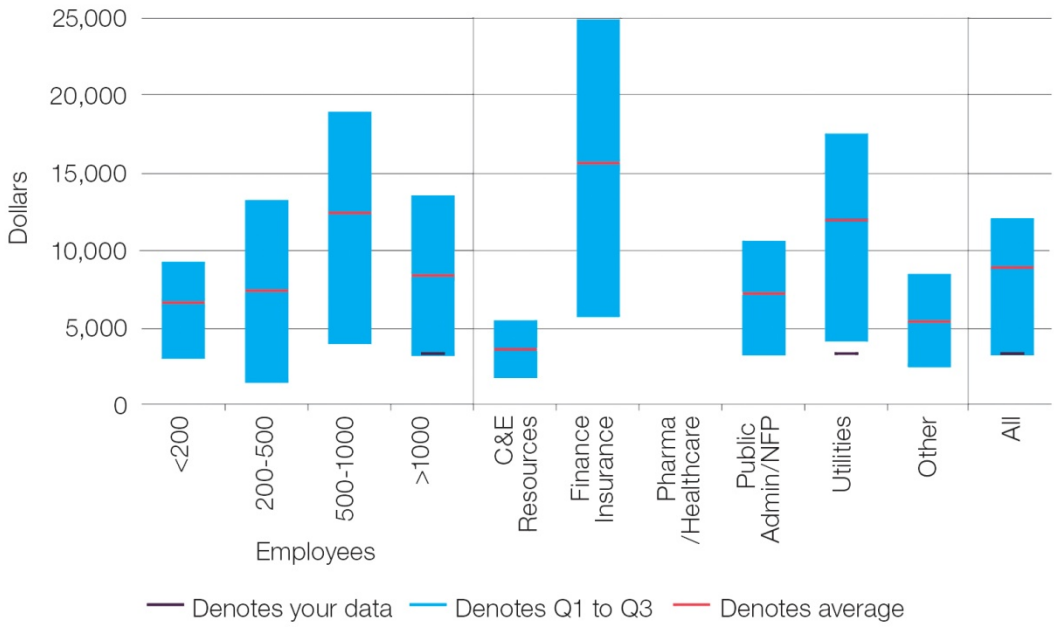
Figure 6.10
OHS Cost Per Full Time Employee



Source: Mercer.

TransGrid's cost of information technology per full time employee is shown in Figure 6.11. The result indicates TransGrid's expenditure on IT as being efficient relative to that of other study participants.

Figure 6.11
IT Support Cost Per Full Time Employee



Source: Mercer.

Business Support

In 2013, TransGrid participated in a study run by UMS that benchmarks corporate overheads between network utilities.

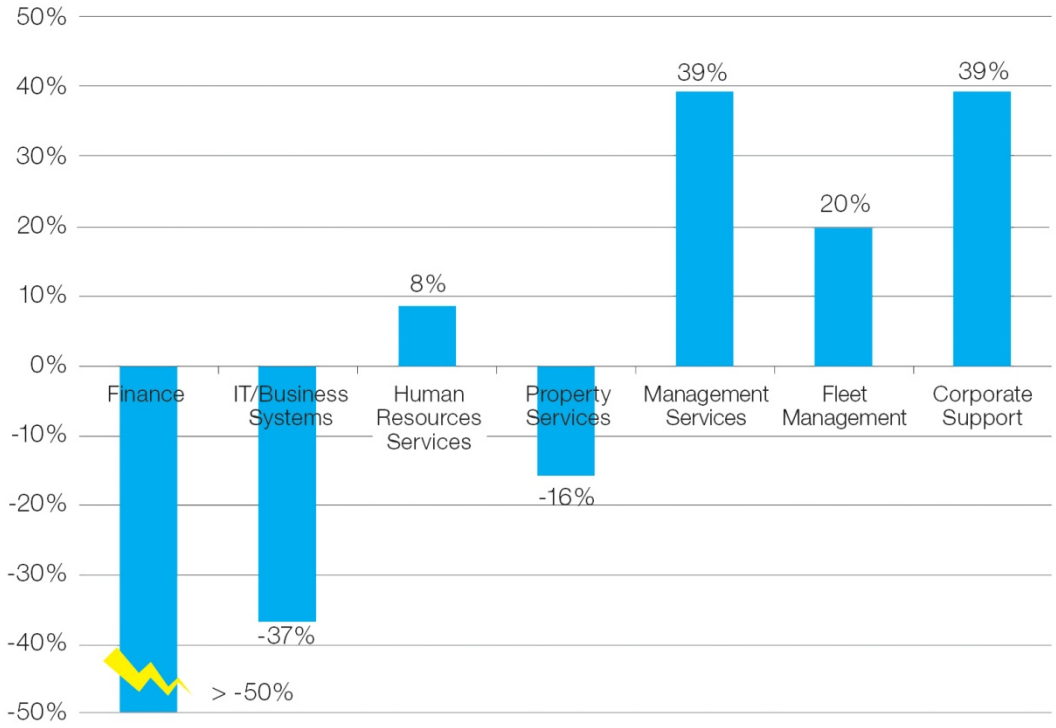
The indicators in the study relate to finance, information technology, human resources, property, management services, fleet management and other corporate support. The study considers multiple indicators, from both bottom-up and top-down perspectives, to provide an overall view of corporate overheads.

The overhead costs as a proportion of total cost are shown in Figure 6.12, and as a proportion of total full time equivalent (FTE) staff are shown in Figure 6.13. Across these indicators, TransGrid's corporate overheads in 2012/13 were approximately 3% higher than the average of all companies in the study. This study corroborates with the Mercer study above on the functions of human resources (which here includes payroll) and information technology.

The three functions on which TransGrid had higher costs than the average of other companies in 2012/13 are corporate support, human resources and management services.[93]

In this proposal, TransGrid has included a number of efficiencies relative to its 2012/13 base year costs, predominantly in the functions that are shown as most above average in this study. These are shown in Table 6.6 in Section 6.3.2. These efficiencies will reduce TransGrid's corporate overhead costs by over 5%, reducing them to just below the average of the companies in the UMS study.

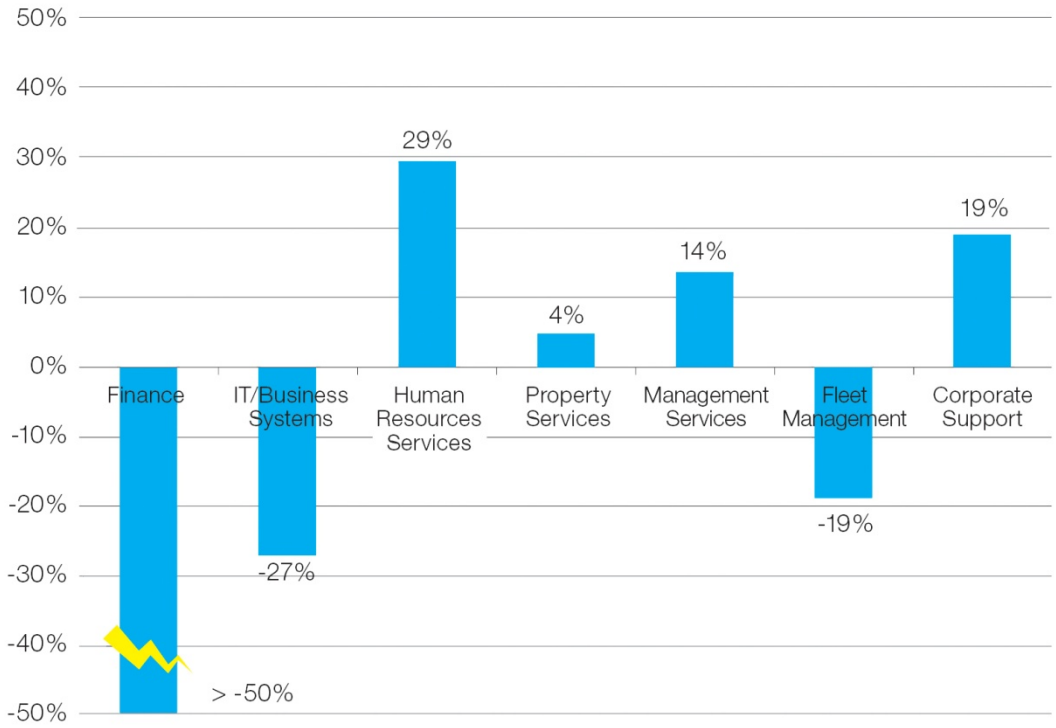
Figure 6.12
Overhead Cost as a Proportion of Total Cost



Source: UMS.

[93] TransGrid's finance function is partly decentralised. Therefore, there may be differences in cost allocation between the finance and management services categories compared to that of other participants in this study.

Figure 6.13
Overhead Cost as a Proportion of Total Full Time Equivalent Staff



Source: UMS.

6.6.2 Aggregated Category Benchmarks

In its *Expenditure Forecast Assessment Guideline*, the AER has stated its intention to use several types of benchmarks, including aggregated category benchmarks. Aggregated category benchmarks measure expenditure against several high level cost drivers, such as circuit length and energy transmitted, taking into account the effects of network scale and density.

The AER has published aggregated category benchmarks in its issues paper on SP AusNet's 2014/15 to 2016/17 revenue proposal.[94] The benchmarks consider operating expenditure against the "measures of scale" of circuit length, peak demand and energy transmitted.

TransGrid's benchmarks of operating expenditure against the "measures of scale" are shown in Figures 6.14, 6.15 and 6.16. These benchmarks have been modified from the AER's benchmarks in two ways:

- the definition of load density as peak demand against service area of the network, which better reflects the exogenous environment in which the network operates than peak demand against circuit length; and
- the use of a logarithmic curve of best fit, which better represents the comparison between two ratios than a linear function.

Notably, while load density and various "measures of scale" have been considered, other exogenous factors have not been considered at this point. TransGrid is aware that the AER

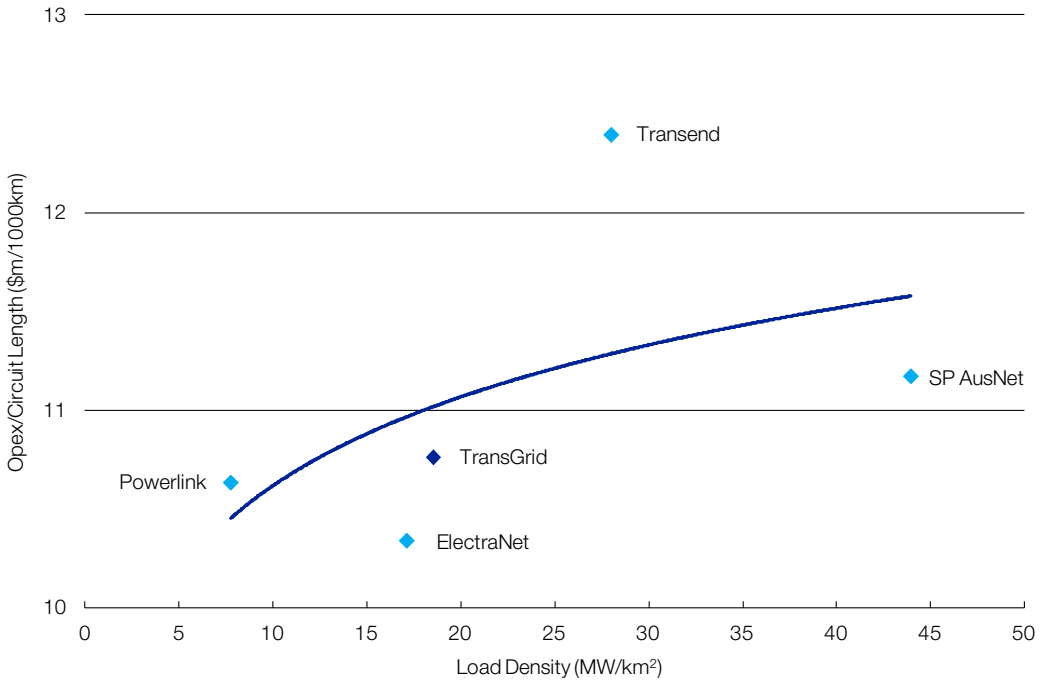
[94] AER, *Issues Paper: SP AusNet's Electricity Transmission Revenue Proposal 2014-15 to 2016-17*, 1 May 2013, Appendix A.

will consider exogenous factors more comprehensively in the benchmarks used in its annual benchmarking report, when published.

TransGrid's performance against these measures of scale and load density demonstrates the efficiency of its operating expenditure, both in TransGrid's modified benchmarks in Figures 6.14, 6.15 and 6.16 and the AER's original benchmarks in the issues paper on SP AusNet's revenue proposal.

Figure 6.14 shows that TransGrid has lower operating expenditure per circuit length than the average of other TNSPs in the NEM.

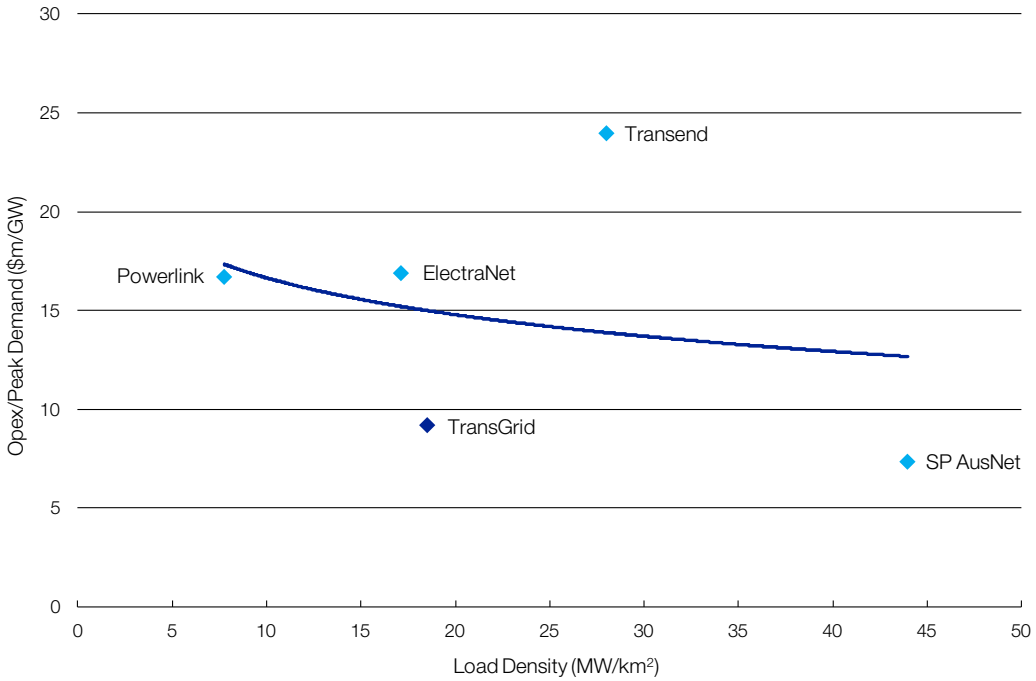
Figure 6.14
Operating Expenditure per Circuit Length



Source: TransGrid.

Figure 6.15 shows that TransGrid has lower operating expenditure per peak demand than the average of other TNSPs in the NEM.

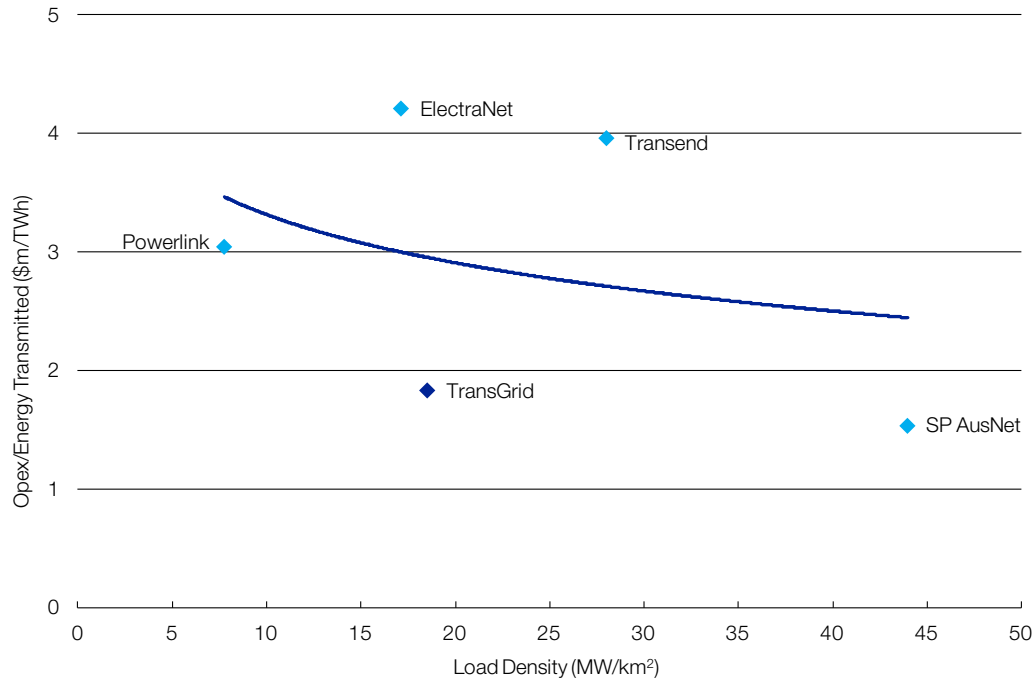
Figure 6.15
Operating Expenditure per Peak Demand



Source: TransGrid.

Figure 6.16 shows that TransGrid has lower operating expenditure per energy transmitted than the average of other TNSPs in the NEM.

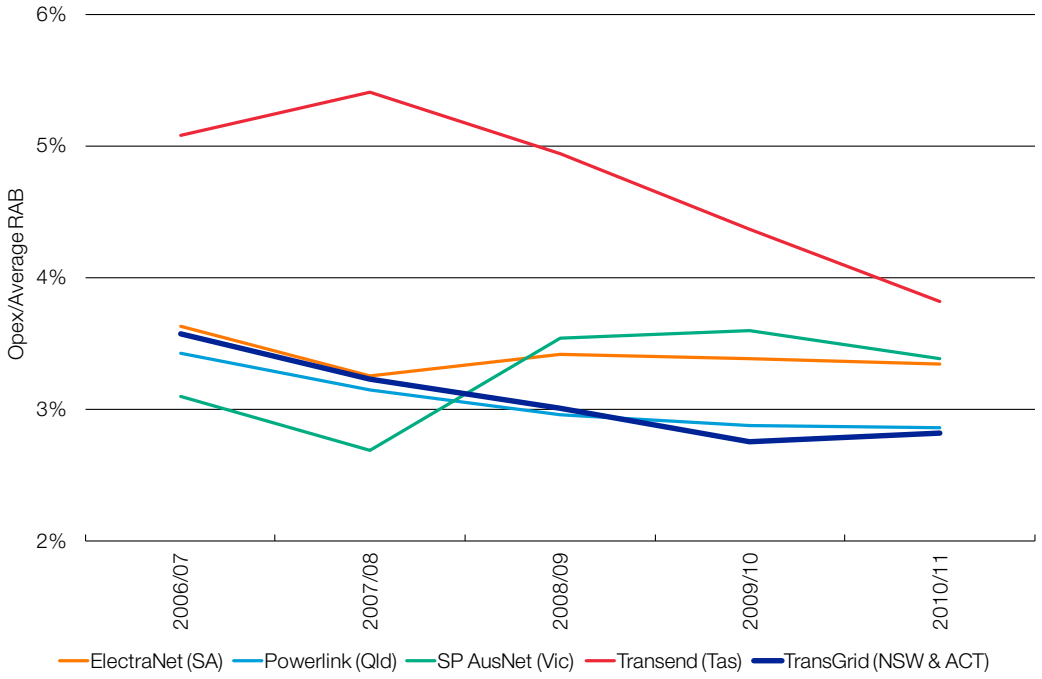
Figure 6.16
Operating Expenditure per Energy Transmitted



Source: TransGrid.

In its *Transmission Network Service Providers Electricity Performance Report 2010-11*, the AER also compares operating expenditure to a TNSP's regulatory asset base. Figure 6.17 shows that TransGrid has the lowest operating expenditure as a proportion of regulatory asset base in the NEM.

Figure 6.17
Operating Expenditure against Regulatory Asset Base



Source: AER, *Transmission Network Service Providers Electricity Performance Report 2010-11*.

The industry benchmarking TransGrid has commissioned, together with the AER's own aggregated category benchmarks, demonstrate the efficiency of TransGrid's operating expenditure.

6.7 Historical Operating Expenditure

This section reviews TransGrid's historical operating expenditure in the 2009/10 to 2013/14 period and highlights key efficiency initiatives and innovations TransGrid has achieved over this time.

6.7.1 Expenditure Trends

TransGrid's actual and expected historical operating expenditure is shown in Table 6.16. Historical actual operating expenditure reflects a provisions approach to employee entitlements, consistent with the last revenue determination and financial accounts. The variability in the historical operating expenditure trend is largely due to movements in these employee entitlement provisions.

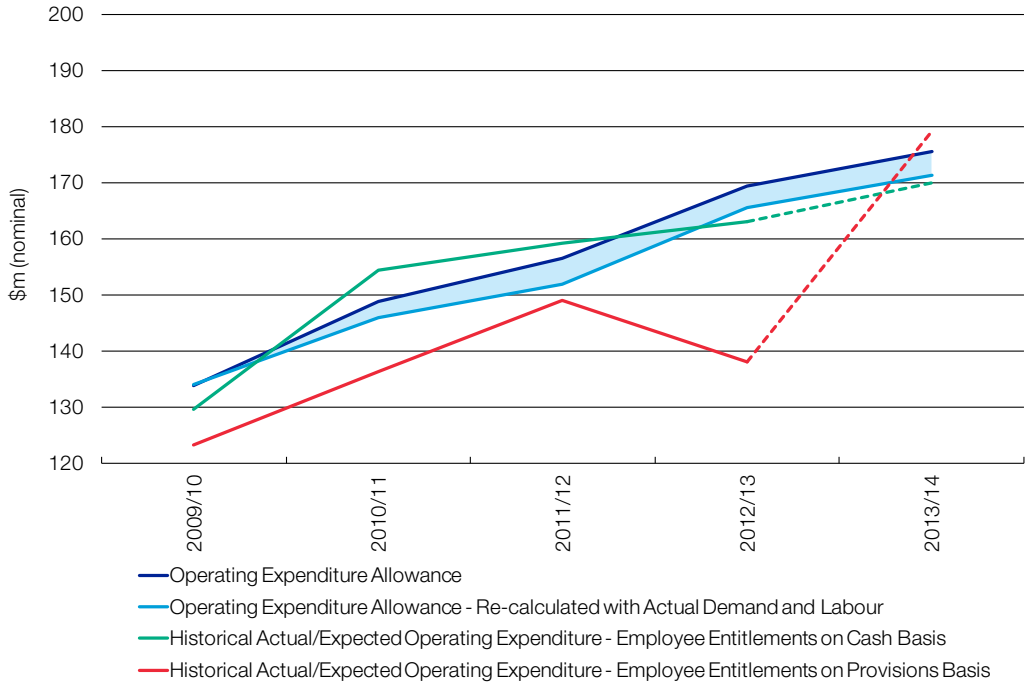
Table 6.16
Historical Operating Expenditure ($m nominal)

Category	2009/10 Actual	2010/11 Actual	2011/12 Actual	2012/13 Actual	2013/14 Expected
Maintenance	**55.0**	**67.4**	**64.7**	**63.5**	**71.2**
Maintenance	50.5	57.9	57.5	60.7	66.7
Major Operating Projects	4.5	9.6	7.2	2.8	4.6
Maintenance Support and Asset Management	11.3	12.6	14.2	11.6	10.7
System Operations	7.7	6.8	7.1	7.8	8.2
Grid Planning	4.2	6.4	8.7	9.3	10.0
Rates and Taxes	4.5	4.7	4.6	5.0	5.5
Property	3.8	3.4	2.3	3.3	4.7
Health, Safety and Environment	2.1	2.4	2.0	1.8	3.0
Information Technology	10.0	11.9	11.4	13.0	16.6
Business Administration	10.7	10.1	10.5	11.9	12.2
Corporate and Regulatory Management	7.0	3.8	16.0	4.5	30.6
Total Controllable Operating Expenditure	**116.2**	**129.4**	**141.4**	**131.7**	**172.6**
Debt Raising Costs	0.0	0.0	0.0	0.0	0.0
Insurance	7.0	7.0	7.6	6.4	5.5
Self Insurance	1.8	1.3	2.9	1.0	0.9
Network Support	18.2	0.0	0.2	3.9	0.0
Total	**143.2**	**137.8**	**152.1**	**143.1**	**179.1**

Source: TransGrid. Totals may not add due to rounding.

The actual controllable operating expenditure compared to the allowance in the 2009/10 to 2013/14 revenue determination is shown in Figure 6.18.

Figure 6.18
Historical Operating Expenditure Compared to Allowance ($m nominal)



Source: TransGrid.

6.7.2 Explanation of TransGrid's Historical Operating Expenditure

TransGrid has reduced its operating expenditure below the allowance set by the AER in the 2009/10 to 2013/14 revenue determination. There are two main reasons for this.

The first is the change in operating environment since the revenue determination for the 2009/10 to 2013/14 period. In this time, labour cost escalation has been subdued compared to the forecasts at the time of the last revenue determination, due to the cost pressures on Australian industry from the Global Financial Crisis together with a strong Australian dollar. Simultaneously, the growth of network assets has been lower than that forecast in the last revenue determination due to TransGrid's deferral of over $600 million of capital expenditure in response to a shift in peak demand.

Figure 6.18 shows both the operating expenditure allowance in the last revenue determination, and the allowance recalculated for actual demand and labour escalation.

The second, and more material, reason TransGrid's operating expenditure is below the AER allowance is a range of efficiency initiatives TransGrid has pursued in the current regulatory control period. These are described in the following section.

6.7.3 Efficiency Initiatives and Innovation

TransGrid has responded to the commercial drivers for cost control and the incentives established by the AER. In the current regulatory control period, TransGrid has undertaken a thorough review of its business activities and made a number of sustainable changes, resulting in efficiencies throughout its business.

The main business improvements achieved over this period are:

- the transition to a "virtual control room" for operating the network, closure of one control room and rostering improvements to better match workload;
- transfer of external insurance cover to SICorp, the NSW Government self insurer;
- a change in the sourcing mix of information technology activities, and strong negotiation of efficiency in information technology contracts;
- a reduction in staff travel, following the installation and increasing use of video conferencing;
- a review of fleet management, including the standardisation of vehicles and consolidation of contracts;
- consolidation of inventory warehouses to one warehouse in each region; and
- a change in sourcing mix for internal audit activities, to include cosourcing.

As such, TransGrid has achieved efficiencies to keep operating costs below the operating expenditure allowance set in the 2009/10 to 2013/14 revenue determination. The cost savings from these initiatives benefit consumers directly in this proposal through a reduction in operating expenditure in the upcoming regulatory control period of approximately $6 million per year, as the operating expenditure forecasts for the next regulatory control period are based on TransGrid's actual costs.

The main business improvements are described as follows.

System Operations

In its last revenue proposal, TransGrid reported on the creation of a "virtual control room" that enabled a review of the control room shift arrangements and a reduction in control room staff. The "virtual control room" replaced paper-based processes with IT applications that were developed in-house, which allow the entire network to be operated from any of the control rooms and shifts to be transferred between control rooms.

During the current regulatory control period, TransGrid further developed the systems used in the control room to achieve further efficiencies in these activities. The improvements include:

- further development of TransGrid's outage planning system, THEOS, to include a business-to-business interface with AEMO's Network Outage Scheduler such that outage requests can progress from TransGrid's enterprise resource planning system automatically to THEOS and on to AEMO with minimal human intervention;
- revision of TransGrid's system for preparing switching instructions (HVPRI), and integration with THEOS such that data entry is minimised and actual outage times are transferred between the two systems; and
- integration of the operators' log software with THEOS and HVPRI and incident notification systems, which has removed the need for entries to be made in multiple systems.

These applications have been developed and are supported in-house by TransGrid's Business Application Centre team, providing fit-for-purpose systems that have been specifically designed to streamline work practices.

Portable Tablets for Field Switching

To prepare equipment for maintenance or capital works, the equipment must be disconnected from the rest of the network to ensure staff and public safety. Following the completion of work, the equipment can then be reconnected to the network. The disconnection and reconnection of equipment is known as switching.

Switching can be complex and is carried out by highly trained staff who are certified and have thorough knowledge of the equipment they are switching. It requires staff to follow a sequence of written instructions to safely disconnect and reconnect the equipment.

TransGrid has developed a portable tablet for field switching that allows the progression through a switching sequence to be automatically synchronised between the control room and the switcher in the field. This provides improved visibility of switching between the control room and field over that of the previous paper-based system, reducing the risk of operator error.

Insurance

TransGrid manages its insurance through a combination of externally procured insurance and self insurance. In 2012, TransGrid secured access to insurance through the NSW Government self insurer, SICorp, and transferred the majority of its externally procured insurance to SICorp.

TransGrid's insurance coverage through SICorp is broader and lower cost than that available through the general insurance market. This has significantly reduced both the cost of insurance premiums and the scope of self insurance, such that TransGrid has forecast no allowance for self insurance in the upcoming regulatory control period. This lower cost insurance arrangement is reflected in TransGrid's base year costs and is carried through in forecast operating expenditure for the upcoming regulatory control period.

Information Technology

TransGrid uses contracted services for some information technology activities such as server, desktop, application and data network support. In 2009, TransGrid reviewed its sourcing mix and found that it would be more cost effective to source certain activities, application development and data network support, internally. TransGrid consequently established internal teams to undertake these activities. TransGrid has continued to review the cost effectiveness of its sourcing mix, and has maintained the same arrangements over the remainder of the current regulatory control period.

TransGrid procures information technology services through a competitive tender process. TransGrid has closely scrutinised and negotiated its information technology contracts during the current regulatory control period to minimise cost increases.

Travel

Given the geographic extent of its network throughout New South Wales and the Australian Capital Territory, TransGrid has staff based in various locations throughout the state. In 2010, TransGrid installed video conferencing at its major depots to improve inter-office communication. Increased use of video conferencing has reduced travelling costs.

Fleet

TransGrid owns and operates its fleet of motor vehicles and mobile plant, the majority of which are used to support maintenance and project activities. TransGrid's vehicle fleet travels in aggregate over 11 million kilometres each year.

In 2011, TransGrid undertook a review of its fleet and adopted a number of measures to deliver efficiency savings in both operating and capital costs. These include the standardisation of motor vehicles, standardisation of accessories relating to the trades for which the vehicles are used and the consolidation of contracts. This has delivered several benefits:

- reduced capital costs through volume purchase discounts;
- reduced operating costs, including fuel costs;
- increased safety, with the majority of vehicles now having a five star safety rating; and
- a reduction in carbon dioxide emissions.

As well as vehicles allocated to maintenance and project activities, TransGrid has a small pool vehicle fleet for business support activities. To ensure that the fleet size is maintained at an optimum level, utilisation is benchmarked against industry standards to ensure the vehicle fleet size and mix are configured to best meet the overall needs of the business. The vehicle fleet is supplemented from time to time by the external hire of vehicles, where this is economic.

Where it is deemed uneconomic to own a specialised mobile plant item, or an additional mobile plant item is required for short term use, TransGrid engages the services of an external hire company to provide the mobile plant item.

Warehousing

During the current regulatory control period, TransGrid has consolidated its inventory warehouses to one warehouse in each region, and reviewed its management structure that oversees the inventory process. This has resulted in a cost saving for this activity.

Internal Audit

In 2009, TransGrid reviewed its internal audit function. The function was adapted to a more strategic approach to internal risk management and the sourcing arrangements changed to include some outsourced services. This has resulted in a cost saving for this activity.

6.8 Assessment against Operating Expenditure Factors

6.8.1 Benchmarking

TransGrid has undertaken a broad set of benchmarking studies, as outlined in Section 6.6. The benchmarking studies demonstrate that TransGrid's costs are generally in line with, or more efficient than, those of its Australian and international peers.

For two categories in which the benchmarking indicates a higher cost than that of its peers, the administration of payroll and corporate support, the operating expenditure forecast has already incorporated a reduction in costs arising from existing improvement initiatives.

TransGrid's costs are higher than those of other companies in a third category, the management of work health and safety. TransGrid considers that given the significant health and safety risks inherent in the operation of an electricity network, TransGrid's costs would be expected to be higher than those of other companies, including other utilities. Therefore, TransGrid has proposed not to reduce its costs in this category.

The AER is required to publish its first annual benchmarking report by September 2014. However, at the time of submission of this proposal, the report has not been published. TransGrid will review and respond to the report when published.

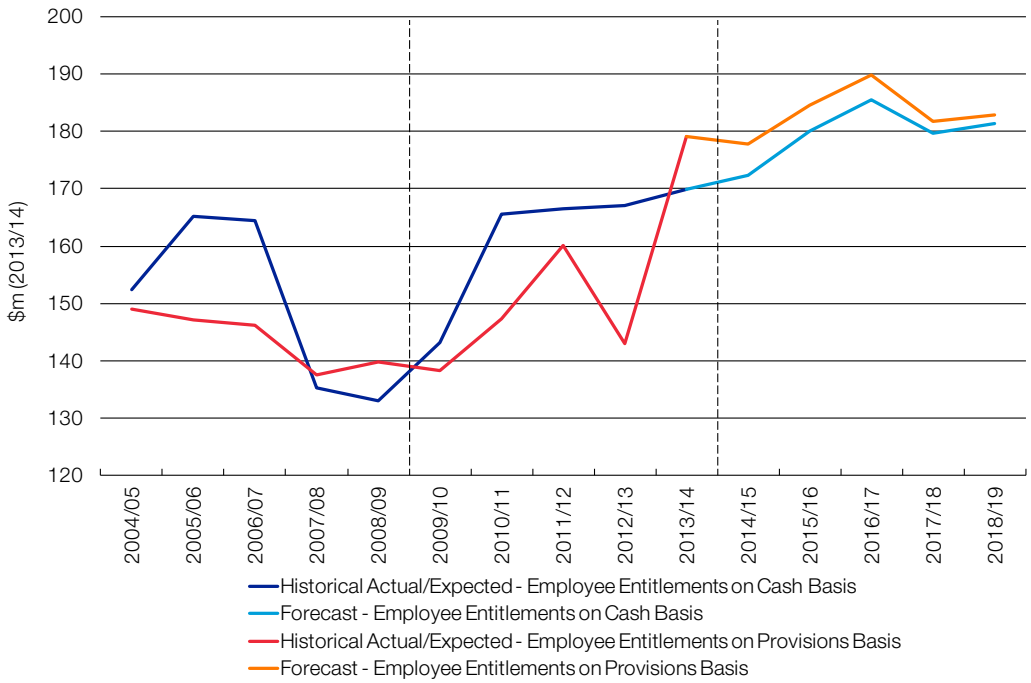
6.8.2 Historical Actual and Expected Operating Expenditure

A comparison of TransGrid's forecast operating expenditure with the actual and expected operating expenditure in the preceding regulatory control periods is shown in Figure 6.19. The trend is in common dollar terms for comparability.

In the 2004/05 to 2008/09 regulatory control period, TransGrid responded to and bettered the productivity targets set in the revenue determination through decreasing real controllable operating costs. In the 2009/10 to 2013/14 regulatory control period, this was no longer possible to sustain and TransGrid required a slight real increase in operating costs, which was recognised by the AER in the revenue determination. In the 2014/15 to 2018/19 forecast operating expenditure, TransGrid continues to forecast a slight real increase in operating costs, driven mainly by forecast labour growth above CPI.

In Figure 6.19, the lower than trend costs in 2007/08 and 2008/09 are due to movements in employee entitlements. In these years, TransGrid made no employer contributions to defined benefit superannuation schemes.

Figure 6.19
Historical and Forecast Operating Expenditure Trend ($m 2013/14)



Source: TransGrid.

6.8.3 Concerns of Electricity Consumers

TransGrid sought feedback on its operating expenditure forecasts during consultation with residential, small business and large energy users and consumer group representatives. Further details on this engagement are provided in Section 3.7.1 and the outcomes in Section 3.7.2.

The summary of consultation report summarises consumers' responses to TransGrid's operating expenditure proposal as follows.

> While participants in the Consumer Advisory Workshop and Large Energy User Roundtable were generally supportive of TransGrid's approach to operating expenditure, they raised questions about how the organisation works to ensure commercial discipline. Some were concerned that the current process through which TransGrid's prices are determined are a disincentive against greater operational efficiencies.
>
> > *How do you make networks a service provider like the retailers and incentivise that system? How has TransGrid been in moving to that alternative model? (November 2013 Consumer Advisory Workshop)*
>
> For residential and small business consumers at the forum, support for the operating expenditure outlined in the five year plan was largely based on the fact that no increase from the current period was planned. They could see evidence that efforts were being made to reduce costs in a number of areas and that this was offset by proposed increases in important areas. They were pleased to learn that prudent maintenance of the system is carried out but a few were somewhat concerned about the prospect of redundancies.[95]

During the deliberative forums, TransGrid presented a range of price and reliability trade-offs and sought consumers' views. TransGrid also sought consumer input on three discretionary items of expenditure:

- a recent increase in planning costs to improve investment decision making and better respond to changing drivers;
- demand management innovation; and
- consumer engagement.

The feedback TransGrid received on these specific items of expenditure is as follows.

Planning

Over the last few years, TransGrid has increased its expenditure on grid planning and asset management support by approximately $3 million per year. This includes the establishment of a portfolio management office to better manage a large capital portfolio and improve the responsiveness of decision making on capital investment, and initiatives to improve the articulation of option identification and evaluation.

In principle, participants in all sessions approved of TransGrid's plan to continue with the increase it has made over the last few years. This is to ensure it is able to respond quickly to changes in demand and adapt its capital investment plans as required to retain the efficiency of its capital portfolio under changing conditions.

In the deliberative forums, residential and small business participants supported a proposal to continue spending the additional $3 million a year on planning, to enable better long term decisions on capital investment. An average acceptability rating of 7.4 out of 10 was given,

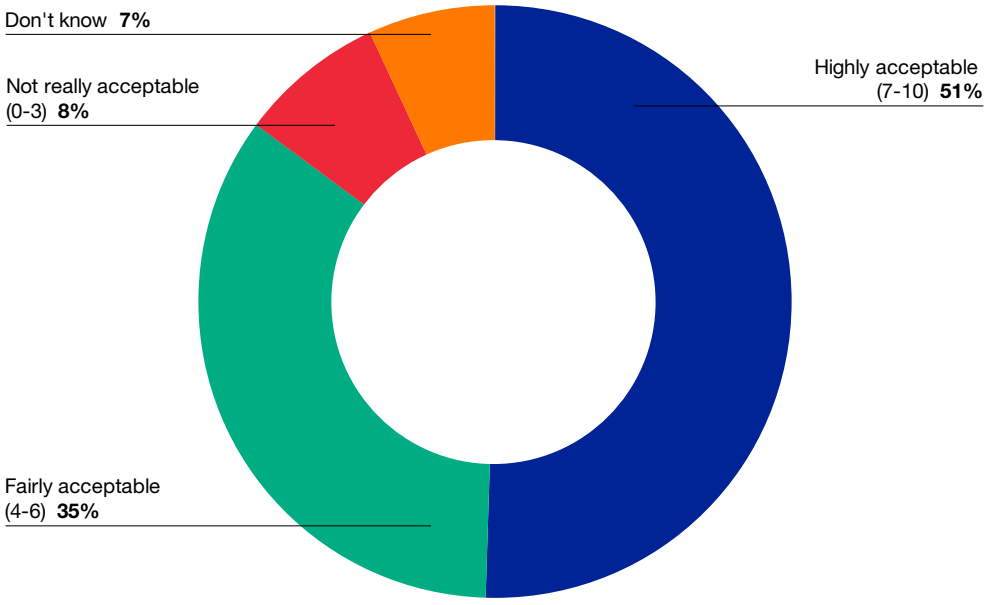
[95] Newgate Research, *Summary of Consultation on Five Year Plan*, 15 May 2014, pp20-23.

where 0 meant not at all acceptable and 10 meant extremely acceptable. Just 8% thought it was not really acceptable (rating 3 or less).

Three quarters (75%) of residential and small business participants also indicated that, in principle, they supported the approach of paying a slightly higher transmission cost now in order to potentially reduce longer term costs, while one quarter would prefer to pay the lowest transmission cost possible.

In the quantitative study, most of the 650 respondents thought TransGrid's proposal to keep spending an additional $3 million a year on planning was at least fairly acceptable. The question asked was:

> How acceptable to you is TransGrid's proposal to keep spending the additional $3 million per year within the next five years on planning, to enable better investment decisions on replacing old infrastructure and building new infrastructure?
>
> This is not an increase on current spending and equates to around 16 cents in the average household's quarterly bill – i.e. this is at the level customers are already paying for. Scale: 0 – not at all to 10 – totally acceptable.



Source: Newgate Research. Totals may not add due to rounding.

Demand Management Innovation

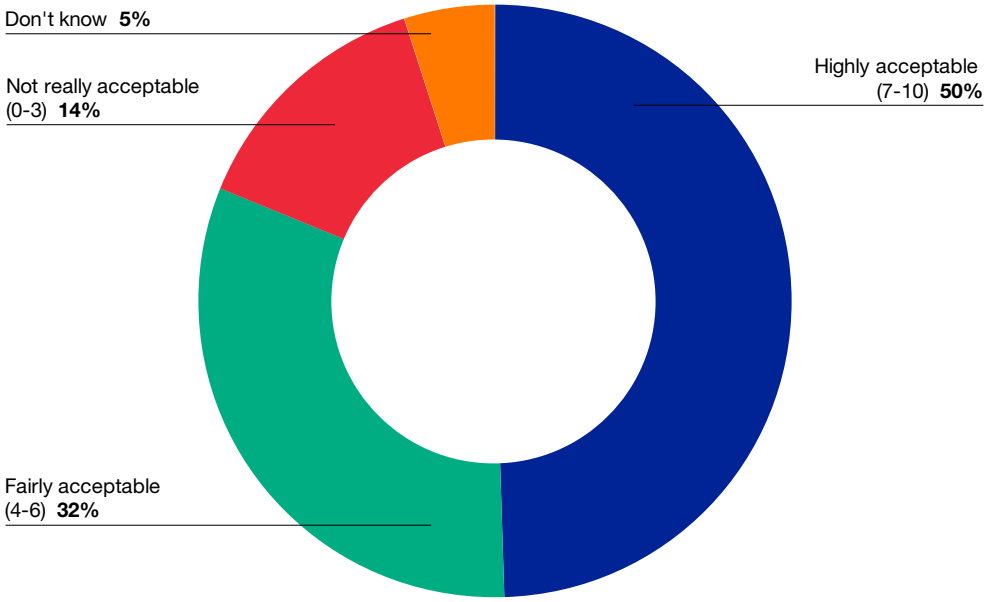
In the current regulatory control period, TransGrid secured a demand management innovation allowance to pursue innovative approaches to encourage, investigate, develop, implement and evaluate demand management opportunities.

During recent consultation, TransGrid put to consumers the concept of an increase in the demand management innovation allowance to more proactively pursue developments in this area. Large energy users were supportive of further research and development into demand management, subject to a value proposition.

This area was explored in some detail during the deliberative forums and responses were almost unanimously positive. Consumers were particularly interested in pilot storage projects, smart meters and energy efficient appliances, although the concept of asking businesses to use less energy at certain times was less well understood.

As the chart below shows, the majority of the 650 respondents to the quantitative survey also supported the increase. The question asked was:

> How acceptable to you is TransGrid's proposal to increase operating expenses by approximately $2 million each year to identify ways to reduce energy demand and, potentially, the amount that will need to be spent on replacing or building new infrastructure in future?
>
> This equates to a one-off increase of around 40 cents per year, or 10 cents per quarter for the average household bill. This is part of its operating expenditure proposal and is within the proposed $1.16 increase already discussed. Scale: 0 – not at all to 10 – totally acceptable.



Source: Newgate Research. Totals may not add due to rounding.

TransGrid's demand management innovation strategy is attached as Appendix R.

Consumer Engagement

Most consumer representatives felt it was important that TransGrid do a better job of communicating and engaging with the broader community, but were also cognisant that electricity transmission issues are not of interest to everyone and that funds should be used judiciously.

A few mentioned that TransGrid needs to improve the way it communicates with local communities on specific infrastructure projects in their area, particularly in terms of giving land owners more certainty when it is postponing or exiting a project.

In general, most participants were keen to see levels of electricity literacy increased with a focus on understanding the electricity supply chain, why costs are rising and what individual consumers can do to keep their costs down.

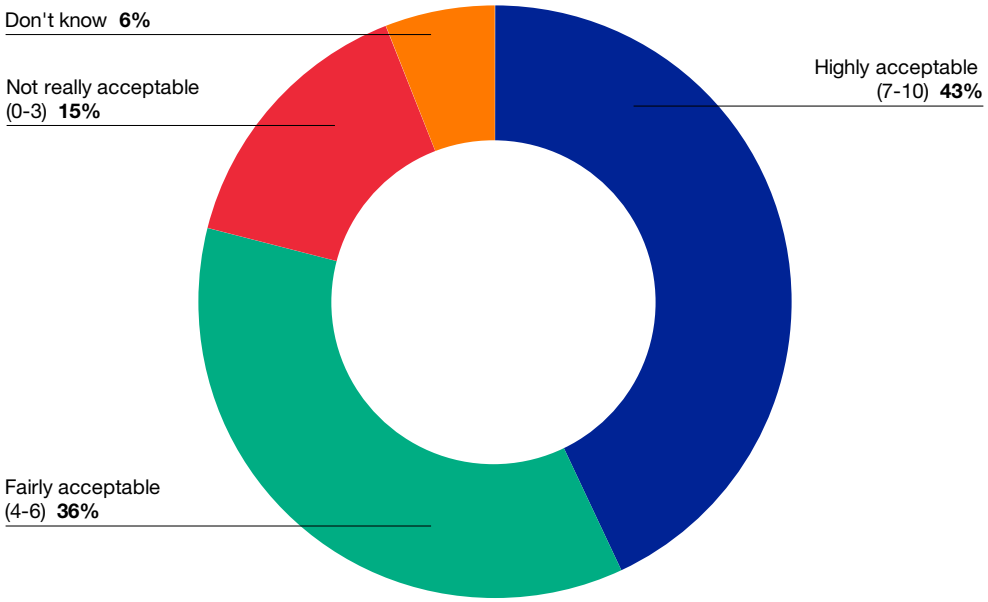
Some participants in all sessions suggested that TransGrid consider undertaking high-level education initiatives in conjunction with Networks NSW, as most people do not differentiate between transmission and distribution businesses, or even that it be conducted by a group representing the electricity sector as a whole.

Broadly, there was support for TransGrid to continue its more recent efforts to engage and consult.

In the forums, residential and small businesses consumer participants were asked about the acceptability of TransGrid spending $2 million each year on consumer communications and engagement activities and this received an average acceptability rating of 7.2 out of 10. Among dissenters, some said that while communications would certainly benefit consumers, they questioned the direct benefit to TransGrid.

The majority of the 650 respondents to the quantitative survey supported TransGrid's proposal to spend $2 million per year on consumer engagement activities. The question asked was:

> How acceptable to you is TransGrid's proposal to spend $2 million each year on consumer engagement and consultation activities?
>
> This equates to a one-off increase of around 40 cents per year or 10 cents per quarter for the average household. This is part of its Operating Expenditure proposal and is within the proposed $1.16 increase already discussed. Scale: 0 – not at all to 10 – totally acceptable.



Source: Newgate Research. Totals may not add due to rounding.

The results reflect that almost 80% of respondents considered the proposal acceptable, with 43% rating it highly acceptable, and an average acceptability rating of 6.0 out of 10 where 0 meant not at all acceptable and 10 meant very acceptable.

The main reasons given by those who gave a high acceptability rating were that it meant consumers' concerns would be taken into account, they generally liked the idea, it would provide consumers with more information, or that it would benefit everybody in the long run. Amongst those who gave a low acceptability rating, the main reasons given were that TransGrid should budget its money, it costs too much, it shouldn't be funded by consumers, and a general dissatisfaction that prices were still going up.

Conversely, some consumer representatives expressed that consumer consultation is worthwhile but results must be treated with caution. Participants questioned the information given to participants, the community's ability to grasp the complexity of the issues and the extent to which the results should be taken into account in decision making. Some large energy users felt that TransGrid should not play a role in educating consumers about energy efficiency, as this should be reserved for the retailer.

There was general agreement that consultation is important and that reporting must reflect the approach, information given, extent of comprehension and strength of sentiment.

TransGrid's stakeholder engagement plan is attached as Appendix S.

Acceptability of TransGrid's Forecast Operating Expenditure

At the deliberative forums, within the 20 minute presentation on expenditure it was explained that TransGrid's operating expenditure was expected to remain fairly stable, with some new expenses offsetting proposed savings. Throughout the forums there was discussion about the acceptability of proposed new expenses including increased spending on planning, demand management innovation, non-build options and communications and engagement.

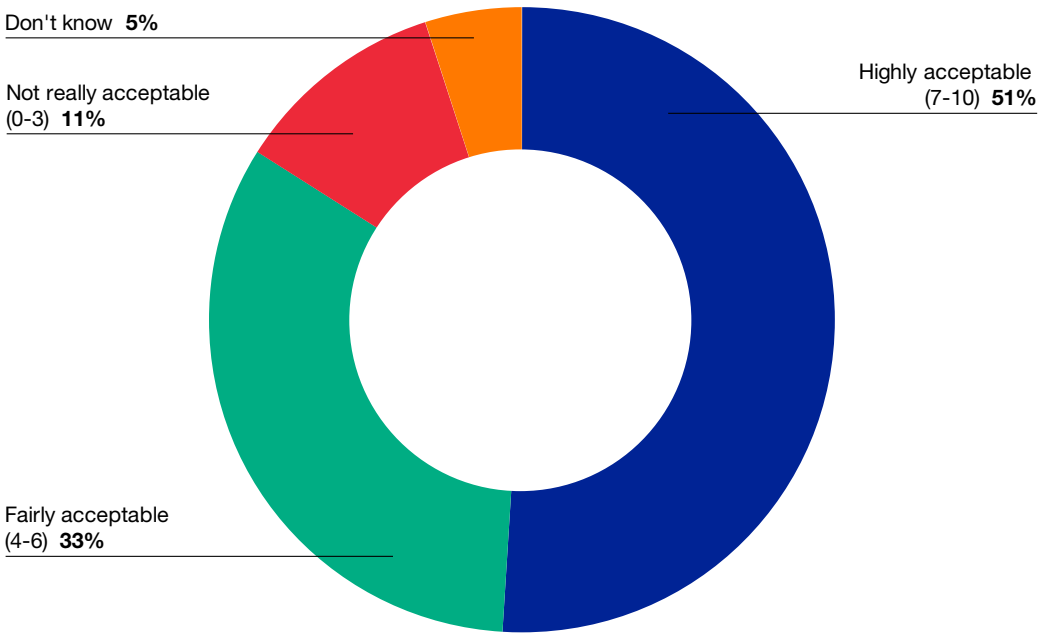
At the end of each forum, participants were asked to rate TransGrid's proposed plan for operating expenditure overall. Of the 59 participants, 68% rated its acceptability between six and 10 out of 10 (where 10 was extremely acceptable), with 46% giving it a score of between eight and 10.

The quantitative survey also sought participants' feedback on the acceptability of TransGrid's total forecast operating expenditure, which includes the three specific areas discussed above.

The question asked was:

> In principle, how acceptable to you is TransGrid's proposal to increase spending on operating expenditure roughly in line with inflation – i.e. by 16 cents per quarterly bill in the first year, rising to 79 cents per quarterly bill in the fifth year? Scale: 0 – not at all to 10 – totally acceptable.

The results reflect that the majority of the 650 respondents consider the forecast operating expenditure in this proposal acceptable, with 51% rating it highly acceptable.



Source: Newgate Research. Totals may not add due to rounding.

Consumers' responses are discussed further in the summary of consultation attached as Appendix F and qualitative research report attached as Appendix G.

6.8.4 Relative Prices of Operating and Capital Inputs and Substitution Possibilities Between Operating and Capital Expenditure

TransGrid considers the relative prices of operating and capital inputs and possibilities for substitution between operating and capital expenditure in the option identification and economic evaluation for each capital project.

When planning an investment, low cost operating and capital options to defer large capital expenditure are considered and implemented where feasible. These include load transfers, de-rating of equipment, network support, and the use of low cost equipment such as reactive plant.

TransGrid has completed the evaluation of options for all projects included in the expenditure forecasts, and has considered substitution possibilities between operating and capital expenditure as part of the option evaluation.

There are two projects in the expenditure forecasts for which the most efficient option has a substantial operating expenditure component.

To meet supply requirements to the Sydney CBD and inner metropolitan area, TransGrid is proposing the use of network support to defer new network investment as part of the Powering Sydney's Future project, described in Section 5.3.7. This is a lower cost option than a network investment alone.

Line 944 Wallerawang to Orange North was scheduled for replacement based on condition. However, the most recent demand forecast for the Central West allow for the line to be decommissioned and replaced by reactive plant to increase the capacity of other transmission lines to the area. This is a lower cost option than rebuilding the line. The decommissioning of the transmission line is operating expenditure and the installation of new reactive plant is capital expenditure.

Deferral of Capacitor Bank Replacement

An example of a need initially identified that was met by an operating option rather than capital option was the replacement of two capacitor banks at Narrabri substation. While the condition of the capacitor banks would require the banks to be replaced in the upcoming regulatory control period based on the failure rate of individual capacitor cans, planning studies showed that under current load forecasts, the capacitor banks could be de-rated and operated with a lower number of individual cans.

This has deferred the need for replacement beyond 2018/19, but will require ongoing operating expenditure to respond to continuing failures of individual capacitor cans until replacement. This is absorbed in the corrective maintenance forecast within the operating expenditure forecast.

6.8.5 Consistency with Incentive Schemes

The operating expenditure forecast in this proposal is consistent with the related incentive schemes, being the efficiency benefit sharing scheme and service target performance incentive scheme.

Consistent with the principles in the efficiency benefit sharing scheme (EBSS), TransGrid has proposed the application of the scheme as set out in the EBSS guideline to operating expenditure categories that are forecast based on revealed costs.

However, MOPS expenditure is forecast as a portfolio of projects and as such is not well suited to the same sharing mechanism. The EBSS guideline recognises that expenditure categories that are not forecast based on revealed costs should be excluded from that EBSS mechanism.[96] However, the exclusion of MOPS from the EBSS altogether would create an imbalance between the EBSS and CESS. As such, to maintain balance between incentives and ensure that the EBSS mechanism is suited to the forecasting method, TransGrid has proposed an alternative EBSS sharing mechanism for MOPS expenditure. This is detailed further in Chapter 14.

6.8.6 Related Parties

In 2012, TransGrid moved its insurance from the general insurance market to SICorp, the NSW Government self insurer. As SICorp is owned by the same shareholder as TransGrid, it is a related party.

TransGrid has sourced estimates of market insurance rates from Marsh, and has confirmed that the rates offered by SICorp are significantly lower than those in the general insurance market.

This is discussed further in Section 6.3.4.

6.8.7 Contingent Projects

The forecast operating expenditure in this proposal does not include expenditure relating to projects that are proposed as contingent projects.

6.8.8 Most Recent National Transmission Network Development Plan

The National Transmission Network Development Plan (NTNDP) is a plan published annually that considers the capability of the national transmission grid and developments of national transmission flow paths.[97] The most recent NTNDP at the time of lodgement of this proposal is the 2013 NTNDP.

The 2013 NTNDP lists committed main transmission projects, transmission limitations and potential economic dispatch limitations. This revenue proposal generally aligns with the NTNDP for those projects that are within its scope, with two exceptions:

- TransGrid proposes to defer the construction of a new supply to Beaconsfield West substation, Powering Sydney's Future, using network support (L-N1) and has proposed it as a contingent project; and
- TransGrid does not consider the reinforcement of capacity between Hunter Valley and Newcastle (L-N2) likely to be required during 2014/15 to 2018/19.

A full comparison of the expenditure forecasts in this proposal with the NTNDP is provided in Section 5.9.

[96] AER, *Efficiency Benefit Sharing Scheme for Electricity Network Service Providers*, November 2013, p7.
[97] *National Electricity Rules*, Clause 5.20.2.

6.8.9 Non-Network Alternatives

TransGrid considers non-network, or network support, alternatives for all network needs under its *Network Investment Process*. TransGrid notifies interested parties of proposed network investments in its Transmission Annual Planning Report each year, and seeks network support as part of the regulatory consultation process and through requests for proposals.

TransGrid has two forecast projects for which it has identified potential network support solutions: Powering Sydney's Future and the Reinforcement of Supply to Gunnedah, Narrabri and Moree.

TransGrid's approach to network support solutions in this proposal is described in Section 5.4.

6.8.10 Regulatory Investment Test for Transmission

At the time of submission of this proposal TransGrid has not completed a Project Assessment Conclusions Report relating to forecast expenditure in the proposal. With the significant reduction in augmentation expenditure compared to that in previous regulatory control periods, few projects in the 2014/15 to 2018/19 period will require the Regulatory Investment Test for Transmission (RIT-T).

6.8.11 Other Factors

At the time of submission of this proposal, the AER has not advised TransGrid of additional operating expenditure factors.

The National Electricity Rules allow the AER to advise of additional operating expenditure factors up to the submission of the revised revenue proposal. TransGrid will address additional factors if and when the AER advises of them.

6.9 Summary of Inputs and Assumptions

A summary of the inputs and assumptions TransGrid has used to forecast operating expenditure is shown in Table 6.17.

Table 6.17
Summary of Operating Expenditure Inputs and Assumptions

Category	Assumption
Standards	Asset management, maintenance and operations performed as set out in TransGrid's Network Management Plan and related asset management procedures
	Compliance with legislative obligations
	Compliance with Australian standards
	Application of good electricity industry practice
Forecasts	Inflation based on geometric average of Reserve Bank of Australia *Statement on Monetary Policy* for two years and the midpoint of its target range for eight years
	Internal labour cost escalation based on TransGrid's employee agreement for the duration of the agreement and Wage Price Index (WPI) forecasts for the NSW Electricity, Gas, Water and Waste Services (EGWWS) sector from BIS Shrapnel thereafter
	External labour cost escalation based on WPI forecasts for the NSW EGWWS sector from BIS Shrapnel
	Materials cost escalation of CPI
	Network growth estimated based on forecast capital expenditure resulting in a change to network size as a proportion of replacement value of the network
Models	TransGrid's operating expenditure model
Key Inputs	2012/13 expenditure with adjustment for abnormal costs is an efficient base year from which to project costs for future years
	Preventative maintenance based on forecast effort from TransGrid's enterprise resource planning system and rates from the base year
	Condition-based maintenance and corrective maintenance forecast as a ratio to preventative maintenance for each asset class
	Major operating projects (MOPS) estimated using a zero-based portfolio approach
	Labour and non-labour split for external costs estimated based on analysis of representative major contracts
	Insurance based on forecasts from TransGrid's insurance provider, SICorp
	Self insurance forecasts based on actuarial assessment, aligned with current insurance coverage from SICorp
	Debt raising costs based on the costs facing a benchmark efficient firm, consistent with the approach to determining the allowed rate of return

7 Regulatory Asset Base

The regulatory asset base is the value, as calculated in the AER's roll forward model, of the assets used by TransGrid to provide regulated network services.

This chapter calculates the opening regulatory asset base as at 1 July 2014 and the forecast annual regulatory asset base for the upcoming regulatory control period. TransGrid has calculated its opening regulatory asset base (RAB) in accordance with Clause 6A.6.1, Schedule 6A.2 and Schedule 6A.1.3(5) of the National Electricity Rules.

7.1 Roll Forward Methodology

The AER's roll forward model has been used to establish the opening RAB as at 1 July 2014. The opening RAB has been calculated based on actual depreciation, in line with the *Economic Regulation of Network Service Providers* rule change.

Based on the 2009/10 to 2013/14 revenue determination, the opening RAB as at 1 July 2009 has been adjusted by:

- adding the actual capital expenditure incurred during 2009/10 to 2012/13;
- adding the forecast capital expenditure for 2013/14;
- removing actual asset disposals during 2009/10 to 2012/13;
- removing forecast asset disposals in 2013/14;
- removing the depreciation expense based on the rates and methodologies determined by the AER;
- adjusting for the difference between the estimated and actual capital expenditure during 2008/09, that is, the last year of the previous regulatory control period, and the return on the difference for that year;
- reversing capitalised movements in provisions; and
- adjusting for the difference between estimated and actual inflation using CPI.

In the *Economic Regulation of Network Service Providers* rule change, the AEMC stated that in relation to depreciation, for consistency the use of actual or forecast depreciation to calculate the opening value of the RAB for both the transitional and subsequent regulatory control periods will be as set out in the last regulatory determination. On this basis, the opening RAB has been calculated based on actual depreciation. The AER will determine the method to be used to establish the opening RAB for the regulatory control period after the subsequent regulatory control period when it makes the full regulatory determination.

The details of all amounts, values and other inputs used for the proposal are included in the roll forward model submitted together with this proposal.

7.2 Roll Forward Value of the Regulatory Asset Base

Applying the roll forward methodology within the AER's roll forward model (RFM), TransGrid's opening RAB at 1 July 2014 is calculated as $6,146.7 million. This is shown in Table 7.1.

Table 7.1
Roll Forward Regulatory Asset Base ($m nominal)

RAB	2009/10 Actual	2010/11 Actual	2011/12 Actual	2012/13 Actual	2013/14 Expected
Opening RAB	4,217.5	4,578.8	4,926.0	5,174.6	5,607.2
Net Capital Expenditure as Incurred	418.5	376.2	354.8	502.2	556.5
Straight line Depreciation	-179.0	-181.7	-184.2	-199.1	-222.3
Inflation Adjustment	121.8	152.6	78.1	129.5	164.3
Closing RAB	4,578.8	4,926.0	5,174.6	5,607.2	6,105.7
Adjustment for Actual Capital Expenditure in 2008/09 Plus Return					41.0
Opening RAB 1 July 2014					6,146.7

Source: TransGrid. Totals may not add due to rounding.

7.3 Asset Disposals

To establish the opening RAB for a regulatory control period, Schedule 6A.2.1(f)(6) of the National Electricity Rules requires that the previous value of the RAB be reduced by the disposal value of any asset that has been disposed of during the previous regulatory control period.

TransGrid has used the accounting book value for disposals within the roll forward model for the current regulatory control period, consistent with the 2009/10 to 2013/14 revenue determination.

TransGrid uses the income approach to determine the value of its network assets for financial accounting assets revaluation. This involves discounting the cash flows to determine the asset values, and is different from the way the RAB is revalued in the post-tax revenue model under the regulatory regime. The RAB is revalued by actual inflation only in the post-tax revenue model, which means that the value of RAB will not match the accounting book value. To overcome this, and given that regulatory models are predicated on cash flows, TransGrid has adopted the approach of net proceeds from the sale of regulatory assets within the post-tax revenue model to forecast asset disposals in the upcoming regulatory control period.

7.4 Regulatory Asset Base Forecast Methodology

TransGrid has used the AER's post-tax revenue model (PTRM) to calculate the annual RAB for the upcoming regulatory control period. Commencing from the opening RAB as at 1 July 2014 discussed in Section 7.2, TransGrid calculates the annual RAB by:

- adding the forecast capital expenditure during 2014/15 to 2018/19, set out in Chapter 5;
- removing forecast asset disposals during 2014/15 to 2018/19;
- removing the depreciation expense based on the rates and methodologies discussed in Chapter 10; and
- adding forecast inflation.

7.5 Transfer of Assets out of Regulatory Asset Base

Connection Assets to Eraring Power Station

During the current regulatory control period, Eraring Energy requested to increase the service capability that TransGrid provides to Eraring Power Station. According to Clause 11.6.11 of the Rules, the connection services being provided in relation to the affected connection points for Eraring Power Station will lose their classification as prescribed connection services at the start of TransGrid's upcoming regulatory control period, that is, 1 July 2014.

As a result, TransGrid has made adjustments to transfer the relevant connection assets out of the RAB. The negative RAB adjustments were made in the roll forward model as asset disposals in 2013/14.

Visy Pulp and Paper Mill

During the current regulatory control period, TransGrid has been unable to provide the Visy Pulp and Paper Mill with the default prescribed level of service in Schedule 5.1 of the Rules and the *Transmission Network Design and Reliability Standard for NSW*. TransGrid has reached agreement with Visy for a negotiated service level, as contemplated in Clause 6A.9.1(4) and negotiated under Clause 5.4A of the Rules. Consequently, the relevant prescribed connection assets have been removed from the RAB. The negative RAB adjustments were made in the roll forward model as asset disposals in 2013/14.

7.6 Forecast Regulatory Asset Base

TransGrid has applied the methodology used in the post-tax revenue model to calculate the RAB for 2014/15 to 2018/19.The forecast RAB is shown in Table 7.2.

Table 7.2
Forecast Regulatory Asset Base ($m nominal)

RAB	2014/15	2015/16	2016/17	2017/18	2018/19
Opening RAB	6,146.7	6,425.3	6,749.8	6,970.6	7,226.6
Net Capital Expenditure	370.3	431.2	342.4	363.6	254.8
Straight Line Depreciation	-246.9	-268.9	-292.0	-283.6	-303.3
Inflation Adjustment	155.2	162.2	170.4	176.0	182.5
Closing RAB	**6,425.3**	**6,749.8**	**6,970.6**	**7,226.6**	**7,360.6**

Source: TransGrid. Totals may not add due to rounding.

8 Rate of Return

The rate of return is the return the business earns on its investments to fund both the cost of debt and the cost of equity it has incurred in making these investments.

The rate of return represents the weighted average cost of capital (WACC), measured as an estimated cost of debt and cost of equity of a benchmark efficient entity. The rate of return objective, as set out in the Rules, is to ensure that the rate of return is commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid.

Electricity transmission businesses are large, asset-intense businesses with substantial investment requirements from both debt and equity investors. The rate of return estimates the efficient costs of these sources of finance to ensure an efficient level of investment in infrastructure is sustained.

Network assets are long-lived assets and both the debt and equity components of their funding must be secured over the life of the asset. Where the rate of return is below investors' risk adjusted required return, and so is below other risk adjusted opportunities in the market, a benchmark efficient entity will no longer be able to attract sufficient capital to provide electricity transmission services.

With a regulated asset base of approximately $6.5 billion, TransGrid has a benchmark debt requirement of $3.9 billion and equity investment of $2.6 billion when applying the AER's preferred benchmark gearing ratio of 60%. Debt is raised incrementally over time as new investments are made and existing debt arrangements expire, and is funded at commercial market rates. Equity investment is made as required to maintain an acceptable level of gearing and credit rating.

For TransGrid to be able to pay the financing costs associated with the capital portfolio that has been invested in over the past 50 years, it is essential that the AER's allowed rate of return provides at least the efficient financing costs of a benchmark efficient entity. Revenue allowances based on arbitrary on-the-day rates that do not reflect the long term costs of investment are incompatible with long-lived assets and longer dated debt. Nor are they compatible with the investment expectations of a typical major infrastructure investor, which is seeking steady returns on its investments with a lower risk profile.

To ensure TransGrid has prepared a Rule compliant and accurate rate of return proposal, independent input has been sought from expert economic advisors NERA and Incenta Economic Consulting, corporate finance and valuation experts SFG Consulting, independent corporate advisory group Grant Samuel & Associates Pty Ltd (Grant Samuel), and banking corporation Westpac. TransGrid's proposal has included the expert advice obtained from

each of these firms in Appendices V to AA and utilises this advice in deriving the proposed rate of return. Further detail on all of the elements of this chapter are set out in these appendices.

8.1 National Electricity Law and Rules Requirements

Section 7 of the National Electricity Law (NEL) sets out the national electricity objective, which is the overarching objective of the NEL. The national electricity objective states that:

> The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to—
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system.[98]

Consistent with this, the Rules state that the allowed rate of return must be determined such that it contributes to the allowed rate of return objective.

> The allowed rate of return objective is that the rate of return for a Transmission Network Service Provider is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the Transmission Network Service Provider in respect of the provision of prescribed transmission services.[99]

TransGrid considers that its approach to estimating the WACC is consistent with the Rules and best achieves the national electricity objective and the rate of return objective.

In this chapter, TransGrid explains why its approach is consistent with both the Rules and the rate of return objective.

8.2 The AER's Rate of Return Guideline

While TransGrid acknowledges that the AER undertook public consultation in the development of the *Rate of Return Guideline* (Guideline), TransGrid considers there are observed shortcomings in the approach that the AER has determined to setting both the cost of debt and the cost of equity for a benchmark efficient business. TransGrid considers that this revenue proposal is compliant with the Rules, but is not in all aspects consistent with the Guideline. Where TransGrid has diverged from the Guideline, the reasons for this are set out.

8.3 TransGrid's Rate of Return

TransGrid proposes a rate of return calculated by use of a WACC of 8.83%.

This rate of return is derived from a 10 year historic cost of debt for a benchmark efficient business of 7.72%. This rate should be updated annually to maintain the trailing average approach. No transition to the historic trailing average is required or proposed.

The cost of equity is estimated at 10.5% based on all the relevant information from noted and respected financial theory models, an independent capital market expert's recent valuation of a business comparable to a benchmark efficient entity and a comparison of the estimated return on equity to observed debt yields as a means of a reasonableness check.

[98] *National Electricity Law*, Section 7.
[99] *National Electricity Rules*, Clause 6A.6.2(c).

8.3.1 Rate of Return Calculations

The Rules require the use of a nominal vanilla WACC to estimate the rate of return. This formulation of the WACC applies a nominal post-tax return on equity and a nominal pre-tax return on debt, resulting in the nominal vanilla WACC.

In contrast, many unregulated businesses typically use a classical post-tax WACC. This results in the same effective WACC, but the post-tax WACC presentation will appear lower than a vanilla WACC due to the tax treatment of debt. For instance, TransGrid's proposed nominal vanilla WACC of 8.83% converts to 7.09% post-tax.

Grant Samuel, independent corporate advisor, uses a classical post-tax WACC which simplifies the calculation of tax costs alongside a zero value of imputation credits. TransGrid has included a report from Grant Samuel on the approach an independent expert valuer takes to setting WACC. Consistent with its approach, Grant Samuel has used a post-tax WACC for their valuations, so the resulting WACC estimates appear lower than would be the case if the vanilla WACC were to have been applied.

8.4 Gearing

Gearing is a representation of the extent to which a business is financed by debt and equity. Represented as a percentage, the gearing ratio is calculated by dividing the amount of debt by the sum of debt and equity. By way of an example, a gearing ratio of 60% indicates that 60% of a company's funding is financed by debt, with the remainder funded by equity from shareholders.

TransGrid used the gearing ratio to determine the weights applied to the return on debt and the return on equity when calculating the total return on capital. In addition, the gearing ratio is also used to:

- determine the systematic risk of equity of the benchmark efficient entity; and
- determine the credit rating of a benchmark efficient entity.

The AER analysed the gearing ratio of businesses in Australia whose operations primarily involved the provision of energy networks from 2002 to 2012. The AER concluded that a gearing ratio of 60% should be used to calculate TransGrid's rate of return.

TransGrid agrees with the AER's analysis and notes that a gearing ratio of 60% is consistent with the gearing ratio assumed in the last three regulatory determinations for TransGrid.[100] Therefore, TransGrid has applied a gearing ratio of 60% to estimate the return on capital.

[100] ACCC, *NSW and ACT Transmission Network Revenue Caps 1999/00-2003/04: Final Decision*, 25 January 2000, p23; ACCC, *NSW and ACT Transmission Network Revenue Cap TransGrid 2004–05 to 2008–09: Final Decision*, 25 April 2005, p161 and AER, *Orders Varying TransGrid Transmission Determination 2009–10 to 2013–14*, March 2010, p1.

8.5 Return on Debt

8.5.1 TransGrid's Approach

The first step in calculating the return on debt is to determine the characteristics of the benchmark efficient entity and the debt that it would issue to fund its operations.

TransGrid agrees with the AER that the benchmark efficient entity should be a "pure play, regulated energy network business operating in Australia" and that such an entity would issue Australian corporate debt with:

- a benchmark credit rating of BBB+; and
- a term to maturity of 10 years.[101]

Further, TransGrid agrees with the AER that the return on debt should be estimated using data published by an independent third party data service provider.[102] However, the Guideline does not identify the third party data provider that is to be used. TransGrid considers that the most appropriate data series to use is that published by the Reserve Bank of Australia (RBA),[103] because the RBA:

- is a reputable and unbiased institution capable of providing high quality econometric data;
- is the only third party data supplier that provides an estimate of the 10 year BBB corporate bond yield;[104]
- is the only data service provider that discloses the methodology used to estimate the corporate bond yield;
- produced a data series that performed better than Bloomberg's Australian dollar fair value curves during the global financial crisis period (GFC);
- uses a richer sample set in comparison to Bloomberg, which samples only Australian denominated debt; and
- publishes monthly estimates of non-financial corporate bond yields for 10 year BBB-rated securities.

A more detailed discussion of why TransGrid proposes to use the RBA's data series can be found in the NERA report attached as Appendix V.[105]

The Rules allow the return on debt to be estimated with reference to a benchmark efficient entity that either:

- raises all of its debt at the same time as the AER's determination;
- raises all of its debt over an historical period prior to the AER's determination; or
- uses a combination of the first two options.[106]

TransGrid supports the AER's conclusion that the benchmark efficient entity would stagger the maturity dates of its debt to minimise refinancing risk. Refinancing risk is the risk of abnormally high debt costs or illiquid debt markets at the time that debt is raised. Therefore,

[101] AER, *Better Regulation – Explanatory Statement Rate of Return Guideline*, December 2013, p126.
[102] AER, *Better Regulation – Explanatory Statement Rate of Return Guideline*, December 2013, p126.
[103] RBA, *Statistical Table F3 - Non-financial Corporate Bond Yields*.
[104] TransGrid notes that Bloomberg publishes only a seven year BBB corporate bond yield.
[105] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p13.
[106] *National Electricity Rules*, Clause 6A.6.2(j).

TransGrid supports the AER's conclusion that the return on debt is calculated using a simple average of annual estimates of the return on debt over the last 10 years. This method is known as the trailing average approach.

Further, TransGrid agrees with the AER that the estimate of the return on debt should be updated annually. That is, the trailing average should be updated annually to:

- include updated annual observations of the yield on non-financial Australian corporate bonds of a term of 10 years and a credit rating of BBB as reported by the RBA; and
- remove the oldest annual observation.

Until this point, TransGrid's approach to calculating the return on debt has been consistent with the approach proposed by the AER in the Guideline. However, TransGrid strongly disagrees with the AER's proposal to impose a transition from the previous on-the-day approach[107] to the trailing average approach. The misconceptions and errors that led the AER to conclude that a transition is needed and the effects of imposing a transition on a benchmark efficient entity are discussed in Section 8.5.2 and the NERA report attached as Appendix V.[108]

In accordance with the approach described in this section, and in greater detail in NERA's report,[109] TransGrid used the data published by the RBA to calculate the trailing average of estimates of the yield on non-financial corporate bonds with a 10 year term and a BBB credit rating. The return on debt using this approach should be 7.72%[110] for the 2014/15 year.

In conclusion, TransGrid proposes that no transition be imposed and the cost of debt be set on the basis of a historical 10 year trailing average using the independently published RBA data set.

8.5.2 Problems with the AER's Proposed Transition Mechanism

The transition proposed by the AER would set the rate of return for all TNSPs using an on-the-day approach, regardless of their current debt management practices, and then transition them to a trailing average approach over 10 years.

TransGrid considers that a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid would periodically issue fixed rate corporate debt regardless of whether it was:

- formulated to mimic the outcomes of a competitive market; or
- formulated to mimic the efficient financing practices of an entity subject to the previous regulatory regime.

In both of these circumstances, a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid would not require a transition as its debt financing practices would already be consistent with the trailing average approach.

[107] The on-the-day approach previously applied by the AER involved calculating the allowance for the return on debt by assuming that a benchmark efficient entity raises all its debt at the time of the regulatory decision, ie, at the start of the regulatory period.
[108] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, pp19-34.
[109] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p13.
[110] Note this number will be updated in the revised proposal due to be submitted to the AER in early 2015 to reflect the full averaging period.

Under the first approach, where a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid was formulated to mimic the outcomes of a competitive market, NERA notes that:

> …in the absence of any regulatory distortions a benchmark efficient entity would finance its long lived assets with a portfolio of long term debt with staggered maturity dates, thereby optimising the trade-off between refinancing risk and the overall cost of debt.[111]

In the alternative, where a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid was formulated to mimic the efficient financing practices of an entity subject to the previous regulatory regime, TransGrid considers that there is a range of efficient debt management practices available to that entity. The choice of which practice to use will depend on a business' particular circumstances. The specific regulatory framework that the business is subject to will not necessarily influence the choice of debt management practice, as there are likely to be more significant factors that determine the most efficient approach. TransGrid is not alone in this view, as it was recognised by both the AEMC when drafting the new Rules in 2012 and by SFG when advising the AEMC on the development of the new Rules.[112]

In the remainder of this section, TransGrid explains that a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid would periodically issue debt in order to manage its refinancing risk, irrespective of the methodology the AER used to calculate the regulatory allowance. Therefore, it is inappropriate to impose a transition on a benchmark efficient entity when moving the regulatory framework from an on-the-day approach to a trailing average approach because its debt management practices would not vary as a result of the change.

Imposing a transition would:

- move a benchmark efficient entity away from the trailing average approach and to an on-the-day approach; and
- then transition it back to the trailing average approach over 10 years.

TransGrid considers that imposing a transition is counterintuitive and that no transition is needed for a TNSP such as TransGrid that already adopts the debt management practice of a benchmark efficient entity.

Further, NERA estimates that imposing a transition would impose a $141 million windfall loss on TransGrid, whereas the AEMC stated that the very purpose of the transitional rules is to avoid imposing costs on a TNSP. The AEMC stated that:

> Its purpose is to allow consideration of transitional strategies so that any significant costs and practical difficulties in moving from one approach to another is taken into account.[113]

Imposing a transition will:

- result in a substantial cost, or windfall loss, that could otherwise be avoided;
- be contrary to the intention of the Rules;
- be inconsistent with the revenue and pricing principles;

[111] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p22.
[112] AEMC, *Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services, Final Position Paper*, 15 November 2012, p56.
[113] AEMC, *Final Rule Determination: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, 29 November 2012, p85.

- result in an allowed rate of return that does not achieve the allowed rate of return objective; and
- not contribute to the achievement of the national electricity objective.

A number of smaller sized regulated businesses submitted to the AER that, under the previous on-the-day approach,[114] they managed their debt portfolios through staggered floating rate debt issuances and then hedged their interest exposure[115] by entering swap agreements to fix the risk free rate at the time of the regulatory period.[116] This led the AER to conclude that, under the current on-the-day approach, the benchmark efficient entity would:

- issue floating rate corporate debt at staggered intervals prior to the regulatory period;
- enter swap agreements to fix the risk free rate at the time that the risk free rate was set for the next regulatory period; and
- require a transition mechanism when the regulatory framework shifted to a trailing average approach to avoid any windfall losses or gains.

As noted above, TransGrid believes that there is more than one efficient debt management practice available to a benchmark efficient entity. TransGrid considers that under the on-the-day regulatory approach, a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid would manage its debt portfolio through the periodic issuance of fixed rate corporate debt and, therefore, requires no transition in the next regulatory control period.

TransGrid notes that the AER's conclusion is inconsistent with:

- the AER's past regulatory decisions;
- the efficient debt management practices of a benchmark efficient business;
- the revenue and pricing principles in the NEL;
- the allowed rate of return objective; and
- the national electricity objective.

Inconsistency with Past AER Decisions

The AER's conclusion that a transition must be imposed assumes that a benchmark efficient entity would hold term floating rate debt with staggered maturity dates and then use swap agreements to hedge interest exposure under the on-the-day approach.

However, in regulatory decisions dating back to 2004, the AER has itself stated that a benchmark efficient entity would issue fixed rate debt under the on-the-day regulatory approach.

[114] The on-the-day approach involves setting the return on debt allowance with reference to a benchmark efficient entity that raises all its debt at the start of the regulatory period.
[115] Swap agreements can be used as a proxy to swap the risk free rate component of floating rate debt to fixed rate debt. Therefore, swapping floating rate debt to fixed rate debt at the time of the regulatory decision allows regulated businesses to mitigate the risk that the regulatory allowance for debt costs, which is based on interest rates around the time of the regulatory decision, differs from the risk free rate component of their actual debt costs throughout the regulatory control period. Note that the risk free rate currently accounts for approximately 60% (RBA, March 2014) of the cost of debt for a BBB+ business using the on the day approach.
[116] CitiPower, Powercor Australia and SA Power Networks, *Response to the AER's Draft Rate of Return Guideline*, 11 October 2013, p7.

As NERA notes, the AER's conclusion in the Guideline as to the debt management practices of a benchmark efficient entity under the on-the-day approach is:

> …inconsistent with the AER's own decisions in the period from 2004 to 2014, during which it set return on debt allowances using an on-the-day approach.[117]

Further, during the period 2004 to present the AER has not allowed the cost of entering swap agreements to be recovered. TransGrid notes that the AER's conclusion in the Guideline implies that it would previously have been efficient to enter swap agreements under the previous on-the-day approach and, therefore, these costs should have been efficiently incurred and recoverable.[118] TransGrid considers that this must be reflected when determining any impact from the change in the methodology used to estimate the return on debt. That is, the benchmark efficient entity used to determine any impact must be the benchmark efficient entity that applied in the AER's 28 April 2009 determination for TransGrid.

TransGrid is Too Large to Hedge its Debt Portfolio

CitiPower, Powercor, SA Power Networks, SP AusNet and Jemena (the smaller regulated businesses) submitted to the AER that they periodically issue term floating rate debt and enter swap agreements.[119] However, TransGrid's benchmark debt requirement is significantly larger than that of these smaller regulated businesses.

An analysis undertaken by NERA indicated that TransGrid's debt portfolio is two to five times greater than the debt portfolio of these smaller regulated businesses. Further, NERA calculated that, at the time that TransGrid would need to enter swap agreements, there will be demand for approximately $22 billion in swaps from regulated electricity businesses alone.[120] In contrast, at the time that the smaller Victorian and South Australian regulated businesses enter the swap market, there will be demand for only $4.7 billion and $1.7 billion of swaps respectively from regulated electricity businesses.

Westpac has been consulted on the capacity of the swap market to absorb the volume of swap transactions required to allow all of the NSW network businesses, ActewAGL and Transend to enter into swaps around the same time. Westpac's advice is that the market is insufficiently liquid to support this volume of swaps without material price impacts.[121]

For the above reasons, TransGrid considers that the Australian debt market is unlikely to be able to hedge the amount of debt necessary for a benchmark efficient entity to enter swap agreements without a material price impact.

TransGrid notes that if avoiding the holiday period from 21 December 2013 to 27 January 2014 when markets tend to trade with lower volumes, it would take from 25 November 2013 to 11 April 2014 placing $300 million[122] of swaps every business day for all the businesses that have regulatory decisions at the same time as TransGrid to place their swaps. It is unlikely that this activity would pass without notice in the banking sector with a flow on cost for the businesses. Nor does it seem likely that a 20 day averaging period

[117] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p24.
[118] This is discussed in more detail in NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p21.
[119] CitiPower, Powercor Australia and SA Power Networks, *Response to the AER's Draft Rate of Return Guideline*, 11 October 2013, p7.
[120] The Networks NSW businesses, that is Ausgrid, Essential Energy and Endeavour along with the ACT distribution business ActewAGL and the Tasmanian transmission business, Transend, all have their regulatory decisions made at the same time. This would result in the total combined debt portfolio of these businesses, amounting to around $22 billion, being placed in the swap market at essentially the same time.
[121] See Appendix AA for further detail.
[122] Westpac has advised that the swap market could only accommodate around $300 million of swaps per day without material price impacts.

commencing in November the year prior to a regulatory decision meets the AER's preference for averaging periods as close as practically possible to the commencement of the regulatory control period.

TransGrid notes that this conclusion is consistent with that of SFG, which the AEMC reiterated in its final position paper:

> … larger state-owned service providers such as those in NSW and Queensland appear unable to enter into these hedges because the relevant financial markets are not sufficiently deep to meet their requirements.[123]

It seems clear that for a benchmark efficient business, the AER is incorrect to assume the only efficient debt management practice is to use swap agreements to hedge the risk free rate. For this reason, imposing a transition is inappropriate because a benchmark efficient entity's debt management practices could already be consistent with the trailing average approach, as is the case for TransGrid.

Inconsistency with the Revenue and Pricing Principles in the NEL

An analysis undertaken by NERA calculated that a benchmark efficient entity that used a trailing average approach would have a return on debt of 7.72% in 2014/15.[124] However, the transition proposed by the AER in the Guideline would result in a return on debt of 6.86% in 2014/15. Then, for the next 10 years, the transition proposed by the AER in the Guideline would put progressively less weight on the prevailing return on debt and progressively more weight on historical observations of the return on debt.

NERA calculates that if this shortfall in the cost of debt were to be applied to TransGrid it would impose a windfall loss of approximately $141 million.[125] However, the revenue and pricing principles in the NEL require that:

> A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in-
>
> (a) providing direct control network services; and
>
> (b) complying with a regulatory obligation or requirement or making a regulatory payment.[126]

Therefore, TransGrid considers that imposing a transition on a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid would be inconsistent with the revenue and pricing principles in the NEL because it would impose a substantial $141 million windfall loss.

It would appear to be regulatory error when a windfall loss is caused by the application of an unnecessary transition mechanism that does not reflect:

- the debt financing practices of a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid; or
- the debt financing practices assumed to be undertaken by a benchmark efficient entity with a similar degree of risk as that which applied to TransGrid at TransGrid's last transmission determination.

[123] AEMC, *Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services: Final Position Paper*, 15 November 2012, p56.
[124] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p72.
[125] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p32.
[126] *National Electricity Law*, Section 7A(2).

Does Not Contribute to the Achievement of the Allowed Rate of Return Objective

The Rules require that the return on debt should contribute to the achievement of the allowed rate of return objective. As such, it must achieve a rate of return commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid.

However, the AER has effectively added an additional criterion, being that the benchmark efficient business is regulated in a particular manner. The implication of imposing this additional criterion is that the AER concludes that an entity operating under an on-the-day approach to setting the return on debt would adopt the small to medium sized NSPs' approach to raising debt.[127] As a consequence, the AER's proposed approach requires all entities to "transition" to the efficient financing costs of a benchmark efficient entity over a 10 year period, regardless of whether they already raise debt in a manner that is consistent with that hypothesised benchmark efficient entity.

TransGrid considers that the allowed rate of return objective will not be achieved by imposing a transition mechanism on a benchmark efficient business.

To the extent that imposing the proposed transition mechanism unnecessarily delays the alignment of the efficient debt raising practices with the return on debt allowance, it cannot be said to contribute to the achievement of the allowed rate of return objective. The one reason for delaying this alignment is to allow entities to unwind their current financial arrangements without undue penalty or reward and TransGrid does not have any financial arrangements that require being unwound.

Does Not Contribute to the Achievement of the National Electricity Objective

The NEL requires TransGrid's transmission determination to contribute to the achievement of the national electricity objective. Applying the transition mechanism set out in the Guideline would not contribute to the achievement of the national electricity objective. The transition mechanism unnecessarily delays the estimation of the return on debt consistent with a benchmark efficient entity with a similar degree of risk as TransGrid and prevents TransGrid from earning a return on debt that reflects the efficient financing costs of that entity.

A return on debt that is estimated without applying the transition mechanism, as proposed by TransGrid, will result in a return on debt that contributes to the achievement of the national electricity objective to a greater degree than one which has been estimated with the transition mechanism. By reflecting the return on debt required by a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid, the estimate of the return on debt promotes the efficient investment in (and efficient operation and use of) electricity services.

Summary of Problems with AER's Proposed Transition

To summarise, TransGrid considers that in developing its *Rate of Return Guideline* the AER has incorrectly characterised the debt raising practices of a benchmark efficient entity under the on-the-day approach and this is inconsistent with AER decisions for the last 10 years. TransGrid believes there is a range of efficient debt management practices available to an efficient benchmark business.

[127] In the NERA report, section 4.4, there is a discussion on efficient debt management practices. NERA do not agree with the AER's conclusion that all regulated energy networks would adopt the debt management practices of the small to medium sized regulated energy networks.

This error led the AER to conclude that the benchmark efficient entity requires a transition to a debt raising practice that, in fact, it would already adopt. The practical result of such an imposed transition is that the benchmark efficient entity would be moved away from an already efficient debt raising practice so that it can be transitioned back to that same debt raising practice over the next 10 years.

The resulting inefficiency does not contribute to either the allowed rate of return objective or the national electricity objective. Further, the transition would be inconsistent with the Rules, and with the revenue and pricing principles in the NEL because it would impose a windfall loss of approximately $141 million.

For these reasons, TransGrid believes the AER is wrong to conclude that it is necessary to impose a transition.

8.6 Return on Equity

Estimating the return on equity is more complicated than the other components of the return on capital calculation as it is not observable on either an ex-post or ex-ante basis. The approach also requires a degree of judgement because the Rules require that:

> In determining the allowed rate of return, regard must be had to… relevant estimation methods, financial models, market data and other evidence.[128]

TransGrid considers that the intention of the requirement to have regard to all relevant estimation models, financial models, market data and other evidence is to broaden the range of information that informs the return on equity estimate. As the AEMC's own expert advisor noted:

> In our view it is difficult to make the case that allowing the regulator to consider more information about the required return on equity would systematically result in lower-quality estimates.[129]

TransGrid's approach to estimating the return on equity concludes that there are a number of sources of relevant information that can be used to improve the estimate of the return on equity. These are:

- the Sharpe-Lintner Capital Asset Pricing Model (CAPM);
- the Black CAPM;
- the Fama-French Three Factor Model;
- the Dividend Growth Model (DGM);
- an independent capital market expert's recent valuation of a business comparable to a benchmark efficient entity; and
- a comparison of the return on equity to observed debt yields as a means of a reasonableness check.

In contrast, the AER has proposed an approach that TransGrid considers to be, in practice, largely the same as the AER's approach prior to the Rule change. In other words, the AER proposes still to derive estimates from only the Sharpe-Lintner CAPM, a model which the AER itself acknowledges as containing bias.

[128] *National Electricity Rules*, Clause 6A.6.2(e)(1).
[129] SFG Consulting, *Preliminary Analysis of Rule Change Proposals: Report for AEMC*, 27 February 2012, paragraph 109.

The significance of this conclusion is evident in the following statement by the AEMC:

> A major concern expressed in numerous submissions is that under the proposed changes the regulator would still be able to, in effect, make exclusive use of the CAPM when estimating a rate of return on equity. The Commission understands this concern is potentially of considerable importance given its intention is to ensure that the regulator takes relevant estimation methods, models, market data and other evidence into account when estimating the required rate of return on equity.[130]

TransGrid considers that there are a number of errors and misconceptions on the part of the AER in developing the approach set out in the Guideline. In so doing, the AER has proposed an approach that results in an estimate of the return on equity with a significant downward bias. This bias means the return on equity will be below the requirements of equity investors, compromising the efficient business' investments and operations. In light of these errors and misconceptions, TransGrid's proposed approach to estimating the return on equity is materially different to that proposed by the AER in the Guideline.

The remainder of this section summarises the approach proposed by TransGrid, highlights how this approach differs from that proposed by the AER and summarises the problems with the AER's approach.

8.6.1 TransGrid's Approach

TransGrid considers its proposed approach contains a systematic application of reasoning consistent with the Rules by:

- identifying relevant material; and
- determining how to combine that material.

Each of these steps is explained in turn below.

Identifying Relevant Material

The Rules require consideration of the relevant estimation methods, financial models, market data and other evidence ("relevant material") when estimating the return on equity. "Relevant material" includes all material that is capable of being used to improve the estimate of the return on equity for a benchmark efficient entity.

On this basis, empirical versions of financial models[131] should be assessed for relevance with reference to the following three criteria:

- empirical support – the extent to which material is capable of explaining the past behaviour of equity returns;
- theoretical support – the degree to which the use of material is underpinned by sound theoretical principles; and
- evidence that the material is used by financial practitioners.

[130] AEMC, *Final Rule Determination: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, p57.
[131] An empirical version of a financial model is the financial model after it has been specified.

NERA assessed the relevance of the same four financial models assessed by the AER in the Guideline[132] and concluded that:

- each financial model has its comparative strengths and weaknesses;
- none of the financial models is demonstrably better at estimating the return on equity than all other relevant information; and
- each model is capable of being used to provide insights as to the return on equity.[133]

In light of these results, TransGrid does not agree with the AER's conclusion that the return on equity range should be constructed with reference to results derived from only a single financial model, the Sharpe-Lintner CAPM. The methodological errors that led the AER to this conclusion are discussed in Section 8.6.2. In summary they are:

- the AER does not assess the relevance of the applied financial models;
- there are inadequacies in the AER's assessment criteria; and
- the AER does not adequately adjust for the downward bias in the only model that it uses to construct the return on equity range.

Grant Samuel lends support to TransGrid's view that relying exclusively on a single financial model is inadequate. Whilst Grant Samuel utilises a Sharpe-Lintner CAPM model as part of its approach, it does not rely on the approach solely and is quite clear that to do so would be an error.

> It is easy to over-engineer the process and to credit the output of models with a precision it does not warrant. Too often, people are captured by the accumulation of data and its apparent sophistication. A mechanistic application of formulae derived from theory can obscure the reality that any cost of capital estimate or model output should be treated as a broad guide rather than an absolute truth.[134]
>
> …
>
> In our view, there is not much point in exercising judgement if you are not prepared to step away from the apparent comfort of calculated rates.[135]

Grant Samuel explains that:

> …while the theory underlying the CAPM is rigorous the practical application is subject to shortcomings and limitations and the results of applying the CAPM model should only be regarded as providing a general guide. There is a tendency to regard the rates calculated using CAPM as inviolate. To do so is to misunderstand the limitations of the model.[136]

Further, Grant Samuel describes the AER approach set out in the Guideline as giving:

> …a misleading impression of the precision about what is, in reality, a relatively crude tool of unproven accuracy [The Sharpe-Lintner CAPM] that gives, at best, a broad approximation of the cost of capital.[137]

[132] The Sharpe-Lintner CAPM, the Black CAPM, the Dividend Growth Model (DGM) and the Fama-French Three Factor model.
[133] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p58.
[134] Grant Samuel, *Cost of Equity Capital*, May 2014, p4.
[135] Grant Samuel, *Cost of Equity Capital*, May 2014, p6.
[136] Grant Samuel, *Envestra, Financial Services Guide and Independent Expert's Report to the Independent Board Sub-Committee in relation to the Proposal by APA Group*, Appendix 3, 3 March 2014, p1.
[137] Grant Samuel, *Envestra, Financial Services Guide and Independent Expert's Report to the Independent Board Sub-Committee in relation to the Proposal by APA Group*, Appendix 3, 3 March 2014, p1.

In addition to the four financial models, the following sources of material are relevant:

- a recent expert report by Grant Samuel that estimates the fair value of Envestra (the Envestra report), an entity recognised by the AER as being comparable to a benchmark efficient entity;[138] and
- a comparison of the return on equity estimate to observed bond yields as a means of a reasonableness check.

A detailed assessment of the relevance of the information can be found in the NERA report.[139]

Combining Relevant Material

The second step in the approach is to determine how to combine relevant material for the purpose of determining a return on equity range and final estimate. The approach to combining relevant material should allow greater regard to be had to material with greater relevance.

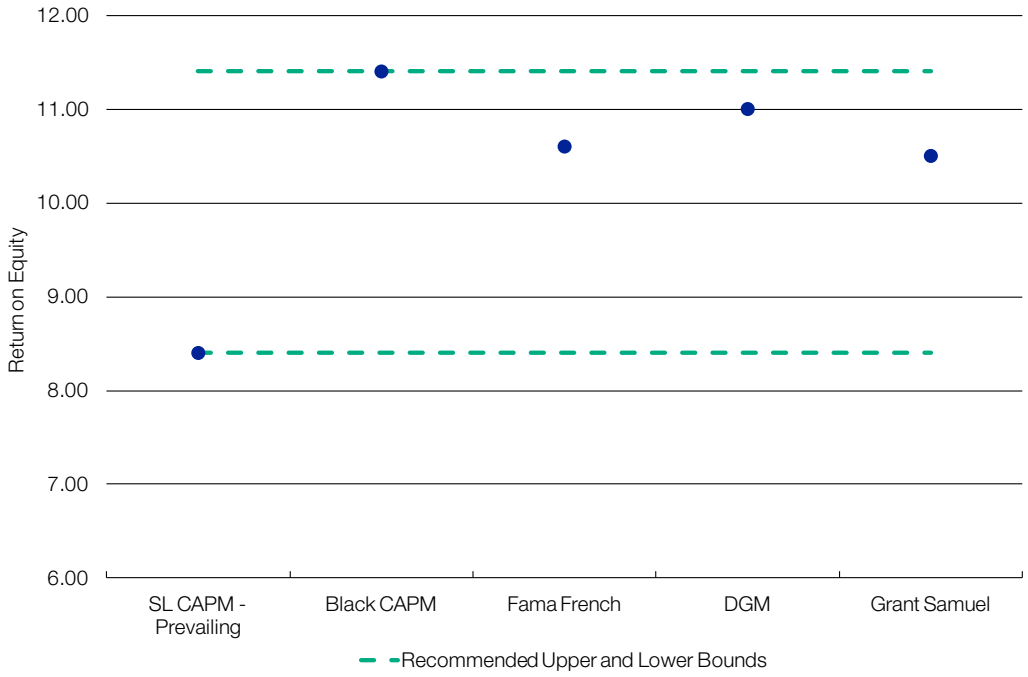
An assessment of relevance indicates that none of the financial models is demonstrably superior to all others and, as a result, using a single financial model to construct the range of return on equity estimates will:

- disregard important insights as to the return on equity; and
- arbitrarily give more weight to the results derived from a particular model.

The assessment of relevance concludes that there are a variety of sources of relevant information that can be used to improve the estimate of the return on equity. NERA's analysis of the relevant information for the return on equity estimate constructed with reference to all relevant material is illustrated in Figure 8.1.

[138] AER, *Explanatory Statement Rate of Return Guidelines (Appendices): Better Regulation*, December 2013, p47 and AER, *Explanatory Statement Rate of Return Guidelines: Better Regulation*, December 2013, p143.
[139] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, pp43-58, 78-114.

Figure 8.1
Return on Equity Estimates with Upper and Lower Bounds



Source: NERA.

The point estimate of the return on equity should be established from the range of estimates produced using a qualitative analysis of:

- the way in which estimates are distributed within the range;
- the respective strengths and weaknesses of the relevant material used to construct the estimates that form the range; and
- prevailing market conditions that, at any particular time, may make a particular source of relevant material more or less relevant.

In TransGrid's opinion, a rate of 10.5% represents the best estimate of the prevailing return on equity for a benchmark efficient TNSP. This conclusion is based on the following:

- the range of return on equity estimates for a benchmark efficient TNSP derived using each form of relevant material range from 8.25% to 11.5%;[140]
- most estimates fall within the range of between 10.5% and 11.5%, with the only estimate outside this range being derived by the Sharpe-Lintner CAPM;
- estimates derived by the Sharpe-Lintner CAPM should be expected to be at the lower end of any range, since there is a substantial body of evidence suggesting that this model will underestimate the return on equity for a benchmark efficient TNSP. Figure 8.1 clearly shows this is the case. This is because the benchmark efficient TNSP:
  - is a low beta stock and the evidence shows that the empirical form of the Sharpe-Lintner CAPM underestimates the returns on stocks with a beta less than one; and

[140] Noting that return on equity estimates are rounded to the closest 25 basis points.

  - has an economically significant, positive exposure to the value risk premium, which is not compensated for in the Sharpe-Lintner CAPM;

- the empirical version of the Black CAPM shows that the Sharpe-Lintner CAPM systematically underestimates the returns on low beta stocks (such as that found for the benchmark efficient TNSP);
- a return on equity of 10.5% is equal to the mid-point of the gamma adjusted return on equity range used by Grant Samuel to value Envestra, an entity recognised by the AER as comparable to a benchmark efficient TNSP. In that context, it represents an unbiased, independent expert estimate of the return on equity that will in turn be relied upon by shareholders to determine whether or not to accept APA Group's proposal to acquire all the issued capital for Envestra;
- a return on equity of 10.5% is consistent with estimates derived using the FFM and the DGM; and
- the observed risk premium provided to debt investors following the GFC has increased by over 150 basis points, as compared with pre-GFC debt premiums. A return on equity of 10.5% is consistent with a post-GFC increase in the required return for equity investors in a benchmark TNSP that is comparable (in absolute terms) with the increase observed in the debt market since that same event.[141]

Contributes to the Allowed Rate of Return Objective and the National Electricity Objective

TransGrid considers that its proposed approach and the estimate of the return on equity produced by that proposed approach contributes to the allowed rate of return objective to a greater degree than the approach set out in the Guideline.

By having regard to and combining all relevant information when estimating the return on equity, TransGrid's estimate of its return on equity reflects the prevailing conditions in the market for equity funds. This results in an estimate of the return on equity that contributes to the achievement of the allowed rate of return objective because it is commensurate with the efficient costs of a benchmark efficient entity.

It follows that TransGrid's estimate of the return on equity contributes to the achievement of the national electricity objective. TransGrid's estimate of the return on equity will promote efficient investment (and efficient operation and use of) electricity services because it reflects the return on equity that is currently required in the market for the provision of those services by a benchmark efficient entity with a similar degree of risk as that which applies to TransGrid. TransGrid considers that a lower return on equity would jeopardise its efficient investment in electricity services and, therefore, not contribute to either the allowed rate of return objective or the national electricity objective.

8.6.2 Problems with the AER's approach

TransGrid does not support the approach proposed by the AER in the Guideline as it relates to return on equity because, in TransGrid's view, it incorporates a number of errors and misconceptions.

[141] The long-term historical average market risk premium is 6.5% and so a firm with an equity beta of 0.7 would have an equity premium of 4.55%. This is approximately 180 basis points lower than the equity premium implied by a return on equity of 10.5%.

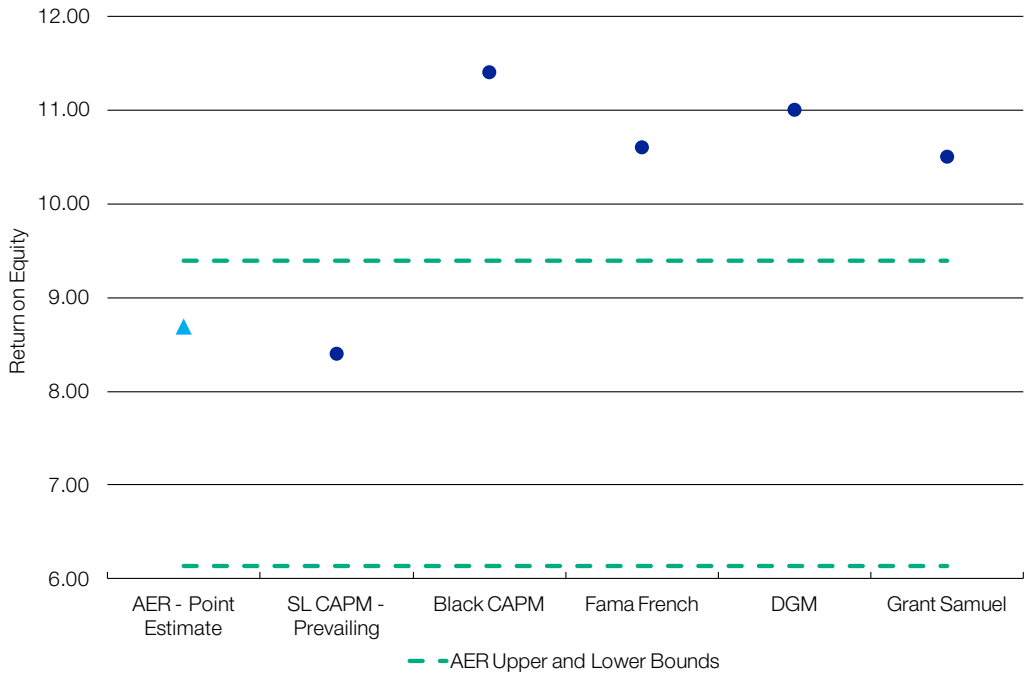
The problems with the AER's approach are:

- the AER does not assess the relevance of the applied financial models;
- there are inadequacies in the AER's assessment criteria;
- the AER does not adequately adjust for the downward bias in the only model that it uses to construct the return on equity range; and
- the AER's approach to combining relevant material disregards relevant material.

A summary of each of the aforementioned problems with the AER's approach follows. A more detailed discussion can be found in the NERA report attached as Appendix V.[142]

TransGrid considers that these errors and misconceptions have resulted in an approach that incorrectly assesses relevance, unnecessarily restricts the AER's ability to have regard to relevant material and, ultimately, produces an estimate of the return on equity with a significant downwards bias, as illustrated in Figure 8.2.[143] This figure shows both the point and range estimates when applying the AER's approach and compares them with estimates from other relevant sources. It seems clear that the AER's approach will not achieve the national electricity objective as it does not allow a benchmark efficient entity to recover its efficient costs.

Figure 8.2
AER Point and Range Estimates of the Return on Equity Compared to Other Sources of Relevant Material



Source: NERA.

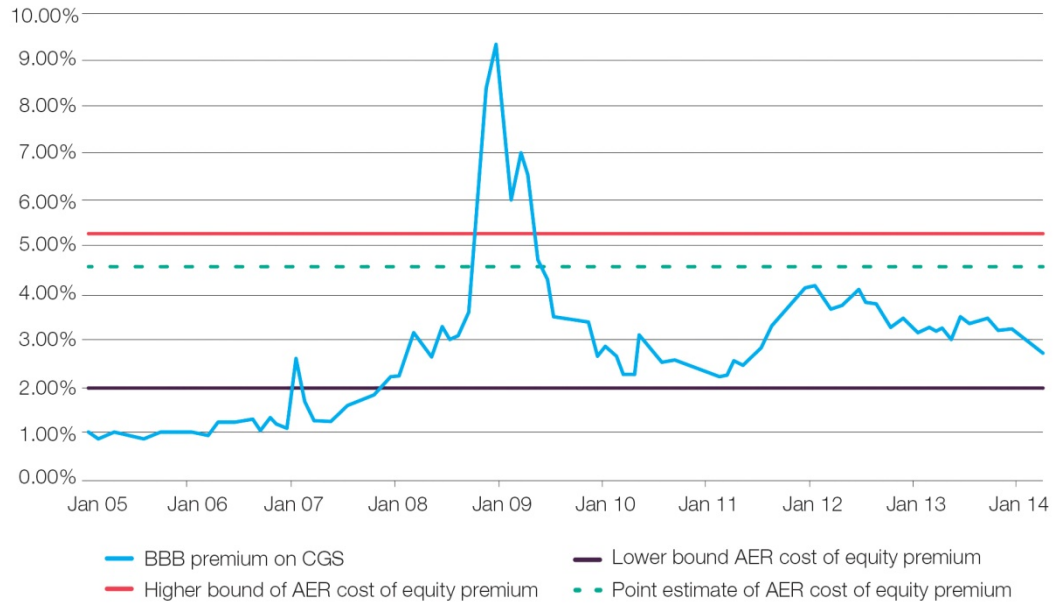
[142] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p61.
[143] NERA's estimate of the AER's point estimate of 8.69% is based on the MRP and beta in the AER's *Rate of Return Guideline* plus the most recent data for the risk free rate.

Analysis undertaken by NERA indicates that more than 60% of the AER's reasonable range for the return on equity[144] is less than the return on BBB rated corporate debt. This is shown in Figure 8.3. NERA notes that:

> It is completely inconsistent with the core principles of financial economics that the premium required by equity investors could fall below that required by debt investors. In our opinion, the magnitude of the observed debt risk premium demonstrates that the AER's assessment of the return on equity in the guidelines is flawed.[145]

For the same reason, that equity should be priced above debt, TransGrid notes that the Federal Energy Regulation Commission (FERC) in the United States of America removes low-end return on equity estimates that are within one per cent of the average yield on public utility bonds over a six month period. An analysis undertaken by NERA indicates that such an analysis would rule out any estimate of the return on equity that is below 8.17%. If applied in Australia this approach would eliminate over half of what the AER's approach identifies as a "reasonable range".

Figure 8.3
AER Reasonable Range and Point Estimate of the Return on Equity Premium and the Debt Risk Premium on BBB Bonds



Source: NERA.

The AER Does Not Assess the Applied Financial Model

TransGrid does not support the AER's proposed methodology for assessing relevance, or its conclusions, because it assesses theoretical financial models for relevance, rather than the applied financial models that would be used in practice.

Estimates of the return on equity are derived from the empirical application of financial models rather than the theoretical versions. The empirical application of a financial model often necessitates adjustments to the theoretical financial model.

[144] Estimated for the 20 days to 31 March 2014.
[145] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p64.

For this reason, NERA notes that:

> …it is imperative that any assessment of the relevance of a financial model must be undertaken after it has been specified, ie, adjusted or adapted as necessary for its application.[146]

NERA notes the following differences between the theoretical version of the Sharpe-Lintner CAPM assessed by the AER and the Sharpe-Lintner CAPM that the AER actually proposes to apply:[147]

Table 8.1
Theoretical and Empirical Versions of the Sharpe-Lintner CAPM

Theoretical Version	AER's Empirical Version
The market risk premium should represent all domestic and international risky assets, including property, debt, equity and human capital	The AER proposes to use only Australian listed stocks
The risk free rate should be the riskless asset for all investors	The AER proposes only the return on Australian Commonwealth Government securities
The equity beta should be calculated as the expected covariance of the benchmark efficient entity to all risky assets	The AER proposes to use historical estimates derived from a portfolio of Australian stocks

NERA assessed the relevance of the applied financial models and found that no model was sufficiently superior so as to justify using the results derived from only one model to construct the return on equity range, as the AER proposed in the Guideline.

A more detailed discussion of the problems associated with the AER's assessment of theoretical financial models, rather than applied financial models, can be found in the NERA report.[148]

There are Deficiencies in the AER's Assessment Criteria

An assessment of relevance should be focused on whether material is capable of being used to improve the estimate of the return on equity and, in so doing, contribute to the achievement of the allowed rate of return objective.

Therefore, TransGrid does not support the assessment criteria used by the AER, which are secondary to whether material can be used to improve the estimate of the return on equity.[149] Further, the AER's assessment criteria impose two objectives that TransGrid considers to be inconsistent to the achievement of the allowed rate of return objective. These are:

- simple over complex approaches; and
- the use of information being consistent with its original purpose.

[146] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p39.
[147] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p82.
[148] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p65.
[149] For a full discussion on the AER's assessment criteria refer to NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, pp68-69.

Simple approaches are only achieved through simplifying assumptions of investors' behaviour. More complex approaches are capable of testing whether these simplifying assumptions are reasonable. As a result, disregarding complex approaches simply because of their complexity is counter to the fundamental objective of estimating the return on equity of a benchmark entity. Further, disregarding information simply because it was not originally designed to estimate the return on equity for a benchmark efficient entity is also inconsistent with the fundamental objective.

By failing to ultimately consider whether material can improve the estimate of the return on equity, the AER has disregarded relevant material and developed an approach that results in an estimate with a downward bias.

The Adjustment for Bias in the Sharpe-Lintner CAPM is Inadequate

TransGrid agrees with the AER that the Sharpe-Lintner CAPM produces an estimate of the return on equity that has a downward bias for stocks with a low equity beta. However, TransGrid strongly disagrees with the AER's approach to adjusting for this bias. In addition, it should be noted that the equity of a regulated utility behaves like a value stock and that the Sharpe-Lintner CAPM underestimates returns for value stocks.[150]

In response to the downward bias in the Sharpe-Lintner CAPM, the AER:

- made an arbitrary adjustment to its point estimate by adjusting a parameter in the Sharpe-Lintner CAPM that would increase the estimate of the return on equity;
- adjusted only the point estimate with no corresponding adjustment to the reasonable range, which would also be affected by the bias; and
- undertook no analysis to evaluate whether the adjustment it made was sufficient to correct for the bias.

The insufficiency of the AER's adjustment can be inferred from the Black CAPM theory, which was developed to correct for the bias in the Sharpe-Lintner CAPM. NERA undertook such an analysis and concluded that the AER's adjustment:

> …can be rejected as insufficient to deal with the low-beta bias associated with an empirical version of the Sharpe-Lintner CAPM. In other words, an analysis of historical Australian financial data rejects at the 5 per cent significance level, that the implied adjustment to the equity beta was sufficient.[151]

TransGrid's view is that the errors and misconceptions in the AER's approach to adjusting for bias have substantial consequences because, if the AER had considered whether its approach produced an estimate with a downward bias:

- the AER would not have selected an empirical version of the Sharpe-Lintner CAPM as its "foundation model"; and
- the AER would have had regard to estimates derived from more than one financial model.

Ultimately, the AER's approach results in an estimate of the return on equity that has a substantial downward bias, which under-compensates equity investors and does not contribute to the achievement of the allowed rate of return objective.

[150] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p44.
[151] NERA, *Return on Capital of a Regulated Electricity Network*, May 2014, p69.

The Approach to Combining Material Disregards Relevant Material

TransGrid does not agree with the AER's approach to combining material because it is unnecessarily restrictive and disregards relevant material. The two most problematic characteristics of the AER's approach to combining material are that:

- the approach restricts more than one financial model from being used to construct the rate of return range; and
- the approach restricts relevant material from being used more than once.

NERA's assessment of relevance indicates that all four of the financial models assessed by the AER are capable of being used to improve the estimate of the rate of return. Therefore, constructing the estimated rate of return range by reference to only the Sharpe-Lintner CAPM will disregard relevant information that can be inferred from other financial models. For example, the Black CAPM may indicate the extent of the bias in the Sharpe-Lintner CAPM.

NERA also considers that restricting the use of relevant information such that it may be used only once is unnecessarily restrictive. Regulatory judgement should be used to ensure that using relevant material more than once does not result in double counting.

For example, the AER's approach allows the DGM to be used only to estimate the excess return on the market (the MRP). However, the DGM can also be used directly to provide an estimate of the return on equity that better reflects prevailing market conditions relative to the other financial models.[152] The DGM has been widely used by North American regulators to directly estimate the return on equity for regulated utilities. Further still, the Rules require that:

> In estimating the return on equity under paragraph (f), regard must be had to the prevailing conditions in the market for equity funds.[153]

For the above reasons, TransGrid considers that the AER's approach to combining material is unnecessarily restrictive and disregards relevant material.

[152] The DGM is derived using estimates of prevailing stock prices and dividend growth rates rather than historical data.
[153] *National Electricity Rules*, Clause 6A.6.2(g).

9 Value of Imputation Credits

The value of imputation credits is described in the National Electricity Rules as gamma. It represents the benefit that shareholders receive from the payment of company income tax.

The Australian dividend imputation tax system allows shareholders to benefit from tax paid at the company level. Companies that pay Australian company tax are able to pass the benefit of company tax paid to shareholders by attaching a tax credit to dividends. These tax credits may be used by shareholders to reduce personal Australian income tax liabilities and Australian residents are also able to receive a rebate for excess (unused) tax credits.

Gamma is the value of these credits created through the payment of company tax payments to investors. In a post-tax revenue model, gamma is used to determine the proportion of estimated company tax that does not need to be compensated through regulated allowable revenue.

Gamma (γ) is estimated as the product of the distribution rate and the value of distributed credits.

9.1 National Electricity Law and Rules Requirements

The Rules require an estimate of the value of imputation credits to investors in the business. This interpretation is consistent with the broader regulatory framework and the task set by the Rules to determine total revenue. It is also consistent with past regulatory practice, and previous decisions of the Australian Competition Tribunal.

Interpreting gamma as the value of imputation credits to investors also best achieves the national electricity objective, as it ensures that the adjustment for imputation credits in the taxation building block properly reflects the actual value of imputation credits to investors, not merely their notional face value or potential value. Accounting for gamma in this way ensures that the overall return received by investors (including the value they ascribe to imputation credits) is sufficient to promote efficient investment in, and use of, infrastructure, for the long term interests of consumers.

9.2 TransGrid's Approach to Calculating Gamma

TransGrid agrees with the AER's proposed use of the Monkhouse formula to calculate gamma as the product of:

- the distribution rate (ie, the extent to which imputation credits that are created when companies pay tax, are distributed to investors); and
- the value of distributed imputation credits to investors who receive them (referred to as theta).

The only area of disagreement TransGrid has with the AER's approach is in relation to the estimation of theta.

TransGrid proposes a distribution rate of 0.7, which is consistent with the AER's *Rate of Return Guideline*. Recent empirical evidence continues to support a distribution rate of 0.7.

TransGrid proposes a value for theta of 0.35. TransGrid considers that the best available method for estimating the value of imputation credits to investors is the dividend drop-off method, and therefore gives primary weight to this method in determining a value for theta.

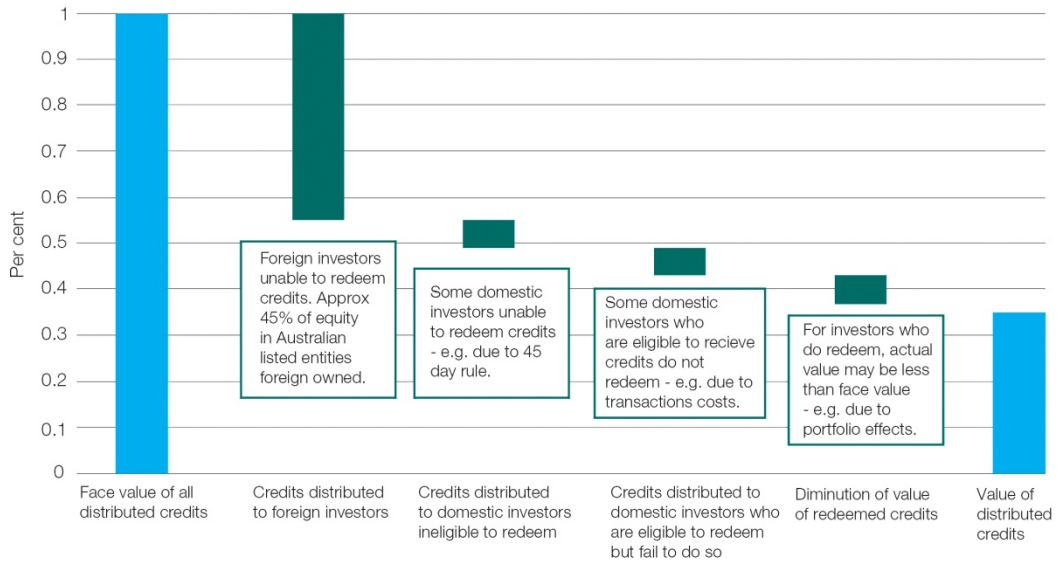
A dividend drop off study estimates investor's valuation of dividends and imputation credits by reference to the change in willingness to pay for shares when dividends are distributed. As with all studies, regard must be had to the strengths and weaknesses of a study before placing reliance on it. The Australian Competition Tribunal engaged SFG in 2011 to undertake a study to address noted shortcomings in previous studies. The SFG study is well regarded in terms of methodology, data set and currency. SFG updated this study in 2013 with the same finding for theta of 0.35 demonstrating stability in the studies.

Combining a distribution rate of 0.7 with a theta estimate of 0.35 produces a value for gamma of 0.25.

TransGrid's approach to valuing theta is discussed in more detail in Appendices AB[154] and AC.[155]

[154] TransGrid, *TransGrid's Approach to Gamma*, May 2014, pp18-23.
[155] SFG, *An Appropriate Regulatory Estimate of Gamma*, May 2014, pp26-38.

Figure 9.1
Illustrative Impact on Value of Imputation Credits



9.3 TransGrid's Concerns with the AER's Approach to Estimating Theta

TransGrid has a number of concerns with the AER's approach to estimating theta. A summary of these concerns follows.

TransGrid does not agree with the conceptual framework adopted by the AER for estimating theta, and in particular the focus on utilisation evidence, rather than market value evidence. The AER's approach is not consistent with the national electricity objective. It does not measure the required return for the purposes of promoting efficient investment, and would lead to underinvestment.

In order to provide an acceptable overall return to equity holders, theta must be estimated as the value of distributed imputation credits to equity holders. This is the conventional and orthodox approach to estimating theta. It is also the approach which best gives effect to the national electricity objective, as it provides for recognition of the value to equity holders of imputation credits and provides for overall returns which promote efficient investment.[156]

There are compelling reasons why the benefit of imputation credits is significantly less than the face value of imputation credits or the utilisation of imputation credits.[157] However, these were not considered in the *Rate of Return Guideline*. In summary these reasons are:

- the 45 day rule which prevents investors redeeming imputation credits unless they hold the share for at least 45 days around the ex-dividend day;
- transaction costs associated with redemption of credits;
- taxation of imputation credits as income;
- the time value of money as there is typically a significant delay between credit distribution and the investor obtaining a tax credit; and

[156] For further information see *TransGrid's Approach to Gamma*, Section 4.3, pp13-14 in Appendix AB.
[157] For a full discussion of the reasons see *TransGrid's Approach to Gamma*, pp14-15 in Appendix AB.

- portfolio effects where investors may sub-optimise their investment portfolio to take advantage of imputation.

There are significant problems with the taxation statistics and other forms of evidence given primary emphasis in the *Rate of Return Guideline*. They are, and are well recognised to be, simply unreliable. Further, a key piece of evidence used by the AER (Handley and Maheswaran (2008)) is not an empirical study at all as the data was not available. Instead the study makes an assumption of full utilisation by domestic investors. Any reliance upon this study involves obvious error.

The AER has assumed that domestic ownership in Australian entities is 70%, on the basis of a 2007 statistic from the Australian Bureau of Statistics (ABS) that is simply outdated. Contemporary statistics from both the ABS and the Australian Securities Exchange estimate the proportion of domestic ownership at 55%.[158]

Finally, the conceptual goalposts approach referred to by the AER provides no relevant information on the actual value of credits. The AER's approach does not appear to be supported by any economic theory or expert views.[159]

[158] See SFG, *An Appropriate Regulatory Estimate of Gamma*, paragraph 111, p22 in Appendix AC.
[159] See SFG, *An Appropriate Regulatory Estimate of Gamma*, Appendix 5, pp 60-71 in Appendix AC.

10 Depreciation

This chapter presents TransGrid's forecast of the depreciation on prescribed assets during the 2014/15 to 2018/19 period.

Depreciation is defined in Australian Accounting Standard AASB 116 (Property, Plant and Equipment) as the systematic allocation of the depreciable amount of an asset over its useful life.

Depreciation is part of the annual building block revenue requirement calculated in accordance with Clause 6A.5.4 of the Rules. The annual regulatory depreciation allowance is a depreciated value of the RAB that reflects the nature of the assets over their economic life.

The allowable regulatory depreciation is also referred to as "return of capital", and is straight line depreciation of the RAB less the inflation adjustment.

10.1 Actual Depreciation

In the *Economic Regulation of Network Service Providers* rule change,[160] the AEMC stated that in relation to depreciation, for consistency the use of actual or forecast depreciation to calculate the opening value of the RAB for both the transitional and subsequent regulatory control periods will be as set out in the current regulatory determination. The AER will determine the method to be used to establish the opening RAB for the following regulatory control period when it makes the full revenue determination on this revenue proposal. On this basis, the opening RAB is based on actual depreciation.[161]

10.2 Depreciation Methodology

Clause 6A.6.3(c) of the Rules states that an asset (or group of assets) must be depreciated on a straight line basis over the life at which that asset (or group of assets) was first included in the RAB for that transmission system.

In accordance with the requirements of Clause 6A.6.3 of the Rules, TransGrid has applied the straight line depreciation method to each asset category in the RAB over the economic life of the asset across the regulatory control period, based on the value of the assets included in the RAB at the beginning of each regulatory year.

[160] AEMC, *Rule Determination, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012*, p247.
[161] AER, *Final Decision, Amendment Electricity Transmission Network Service Providers Roll Forward Model Handbook*, December 2010, p7.

The annual depreciation expense for the 2014/15 to 2018/19 period is calculated within the post-tax revenue model based on:

- the opening RAB value as at 1 July 2014, derived from the roll forward model;
- the annual capital expenditure forecast set out in Chapter 5;
- the standard asset lives described in Section 10.3; and
- the remaining asset lives discussed in Section 10.4.

The post-tax revenue model commences the annual depreciation calculation for a new asset over its standard asset life in the year after the capital expenditure is commissioned. The existing assets as at 1 July 2014 are depreciated over their remaining asset lives. The remaining asset lives are calculated within the post-tax revenue model.

Assets that are forecast to be disposed of, or decommissioned, are removed from the asset base of the relevant asset class in the year of disposal.

Depreciation is not applied to the Land and Easement asset category.

TransGrid's depreciation calculation details are contained in the completed post-tax revenue model submitted with this revenue proposal.

10.3 Asset Classes and Standard Asset Lives

Clause 6A.6.3(b) of the Rules states that the depreciation schedules must depreciate using a profile that reflects the nature of the assets or category of assets over the economic life of that asset or category of assets.

TransGrid has assigned regulatory lives to well recognised classes of assets that reflect the assets' expected technical lives.

TransGrid creates a separate asset class for each regulatory control period to ensure accurate treatment of depreciation and asset disposals. In this proposal, existing asset classes have been streamlined as follows:

1. removing Accelerated Lines (2004-05) and Accelerated Substations (2004-05) asset classes as assets in these asset classes are fully depreciated;
2. combining Land and Easements across all regulatory control periods – as there is no depreciation required;
3. combining the following Augmentation and Replacement asset classes for the 2009/10 to 2013/14 regulatory control period, as each pair have the same asset life:
    - Secondary Systems - Augmentation and Replacement;
    - Communications - Augmentation and Replacement;
    - Substations - Augmentation and Replacement; and
    - Transmission Lines - Augmentation and Replacement; and
4. combining Support the Business – Minor Plant, Motor Vehicle and Mobile Plant asset classes for the 2009/10 to 2013/14 regulatory control period as they have the same asset life.

Clause 6A.6.3(b)(3) of the Rules states that the economic life of the relevant assets and the depreciation methodologies and rates underpinning the calculation of actual depreciation for

a given regulatory control period must be consistent with those determined for the same assets on a prospective basis in the transmission determination for that period. The proposed changes above will not result in any changes in economic lives or depreciation rates determined in previous revenue determinations.

TransGrid has added a new asset class, Transmission Line Life Extension. This asset class is used to record capital works which will result in life extension of transmission line assets, such as corrosion treatment, painting and replacement of fittings. TransGrid has not performed extensive life extension works on transmission lines previously. Minor remediation of localised condition issues has been previously carried out as part of the maintenance program and included in operating expenditure. However, transmission line life extension works are proposed in the upcoming regulatory control period. TransGrid has estimated the asset life for refit to be 25 years and considers that it reflects the economic and technical life of the extended transmission line assets.

Reflecting changing technology, TransGrid also changed asset lives for Secondary Systems and Communications asset classes for the upcoming regulatory control period from 35 years to 15 years and 10 years respectively.

Transmission Lines and Cables have been split into separate assets classes, reflecting their differing economic lives.

The new asset classes and standard lives for the upcoming regulatory control period are shown in Table 10.1. These asset categories and lives have been used in the post-tax revenue model to forecast TransGrid's revenue requirements.

Table 10.1
Asset Categories and Standard Lives

No	Asset Class	Asset Life (Years)
1	Transmission Lines (2014-18)	50
2	Underground Cables (2014-18)	45
3	Substations (2014-18)	40
4	Secondary Systems (2014-18)	15
5	Communications (2014-18)	10
6	Business IT (2014-18)	4
7	Minor Plant, Motor Vehicles and Mobile Plant (2014-18)	8
8	Transmission Line Life Extension (2014-18)	25
9	Land and Easements	N/A

10.4 Remaining Asset Lives

Clause 6A.6.3 of the Rules states that the economic life of the relevant assets and the depreciation methodologies and rates underpinning the calculation of depreciation for a given regulatory control period must be consistent with those determined for the same assets on a prospective basis in the transmission determination for that period.

For existing assets, TransGrid has used the same asset lives in accordance with the Rules. The calculation of weighted average remaining asset lives in the roll forward model and post-tax revenue model has been adopted by TransGrid to calculate remaining asset lives.

10.5 Depreciation Forecast

Regulatory depreciation is made up of straight line depreciation and an adjustment for the annual inflation of the opening RAB.

Schedule 6A.1.3(7) of the Rules requires TransGrid to provide the depreciation schedules which categorise the relevant assets for these purposes by reference to well accepted categories such as:

(i) asset class (e.g. transmission lines and substations); or

(ii) category driver (e.g. regulatory obligations or requirements, replacement, reliability, net market benefit, and business support),

and also by location, together with:

(iii) details of all amounts, values and other inputs used by the transmission network service provider to compile those depreciation schedules;

(iv) a demonstration that those depreciation schedules conform with the requirements set out in Clause 6A.6.3(b) of the Rules; and

(v) an explanation of the calculation of the amounts, values and inputs referred to in subparagraph (iii).

A detailed depreciation schedule with the required information is attached as Appendix AD.

The proposed regulatory depreciation allowance is shown in Table 10.2.

Table 10.2
Depreciation Forecast ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19
Straight line Depreciation	246.9	268.9	292.0	283.6	303.3
Less: Inflation Adjustment on RAB	-155.2	-162.2	-170.4	-176.0	-182.5
Regulatory Depreciation	**91.7**	**106.7**	**121.6**	**107.5**	**120.9**

Source: TransGrid. Totals may not add due to rounding.

11 Corporate Income Tax

Clause 6A.5.4(a)(4) of the Rules requires that the estimated cost of the corporate income tax allowance must be made as part of the post-tax nominal approach to the revenue determination.

11.1 Tax Depreciation

For the purpose of estimating the cost of income tax, TransGrid has calculated tax depreciation on a straight line basis, using the AER's roll forward model and post-tax revenue model. The asset lives applied for tax purposes are the same as standard asset lives which are set out in Table 10.1 in Chapter 10.

For convenience, Table 11.1 shows the asset lives applied for tax purposes.

Table 11.1
Asset Categories and Standard Lives

No	Asset Class	Asset Life (Years)
1	Transmission Lines (2014-19)	50
2	Underground Cables (2014-19)	45
3	Substations (2014-19)	40
4	Secondary Systems (2014-19)	15
5	Communications (2014-19)	10
6	Business IT (2014-19)	4
7	Minor Plant, Motor Vehicles and Mobile Plant (2014-19)	8
8	Transmission Line Life Extension (2014-19)	25
9	Land and Easements	N/A

Based on the asset lives in Table 11.1, TransGrid's forecast tax depreciation for the upcoming regulatory control period calculated using the AER's post-tax revenue model is set out in Table 11.2. This has been used to calculate TransGrid's corporate income tax allowance.

Table 11.2
Forecast Tax Depreciation Schedule ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19
Tax Depreciation	196.2	210.7	170.9	160.5	173.3

Source: TransGrid.

11.2 Tax Allowance

Clause 6A.6.4 of the Rules sets out the methodology for calculating the allowance for corporate income tax. The estimated cost of corporate income tax of a Transmission Network Service Provider for each regulatory year (ETC_t) must be estimated in accordance with the following formula:

$$ETC_t = (ETI_t \times r_t)(1 - \gamma)$$

where:

- ETI_t – is an estimate of the taxable income for that regulatory year that would be earned by a benchmark efficient entity as a result of the provision of prescribed transmission services if such an entity, rather than the Transmission Network Service Provider, operated the business of the Transmission Network Service Provider, such estimate being determined in accordance with the post-tax revenue model
- r_t – is the expected statutory income tax rate for that regulatory year as determined by the AER
- γ – is the value of imputation credits

The estimate of taxable income is calculated using the AER's post-tax revenue model. TransGrid has applied γ of 0.25 based on 30% statutory income tax rate, as discussed in Chapter 9.

TransGrid has calculated its allowance for corporate income tax in accordance with the methodology set out in Clause 6A.6.4 of the Rules, using the AER's post-tax revenue model. The forecast corporate income tax is shown in Table 11.3.

Table 11.3
Forecast Corporate Tax Allowance ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19
Corporate Income Tax	59.5	64.2	90.7	92.8	97.2
Less: Value of Imputation Credits	-14.9	-16.0	-22.7	-23.2	-24.3
Total Allowance	**44.6**	**48.1**	**68.0**	**69.6**	**72.9**

Source: TransGrid. Totals may not add due to rounding.

12 Shared Assets

Shared assets are assets that are used to provide both prescribed transmission services and non-regulated services.

TransGrid's prescribed assets are funded by consumers through their use of prescribed services. TransGrid may also provide non-regulated services on a commercial basis which utilise prescribed assets where it is efficient to do so.

If it is known at the time of investing in an asset that it will be used for both prescribed and non-regulated services, only a proportion of the asset's cost is added to the regulatory asset base. This ensures that electricity customers only pay for the share of the asset they use.

Occasionally, an asset will be fully included in the regulatory asset base, but at some point later in the asset's life it may also be used for non-regulated services. At this time the asset becomes a "shared asset".

Consumers who fund shared assets through their electricity bills can share in the benefits of the unregulated activities by an amount that reflects the alternate use of the asset.

12.1 National Electricity Rules Requirements

Clause 6A.5.5 of the Rules sets out the requirements for shared assets, where an asset is used to provide both prescribed transmission services and either non-regulated transmission services or services that are not transmission services.

The definition of prescribed transmission services in Chapter 10 of the Rules excludes negotiated transmission services and market network services. Similarly, non-regulated transmission services is defined in Chapter 10 of the Rules as a transmission service that is neither a prescribed transmission service nor a negotiated transmission service. Therefore, the non-regulated revenues referred to by the AER in the *Shared Asset Guideline* exclude the use of assets used to provide both prescribed transmission services and negotiated transmission services or market network services. TransGrid does not have any assets providing market network services.

12.2 Shared Asset Guideline Requirements

The AER's *Shared Asset Guideline* details the AER's preferred approach to adjusting the maximum allowed revenue to reflect a TNSP's use of shared assets. The suggested methodology in the guideline is non-binding and TransGrid may propose alternative approaches to calculating the cost reduction for approval by the AER. The guideline does

not apply to assets where the approved Cost Allocation Methodology (CAM) has been applied. TransGrid has applied the AER's methodology as detailed in the guideline.

The guideline has a materiality principle, where adjustments are only to be made if non-regulated revenue from shared assets is expected to be greater than 1% of total smoothed revenue. TransGrid's forecast non-regulated revenue from shared assets is less than 1% of smoothed revenue in all years.

12.3 Shared Assets Proposal

TransGrid has identified two main categories of non-regulated services provided using shared assets, as follows.

1. Telecommunications Services. These services account for the majority of TransGrid's non-regulated revenue. TransGrid provides telecommunications services in the following two areas:
    - Leasing of telecommunication facilities: TransGrid provides third party access to its radio communication sites including leasing of tower space for attaching radio transmitters, equipment building space and ground space to locate third party telecommunication assets. TransGrid provides these services to approximately 50 customers including other utilities, government organisations, emergency services and licensed telecommunications carriers. Access is typically provided to emergency services at heavily discounted rents.
    - Leasing of the optical fibre network capacity: TransGrid provides both dark fibre and bandwidth backhaul services to a number of customers, including electricity supply industry members and licensed telecommunications customers. The shared asset in this case is the underlying optical fibre as bandwidth services are provided over terminal equipment funded by the customer.
2. Property Rental. In some circumstances, TransGrid needs to acquire land in excess of what is required for the purposes of construction of transmission lines, as the land owner may be unwilling or unable to subdivide. In other cases, land is purchased for future development requirements. TransGrid may rent these properties, to ensure an efficient and effective use of assets. The nature of lettings includes office accommodation, land used for operational purposes and the letting of surplus land for agricultural and grazing or other purposes. There are also instances where TransGrid grants temporary occupation of land to enable urgent works or in unusual circumstances.

TransGrid has applied the materiality test based on the methodology set out in the final *Shared Asset Guideline*. The total smoothed annual revenue requirement is derived from the PTRM. Non-regulated revenue from shared assets is based on TransGrid's forecast of expected revenue during 2014/15 to 2018/19. In all years, non-regulated revenue from shared assets is below the materiality threshold, that is 1% of the smoothed annual revenue requirement. Therefore, TransGrid proposes that cost reductions should not apply, in accordance with the *Shared Asset Guideline*.

13 Maximum Allowed Revenue

The maximum allowed revenue defines the maximum amount of revenue TransGrid proposes it be allowed to recover in each year of the upcoming regulatory control period.

TransGrid's proposed maximum allowed revenue (MAR) is calculated based on the post-tax building block approach outlined in the National Electricity Rules and the AER's post-tax revenue model.

The pricing methodology approved by the AER is applied to the MAR to calculate prices for TransGrid's transmission customers.

The detailed information substantiating the building block components has been described in the preceding chapters. This chapter summarises the building block approach and presents the resultant maximum allowed revenue and x-factor, along with an indication of the average price path.

13.1 Building Block Approach

The building block components outlined in Clause 6A.5.4 of the Rules, and to be applied in each year of the regulatory control period, are:

MAR = return on capital + return of capital + opex + EBSS + tax allowance

ie, MAR = WACC*RAB + regulatory depreciation + opex + EBSS + tax allowance

where:

MAR – maximum allowed revenue;

WACC – nominal vanilla weighted average cost of capital;

RAB – regulatory asset base;

regulatory depreciation – straight line depreciation less indexation of RAB;

opex – operating expenditure;

EBSS – Efficiency benefit sharing scheme; and

tax allowance – cost of corporate income tax for the regulated business.

TransGrid has applied the AER's building block approach to forecast the revenue requirement. The proposed revenue requirement is then smoothed with an x-factor in accordance with Clause 6A.6.8 of the Rules.

A brief summary for each building block component is set out in the rest of this chapter along with unsmoothed and smoothed revenue requirements.

13.1.1 Regulatory Asset Base

The forecast regulatory asset base over the 2014/15 to 2018/19 period is discussed in detail in Chapter 7 and set out in Table 13.1.

Table 13.1
Forecast Regulatory Asset Base ($m nominal)

RAB	2014/15	2015/16	2016/17	2017/18	2018/19
Opening RAB	6,146.7	6,425.3	6,749.8	6,970.6	7,226.6
Net Capital Expenditure	370.3	431.2	342.4	363.6	254.8
Straight Line Depreciation	-246.9	-268.9	-292.0	-283.6	-303.3
Inflation Adjustment	155.2	162.2	170.4	176.0	182.5
Closing RAB	**6,425.3**	**6,749.8**	**6,970.6**	**7,226.6**	**7,360.6**

Source: TransGrid. Totals may not add due to rounding.

13.1.2 Equity Raising Costs

TransGrid has applied the AER's dividend payout ratio methodology to forecast equity raising costs, and consequently has no allowance for these costs included in this revenue proposal.

13.1.3 Inflation Assumption

TransGrid has applied 2.52% inflation, based on the Reserve Bank of Australia February 2014 monetary policy forecast for 2014/15 and 2015/16 and the midpoint of the target inflation band of 2% to 3% per annum for the following eight years.

13.1.4 Return on Capital

The return on capital is calculated based on applying the post-tax vanilla nominal WACC to the opening RAB in the respective year using the AER's PTRM. The calculation of the WACC of 8.83% is discussed in Chapter 8.

The forecast return on capital for the 2014/15 to 2018/19 period is shown in Table 13.2.

Table 13.2
Return on Capital ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19	Total
Opening RAB	6,146.7	6,425.3	6,749.8	6,970.6	7,226.6	
Return on Capital	542.8	567.4	596.1	615.6	638.2	2,960.2

Source: TransGrid.

13.1.5 Regulatory Depreciation

The calculation of regulatory depreciation is discussed in detail in Chapter 10. The forecast regulatory depreciation is derived from the AER's PTRM. A summary of the forecast depreciation for the 2014/15 to 2018/19 period is shown in Table 13.3.

Table 13.3
Depreciation Forecast ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19	Total
Regulatory Depreciation	91.7	106.7	121.6	107.5	120.9	548.4

Source: TransGrid.

13.1.6 Operating Expenditure

Operating expenditure is discussed in Chapter 6. The forecast operating expenditure for the 2014/15 to 2018/19 period is summarised in Table 13.4.

Table 13.4
Operating Expenditure Forecast ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19	Total
Controllable Operating Expenditure	173.2	185.1	195.2	192.9	198.9	945.3
Debt Raising Costs	7.4	7.8	8.2	8.4	8.7	40.6
Insurance	6.1	6.8	7.6	8.5	9.5	38.4
Self Insurance	0.0	0.0	0.0	0.0	0.0	0.0
Network Support	5.5	6.6	7.8	8.7	9.6	38.2
Total	192.2	206.3	218.7	218.5	226.7	1,062.4

Source: TransGrid. Totals may not add due to rounding.

13.1.7 Efficiency Benefit Sharing Scheme

The Efficiency benefit sharing scheme (EBSS) is discussed in Chapter 14. A summary of the efficiency carryover amounts is set out in Table 13.5.

Table 13.5
Efficiency Carryover ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19	Total
EBSS Carryover	21.0	6.5	8.7	17.6	0.0	53.7
ECFM Adjustment	0.0	5.6	5.8	5.9	0.0	17.3
Total Efficiency Carryover	**21.0**	**12.1**	**14.5**	**23.5**	**0.0**	**71.1**

Source: TransGrid. Totals may not add due to rounding.

13.1.8 Corporate Tax Allowance

The forecast corporate tax allowance is discussed in Chapter 11. The proposed corporate tax allowance is shown in Table 13.6.

Table 13.6
Corporate Tax Allowance ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19	Total
Tax Allowance	44.6	48.1	68.0	69.6	72.9	303.3

Source: TransGrid. Totals may not add due to rounding.

13.2 Maximum Allowed Revenue

TransGrid's proposed unsmoothed revenue requirement for each year of the regulatory control period is calculated as the sum of the building block components. Based on the building blocks outlined in the previous sections, the proposed unsmoothed revenue requirement for 2014/15 to 2018/19 is shown in Table 13.7.

Table 13.7
Unsmoothed Revenue Requirement ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19	Total
Return on Capital	542.8	567.4	596.1	615.6	638.2	2,960.2
Return of Capital (Regulatory Depreciation)	91.7	106.7	121.6	107.5	120.9	548.4
Operating Expenditure	192.3	206.3	218.7	218.5	226.7	1,062.4
Efficiency Carryover	21.0	12.1	14.5	23.5	0.0	71.1
Net Tax Allowance	44.6	48.1	68.0	69.6	72.9	303.3
Annual Building Block Revenue Requirement (Unsmoothed)	**892.4**	**940.7**	**1,018.9**	**1,034.8**	**1,058.7**	**4,945.4**

Source: TransGrid. Totals may not add due to rounding.

13.3 Smoothed Maximum Allowed Revenue

The unsmoothed revenue requirement is required to be smoothed with an x-factor, in accordance with Clause 6A.6.8 of the Rules. TransGrid has proposed x-factors which meet the requirements of the Rules that the smoothed MAR is equal to net present value (NPV) of the annual building block revenue requirement, while ensuring that the expected MAR for the last regulatory year is as close as reasonably possible to the annual building block revenue requirement.

TransGrid has forecast smoothed revenue over four years, consistent with its proposal for a four year regulatory control period. However, to enable the AER to assess the length of the regulatory control period, a forecast of smoothed revenue over five years is also provided below.

13.3.1 Four Year Regulatory Control Period

The smoothed revenue requirement and x-factor over a four year regulatory control period are shown in Table 13.8.

Table 13.8
Smoothed Revenue Requirement ($m nominal)

	2014/15	2015/16	2016/17	2017/18	Total
Unsmoothed Revenue	892.4	940.7	1,018.9	1,034.8	3,886.8
Smoothed Revenue	932.9	956.5	980.7	1,005.4	3,875.5
X-factor	2.59%	0.00%	0.00%	0.00%	

Source: TransGrid.

13.3.2 Five Year Regulatory Control Period

The smoothed revenue requirement and x-factor over a five year regulatory control period are shown in Table 13.9.

Table 13.9
Smoothed Revenue Requirement ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19	Total
Unsmoothed Revenue	892.4	940.7	1,018.9	1,034.8	1,058.7	4,945.4
Smoothed Revenue	937.4	961.1	985.3	1,010.2	1,035.7	4,929.8
X-factor	2.13%	0.00%	0.00%	0.00%	0.00%	

Source: TransGrid.

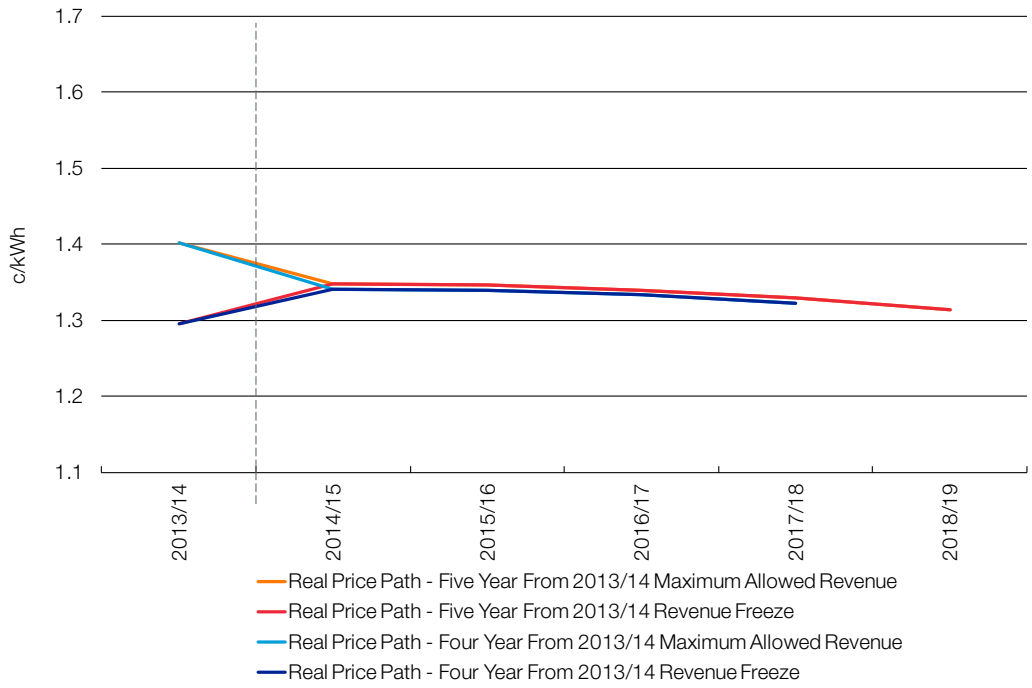
13.4 Average Price Path

TransGrid determines its transmission charges based on the AER's approved revenue and the pricing principles in Clause 6A.23 of the Rules. The average price path is estimated using the AER's PTRM, by dividing the revenue requirement by the energy delivered in New South Wales forecast by AEMO.[162] Price movements for individual customers may vary depending on usage and location.

To minimise price rises for consumers, TransGrid has ensured its smoothed revenue forecast is no higher than CPI for the upcoming regulatory control period. As a result of the forecasts in this revenue proposal, the prices represent a 4% real decrease from the maximum allowed revenue in 2013/14 to 2014/15, followed by price changes below CPI over the remaining years. They represent a 3.5% real increase from TransGrid's revenue freeze in 2013/14 to 2014/15, followed by price changes below CPI over the remaining years.

The average price path over both four year and five year periods, from TransGrid's maximum allowed revenue and the revenue following the revenue freeze in 2013/14, is shown in Figure 13.1.

Figure 13.1
Average Price Path ($ 2013/14)



Source: TransGrid.

[162] AEMO, *National Electricity Forecasting Report*, 2013 and *2013 National Electricity Forecasting Report Update*, November 2013.

13.5 Revenue Cap Adjustments

In accordance with the Rules, TransGrid's revenue cap determined by the AER will be subject to adjustment during the regulatory control period as follows:

- the revenue cap is calculated each year using actual CPI;
- network support costs are treated as a pass through cost. Clause 6A.7.2 of the Rules requires that any changes in network support costs will be subject to a pass through application. The application will seek to vary the annual MAR each year based on the difference between forecast and actual network support expenditure;
- Clause 6A.7.3 of the Rules allows the pass through of other approved costs related to:
    1. regulatory change event;
    2. service standard event;
    3. tax change event;
    4. insurance event; and
    5. any other event specified in a transmission determination as a pass through event for the determination; and
- Clause 6A.8.2 of the Rules allows amendment of the revenue determination for contingent projects. Contingent projects are discussed in Section 5.3.7. If a trigger event for a contingent project occurs, TransGrid will assess the projects using the RIT-T, where applicable, and lodge an application to the AER requesting a revised MAR in accordance with Clause 6A.8.2 of the Rules.

14 Efficiency Benefit Sharing Scheme

The efficiency benefit sharing scheme provides incentives for transmission network service providers to make ongoing efficiency improvements in operating expenditure.

TransGrid has responded to the commercial drivers for cost control and the incentives provided by the efficiency benefit sharing scheme (EBSS). In the 2009/10 to 2013/14 regulatory control period, TransGrid has pursued efficiencies throughout its business, and as such has achieved an operating expenditure below the allowance set in the 2009/10 to 2013/14 revenue determination.

This chapter discusses TransGrid's historical EBSS performance and a carryover from the previous efficiency carry forward mechanism (ECFM) that applied in the 2004/05 to 2008/09 regulatory control period.

It also proposes the application of the EBSS to TransGrid in the upcoming regulatory control period.

14.1 Version of the Scheme

In the current regulatory control period, TransGrid is subject to version 1 of the EBSS, as set out in the *Electricity Transmission Network Service Providers Efficiency Benefit Sharing Scheme – September 2007*. This version applies to the efficiency carryover from the current regulatory control period to the upcoming regulatory control period.

From 2014/15, TransGrid will be subject to version 2 of the EBSS. This version will apply to the efficiency carryover from the upcoming regulatory period to the regulatory control period after the upcoming regulatory control period.

14.2 Historical Performance

TransGrid's targets for the EBSS in the current regulatory control period were set in the 2009/10 to 2013/14 revenue determination.

In the current regulatory control period, growth in peak demand has been lower than that forecast at the time of the 2009/10 to 2013/14 revenue determination. In response, TransGrid has deferred over $600 million of capital expenditure and the additional operating expenditure arising from growth in the size of the network has been less than that forecast.

TransGrid proposes an adjustment to its EBSS targets for the 2009/10 to 2013/14 regulatory control period, such that the targets reflect the actual demand rather than the previously forecast demand. This ensures that the EBSS provides a sharing of genuine efficiencies and excludes windfall benefits from the reduction in demand.

TransGrid confirms that there has been no change to its capitalisation policy during the current regulatory control period.

TransGrid's performance against the adjusted EBSS targets in the 2009/10 to 2013/14 revenue determination are shown in Table 14.1. TransGrid has adjusted the actual operating expenditure for EBSS purposes to add $2 million for uncompleted easement maintenance in 2012/13, commensurate with a proposed adjustment to reinstate this expenditure to establish an efficient base year from which to forecast operating expenditure. The adjustment is described in more detail in Section 6.3.1.

This results in the carryover amounts shown in Table 14.2.

Table 14.1
Historical EBSS Performance ($m nominal)

	2009/10	2010/11	2011/12	2012/13	2013/14
EBSS Target	120.7	134.8	141.7	153.8	159.6
EBSS Target Adjusted for Change in Peak Demand	120.7	134.7	141.2	152.1	157.6
Actual/Expected Operating Expenditure under EBSS	108.0	123.3	136.9	132.5	137.4

Source: TransGrid.

Table 14.2
EBSS Carryover ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19
EBSS Carryover	21.0	6.5	8.7	17.6	0.0

Source: TransGrid.

14.3 Efficiency Carryover from Previous Regulatory Control Period

In the 2004/05 to 2008/09 regulatory control period, a predecessor to the EBSS, the efficiency carry forward mechanism, applied to TransGrid. At the time of the 2009/10 to 2013/14 revenue determination, the last year of the regulatory control period, 2008/09, had not yet been completed and therefore, the actual expenditure in this year was unknown.

In TransGrid's 2009/10 to 2013/14 revenue determination, the AER used TransGrid's budgeted expenditure for 2008/09 to calculate the carryover under the ECFM, and provided for an adjustment to be made to substitute actual expenditure in the next revenue determination. The allocation of the adjustment within the upcoming regulatory control period will be determined with regard to the magnitude of the adjustment amount and potential price volatility impacts. The AER noted two potential approaches: to make the

adjustment entirely in 2014/15, or throughout all years of the upcoming regulatory control period.[163]

In its submission on TransGrid's transitional revenue proposal, Major Energy Users (MEU) requested that TransGrid's efficiency carryover be smoothed over the regulatory control period, rather than predominantly in the first year. While the timing of the EBSS gain or loss is set by the carryover arrangement, the timing of the ECFM adjustment is not subject to the same arrangement and is subject to some discretion.

TransGrid proposes to make the ECFM adjustment evenly throughout years two to four of the upcoming regulatory control period,[164] to address consumers' preference to smooth the overall efficiency carryover over the period. This leads to the adjustments shown in Table 14.3.

Table 14.3
ECFM Adjustment ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19
ECFM Adjustment	0.0	5.6	5.8	5.9	0.0

Source: TransGrid.

14.4 Proposed Application

In the upcoming regulatory control period, TransGrid will be subject to the *Efficiency Benefit Sharing Scheme for Electricity Network Service Providers – November 2013*. This is a non-binding guideline[165] that is applied in the framework and approach paper, which is also non-binding.[166]

TransGrid proposes to apply the EBSS as set out in the EBSS guideline to operating expenditure categories that are forecast based on revealed costs, consistent with the design of the scheme.

TransGrid proposes to apply an alternative efficiency sharing mechanism to major operating projects (MOPS). Major operating projects are more similar in nature to capital projects than operating expenditure, and TransGrid estimates them accordingly using a zero-based portfolio approach. A zero-based approach is best suited to forecasting major operating projects, as a trend based approach may under or over forecast the efficient costs required to meet the operating expenditure objectives. Consequently, an efficiency sharing mechanism similar to that of the capital expenditure sharing scheme is more appropriate for this class of projects.

TransGrid proposes to exclude non-controllable operating expenditure categories, employee entitlements and specific allowances from its EBSS targets. This is because these categories are largely outside of TransGrid's control, and are forecast based on a benchmark firm or market rates.

[163] AER, *Draft Decision: TransGrid Transmission Determination 2009-10 to 2013-14*, 31 October 2008, pp152-153.
[164] As TransGrid is requesting a four year regulatory control period, it proposes to smooth the ECFM carryover over years two to four rather than years two to five. It proposes to smooth the adjustment evenly in real dollar terms.
[165] *National Electricity Rules*, Clause 6A.2.3(c).
[166] *National Electricity Rules*, Clause 6A.10.1A(f).

14.4.1 Application to Revealed Cost Expenditure

TransGrid proposes the application of the EBSS as set out in the EBSS guideline to the operating expenditure categories that are forecast based on revealed costs. This includes all operating expenditure other than major operating projects and proposed exclusions.

The proposed targets for revealed cost expenditure are shown in Table 14.4.

Table 14.4
EBSS Targets for Revealed Cost Expenditure ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19
Operating Expenditure	**192.2**	**206.3**	**218.7**	**218.5**	**226.7**
Debt Raising Costs	-7.4	-7.8	-8.2	-8.4	-8.7
Insurance	-6.1	-6.8	-7.6	-8.5	-9.5
Self Insurance	-0.0	-0.0	-0.0	-0.0	-0.0
Network Support	-5.5	-6.6	-7.8	-8.7	-9.6
Demand Management Innovation Allowance	-2.2	-3.6	-4.7	-5.2	-4.1
Employee Entitlements	-20.3	-19.9	-19.3	-21.0	-20.4
Network Capability Incentive	-0.0	-0.0	-0.0	-0.0	-0.0
Major Operating Projects	-9.1	-12.1	-14.0	-6.2	-6.2
EBSS Targets for Revealed Cost Efficiency Benefit Sharing Scheme	**141.7**	**149.5**	**157.1**	**160.6**	**168.1**

Source: TransGrid. Totals may not add due to rounding.

14.4.2 Application to Major Operating Projects

Major operating projects are more similar in nature to capital projects than operating expenditure, and TransGrid estimates them using a zero-based portfolio approach rather than a revealed cost approach. Because they are not forecast based on revealed costs and the total expenditure can vary from year to year, TransGrid considered the standard EBSS carryover mechanism unsuitable for this operating expenditure category.

The EBSS provides for categories of expenditure that are not forecast from revealed costs to be excluded from the scheme. While this is appropriate in many cases, the exclusion of major operating projects altogether would create an imbalance between incentives on operating expenditure and capital expenditure. Therefore, TransGrid considers that the inclusion of major operating projects in the scheme using a sharing mechanism that suits their forecasting approach would best satisfy the national electricity objective.

TransGrid proposes an efficiency sharing mechanism for MOPS that is suited to a zero-based forecasting approach, and provides the same sharing ratio as the EBSS mechanism for revealed cost expenditure. The mechanism is shown in Table 14.5, and developed in more detail in the advice from Incenta Economic Consulting attached as Appendix AE.

Table 14.5
Proposed EBSS for Zero-Based Expenditure

Year	1	2	3	4	5	6	7	8	9	10	11
Forecast	F_1	F_2	F_3	F_4	F_5						
Actual	A_1	A_2	A_3	A_4	A_5						
Underspend	F_1-A_1	F_2-A_2	F_3-A_3	F_4-A_4	F_5-A_5						
EBSS Carryover							-F_1+A_1	-F_2+A_2	-F_3+A_3	-F_4+A_4	-F_5+A_5

Source: TransGrid.

The proposed targets for zero based expenditure are shown in Table 14.6.

Table 14.6
EBSS Targets for Zero-Based Expenditure ($m nominal)

	2014/15	2015/16	2016/17	2017/18	2018/19
Major Operating Projects	9.1	12.1	14.0	6.2	6.2

Source: TransGrid.

14.4.3 Exclusions

TransGrid proposes to exclude non-controllable operating expenditure categories, employee entitlements and specific allowances from its EBSS targets. The proposed exclusions are:

- debt raising costs;
- insurance;
- self insurance;
- network support;
- demand management innovation allowance;
- employee entitlements; and
- operating expenditure under the network capability incentive.

14.4.4 Carryover Period

TransGrid proposes a five year carryover period for the EBSS, in order to maintain a sharing ratio of approximately 30% (to TransGrid) to 70% (to consumers). This is consistent with the EBSS guideline and maintains a sharing ratio consistent with other incentives, including the CESS and STPIS.

15 Capital Expenditure Sharing Scheme

The capital expenditure sharing scheme provides incentives for transmission network service providers to deliver efficient capital expenditure.

15.1 Version of the Scheme

From 2015/16,[167] TransGrid will be subject to the capital expenditure sharing scheme (CESS) in the *Capital Expenditure Incentive Guideline for Electricity Network Service Providers – November 2013*. This is a non-binding guideline[168] that is applied in the framework and approach paper, which is also non-binding.[169]

15.2 Proposed Application

TransGrid proposes to apply the CESS using the mechanism set out in the CESS guideline.

15.2.1 Exclusions

TransGrid proposes to exclude employee entitlements and specific allowances from the CESS, consistent with the proposal for the EBSS. This is important to ensure balanced incentives between operating expenditure and capital expenditure, such that the incentives do not favour one type of expenditure over the other. The proposed exclusions are:

- equity raising costs;
- demand management innovation allowance, where expenditure under the allowance is classified as capital expenditure;
- employee entitlements; and
- capital expenditure under the network capability incentive.

[167] *National Electricity Rules*, Clause 11.58.3(a)(2).
[168] *National Electricity Rules*, Clause 6A.2.3(c).
[169] *National Electricity Rules*, Clause 6A.10.1A(f).

16 Service Target Performance Incentive Scheme

The service target performance incentive scheme provides incentives for transmission network service providers to improve and maintain the performance of the network.

TransGrid has participated in the service target performance incentive scheme (STPIS) since 2004. It has responded to the incentives to maintain or improve reliability under the service component, and has responded to reduce transmission congestion during equipment outages under the market impact component.

From July 2014, TransGrid will participate in the new network capability component, which provides an incentive to improve network capability for the benefit of consumers.

16.1 Version of the Scheme

In the current regulatory control period, TransGrid is subject to version 2 of the STPIS. This version is comprised of the service component and market impact component.

In 2014/15, TransGrid will be subject to transitional arrangements as set out in the AER's position paper, *Service Target Performance Incentive Scheme for Transmission Businesses: Early Application of Version 4* and given effect in the framework and approach paper for this revenue proposal. The transitional arrangements apply version 2 of the service component, version 4 of the market impact component and version 4 of the network capability component in 2014/15.

From 2015/16, TransGrid will be subject to version 4 of the STPIS in its entirety. This includes a revised service component, revised market impact component and the new network capability component.

16.2 Historical Performance

16.2.1 Service Component

TransGrid has been subject to the service component of the STPIS for 10 years. The service component measures the availability and reliability of the transmission network.

TransGrid operates its network in a manner consistent with the incentives offered by the service component. TransGrid:

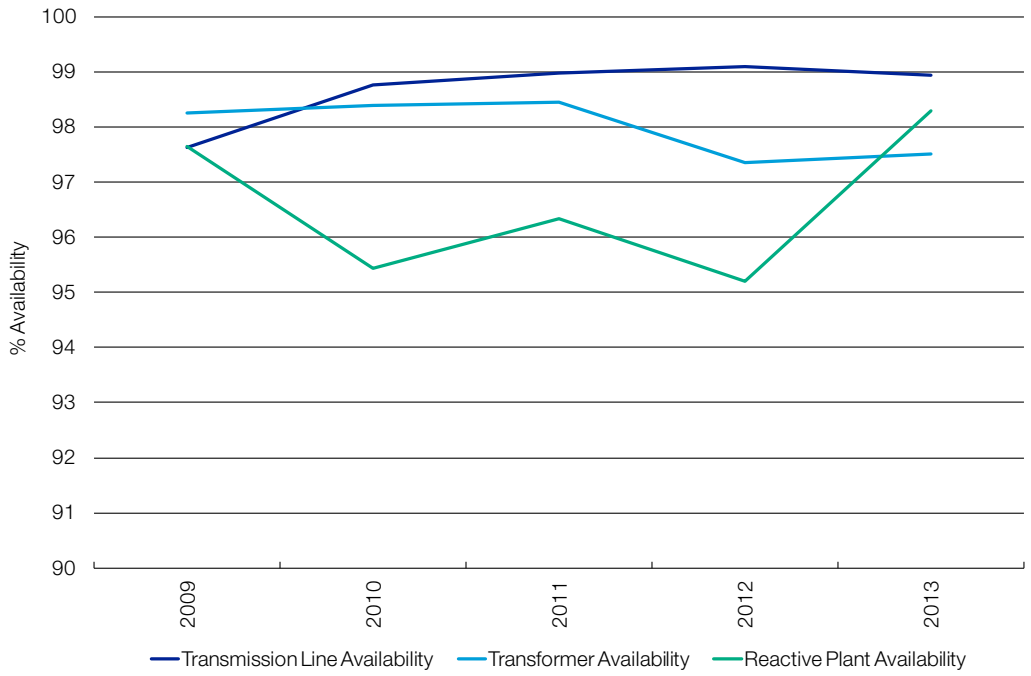
- regularly reviews the performance of its network and responds to trends that affect network reliability as they emerge;
- plans outages to minimise the impact on customers, that is, at the time of year and time of day that has least impact;
- coordinates work on the same equipment in the same outage where possible; and
- responds as soon as possible to restore equipment to service following an unplanned outage.

Transmission Circuit Availability

The transmission circuit availability parameter is an aggregate measure of the percentage of time equipment is available for service. While the incentive is to ensure that equipment is available for service as much as possible, this parameter has historically counted outages for maintenance and capital works as equipment being unavailable. Therefore, a result of 100% is inherently unachievable (and undesirable), as equipment outages are required for maintenance and capital works and most are scheduled such that they have no impact on electricity consumers.

The transmission circuit availability parameter has three sub-parameters measuring performance for different categories of equipment: transmission lines, transformers and reactive plant. TransGrid's performance against these sub-parameters is shown in Figure 16.1.

Figure 16.1
Transmission Circuit Availability Performance



Source: TransGrid.

TransGrid operates its network so that equipment is available for service as much as possible. The majority of the difference between the performance levels and 100% is due to planned outages for maintenance and capital works.

Loss of Supply Event Frequency

The loss of supply event frequency parameter counts the number of events in TransGrid's system that black out customers. It has two sub-parameters, which measure small and large events that have been sized based on the historical performance of TransGrid's network. The parameter is measured in system minutes, which is a measure of the amount of energy not supplied normalised for the peak demand on the network.

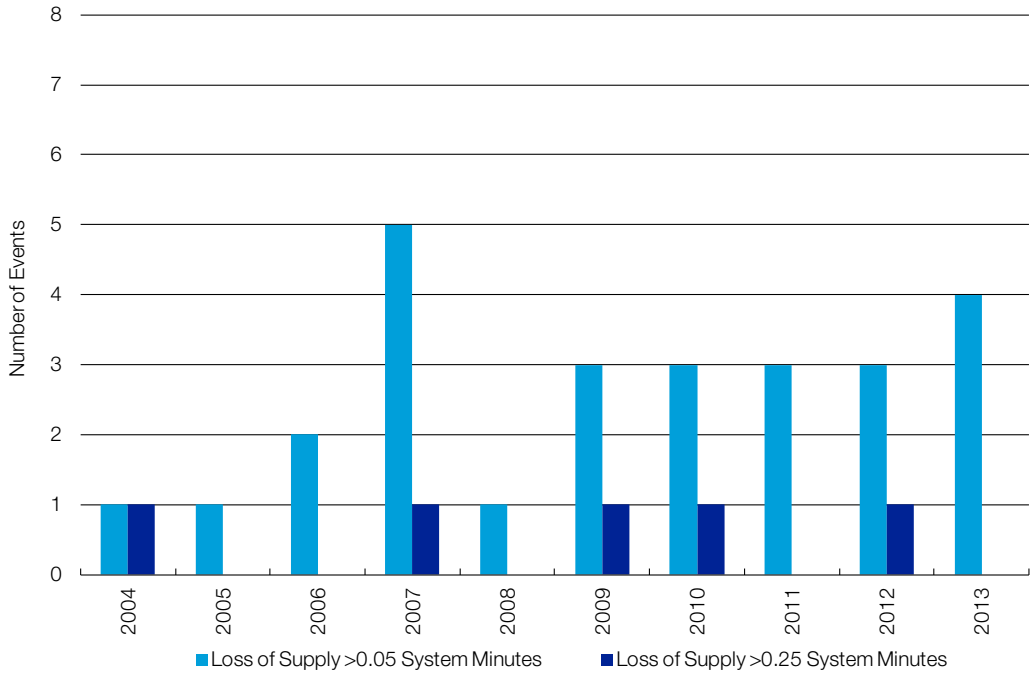
The small loss of supply event frequency sub-parameter counts the number of events that result in energy not supplied of more than 0.05 system minutes. This is the equivalent to an outage of approximately 40 minutes for a mid-size country town or 1 minute for the Sydney CBD.

The large loss of supply event frequency sub-parameter counts the number of events that result in energy not supplied of more than 0.25 system minutes. This is the equivalent to an outage of approximately 3½ hours for a mid-size country town or 5 minutes for the Sydney CBD.

A large loss of supply event also counts as a small loss of supply event.

TransGrid's performance against these sub-parameters is shown in Figure 16.2. Performance is shown over a 10 year period as the statistical nature of this parameter and small number of events mean that a longer period more suitably reflects the performance of the network.

Figure 16.2
Loss of Supply Event Frequency Performance



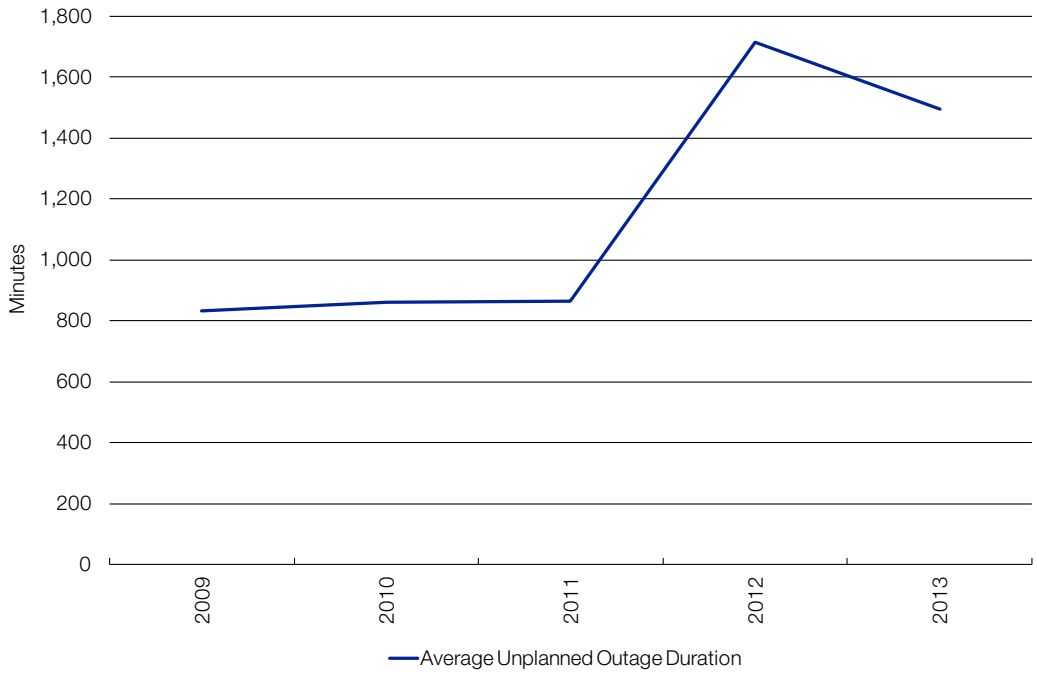
Source: TransGrid.

Average Outage Duration

The average outage duration measures the average restoration time for unplanned equipment outages. Most outages do not affect consumers. However, the parameter includes all unplanned outages to reduce the risk of multiple simultaneous events leading to blackouts.

TransGrid's performance against this parameter is shown in Figure 16.3.

Figure 16.3
Average Outage Duration Performance



Source: TransGrid.

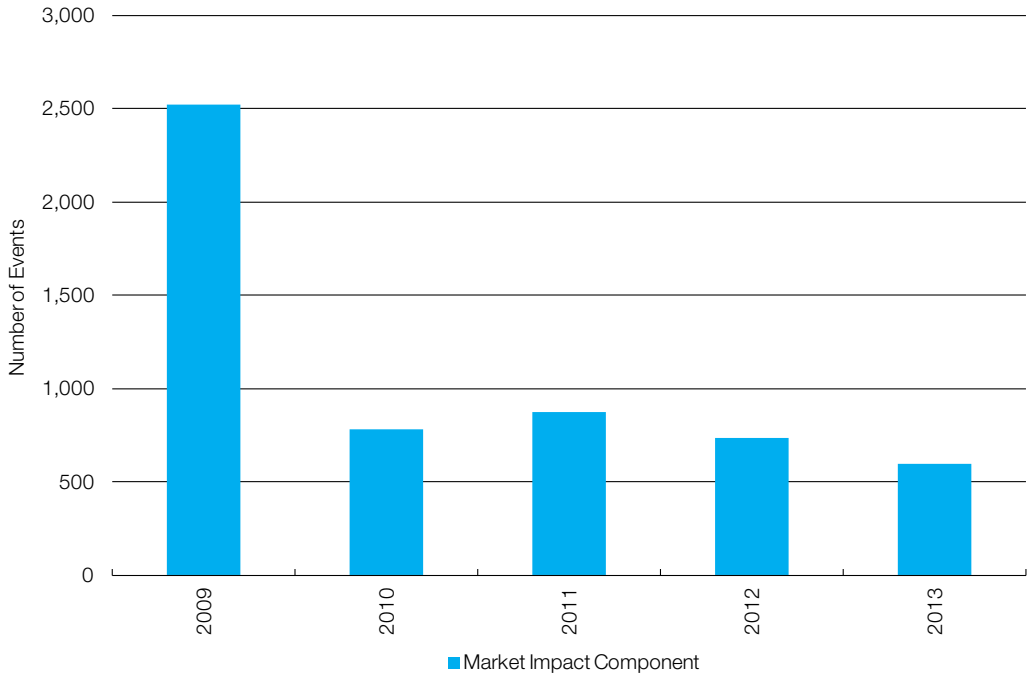
16.2.2 Market Impact Component

The market impact component measures the impact of transmission network outages on the wholesale electricity market price. This may occur when an outage reduces the available capacity between low cost generation and customer loads, such that higher cost generation needs to be dispatched to supply load.

Performance against the component is measured by the number of dispatch intervals where a transmission outage results in an increase in the spot market price by more than $10/MWh.

TransGrid's performance against the market impact component is shown in Figure 16.4.

Figure 16.4
Market Impact Component Performance



Source: TransGrid.

TransGrid has responded to the market impact component since its introduction in 2009 by:

- planning outages for times when they are unlikely to cause a market impact, that is, at the time of year and time of day that is least likely to have a market impact;
- planning outages around outages of market participants, such as generators;
- providing sufficient notice to the market to enable participants to make mitigating financial arrangements;
- rescheduling outages if market impacts emerge in the lead-up to or at the time of the outage;
- monitoring market constraints in real time in the control room, in order to be able to respond quickly through operational measures or by recalling outages;
- replacing equipment with higher rated equipment, where economically feasible; and
- using short-time ratings, such as 15 minute ratings, where feasible.

16.3 Proposed Application

16.3.1 Service Component

Average Circuit Outage Rate, Loss of Supply Event Frequency and Average Outage Duration

TransGrid has used the approach set out in the STPIS guideline to calculate targets, caps and collars for the service component of the STPIS. This approach is to set the target as the

historical average performance for each sub-parameter, and to set caps and collars in relation to the target.

TransGrid engaged PB to review its historical performance under the sub-parameters in version 4 of the STPIS, determine statistical distributions that best fit its historical performance under each sub-parameter, and use these statistical distributions to propose caps and collars. The details of PB's analysis are attached as Appendix AF.

Proper Operation of Equipment

The proper operation of equipment parameter was introduced in version 4 of the STPIS as a reporting-only parameter.[170] Accordingly, TransGrid does not propose values for the parameter for the upcoming regulatory control period, but will commence reporting against this parameter from July 2015.

Summary

A summary of the proposed targets, caps and collars for the service component is shown in Table 16.1.

The weightings applied are those that have been set in the STPIS guideline.

Table 16.1
Proposed Service Component Values

Parameter	Collar	Target	Cap	Weighting
Average Circuit Outage Rate				
Line Outage – Fault	22.46%	17.86%	13.26%	0.20
Transformer Outage – Fault	20.26%	14.92%	9.58%	0.20
Reactive Plant Outage – Fault	23.32%	15.54%	7.76%	0.10
Line Outage – Forced	30.48%	14.98%	0.00%	0
Transformer Outage – Forced	25.51%	20.25%	14.99%	0
Reactive Plant Outage – Forced	33.57%	20.39%	7.21%	0
Loss of Supply Event Frequency				
> 0.05 System Minutes	5	3	1	0.15
> 0.25 System Minutes	3	1	0	0.15
Average Outage Duration	284.25	144.49	4.73	0.20
Proper Operation of Equipment	N/A	N/A	N/A	0

Source: PB and TransGrid.

16.3.2 Market Impact Component

From 2014/15, the market impact component in version 4 of the STPIS will apply to TransGrid.

[170] AER, *Final Decision: Electricity Transmission Network Service Providers Service Target Performance Incentive Scheme*, December 2012, p20.

Under this version of the market impact component, targets are set based on a rolling three year average of historical performance. Therefore, TransGrid understands that the targets will be set in the annual STPIS performance review process rather than in the revenue determination.

16.3.3 Network Capability Component

From 2014/15, the network capability component in version 4 of the STPIS will apply to TransGrid.

The network capability component measures improvements in the capability of transmission assets through operating expenditure and minor capital expenditure on a TNSP's network that results in:

- improved capability of those elements of the transmission system most important to determining spot prices; or
- improved capability of the transmission system at times when Transmission Network Users place greatest value on the reliability of the transmission system.[171]

The parameter has been designed to benefit both consumers and market participants, as described in the AER's draft decision to introduce the component.[172]

TransGrid's normal planning practice includes the identification of low cost solutions to improve network capability. In the previous and current regulatory control periods, TransGrid has undertaken numerous low cost projects that have improved the capability of its network, supporting the wholesale electricity market by reducing network constraints or benefiting consumers by deferring the need for higher cost capital projects.

To allow this component to apply from 2014/15, TransGrid submitted a Network Capability Incentive Parameter Action Plan (NCIPAP) with its transitional revenue proposal in January 2014. The NCIPAP is also attached to this proposal as Appendix AG.

[171] AER, *Final Electricity Transmission Network Service Providers Service Target Performance Incentive Scheme*, December 2012, p11.
[172] AER, *Explanatory Statement: Electricity Transmission Network Service Providers Draft Service Target Performance Incentive Scheme*, September 2012.

17 Pass Through Events

Cost pass through arrangements provide for adjustments to the allowed revenue if a non-controllable predefined event occurs that leads to a material change in TransGrid's costs.

This chapter presents the identified risks that TransGrid proposes be treated as cost pass through events for the upcoming regulatory control period.

17.1 National Electricity Rules Requirements

Clause 6A.7.3 of the Rules gives TNSPs the ability to nominate specific pass through events as part of their revenue proposals. The AER must take into account the nominated pass through event considerations in determining whether to accept the nominated pass through events.

17.2 Cost Forecasting Approach

TransGrid has sought advice from Marsh's insurance practice on the risks TransGrid faces, and the feasibility and cost of addressing these material risks via general insurance. Marsh's actuaries have assessed the possibility of addressing non-insurable risks via self insurance, or pass through where it is not possible to calculate the self insurance premiums.

Marsh's report covers the likely range of events that TransGrid faces which would not be cost-effectively insurable in the commercial market. TransGrid has not included the costs estimated by Marsh for self insurance as TransGrid's current insurance coverage through SICorp is relatively comprehensive, but notes that TransGrid will face these costs should it no longer have access to the NSW Government's self insurance fund through SICorp. This approach is discussed in more detail in Section 6.3.4.

17.3 Pass Through Events

Clause 6A.7.3 of the Rules provides the following list of prescribed pass through events:

- regulatory change event;
- service standard event;
- tax change event;
- insurance event; and
- any other event specified in a transmission determination as a pass through event for the determination.

The Rules give TNSPs the ability to nominate additional pass through events as part of their revenue proposals.

TransGrid proposes that the events set out in Table 17.1 should be treated as additional pass through events, providing their cost exceeds the materiality threshold defined in the Rules.

“Terrorism event” is to apply to the transitional year 2014/15 in accordance with Clause 11.58.3(4) of the Rules, and has been included as one of the nominated pass through events for the remaining years of the upcoming regulatory control period.

The AER must take into account the nominated pass through event considerations in Chapter 10 of the Rules when determining whether to accept TransGrid’s nominated pass through events. TransGrid considers that the nominated pass through events are consistent with these considerations and the intent of the Rules, and confirms that they have been assessed by qualified actuaries as not being possible to calculate a reliable self insurance premium, nor are they insurable events.

It should be noted that while TransGrid is able to continue accessing the NSW Government’s self insurer, SICorp, then TransGrid has uncapped insurance coverage for most events. Under these circumstances, the insurance cap event could not be triggered. However, should TransGrid lose access to SICorp and be required to purchase insurance in the general insurance market, then the insurance cap event will become applicable.

Table 17.1
Nominated Pass Through Events

Pass Through Event	Definition
Insurance cap event	1. TransGrid makes a claim or claims and receives a payment or payments under a relevant insurance policy; 2. TransGrid incurs costs beyond the relevant policy limit; and 3. the cost beyond the relevant policy limit materially increases the cost to TransGrid of providing prescribed transmission services.
Terrorism event	An act (including, but not limited to, the use of force or violence or the threat of force or violence) of any person or group of persons (whether acting alone or on behalf of in connection with any organisation or government), which from its nature or context is done for, or in connection with, political, religious, ideological, ethnic or similar purposes or reasons (including the intention to influence or intimidate any government and/or put the public, or any section of the public, in fear) and which materially increases the costs to TransGrid of providing prescribed transmission services or the costs of providing direct control services.
Insurer default	Default of an insurer from which TransGrid is unable to recover its outstanding insurance claims.
Cyber-related external attack	Cyber-related external attack resulting in direct or third party losses to TransGrid.
Gradual environmental contamination event	TransGrid is exposed to a number of environmental risks, each of which could lead to a range of legal and financial consequences for TransGrid. This may include settlement of claims by an individual or group of individuals who have suffered health effects or financial losses, legal costs associated with negotiating that settlement, and the cost of remediation of any contaminated site.

Glossary

Acronym/Term	Definition
ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ASX	Australian Securities Exchange
ATO	Australian Taxation Office
AWE	Average Weekly Earnings
Capex	Capital Expenditure
CAPM	Capital Asset Pricing Model
CBD	Central Business District
CESS	Capital Expenditure Sharing Scheme
CGS	Commonwealth Government Securities
CIGRE	International Council on Large Electrical Systems
CPI	Consumer Price Index
CUARP	Communications Upgrade and Replacement Project
DG	Decision Gate
DNSP	Distribution Network Service Provider
EBSS	Efficiency Benefit Sharing Scheme
ECFM	Efficiency Carry Forward Mechanism
EGWWS	Electricity, Gas, Water and Waste Services
ENA	Energy Networks Association
ERA	Economic Regulation Authority of Western Australia
EUAA	Energy Users Association of Australia

Acronym/Term	Definition
FTE	Full Time Equivalent
GIS	Gas Insulated Switchgear
Guideline	Rate of Return Guideline
GWh	Giga Watt Hour
ICT	Information, Operating and Communications Technology
IPART	Independent Pricing and Regulatory Tribunal
IT	Information Technology
ITAMS	International Transmission Asset Management Study
ITOMS	International Transmission Operations and Maintenance Study
kV	Kilo Volts
kW	Kilo Watt
kWh	Kilo Watt Hours
MAR	Maximum Allowed Revenue
MOPS	Major Operating Projects
MRP	Market Risk Premium
MVA	Mega Volt Amps
MW	Mega Watt
MWh	Mega Watt Hours
NCIPAP	Network Capability Incentive Parameter Action Plan
NEM	National Electricity Market
NERA	NERA Economic Consulting
NSW	New South Wales
NZ	New Zealand
OFGEM	Office of Gas and Electricity Markets in the UK
OHS	Occupational Health and Safety
Opex	Operating Expenditure
PAS 55	Publicly Available Specification 55 (Asset Management)
PB	Parsons Brinckerhoff
PoE	Probability of Exceedance
PTRM	Post-Tax Revenue Model
Qld	Queensland
QNI	Queensland to New South Wales Interconnector

Acronym/Term	Definition
RAB	Regulatory Asset Base
RBA	Reserve Bank of Australia
RIIO-T1	Revenue = Incentives + Innovation + Outputs Transmission Price Control 1 in the UK
RIN	Regulatory Information Notice
RIT-T	Regulatory Investment Test for Transmission
Rules	National Electricity Rules
SORI	Statement of Regulatory Intent on WACC Parameters
STPIS	Service Target Performance Incentive Scheme
SA	South Australia
SCADA	Supervisory Control and Data Acquisition
SF_6	Sulfur Hexafluoride
SICorp	NSW Self Insurance Corporation
SKM	Sinclair Knight Merz
STPIS	Service Target Performance Incentive Scheme
TAPR	Transmission Annual Planning Report
Tas	Tasmania
TMF	Treasury Managed Fund
TNSP	Transmission Network Service Provider
TUOS	Transmission Use of System
TW	Tera Watt
TWh	Tera Watt Hour
UK	United Kingdom
US	United States
Vic	Victoria
WACC	Weighted Average Cost of Capital
WPI	Wage Price Index

Appendices

Appendix	Topic	Author
A	Submission Checklist	TransGrid
B	Directors' Certification of Reasonableness of Key Assumptions	TransGrid
C	Network Vision	TransGrid
D	Asset Management Policy	TransGrid
E	Network Development Strategy	TransGrid
F	Summary of Consultation on Five Year Plan	Newgate Research
G	Qualitative Research Report	Newgate Research
H	Labour Escalation Forecast	BIS Shrapnel
I	Commodity Price Escalation Forecast	SKM
J	Property Value Escalation Forecast	BIS Shrapnel
K	Review of Network Investment Plans and Supporting Documents	GHD
L	Contingent Projects	TransGrid
M	Estimating Risk Assessment	Evans & Peck
N	Capital Cost Estimating Review	SKM
O	2013 Success Estimating Database – Benchmarking Summary	TransGrid
P	Network Map	TransGrid
Q	Efficiency Review of Maintenance Tasks	SKM
R	Demand Management Innovation Strategy	TransGrid
S	Stakeholder Engagement Plan	TransGrid
T	Insurance and Self Insurance Market Estimate	Marsh
U	Debt Raising Transaction Costs	Incenta
V	Return on Capital of a Regulated Electricity Network	NERA

Appendix	Topic	Author
W	Fama French Model	SFG
X	Alternative Versions of the Dividend Discount Model and the Implied Cost of Equity	SFG
Y	Evidence on Return on Equity from Independent Expert Reports	Incenta
Z	Grant Samuel's Cost of Equity Capital	Grant Samuel
AA	Liquidity of the Interest Rate Swap Market	Westpac
AB	TransGrid's Approach to Gamma	TransGrid
AC	An Appropriate Regulatory Estimate of Gamma	SFG
AD	Depreciation Schedule	TransGrid
AE	EBSS Mechanism for Bottom Up Costs	Incenta
AF	Fitting Probability Distribution Curves to Reliability Data	PB
AG	Network Capability Incentive Parameter Action Plan	TransGrid
AH	Transmission Pricing Methodology – Better Outcomes for Customers	TransGrid
AI	Pricing Methodology	TransGrid
AJ	Negotiating Framework	TransGrid

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