TRANSGRID REVENUE RESET

APR 2008 SUPPLEMENTARY REPORT

An independent review

Prepared for

AUSTRALIAN ENERGY REGULATOR

PB Quality System:

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1. EXECUTIVE SUMMARY

Parsons Brinckerhoff Australia (PB) has been engaged by the Australian Energy Regulator (AER) as an independent expert to review aspects of TransGrid's Revenue Proposal for the 1 July 2009 – 30 June 2014 regulatory period. The details of PB's review, the background to the work, our methodology, as well as our findings and recommendations are presented in our main report 'TransGrid Revenue Reset - An independent review - Prepared for – Australian Energy Regulator'.

During the course of our review, TransGrid published its 2008 Annual Planning Report (2008 APR), and in particular the 2008 load forecast. As a consequence, TransGrid's capex, opex and service standards proposals for the 1 July 2009 – 30 June 2014 regulatory period have been impacted.

PB has been engaged by the AER to conduct a supplementary review focusing on the impact of the 2008 APR on TransGrid's revenue proposal and on PB recommendations as set out in our main report.

This supplementary report presents PB's independent review of the changes arising from the 2008 APR. Specifically, this report provides PB's comments on these changes, and we present our recommendations in relation to TransGrid's capex, opex, and service standards proposals. PB's views, as set out in this report, are presented in the context of our findings and recommendations arising from our independent review of TransGrid as detailed in our main report[1]. Reference should be made to PB's main report when considering the details of this supplementary review.

In undertaking this review, our approach has been firstly to review the 2008 APR documentation and define the key changes between the 2007 APR and the 2008 APR that impact on TransGrid's revenue proposal and on our findings and recommendations as presented in our main report. Based on this review, PB then independently assessed the impact of these changes.

In undertaking this review, PB has formed the following views and opinions in relation to the load forecast:

- the 2008 load forecast results in a deferral of demand driven projects (compared with 2007) by at least one year for projects planned for the early part to the forecast period, and a deferral of at least two years for projects in the latter part of the forecast period
- the greater difference between the high, medium and low scenarios in the 2008 forecasts (compared with 2007) represents greater uncertainty in project timing and this will correspond to a spread of the forecast commissioning dates across the planning scenarios.

In relation to the scenario probabilities and generation planting scenarios we are of the view that:

- the scenario probabilities have not changed under the 2008 APR
- a reduction of new entry generation between 380MW and 680MW is in line with the reduction in the 2008 load forecast.

In light of these findings, we believe that a reasonable number of load driven projects would be deferred under the impact of the 2008 APR. To test this view we examine the proposed changes to the ex-ante capex portfolio. In examining the portfolio we find that the portfolio contains 40 load driven projects, and that the timing of 32% of these projects is constrained by factors such as generation planting. Consequently, we conclude that the timing of 68% of the load driven projects that are not constrained changes under the 2008 APR.

In considering TransGrid's application of the 2008 load forecast, and the revised generation planting scenarios, PB is of the view that in cases where the timing impact on the project is marginal, TransGrid has been conservative in its treatment of these changes by retaining the project within the original commissioning year. Notwithstanding this conservative treatment, PB is of the opinion that the proposed

[1] PB 2008, "TransGrid Revenue Reset - An independent review, Prepared for the Australian Energy Regulator".

changes in the ex-ante capex portfolio are reasonable, and in line with the 2008 forecast as well as ROAM's revised generation planting scenarios.

One significant adjustment to TransGrid's revised forecast has been recommended for the Hunter Valley-Central Coast 500kV line easement acquisition. In this case TransGrid has proposed a net increase of $3.0m over the regulatory period. PB notes that TransGrid has not identified any specific changes to the easement acquisition arising from the release of the 2008 APR. Given that the related transmission line project has been deferred, PB is of the view that there is no change associated with the 2008 APR that would require the easement acquisition to be expedited, indeed the opposite is more likely. Therefore PB recommends that the probability weighted easement costs, as reviewed under TransGrid's original proposal be retained, including PB's recommended adjustments of $1m. This represents a total $4.0m reduction to the forward capital expenditure proposed by TransGrid.

Following our review of the 2008 APR, PB considered the impact of the findings of this review on our detailed findings presented in our main report. Sections 4, 5, and 6 present our detailed review of the impacts for capex, opex and service standards respectively. The key outcomes of this review are:

- Table 4-8 summarises the total change in the ex-ante capital expenditure allowance arising from the 2008 APR. The impact of the 2008 APR has been assessed and PB is of the view that TransGrid has generally applied a reasonable approach in assessing the impact of the 2008 APR. PB recommends an additional adjustment of $4.0m be applied to TransGrid's proposed $68.1m change arising from the revised timing. This results in a total $72.1m adjustment from TransGrid's original ex-ante capex proposal associated with the 2008 APR
- Table 4-1summarises PB's recommendations for capital expenditure based on the 2007 APR as presented in our main report. In our main report PB recommends a reduction of $128.6m in TransGrid's ex-ante capex proposal. This recommended adjustment represents a reduction of $119.7m (4.6%) when normalised for consistency with the 2008 APR submission. The impact of the 2008 APR has been assessed, (refer section 4 above) and PB recommendations are summarised in Table 4-11. PB's recommendations result in a total reduction of $121.1m (4.8%) to TransGrid's revised ex-ante capex proposal
- Table 4-12 reconciles the changes associated with the revised load forecast, PB's recommendations and the agreed adjustments to the total ex-ante capital expenditure contained in TransGrid's original revenue proposal. The total adjustment results in a $198.1m (7.5%) reduction in TransGrid's original ex-ante capital proposal of $2,626.8m to $2,428.7m.
- Table 5-17 summarises PB's recommendations for operational expenditure based on the 2007 APR as presented in our main report. In our main report PB has recommended a total reduction of $38.5m in TransGrid's opex expenditure proposal. The impact of the 2008 APR has been assessed (refer section 5 above) and PB recommends a total reduction of $39.4m in TransGrid's opex expenditure proposal
- Table 6-1 summarises PB recommendations for the service target performance incentive scheme (STPIS) based on the 2007 APR as presented in our main report. TransGrid has submitted updated outage forecasts and availability parameter values based on the 2008 APR. PB has assessed the updated forecasts and values (refer section 6 above) and based on TransGrid's submission, PB's recommendations for the STPIS are presented in Table 6-2. The changes are a small increase in the transmission line availability, and a small reduction in the reactive plant availability to reflect the changes in the ex-ante capital works portfolio.

2. INTRODUCTION AND BACKGROUND

In this section of the report we provide some background to this supplementary review, and describe the PB approach to the work. We also set out details of the structure of this report.

2.1 BACKGROUND AND OVERVIEW OF THIS SUPPLEMENTARY REVIEW

PB has been engaged by the AER to conduct a review of TransGrid in support of the AER undertaking its revenue determination assessment. This work involves conducting a review of, and providing advice to the AER on TransGrid's capex, opex, and service standards proposals. TransGrid's revenue proposal is based on the 2007 load forecast and specifically on the 2007 APR.

PB has documented its independent review of TransGrid in our report entitled "TransGrid Revenue Reset - An independent review, Prepared for the Australian Energy Regulator".

During the course of the review, TransGrid published its 2008 Annual Planning Report (2008 APR), and in particular the 2008 load forecast. It was agreed that TransGrid would update its proposed capital projects to take account of the 2008 APR. As a consequence, TransGrid's capex, opex and service standards proposals have been impacted. PB has been engaged by the AER to conduct a supplementary review focusing on the impact of the 2008 APR on TransGrid's revenue proposal and PB recommendations as set out in our main report.

This supplementary report presents PB's independent review of the changes arising from the 2008 APR. Specifically, this report provides PB's comments on these changes and we present our recommendations in relation to TransGrid's capex, opex, and service standards proposals. PB's views as set out in this report are presented in the context of our findings and recommendations arising from our independent review of TransGrid as detailed in our main report[2]. The reader should reference PB's main report when considering the details of our review as set out in this supplementary report.

2.2 REPORT STRUCTURE

The content of this supplementary report is as follows:

Section 2 provides background and overview of the supplementary review.

Section 3 considers the 2008 APR and provides our views on the primary changes from the 2007 APR that impact the ex-ante capex and opex.

Section 4 presents the impacts of the 2008 APR and presents our recommendations in relation to TransGrid's capex, opex, and service standards proposals.

Section 5 presents our final conclusions and recommendations.

[2] PB 2008, "TransGrid Revenue Reset - An independent review, Prepared for the Australian Energy Regulator".

3. THE 2008 APR

In this section we summarise the key changes between TransGrid's 2007 Annual Planning Report, and the 2008 Annual Planning Report. The focus of this summary is to highlight the key changes that impact on TransGrid's revenue proposal as set out in TransGrid's revenue proposal for the regulatory period from 1 July 2009 to 30 June 2014 (the next regulatory period).

3.1 LOAD FORECAST

TransGrid's 2007 APR presents forecasts of NSW energy, summer and winter NSW peak demand for the state and for individual connection points. These forecasts were revised in TransGrid's 2008 APR which was released in June 2008. In this section we consider the main differences between these forecasts, focusing on the key aspects that drive TransGrid's ex-ante capex.

It should be noted that PB is not required to undertake a review of TransGrid's demand forecast, or the underlying forecast methodology. A review of the demand forecast, addressing these issues, was provided to AER by McLennan Magasanik Associates (MMA)[3], and where appropriate, PB has given regard to the MMA report in undertaking this review.

As discussed in chapter 2 of PB's independent review of TransGrid's revenue proposal, the 10% and 50% probability of exceedance (PoE) forecasts are primarily relied upon in TransGrid's planning processes when identifying network constraints. While summer and winter peak demand can drive network constraints, increasingly summer peak demand is predominant. Consequently, while general consideration is given to the forecasts, this section concentrates on changes in the summer 10% PoE and 50% PoE forecasts between 2007 and 2008.

TransGrid's 2008 APR notes the significant overall changes between the 2007 and 2008 forecasts. In particular, the following changes are noted[4]:

- Native forecasts[5] (on average):
    - energy - 3.1% down
    - summer peak demand (10% PoE) - 4.5% down
    - winter peak demand (10% PoE) – 3.1% down
- Scheduled forecast[6] (on average):
    - energy - 4.9% down
    - summer peak demand (10% PoE) - 4.9% down
    - winter peak demand (10% PoE) – 3.6% down

PB notes that in the 2007 forecast, the average annual growth for the 10% PoE medium scenario forecasts is approximately 2.5%, while for the 2008 forecast this growth is approximately 2.3%. We further note that this reduction in the average growth is in line with

3 McLennan Magasanik Associates (MMA) 2008, "Final Report to Australian Energy Regulator - Review of TransGrid demand forecasts for the period 1 July 2009 to 30 June 2014", 28 May 2008.

4 TransGrid 2008 New South Wales Annual Planning Report, page 21.

5 Energy supplied from scheduled and significant non-scheduled generation.

6 Energy supplied from scheduled NEM generation only.

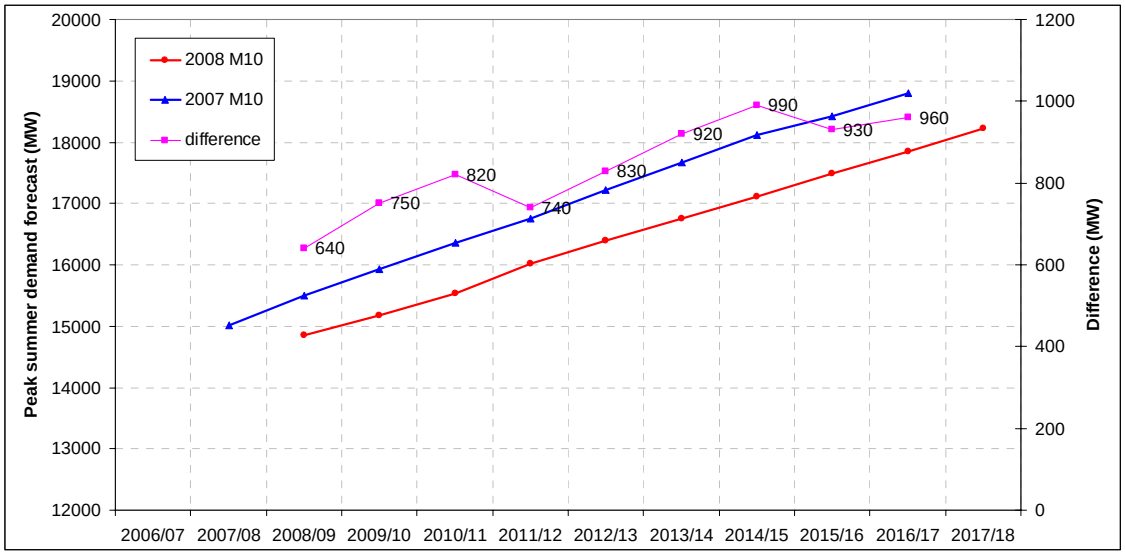
the view expressed in the MMA report when considering the specification of a model index and the impact of changes in the macro-economic environment. Specifically, MMA notes[7]:

> *"… These might in combination be expected to reduce forecast annual growth in summer 10% POE maximum demand to a figure closer to 2.1% pa between 2006 and 2014 rather than the forecast 2.5% pa."*

In a similar manner, we note that the 2007 forecast average annual growth for the 50% PoE medium scenario forecasts is approximately 2.5%, while for the 2008 forecast this growth is approximately 2.2%. Similar reductions are also noted in the high and low scenarios across the 10%, 50% and 90% PoE forecasts.

Figure 3-1 shows the 2007 and 2008 10% PoE medium scenario scheduled summer peak demand forecasts, and in particular the difference between these forecasts. Similarly, Figure 3-2 presents the 50% PoE comparison. These figures clearly show the overall reduction in the 2008 forecast compared to the 2007 forecast, with the reduction varying from 640 MW to 960 MW for the 10% PoE medium scenario forecast, and from 250 MW to 480 MW for the 50% PoE medium scenario forecast. On average across these forecasts, this corresponds to a reduction of 840 MW for the 10% PoE medium scenario forecast, and 360 MW for the 50% PoE medium scenario forecast. With annual growth in NSW being in the range of 300 MW to 400 MW, this reduction corresponds broadly to a deferral of growth of around 1 to 2.5 years.

Figure 3-1 – Difference between 2007 and 2008 10% PoE medium scenario scheduled summer peak demand forecast.



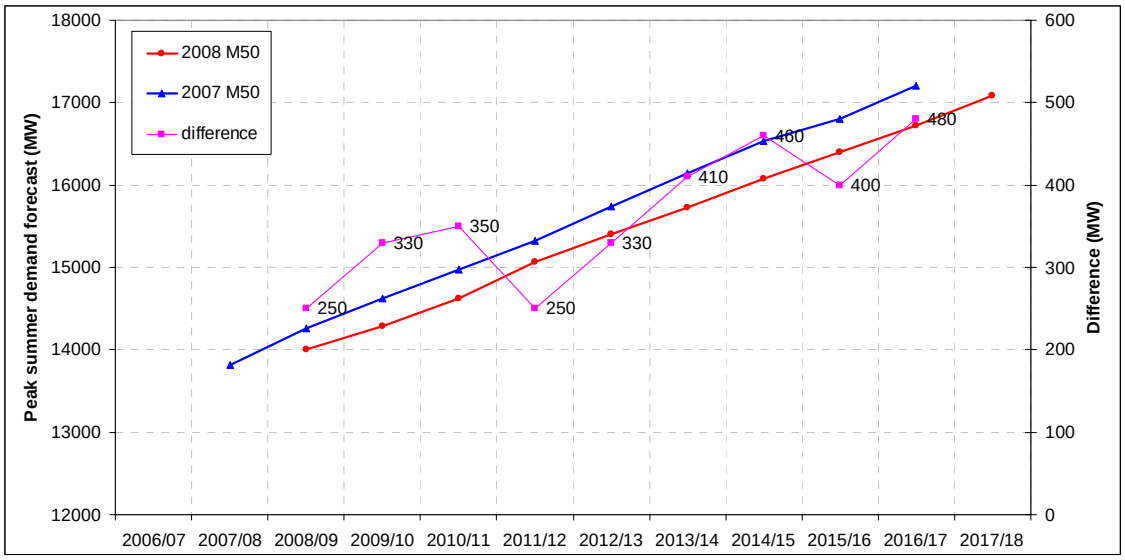
Source: PB analysis.

A further characteristic of these forecasts that should to be noted is the change in the difference between the high, medium and low scenarios across the forecast period. For the 2007 10% PoE forecast, PB notes that the difference between the high and low scenarios varies from 50 MW to 930 MW across the forecast period. Similarly, for the 2007 50% PoE forecast, the difference varies form 70 MW to 1430 MW[8]. In contrast, the difference between the high and low scenarios for the 10% PoE 2008 forecast varies from 200 MW to 2220 MW, and for the 50% PoE the variation is 190 MW to 2090 MW.

7 McLennan Magasanik Associates (MMA) 2008, "Final Report to Australian Energy Regulator - Review of TransGrid demand forecasts for the period 1 July 2009 to 30 June 2014", 28 May 2008, page 49.

8 Note that the medium scenario falls approximately in the middle of this range.

Figure 3-2 – Difference between 2007 and 2008 50% PoE medium scenario scheduled summer peak demand forecast.



Source: PB analysis.

In support of the 2008 forecast, and associated 2008 APR, TransGrid has submitted a review by the National Institute of Economic and Industry Research (NIEIR) of the assumptions supporting TransGrid's load projects[9]. NIEIR discuss a number of issues central to the development of the 2008 forecast, and in particular note that:

> *"5. … A significant issue that has been raised is the change of forecasts and the impact of this on the capex program. Equally importantly is the degree of uncertainty regarding the forecasts at this time.*
>
> *6. The uncertainty relates to a number of areas, but high amongst these is the assumptions made by NIEIR in relation to the timing and impact of the proposed ETS and MRET schemes, and hence the forecast price path(s) for electricity prices in NSW."*

PB notes the impact of the uncertainty discussed by NIEIR, as reflected in the change in the difference between the high, medium and low scenarios in the 2008 forecast, and in particular we note the implications for this uncertainty on the timing of network constraints. The implication of this are discussed further in section 3.2.4 below.

TransGrid also relies upon connection point forecasts provided by the NSW and ACT distributors. These forecasts are presented graphically in TransGrid's 2008 APR, along with comparisons to the 2007 forecasts. In regards to these connection point forecasts PB notes the following:

- EnergyAustralia forecast – the summer 50% PoE medium scenario shows only a marginal reduction in the 2008 forecast over the 2007 forecast across the entire forecast period
- Integral Energy forecast – the summer 50% PoE medium scenario shows a small reduction in early years of the 2008 forecast over the 2007 forecast. However the 2008 forecast also reflects a higher growth rate than the 2007 forecast, and in later years (post 2010/11) the 2008 summer forecast is greater than the 2007 summer forecast

9 National Institute of Economic and Industry Research (NIEIR), 2008, "A qualitative review of the assumptions underlying TransGrid's load projections - A report for TransGrid", 12 August 2008.

- Country Energy forecast – the summer 50% PoE medium scenario shows a small increase in the 2008 forecast over the 2007 forecast across the entire forecast period
- ActewAGL forecast – the summer 10% PoE medium scenario shows no initial reduction in the 2008 forecast over the 2007 forecast, however it has a lower growth rate which results in a progressively lower 2008 forecast over the 2007 forecast across the forecast period.

3.2 SCENARIO BASED PLANNING

As discussed in chapter 5 of PB's independent review of TransGrid's revenue proposal, TransGrid has employed a probabilistic methodology in preparing its ex-ante capex forecast for the 2009/10 to 2013/14 period. In this section we consider the key changes to the scenario based planning approach arising from the 2008 APR.

In the development of TransGrid's forecast capex, and in conjunction with ROAM Consulting (ROAM), TransGrid developed 36 scenarios to provide a probability weighted view of the potential generation development (principally within NSW). Section 5.2 of PB's independent review of TransGrid's revenue proposal addresses the development of these scenarios and their application within TransGrid's planning process. In particular, section 5.2.2 addresses the application of the scenario probabilities in determining the TransGrid's ex-ante capex proposal. This section notes that TransGrid's Capital Accumulation Model (CAM) spreadsheet combines the costs of each project identified under each of the 36 scenarios by summing the estimated cost of each project proposed under each scenario, and weighting the total project costs by the scenario probability to produce a probability weighted total capital cost for each scenario. These probability weighted total capital costs are then summed across the 36 scenarios to give the total probability weighted forecast capex.

As a consequence of the CAM process, there are several essential elements that may vary under the change from the 2007 to 2008 forecasts; namely the scenario probabilities, the generation planting, the mix of capital works projects, and the timing of projects required under each scenario[10]. These are considered in the following sections.

3.2.1 Scenario probabilities

TransGrid has advised that the scenario probabilities have not been changed and remain as submitted in the CAM on 31 May 2008 (CAM version CAM V1.8_Future deliverables 12a.xls). TransGrid has provided a revised CAM that reflects the 2008 APR changes (CAM version CAM V1.8_Future deliverables 16-20080822-1055.xls). PB has reviewed this CAM revision and compared it to the original CAM as submitted on 31 May 2008. We have concluded that the scenario probabilities remain as submitted.

3.2.2 Generation planting

TransGrid engaged ROAM to develop scenarios on which to base development of the ex-ante capex portfolio. ROAM was again engaged to review the scenarios based on the 2008 forecast and subsequent development. ROAM's review has been submitted in support of the 2008 APR. In this review ROAM considered recent policy developments including[11]:

- existing mandatory renewable energy target (MRET)

[10] PB notes that scenario changes are less likely due to the longer term nature of the scenario definitions. Section 5.2.1 of PB's independent review of TransGrid's revenue proposal provides further details.

[11] ROAM Consulting, 2008, "National Electricity Market Forecasting - Scenario review for Revenue Reset with Garnaut Review and Green Paper", 4 August 2008, Ref No. Trg00011, page 2-11.

- expanded renewable energy target (RET)
- the price of renewable energy certificates (RECs)
- carbon pollution reduction scheme (emissions trading scheme) and the likely carbon price range for the CPRS as well as the pool price impacts.

Within this context the review the scenario assumptions were reviewed, and in particular the review considered the 2008 load forecast, concluding that *"… this revision requires approximately 600MW less new entrant capacity installed over the forecast period than the previous report"*. The abolition of snowy regional boundary was also addressed and the review concluded that the *"The net change therefore for the methodology is zero …"*. In addition the effect of the snowy region abolition on the limited water availability case was also addressed, and concluded that *"The theme set however remains unchanged …"*[12].

Based on their analysis, ROAM went on to consider changes in generation planting that could occur given the recent policy developments. In reviewing the generation planting, ROAM addressed the three most likely scenarios based on their earlier report. That is, scenarios 16, 15 and 14 as shown in Table 3-1. PB notes that:

- these probabilities were reassessed by TransGrid prior to submission of the original CAM, and the revised TransGrid scenario probabilities are shown contrasted with ROAM's probabilities in Table 3-1
- under ROAM's probabilities these scenarios account for 33% of the considered range of outcomes, while under TransGrid's probabilities these scenarios account for 35.9% of the considered range of outcomes
- as discussed in section 5.2 of PB's independent review of TransGrid's revenue proposal, in PB's opinion the development of the scenario probabilities is well considered, with the final scenario probabilities being realistic.

Based on their analysis, ROAM revised the probabilities of some proposed generation developments, and updated the possible developments with recent announcements (e.g. Gullen Range 150MW Wind Farm). From this a revised generation schedule was developed and is documented in ROAM's review[13]. In revising the generation planting ROAM concluded that::

> *"For this revision, in light of the lesser demand, ROAM has reduced the magnitude of new entry generation by between 380MW and 680MW. Although there is a significant oversupply of predominantly peaking) capacity in the early years of TransGrid's revenue reset period, the CPRS and expanded RET will still provide incentives for development."*

PB notes that this reduction is in line with the reduction of 840 MW for the 10% PoE medium scenario forecast, and 360 MW for the 50% PoE medium scenario forecast as discussed in section 3.1 above. Further, ROAM also notes that:

> *"ROAM's review incorporates between 1500MW and 2500MW of additional wind capacity, which is expected to contribute between 75MW and 125MW to the peak demand, in line with TransGrid demand forecast estimates."*

12 ROAM Consulting, 2008, "National Electricity Market Forecasting - Scenario review for Revenue Reset with Garnaut Review and Green Paper", 4 August 2008, Ref No. Trg00011, page 11-13.

13 ROAM Consulting, 2008, "National Electricity Market Forecasting - Scenario review for Revenue Reset with Garnaut Review and Green Paper", 4 August 2008, Ref No. Trg00011, page 17-19.

Table 3-1 – Final scenario probabilities.

Scenario	Theme combination				ROAM probabilities %	Final probabilities %
	Load	Inter-regional trade	Water availability	Greenhouse policy		
1	L	BAU	BAU	BAU	1.4	1.0
2	L	BAU	BAU	CO2 tax	1.8	3.3
3	L	BAU	Limited	BAU	2.7	1.9
4	L	BAU	Limited	CO2 tax	3.5	6.4
5	L	QNI upgrade	BAU	BAU	0.7	0.5
6	L	QNI upgrade	BAU	CO2 tax	1.0	1.8
7	L	QNI upgrade	Limited	BAU	1.5	1.0
8	L	QNI upgrade	Limited	CO2 tax	2.0	3.7
9	L	NSW–Vic upgrade	BAU	BAU	0.2	0.1
10	L	NSW–Vic upgrade	BAU	CO2 tax	0.3	0.5
11	L	NSW–Vic upgrade	Limited	BAU	0.5	0.3
12	L	NSW–Vic upgrade	Limited	CO2 tax	0.6	1.1
13	M	BAU	BAU	BAU	6.3	3.3
14	M	BAU	BAU	CO2 tax	9.3	12.8
15	M	BAU	Limited	BAU	11.1	5.7
16	M	BAU	Limited	CO2 tax	12.6	17.4
17	M	QNI upgrade	BAU	BAU	3.3	1.7
18	M	QNI upgrade	BAU	CO2 tax	4.0	5.5
19	M	QNI upgrade	Limited	BAU	7.4	3.8
20	M	QNI upgrade	Limited	CO2 tax	8.4	11.6
21	M	NSW–Vic upgrade	BAU	BAU	1.0	0.5
22	M	NSW–Vic upgrade	BAU	CO2 tax	1.2	1.7
23	M	NSW–Vic upgrade	Limited	BAU	2.3	1.2
24	M	NSW–Vic upgrade	Limited	CO2 tax	2.9	4.0
25	H	BAU	BAU	BAU	1.4	0.5
26	H	BAU	BAU	CO2 tax	1.9	1.7
27	H	BAU	Limited	BAU	2.4	0.8
28	H	BAU	Limited	CO2 tax	2.0	1.8
29	H	QNI upgrade	BAU	BAU	0.8	0.3
30	H	QNI upgrade	BAU	CO2 tax	1.0	0.9
31	H	QNI upgrade	Limited	BAU	1.5	0.5
32	H	QNI upgrade	Limited	CO2 tax	1.6	1.5
33	H	NSW–Vic upgrade	BAU	BAU	0.2	0.1
34	H	NSW–Vic upgrade	BAU	CO2 tax	0.3	0.3
35	H	NSW–Vic upgrade	Limited	BAU	0.4	0.1
36	H	NSW–Vic upgrade	Limited	CO2 tax	0.7	0.6

Source: TransGrid 2008, "Revenue Reset 2008 Scenario Probabilities", Revision 0, 4/5/2008, page 13-14.

3.2.3 Capital works mix

TransGrid has advised of one change to the mix of ex-ante capex projects as a result of the 2008 APR. Project 5568 Hunter – Central Coast 500kV line has been removed from the ex-ante capex proposal[14], and has reflected this change in the revised CAM (CAM version CAM V1.8_Future deliverables 16-20080822-1055.xls). PB has reviewed this CAM revision and compared it to the original CAM as submitted on 31 May 2008. We have concluded that the construction component of project 5568 has been removed. The Hunter Valley – Central Coast 500kV line has been made contingent. PB thinks that it is appropriate to delay the construction of this project because of the low probability of it occurring under the original demand scenario.

3.2.4 Project timing

As discussed in section 3.1 above, the primary impact of the 2008 forecast is the deferral of demand growth of around 1 to 2.5 years. In addition, the 2008 forecast exhibits greater uncertainty in the demand as indicated by the increased difference between the high, medium and low scenarios across the forecast period (refer section 3.1 for further details). These two factors impact on the timing of the proposed ex-ante projects, and on the range of possible timings under the various scenarios.

It should be noted that programs of work (e.g. maintenance) and projects addressing needs that are mainly unrelated to load growth will generally not be affected by changes to the forecasts other than through works scheduling related matters (e.g. resource balancing). PB has made enquiries with TransGrid in relation to the mix of project drivers, and in particular to identify those projects that are load growth driven and those that are not. Appendix 8.1 presents the ex-ante projects grouped by type of primary driver, and shows the commissioning date consistent with TransGrid's revenue proposal for the medium growth scenario. For projects that are load driven (refer Table 8-4), the revised commissioning dates based on the 2008 APR are also included. As programs of work and projects other than load drive are not impacted by the 2008 forecast, they are not considered in this section.

In section 5.2.2 of PB's independent review of TransGrid's revenue proposal, PB noted that of the total 160 capital works projects proposed by TransGrid, 140 have common dates across all scenarios, with the timing varying in only 12.5% of projects (by number) and 36% of project (by cost). Hence, a large number of projects under the 2007 APR are not sensitive to the planning scenarios. We also noted that this was essentially due to the large number of projects which are driven by fundamental needs other than generation patterns and state load growth. Table 3-2 presents a summary of the variation in project timing observed in the submitted version of CAM as submitted on 31 May 2008 (CAM version CAM V1.8_Future deliverables 12a.xls).

[14] However the easement costs are retained under all scenarios for 2013/14.

Table 3-2 – 2007 APR project timing variation.

Variation in project timing (years)	No. of projects	% of projects	$m[1] (07/08 real)	% by $m
0	140	88	1,500	65
1	5	3	306	13
2	10	6	148	6
3	3	2	335	14
4	2	1	42	2
5	0	0	0	0

Note 1: no escalation and no risk applied.

Source: PB analysis.

TransGrid has provided a revised CAM that reflects the 2008 APR changes (CAM version CAM V1.8_Future deliverables 16-20080822-1055.xls). PB has reviewed this CAM revision to identify the proposed changes in project timing. Table 3-3 presents a summary of the variation in project timing observed in the 2008 APR revision of CAM. It should be noted that due to an omission in the submitted version of CAM[15], the revised version includes 160 projects (The Hunter Valley 500kV project is included in the CAM but the cashflow is zero)..

Table 3-3 – 2008 APR project timing variation.

Variation in project timing (years)	No. of projects	% of projects	$m[1] (07/08 real)	% by $m
0	129	80	1,267	56
1	15	9	383	17
2	8	5	420	18
3	6	4	114	5
4	1	1	39	2
5	2	1	53	2

Note 1: no escalation and no risk applied.

Source: PB analysis.

Table 3-3 shows that under the 2008 APR a total of 161 capital works projects are proposed, of which 129 have common dates across all scenarios, with the project timing varying in 19.5% of projects (by number) and 44% of projects by cost. It is also clear when comparing Table 3-2 and Table 3-3 that the variation in project timing has also increased with more projects having a larger spread of proposed commissioning dates across the scenarios.

15 Project 6266 – Tomago 3rd Transformer – was missing the easement acquisition project as advised by TransGrid in the "Capex Accumulation Model – Change Record (after submission of Proposal)" document dated 22/08/08.

3.3 2008 APR CHANGES

Following the issue of the 2008 APR, TransGrid advised of a number of changes to the proposed ex-ante capex portfolio. Appendix 8.1 presents the ex-ante projects grouped by type of primary driver, and shows the commissioning date consistent with TransGrid's revenue proposal for the medium growth scenario. For the load driven projects shown in Table 8-4 (Appendix 8.1) the revised commissioning dates based on the 2008 APR are also included.

Table 3-4 below sets out the changes implemented in the Capital Accumulation Model (CAM) as a result of the 2008 APR revision. The changes listed in the following table are the CAM changes as advised by TransGrid in the document entitled "Capex Accumulation Model – Change Record (after submission of Proposal)" - document dated 22/08/08.

Table 3-4 – 2008 APR project timing variation.

Project ID	Project name	Comm. date (2008 APR)	Comm. date (submitted)	Change
3978	Kemps Creek – Liverpool	2013	2013	Commissioning dates to be changed as followed: - scenario 1-12: 2015 - other scenarios remain unchanged Applies to Construction portion only
4188	Syd West – Holroyd D/C	2012	2013	Commissioning dates to be changed as follows: - scenarios 1-12: 2014 - scenarios 13-24: 2013 - scenarios 25-36: 2012 Applies to Construction portion only.
4213	Holroyd Sub Establishment	2012	2013	Commissioning dates to be changed as follows - scenarios 1-12: 2014 - scenarios 13-24: 2013 - scenarios 25-36: 2012 Applies to Construction portion only.
5558	Jindera-Albury area	2016	2017	Commissioning dates to be changed as follows - scenarios 1-12: 2018 - scenarios 13-24: 2017 - scenarios 25-36: 2015
5559	Yass-Cowra upgrade	2017	2019	Commissioning dates to be changed as follows - scenarios 1-12: 2021 - scenarios 13-24: 2019 - scenarios 25-36: 2018 Applies to both Construction and Easement

Project ID	Project name	Comm. date (2008 APR)	Comm. date (submitted)	Change
5567	Bannaby-South Creek 500kV line	2014	2015	Commissioning dates have changed as follows (Applies to construction portion only.): - for the low growth scenario all dates deferred one year except scenario 4 and 6 where there is no change. - for the medium growth scenario no deferral for two scenarios, a one year deferral for seven scenarios, and a two year deferral three scenarios. - for the high growth scenario - deferral of two years for all scenarios..
5568	Hunter – Coast 500kV line[1]	2017	2014	Project construction removed from the regulatory period - easement acquisition remains in 2013/14 for all scenarios
5618	Yanco Tx Replacement	2013	2013	Commissioning dates to be changed as follows: - scenarios 1-12: 2014 - scenarios 13-24: 2013 - scenarios 25-36: 2013
5889	Syd No.4 Transformer	2011	2013	Commissioning dates to be changed as follows: - scenarios 1-12: 2013 - scenarios 13-24: 2013 - scenarios 25-36: 2012
5890	Tamworth Transformer	2013	2013	Commissioning dates to be changed as follows: - scenarios 1-12: 2014 - scenarios 13-24: 2013 - scenarios 25-36: 2013
5950	Syd North No.5 Tx	2010	2010	Commissioning dates to be changed as follows: - scenarios 1-12: 2011 - scenarios 13-24: 2010 - scenarios 25-36: 2010
5995	Inner Syd-Chullora Cable	2013	2013	Commissioning dates to be changed as follows: - scenarios 1-12: 2014 - scenarios 13-24: 2013 - scenarios 25-36: 2013 Applies to Construction portion only
5999	Coffs Hbr 2nd Transformer	2012	2013	Commissioning dates to be changed as follows: - scenarios 1-12: 2014 - scenarios 13-24: 2013 - scenarios 25-36: 2013

Project ID	Project name	Comm. date (2008 APR)	Comm. date (submitted)	Change
6006	Taree-Pt Macq line	2018	2020	Commissioning dates to be changed as follows: - scenarios 1-12: 2021 - scenarios 13-24: 2020 - scenarios 25-36: 2016 Applies to both Construction and Easement components
6098	Armidale SVC	2016	2015	Commissioning dates changed as follows: - scenario 15: 2014 - scenario 14: 2014 - other scenarios remain unchanged
6182	Darl Pt-Coll'ly duplication	2015	2017	Commissioning dates to be changed as follows: - scenarios 1-12: 2019 - scenarios 13-24: 2017 - scenarios 25-36: 2016 Applies to both Construction and Easement components
6204	Inner Syd – H'ryd Potts Hill 330 Cable	2013	2013	Commissioning dates to be changed as follows: - scenarios 1-12: 2014 - scenarios 13-24: 2013 - scenarios 25-36: 2013 Applies to Construction portion only
6266	Tomago 3rd Transformer	2013	2014	Commissioning dates to be changed as follows: - scenarios 1-12: 2015 - scenarios 13-24: 2014 - scenarios 25-36: 2014 Applies to both Construction and Easement components
6316	Vineyard No.3 Transformer	2012	2010	Commissioning dates to be changed as follows: - scenarios 1-12: 2011 - scenarios 13-24: 2010 - scenarios 25-36: 2010
6380	Albury-Mulwala lines trip scheme	2010	2010	Commissioning dates to be changed as follows: - scenarios 1-12: 2011 - scenarios 13-24: 2010 - scenarios 25-36: 2010
6384	Syd area Capacitors – 200 MVAr 2nd new bank	2014	2014	Commissioning dates changed as follows: - scenario 16: 2015 - scenario 14: 2014 - other scenarios remain unchanged

Note 1: Project 5568 – Hunter–Coast 500kV line has been removed form the ex-ante capex, but TransGrid has retained it in the proposed contingent projects. Reference should be made to section 5.6 of PB's independent review of TransGrid's revenue proposal for further discussion on this project.

Source: TransGrid 2008, "Capex Accumulation Model – Change Record (after submission of Proposal)" document dated 22/08/08. PB analysis.

As shown in Table 8-4 (refer Appendix 8.1), of the 40 load driven projects, 27 do not change as a result of the 2008 APR. Eight projects do not move under the scenarios due to generation planting (generation scenarios), the timing of thirteen are constrained by existing network constraints or work scheduling issues, and six are only impacted by the low load growth scenario change which is not sufficient to defer the project. Of the 13 projects whose timing does alter under the 2008 APR, six are deferred by one year, four by two years, while a further two are advanced between one and two years. While the construction of the remaining project has been withdrawn from the 2009/14 regulatory period, however the easement portion of the project has been retained. Further details of these changes can be found in Table 8-4 in appendix 8.1.

3.4 PB COMMENTS AND CONCLUSIONS

PB has reviewed the changes between TransGrid's 2007 APR and the 2008 APR, particularly the outcome of the 2008 load forecast, and the changes to the scenarios used by TransGrid in network planning. From this review, PB notes the following with regards to the 2008 forecast:

- the average annual growth for the 10% PoE medium scenario forecast in 2007 is approximately 2.5%, and is approximately 2.3% in the 2008 forecast
- the average annual growth for the 50% PoE medium scenario forecast in 2007 is approximately 2.5%, and is approximately 2.2% in the 2008 forecast
- similar reductions in forecast growth are noted in the high and low scenarios across the 10%, 50% and 90% PoE forecasts
- on average, this reduction in growth corresponds to a reduction of 840 MW for the 10% PoE medium scenario forecast, and 360 MW for the 50% PoE medium scenario forecast, which corresponds broadly to a deferral of growth of around 1 to 2.5 years[16]
- the difference between the high, medium and low scenarios across the forecast period is greater for the 2008 forecast compared with the 2007 forecast, with this change in the difference being more that 2.5 times greater on average.

From these observations, PB is of the view that the impact of the 2008 forecast is a deferral of a least one year for demand driven projects in the early part to the forecast period, and a deferral of at least two years for project in the latter part of the forecast period. Furthermore, the greater difference between the high, medium and low scenarios between the 2007 and 2008 forecasts represents greater uncertainty. It is PB view that this will correspond to a spread of the forecast commissioning dates across the planning scenarios and an expected delay in commissioning dates overall of between 1 and 2.5 years.

While the 2008 forecast will impact on the ex-ante capex, the planning scenarios, and in particular the generation planting scenarios, also influence the capex portfolio. PB notes that the scenario probabilities have not changed and remain as submitted in the CAM on 31 May 2008 (CAM version CAM V1.8_Future deliverables 12a.xls). We also note that the ROAM revision of the generation planting scenarios (refer section 3.2.2 above) concluded that magnitude of new entry generation would reduce by 380MW to 680MW with a significant oversupply of generating capacity in the early years of the forecast period[17]. We note that ROAM refers an to significant oversupply of predominantly peaking generating capacity in the in the early years of TransGrid's revenue reset period. On this basis ROAM has adjusted the generation scenarios, but the impact of these adjustments is predominantly in the later years of the forecast period. Additionally, ROAM's adjustments to the generation planting scenarios do not significantly change the locations of the generators being planted and hence the

16 Based on the annual growth in NSW being in the range of 300 MW to 400 MW.

17 ROAM Consulting, 2008, "National Electricity Market Forecasting - Scenario review for Revenue Reset with Garnaut Review and Green Paper", 4 August 2008, Ref No. Trg00011, page 17-19.

impact on the main system is not significantly altered. After considering the revised ROAM generation planting[18] under the 2008 forecast, it is PB's view that these changes are broadly in line with the reduction of 840 MW for the 10% PoE forecast, and 360 MW for the 50% PoE forecast.

On examination of the changes proposed by TransGrid as a consequence of the 2008 APR, PB notes that:

- a total of 40 projects are load driven and hence can move with the load growth scenarios[19]
- 67.5% of load driven projects do not change
- 25.0% of load driven projects are deferred between one and four years
- 5.0% of load driven projects are advanced between one and three years.

While a significant proposition of load driven projects do not change under the 2008 APR, 48% of these are constrained by existing network constraints or work scheduling issues, and 30% relate to the generation planting scenarios, while the balance are only impacted in a limited way by the load growth scenarios. Consequently, the forecast commissioning dates do not change under the 2008 APR[20].

We note that the two projects that advance under the 2008 APR advance due to changes in connection point forecasts, or generation scenario impacts (refer Table 8-4).

With the 2008 forecast deferring load growth by about 1 to 2.5 years[21], and limited changes in ROAM's generation planting scenarios amounting to a reduction of 380MW to 680MW across the forecast period, PB are of the view that this would lead to a reasonable number of load driven projects being deferred.

Essentially, of the 40 projects that are load driven, 32.5% of these (13 projects) are constrained so that the commissioning dates can't change with the load growth scenarios. Generation planning scenarios constrain a further 20% (8 projects) which while sensitive to load growth, alter in a limited fashion under the 2008 APR. Of the remaining 19 load driven projects the timing of 68% of these (13 projects) changes under the 2008 APR, with the balance being only impacted by the low load growth scenario changes which are not sufficient to defer the project.

PB has considered the scenario probabilities, the changes to the generation planting scenarios, and TransGrid's application of these to the revision of the proposed ex-ante capex portfolio. We have also considered the constraints identified by TransGrid to the movement of the projects under the 2008 APR, and we have assessed these constraints in the light of our expectations of project deferral under the 2008 APR (refer above analysis). In our opinion, while we believe that in cases where the timing impact on the project is marginal TransGrid has been conservative in its treatment of the 2008 forecast impact and the impacts of the generation planting scenarios by retaining the project within the original commissioning year, we are of the opinion that the proposed changes in the ex-ante capex are reasonable and in line with the 2008 forecast as well as ROAM's revised generation planting scenarios.

18 ROAM Consulting, 2008, "National Electricity Market Forecasting - Scenario review for Revenue Reset with Garnaut Review and Green Paper", 4 August 2008, Ref No. Trg00011, page 17-19.

19 TransGrid 2008, "Movement of Projects" undated document page 9-12 (file Project Drivers.pdf) and PB analysis.

20 Further details of these deferrals can be found in Table 8-4 in appendix 8.1.

21 Based on the annual growth in NSW being in the range of 300 MW to 400 MW.

4. IMPACT OF THE 2008 APR ON CAPITAL EXPENDITURE

In this section we discuss the impact of the 2008 APR on TransGrid's ex-ante capex proposal.

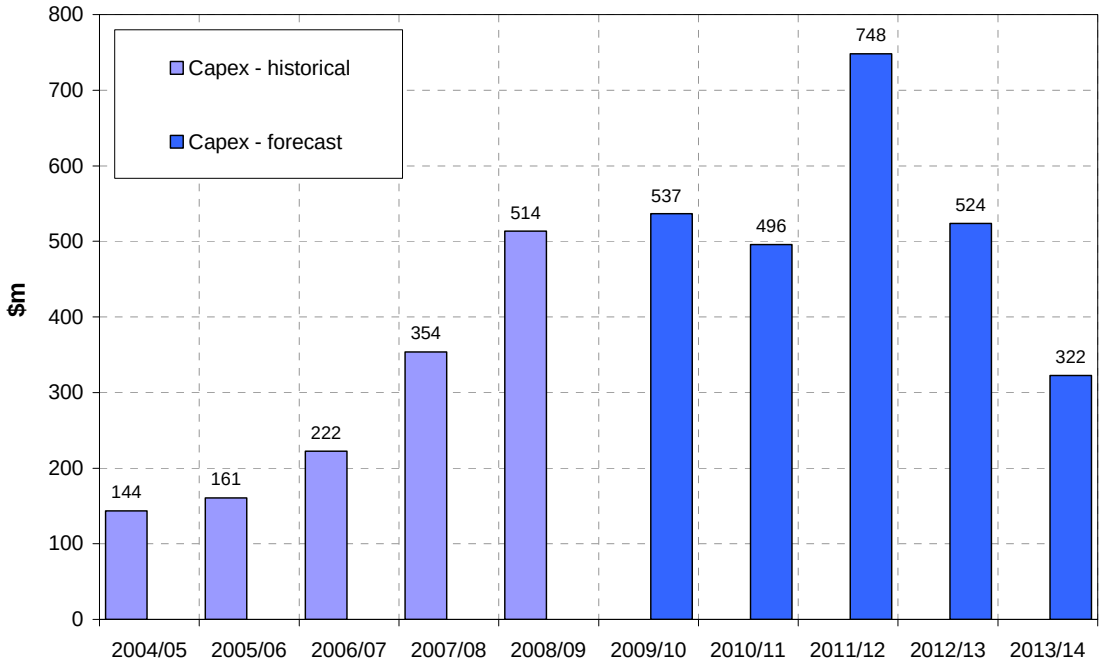
4.1 REVIEW OF THE EXPENDITURE PROGRAM

In this section we provide a summary of the historical and forecast expenditure proposals made by TransGrid for the period 2009/10-2013/14 for both opex and capex, based on the 2007 APR. This section reflects the findings described in Section 3 of the main PB report and represents the baseline for the assessment of the impact of the revised forecast contained in TransGrid's 2008 APR.

As shown by the trend in Figure 4-1, TransGrid has increased its capital program progressively and considerably since 2004/05. The five-year forecast total is $2,627m (real 2007/08) and this represents an increase in real terms of 88% compared with the current period spend of $1,394m. The expenditure is comprised of three major transmission line and cable projects totalling over $1.1b, on ongoing program smaller augmentation projects totalling around $0.9b, replacement capex of $0.49b and non-network related capex of around $0.15b.

The forecast capex requirement is determined by identifying the specific projects that TransGrid expect to require expenditure during the 2009/10 to 20013/14 regulatory period. The timing of these projects is determined on the basis of asset condition, compliance requirements, forecast load growth and network constraints. The timing of a number of projects will be affected by changes to forecast load growth and network constraints that are provided in the annual planning report. For the purpose of this review, TransGrid have identified the projects that it believes are dependent on the change in forecast load growth associated with the 2008 APR. The impacts of these changes are discussed in this section.

Figure 4-1 – TransGrid actual and forecast capital expenditure (real 07/08).



Source: PB analysis.

Impact of the 2008 APR

Under the 2008 APR, TransGrid have proposed a total forecast capital expenditure for the 2009/10 -2013/14 regulatory period of $2,550m (real 2007/08) representing a $77m, or 2.9%, reduction in TransGrid's ex-ante capex proposal. PB notes that this $77m reduction includes $8.9m of agreed adjustments that have been made by TransGrid in their capital accumulation process to correct for discrepancies identified in the process of conducting PB's original review. Details of these adjustments can be found in Section 5.4.1 of PB's main report.

Therefore the total change to TransGrid's ex-ante capex proposal associated with the revised load forecast is $68.1m (2.6%).

4.2 REVIEW OF FORECAST CAPEX

This section summarises the recommended adjustments and findings from PB's review of TransGrid's $2.63b forecast capital program undertaken for the main report. Detailed discussion relating to the cost accumulation methodologies, probabilistic approach and detailed project reviews, including justification for each adjustment, is contained in Section 5 of PB's main report.

4.2.1 Summary of recommended adjustments – 2007 APR

As a result of our assessment of TransGrid's original revenue proposal, PB recommended a number of adjustments to the forecast capex requested by TransGrid. The total $129.0m adjustment recommended by PB, is summarised in Table 4-1 and represents a 4.9% reduction in TransGrid's proposed $2.63b ex-ante capital expenditure over the 2009/10-20013/14 regulatory period. The recommended adjustment from our original review represents a reduction of $120.1 or 4.6% when normalised to reflect the 2008 APR submission. This is because TransGrid's original capex submission did not include the agreed adjustments.

A brief description of the recommended adjustments to the forward capital expenditure from the original PB report is provided below. Where these adjustments are affected by the changes arising from the 2008 APR, PB's position from our main report and the recommended changes to our position arising from the 2008 APR forecast are summarised in sections 4.3 and 4.4 of this report.

Table 4-1 – Summary of PB's recommended adjustments to forecast capex allowance.

Expenditure $m (real 2007/08)	Ref.	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Bannaby - South Creek 500 kV lines and substation	5.4.3	-	-	-	-	-	-
Holroyd – Chullora 330 kV cable	5.4.4	-	-	-	-	-	-
Dumaresq - Lismore 330 kV line	5.4.5	(1.2)	(17.6)	(17.6)	-	-	(36.4)
SW NSW microwave & satellite	5.4.6	-	-	-	-	-	-
Wallerawang No.1 &No.2 transformer	5.4.7	(0.3)	-	-	-	-	(0.3)
Cooma 132 kV substation replacement	5.4.8	4.8	4.8	3.8	(6.5)	(25.2)	(18.2)
Beaconsfield West 132 kV GIS replacement	5.4.9	(0.5)	(1.6)	(2.3)	(6.2)	-	(10.6)
Newcastle 330 kV substation transformer replacement	5.4.10	-	-	-	(10.5)	-	(10.5)
Hunter Valley - Central Coast 500 kV line easements	5.4.11	-	-	-	(0.1)	(0.9)	(1.0)
Replacement programs	5.4.12	(0.8)	(2.0)	(1.0)	(0.9)	(0.9)	(5.6)
Escalation adjustments (factors)	5.3.1	(0.4)	(1.6)	(3.3)	(2.6)	(1.3)	(9.4)
Yearly weightings	5.3.2	1.1	1.9	(4.2)	(2.3)	(0.1)	(3.6)
Agreed CAM adjustments	5.4.1	(2.0)	(1.8)	(2.9)	(2.0)	(1.2)	(9.9)
Risk allowance adjustments	5.3.4	(2.4)	(2.2)	(3.4)	(2.4)	(1.4)	(11.7)
Cost estimating factors adjustment	3.5.3	(2.8)	(2.6)	(4.0)	(2.8)	(1.7)	(13.9)
PB total adjustment		(4.4)	(22.3)	(34.3)	(34.8)	(32.6)	(128.6)
TransGrid Submitted ex-ante capex		536.8	495.9	748.0	523.8	322.3	2,626.8
PB total adjustment - %		(0.8%)	(4.5%)	(4.6%)	(6.7%)	(10.1%)	(4.9%)
Agreed CAM adjustments (included in TransGrid Submitted 2008 APR Capex)		(1.8)	(1.6)	(2.6)	(1.8)	(1.0)	(8.9)
PB total adjustment (Normalised)[1]		(2.6)	(20.7)	(31.7)	(33.0)	(31.5)	(119.7)
TransGrid Submitted ex-ante capex (Normalised) [1]		535.0	494.3	745.4	522.0	321.3	2,617.9
PB total adjustment - % (Normalised)[1]		(0.5%)	(4.2%)	(4.2%)	(6.3%)	(9.8%)	(4.6%)

Note 1: 2007 APR submitted capex contains $8.9m of agreed adjustments which have been subtracted from TransGrid's revised 2008 APR capital expenditure allowance.

Source: PB analysis.

Detailed project adjustments

PB recommended adjustments resulting in a total $74.5m reduction of the forecast capex allowance associated with the detailed project reviews. Three of the reviewed projects (Bannaby – South Creek 500 kV lines and substation, Hunter Valley – Central Coast 500 kV line easement and Holroyd – Chullora 330 kV cable) are subject to changes associated with the 2008 APR. Therefore, the outcome of our main report recommendations for these detailed projects and the revised findings to accommodate the 2008 APR forecast are summarised in section 4.3 of this report.

Replacement programs adjustment

PB recommended adjustments resulting in a total $5.6m reduction of the forecast capex allowance associated with the instrument transformers and wood poles replacement programs proposed for the 2009/10-2013/14 regulatory period. No further adjustments have been recommended for the remaining programs. These adjustments are not affected by the 2008 APR.

Escalation adjustments

PB recommended adjustments resulting in a total $13.0 reduction of the forecast capex allowance associated with the base escalators, escalation weighting and application of escalation within the capital accumulation process proposed for the 2009/10-2013/14 regulatory period.

The escalation adjustments have been calculated with respect to TransGrid's total proposed ex-ante capital expenditure which is affected by the 2008 APR. The individual escalation adjustments included in our original recommendation and revisions to accommodate the 2008 APR forecast are detailed in section 4.4.1 of this report.

Agreed CAM adjustments

PB together with TransGrid identified a number of corrections that resulted in material adjustments to the calculation of the forward capital expenditure. The adjustments typically related to discrepancies between the values entered into the Capital Accumulation Model (CAM) and the values contained in the supporting documentation. These adjustments resulted in a total $9.9m reduction of the forecast capex allowance proposed for the 2009/10-2013/14 regulatory period.

The agreed adjustments detailed in the main report are not affected by the 2008 APR.

Risk adjustments

PB recommended adjustments resulting in a total $11.7m reduction of the forecast capex allowance associated with the inclusion of escalation in the probability variance and risk allowance used within the capital accumulation process proposed for the 2009/10-2013/14 regulatory period.

The risk adjustments have been calculated with respect to TransGrid's total proposed ex-ante capital expenditure which is affected by the 2008 APR. The individual risk adjustments included in our original recommendation and revisions to accommodate the 2008 APR forecast are detailed in section 4.4.2 of this report.

Cost estimating factors adjustment

PB recommended adjustments resulting in a total $13.9m reduction of the forecast capex allowance associated with the use of non-standard cost estimating factors in determining the forward capital expenditure requirement proposed for the 2009/10-2013/14 regulatory period.

The cost estimating factors adjustments have been calculated with respect to TransGrid's total proposed ex-ante capital expenditure which is affected by the 2008 APR. The cost estimating factors adjustment included in our original recommendation and revision to accommodate the 2008 APR forecast is detailed in section 4.4.3 of this report.

4.3 PROJECT SPECIFIC RECOMMENDATIONS – 2008 APR

This section summarises the findings of PB's detailed review of the following projects that are subject to changes arising from the 2008 APR:

- Bannaby – South Creek 500 kV lines and substation
- Hunter Valley – Central Coast 500 kV line easement
- Holroyd – Chullora 330 kV cable

The impact of the 2008 APR is discussed for each project and our recommendations are restated in light of the revised load forecast.

The remaining six projects subject to detailed review are driven by factors that are not related to the changes arising from the 2008 APR. The detailed reviews for all nine of the network projects reviewed by PB are provided in Appendices C to K of the main PB report.

In addition to the adjustments associated with the detailed project reviews, PB have identified the additional adjustment arising from changes to the commissioning dates of projects, arising from the revise forecast, that have not been reviewed. This adjustment is discussed in section 4.3.4

4.3.1 Bannaby – South Creek 500 kV lines and substation

The Bannaby-South Creek 500 kV lines and substation project (Project ID 5567) involves the construction of a 500 kV transmission line between Bannaby and South Creek. The primary drivers for the project are line rating and voltage control constraints expected to develop on the 330 kV lines that serve the Newcastle-Sydney-Wollongong load corridor from the south. Hence this project is impacted by the 2008 APR.

Under the 2007 APR this project has an anticipated commissioning date in 2014 for 16 of the 36 scenarios forecast by TransGrid[22].

In PB's detailed review (refer Appendix C of our main report), we conclude that the drivers, strategic alignment, cost and timing of the project are demonstrated to be both prudent and efficient, and that a reasonable range of alternative options has been identified. However, PB raised a number of concerns regarding the options analysis presented, but concluded that in our opinion the project is prudent, and that it represents efficient investment.

As contained in our main report, Table 4-2 sets out PB's original recommendation in relation to the submitted expenditure associated with the Bannaby-South Creek 500 kV lines and substation project.

[22] The an anticipated commissioning date is 2013 in 15 of the 36 scenarios, 2014 in 16 of the scenarios, 2015 in 3 of the 36 scenarios and 2016 in 2 of the 36 scenarios.

Table 4-2 – PB original recommendation for Bannaby-South Creek 500 kV lines and substation.

Expenditure $m (real 2007/08)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Submitted	1.7	9.8	62.6	110.4	63.1	247.6
Proposed variation	-	-	-	-	-	-
PB recommendation	1.7	9.8	62.6	110.4	63.1	247.6

Source: TransGrid CAM V1.8 Deliverable 12a, and PB analysis.

Impact of 2008 APR

The impact of the changes arising from the 2008 APR is a deferral of the median commissioning date of this project by one year from 2014 to 2015[23] and an increase in the weighted average commissioning year of 0.9 years. This change is reflected in the revised Capital Accumulation Model provided by TransGrid.

Table 4-3 sets out PB's revised recommendation on the prudency and efficiency of the submitted expenditure associated with the Bannaby-South Creek 500 kV lines and substation project.

Table 4-3 – PB revised recommendation for Bannaby-South Creek 500 kV lines and substation for 2008 APR.

Expenditure $m (real 2007/08)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Submitted (2008 APR)	0.4	1.5	8.9	55.0	100.7	166.5
Proposed Variation (APR 2008)	-	-	-	-	-	-
PB recommendation	0.4	1.5	8.9	55.0	100.7	166.5

Source: TransGrid CAM V1.8 revised with Deliverable 16 input data and PB analysis.

4.3.2 Holroyd – Chullora 330 kV cable

This project involves the augmentation of TransGrid's network by installing new 330 kV cable(s) from Hyland Road, Holroyd to a new Chullora 330/132 kV substation. Under the 2007 APR TransGrid asserts that the reinforcement of supply to the inner metropolitan area is required by the summer of 2012/2013 in part due to load growth[24]. Hence this project is impacted by the 2008 APR.

In PB's detailed review (refer Appendix D of our main report), we conclude that the drivers, strategic alignment and timing of the project are demonstrated to be both prudent and efficient, and following the review of subsequent information, we concluded that the scope and cost efficiency of the selected option was adequately demonstrated.

23 CAM V1.8 Deliverable 12a and CAM V1.8 Deliverable 16.

24 TransGrid 2008, 'Project Evaluation Summary : Inner Metropolitan 330 kV Supply: Project Number 5995', page 6.

As contained in our main report, Table 4-4 sets out PB's original recommendation in relation to the submitted expenditure associated with the Holroyd-Chullora 330 kV Cable augmentation project.

Table 4-4 – PB original recommendation for Holroyd-Chullora 330 kV cable.

Expenditure $m (real 2007/08)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Submitted	-	23.5	187.5	33.5	-	244.5
Proposed variation	-	-	-	-	-	-
PB recommendation	-	23.5	187.5	33.5	-	244.5

Source: TransGrid CAM V1.8 Deliverable 12a, and PB analysis.

Impact of 2008 APR

The impact of the changes arising from the 2008 APR is a deferral of the median commissioning date of this project by one year from 2013 to 2014[25], under the 12 low load growth scenarios with no change for the remaining 24 scenarios. This results in an increase in the weighted average commissioning year of 0.2 years. This change is reflected in the revised Capital Accumulation Model provided by TransGrid. Due to escalation, the deferral of the project results in a small increase in the total cost allocated to the project through the 2009/10-2013/14 regulatory period.

Table 4-5 sets out PB's revised recommendation on the prudency and efficiency of the submitted expenditure associated with the Holroyd-Chullora 330kV Cable project.

Table 4-5 – PB revised recommendation for Holroyd-Chullora 330 kV cable for 2008 APR.

Expenditure $m (real 2007/08)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Submitted (APR 2008)	-	18.5	152.9	67.8	7.4	246.6
Proposed Variation (APR 2008)	-	-	-	-	-	-
PB recommendation	-	18.5	152.9	67.8	7.4	246.6

Source: TransGrid CAM V1.8 updated with Deliverable 16 input data and PB analysis.

4.3.3 Hunter Valley – Central Coast 500 kV line easement

This project involves the acquisition of easements associated with the Hunter Valley to Central Coast 500 kV Line project. Under the 2007 APR these acquisitions are proposed for the period 2012/13-2013/14. The Hunter Valley to Central Coast 500 kV Line project is driven primarily by load growth and consequently is impacted by the 2008 APR.

In PB's detailed review (refer Appendix K of our main report), we conclude that the drivers, strategic alignment and timing of the project are demonstrated to be both prudent and efficient, and that a reasonable range of alternative options has been identified. However from a cost efficiency standpoint, PB could not conclude that the costs as present are reasonable and a proposed variation is recommended.

[25] CAM V1.8 Deliverable 12a and CAM V1.8 Deliverable 16.

As contained in our main report, Table 4-6 sets out PB's original recommendation in relation to the Hunter Valley - Central Coast 500 kV Lines easement project[26].

Table 4-6 – PB original recommendation for Hunter Valley - Central Coast 500 kV line easement.

Expenditure $m (real 2007/08)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Submitted	-	-	0.2	2.1	1.9	4.2
Proposed variation	-	-	-	(0.1)	(0.9)	(1.0)
PB recommendation	-	-	0.2	2.0	1.0	3.2

Source: TransGrid CAM V1.8 Deliverable 12a, and PB analysis.

Impact of 2008 APR

Under the 2008 APR, the Hunter Valley to Central Coast 500 kV transmission line project has been removed from the ex-ante capex allowance for the 2009/10 to 2013/14 regulatory period. However, TransGrid have advised that a $5.0m (2007$) strategic easement acquisition in the Hunter Valley is required to occur in 2014 to support the implementation of its 500kV ring strategy. When risk and escalation is applied, this represents $7.2m in TransGrid's proposed ex-ante capex requirement.

In its original submission, TransGrid had included total of $42.6m for easement purchase relating to this line with a commissioning date between 2016 and 2017 under five scenarios comprising a total probabilistic weighting of 6.8%. Under these conditions, the total allowance for easement acquisition is $4.2m as shown in Table 4-6. Therefore TransGrid's revised easement proposal represents a $3.0m increase in the weighted average easement expenditure over the 2009/10 to 2013/14 regulatory period, despite a corresponding deferral of the transmission line project itself.

Whilst PB acknowledges the need for strategic easement acquisitions to support major transmission lines projects, we are of the view that TransGrid had previously considered the extent of the early easement acquisition required to facilitate the project in determining the cost associated with the easements in the original capex proposal.

With regard to the impact of the 2008 APR on the easement acquisition, TransGrid states:

"The easement costs associated with the line may also remain at the previous timing due to the need to secure a line route for the future"[27]

TransGrid has identified no specific changes to the easement acquisitions required for the line arising from the release of the 2008 APR. Given that the related transmission line project has been deferred, PB is of the view that there is no change associated with the 2008 APR that would require the easement acquisition to be expedited. Therefore PB recommends that the probability weighted easement costs, as reviewed under TransGrid's original proposal be retained, including PB's recommended adjustments.

26 PB notes that all values have been adjusted to reflect the 6.8% probability of this project being required under the 36 scenarios represented in the CAM.

27 TransGrid, NSW Main System – Scenarios Preliminary Impact of the APR 2008 Forecast, 20 August 2008, page 17.

Table 4-7sets out PB's revised recommendation on the expenditure associated with the revised Hunter Valley – Central Coast 500 kV easements project.

Table 4-7 – PB revised recommendation for Hunter Valley – Central Coast 500 kV lines and substation for 2008 APR.

Expenditure $m (real 2007/08)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Submitted (2008 APR)	-	-	-	-	7.2	7.2
Recommended Adjustments (APR 2008)	-	-	0.2	2.0	(6.2)	(4.0)
PB recommendation	-	-	0.2	2.0	1.0	3.2

Source: TransGrid CAM V1.8 updated with Deliverable 16 input data and PB analysis.

4.3.4 Adjustments to projects affected by 2008 APR

The adjustments associated with the projects affected by the changes arising from the 2008 APR are reflected in the difference in the total capital works portfolio between TransGrid's original submission and the 2008 APR revised submission. The total difference in the ex-ante capital expenditure between the submitted proposals is $77.0m. However, when the value of the previously agreed $9.9m adjustments included in the calculation of the 2008 APR capex requirements is removed from the original submission, the total adjustment arising from the changes associated with the timing of projects is $68.1m Table 4-8 summarises the changes on an annual basis. -

Table 4-8 – Total change in 2009/10-2013/14 Capex requirement associated with revised 2008 APR forecast.

Expenditure $m (real 2007/08)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
TransGrid Submitted ex-ante capex (2007 APR)	535.0	494.3	745.4	522.0	321.3	2617.9
TransGrid Submitted ex-ante capex (2008 APR)	531.9	465.9	579.2	552.3	420.6	2549.8
Total Change Proposed	(3.1)	(28.4)	(166.2)	30.3	99.3	(68.1)
PB Adjustments			0.2	2.0	(6.2)	(4.0)
Total Change Recommended	(3.1)	(28.4)	(166.0)	32.3	93.1	(72.1)

Note 1: 2007 APR submitted capex contains $9.9m of agreed adjustments which have been subtracted from TransGrid's revised 2008 APR capital expenditure allowance.

Source: PB analysis.

PB notes that the reduction in the forecast capex requirement from the deferral of projects beyond the regulatory period is partially offset by the increased escalation applicable when projects are deferred within the regulatory period.

PB has reviewed the input parameters to TransGrid's revised Capital Accumulation Model[28] used in the calculation of the changes associated with the 2008 APR. With the exception of the $4.0m adjustment associated with the Hunter Valley-Central Coast 500 kV line easement acquisition discussed in Section 4.3.3, PB is of the view that the changes reasonably represent the impact on the forecast capital expenditure associated with the 2008 APR. As shown in Table 4-8, the total change in the proposed ex-ante capex, including PB's adjustments, is $72.1m.

4.4 NON-PROJECT SPECIFIC RECOMMENDATIONS

This section restates the outcome of our main report and details the calculation method used to determine the non-project specific adjustments that arise from the 2008 APR. The recommended adjustments associated with the 2008 APR relating to escalation, risk allowance and cost estimating factors are detailed below.

4.4.1 Escalation adjustments

PB recommended two adjustments resulting in a total $13.0m reduction of the forecast capex allowance in the 2009/10-2013/14 regulatory period. Under the 2008 APR this is reduced to $12.4m. The outcome from our main report, calculation methods used to determine each component of the adjustment and the changes to reflect the revise forecast are summarised below.

Escalator adjustments

The escalator adjustment has been determined based on the calculation of revised labour and materials escalators established by setting the producers margin escalation for the years 2009/10 to 2010/11 to zero, as discussed in section 5.3.1 of PB's main report. This results in the escalators shown in Table 4-9.

Table 4-9 – PB recommended weighted cost escalation factors for base escalation adjustments, %.

Component	08/09	09/10	10/11	11/12	12/13	13/14	Total Value ($M)
TransGrid proposed	1.63%	1.02%	0.76%	0.82%	1.17%	1.44%	-
PB base escalation adjustments	1.63%	0.78%	0.47%	0.82%	1.17%	1.44%	(9.35)

Source: PB analysis.

Using TransGrid's Capital Accumulation Model[29], PB has calculated the total value associated with these adjustments to be a reduction in the escalation allowance of approximately $9.35m based on the weighted escalators presented in Table 4-9. PB notes that TransGrid have applied slightly lower weighted escalators in their revised CAM model[30]. TransGrid have advised that this is due to the agreed steelwork escalation weighting adjustment recommended in PB's main report. These escalators have been taken into account in calculating the changes arising from the 2008 APR.

28 TransGrid, Snap_CAM V1.8 Deliverable 16.

29 TransGrid Capital Accumulation Model Version 1.8 deliverable 12a (revised to deliverable 16 input).

30 TransGrid snap_CAM V1.8 deliverable 16.

Table 4-10 – PB recommended weighted cost escalation factors for base escalation adjustments under APR 2008, %.

Component	08/09	09/10	10/11	11/12	12/13	13/14	Total Value ($M)
TransGrid proposed (APR 2008)	1.62%	1.01%	0.75%	0.82%	1.17%	1.43%	-
PB base escalation adjustments (APR 2008)	1.62%	0.77%	0.46%	0.82%	1.17%	1.43%	(8.89)

Source: PB analysis.

Weighting adjustments

The agreed weighting adjustment associated with the adjustment of the 'Structures and Fabricated Steel' and 'Transmission Towers' weightings to 11% Steel / 89% Construction Costs has been considered by TransGrid in the calculation of the revised forecast capex requirement associated with the 2008 APR.

Therefore PB is recommending no further adjustments to the escalation weightings.

Annual Application of Escalation

PB recommends an adjustment of $3.6m to be removed from the TransGrid capex allowance to account for the annual profile of spend in each category being escalated for real labour and material escalators across the outlook period.

This adjustment relates to the inability of the TransGrid CAM model to accommodate variation in the escalation weightings on an annual, rather than weighted five-yearly basis. From the analysis[31] undertaken by TransGrid, the inflexibility of the CAM model to accommodate a more appropriate representation (in PB's opinion) of critical input assumptions results in a typical reduction of $3.6 m.

PB notes that the calculation was based on the original capital works portfolio and should be adjusted to reflect the changes in capital works portfolio arising from the 2008 APR. Therefore PB recommends that the $3.6m adjustment is scaled by the 3.2% difference in capital works capex requirements arising from the 2008 APR, resulting in a revised adjustment of $3.5m.

4.4.2 Risk allowance adjustments

Based on the capital works program determined to meet the 2007 APR forecast, PB recommended three adjustments resulting in a total $11.7m reduction of the forecast capex allowance for the 2009/10-2013/14 regulatory period. The outcome from our main report and the calculation methods used to determine each component of the adjustment is outlined below.

Under the 2008 APR capital works program, the total of the revised adjustments to the risk allowance is $11.4m.

Double counted escalation of risk allowance

Under the 2007 APR capital works program, PB recommended that an adjustment be made to remove the inclusion of escalation from the risk allowance. The total escalation in

[31] TransGrid, Response – PB Advice 6 – E4 Issues 122 166 Revised 21 August 2008,page 2.

TransGrid's CAM is $239.3 m, of which $10.0m is attributable to escalation of the risk allowance. PB recommended that the total risk allowance of $76.8m be reduced by $10.0m (i.e. reduced to $66.7 m) to remove this double counting.

Under the 2008 APR, The total escalation in TransGrid's CAM is $234.5 m, of which $9.7m is attributable to escalation of the risk allowance. PB recommends that the total risk allowance of $72.6m is reduced by $9.7m (i.e. reduced to $62.9 m) to remove this double counting

Inclusion of escalation in variance

While the above adjustment removes the escalation of the allowance for escalation in the variance estimate, it does not remove that allowance for escalation in the variance estimate itself. Consequently, PB recommended a further adjustment to remove escalation from the estimate of variance.

This adjustment is recalculated to reflect the reduced forward capital works program arising from the release of the 2008 APR.

As an approximation, the allowance for escalation of the forecast capex is approximately 12.8%, and hence 12.8% of the cost risk variance could be considered to be attributable to cost escalation. Consequently, PB recommends that the risk allowance be further reduced by $8.1m (12.8% of $62.9m) to remove the allowance for escalation in the variance estimate itself.

Recalculation of Escalation of the Risk Allowance

The resulting value of $54.8m is approximately the equivalent CAM input value for the risk adjustment allowance, and should then be escalated to provide the correct overall value of the risk adjustment allowance. Again, such an adjustment is not practical without changes to the CAM model and rerunning the CAM Monte Carlo simulation. Hence, using the same approximation of 12.8% escalation yields an overall risk allowance of $61.8m and gives a $7.0m escalation component of the risk that should be added back into the ex-ante forecast capex.

Use of mean instead of P50

PB recommended that the P50 value is adopted to reflect an equal risk sharing arrangement between TransGrid and its customers of those cost variation risks that are not reasonably manageable by TransGrid.

PB notes that the difference between TransGrid's P50 and mean vales was small, with the P50 $0.6m less than the mean. However, for consistency with cases where a greater variance may exist, PB is of the view that the P50 should be adopted.

TransGrid's revised CAM model[32] for the 2008 APR does not include updated probabilistic simulation results. Given the small magnitude of this correction no significant change occurs when the adjustment is scaled according to the change in the total proposed capital works portfolio value for the 2008 APR. Therefore PB recommends that the $0.6m adjustment is retained.

4.4.3 Cost estimating factors adjustment

PB recommended an adjustment resulting in a total $13.9m reduction of the forecast capex allowance for the 2009/10-2013/14 regulatory period. The outcome from our main report and the calculation methods used to determine the adjustment is restated below.

[32] TransGrid snap_CAM V1.8_Combined Output deliverables 16 - 20080822-1055.xls.

The -$8.1m correction recommended for the unjustified increase in DCF and NCF factors in the Beaconsfield West project, represents 0.89% of the value of the $908.7m of reviewed projects. On the basis that this is likely to be a systemic issue with the cost estimating and options analysis process, we recommended that an adjustment be made to the portion of the ex-ante capex portfolio that has not been subject to detailed review to correct for this systemic inconsistent or arbitrary application of the factors.

The adjustment of 0.89% was applied on a pro-rata basis across the $1.56b of the un-reviewed network capital works portfolio, resulting in a further correction of -$13.9m. PB notes that only the total value of this adjustment is affected by the changes arising from the 2008 APR. The -0.89% adjustment rate remains constant as the value of the reviewed projects remains unchanged.

Under the 2008 APR, this adjustment has been applied to a reduced un-reviewed capital works portfolio of $1.48b. Therefore PB recommends that a revised correction of $13.2m is applied.

4.5 CONTINGENT PROJECTS

In section 5.6 of PB's main report we address a number of issues relating to contingent projects under the 2007 APR. Under the 2008 APR, TransGrid have proposed to withdraw the construction[33] of the Hunter Valley - Central Coast 500 kV line (project ID 5568) from the ex-ante capex where it appeared under five (5) scenarios[34]. This project was also included as a contingent project, and TransGrid have proposed to retain it as a contingent project. This issue is addressed further in section 5.6 of PB's main report.

[33] Note that the easement component of this project is retained in the 2008 APR ex-ante capex proposal.

[34] Specifically, scenarios 5, 17, 19, 21, and 29 (CAM version, 200805211018_snap_CAM V1.8_Future deliverables 12.xls).

4.6 PB RECOMMENDATIONS AND CONCLUSIONS – FORECAST CAPEX

In the course of PB's main review we examined $983m of TransGrid's proposed total network capex of $2.47b, or approximately 40% of the planned network expenditure. PB's recommendations as set out in section 5.8 of our main report are summarised in Table 4-11 below. Under the 2007 APR PB recommended a total $119.7m adjustment (normalised to the 2008 APR submission) representing a 4.6% reduction in TransGrid's total proposed ex-ante capital expenditure over the 2009/10-2013/14.

Under the 2008 APR PB's recommendation is for a total adjustment of $121.1m (4.8%) of the $2.55b total ex-ante capex allowance proposed by TransGrid as summarised in Table 4-11.

Table 4-11 – Summary of PB's recommended adjustments to forecast capex allowance.

Expenditure $m (real 2007/08)	Ref.	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Bannaby - South Creek 500 kV lines and substation	5.4.3	-	-	-	-	-	-
Holroyd – Chullora 330 kV cable	5.4.4	-	-	-	-	-	-
Dumaresq - Lismore 330 kV line	5.4.5	(1.2)	(17.6)	(17.6)	-	-	(36.4)
SW NSW microwave & satellite	5.4.6	-	-	-	-	-	-
Wallerawang No.1 &No.2 transformer	5.4.7	(0.3)	-	-	-	-	(0.3)
Cooma 132 kV substation replacement	5.4.8	4.8	4.8	3.8	(6.5)	(25.2)	(18.2)
Beaconsfield West 132 kV GIS replacement	5.4.9	(0.4)	(1.2)	(1.8)	(4.7)	-	(8.1)
Newcastle 330 kV substation transformer replacement	5.4.10	-	-	-	(10.5)	-	(10.5)
Hunter Valley - Central Coast 500 kV line easements	5.4.11	-	-	0.2	2.0	(6.2)	(4.0)
Replacement programs	5.4.12	(0.8)	(2.0)	(1.0)	(0.9)	(0.9)	(5.6)
Escalation adjustments (factors)	5.3.1	(1.8)	(1.6)	(2.1)	(2.0)	(1.4)	(8.9)
Yearly weightings	5.3.2	(0.7)	(0.6)	(0.8)	(0.8)	(0.6)	(3.5)
Agreed CAM adjustments (not included in TransGrid Submitted 2008 APR Capex)	5.4.1	(0.2)	(0.2)	(0.3)	(0.2)	(0.1)	(1.0)
Risk allowance adjustments	5.3.4	(2.3)	(2.0)	(2.6)	(2.5)	(1.8)	(11.4)
Cost estimating factors adjustment	3.5.3	(2.8)	(2.4)	(3.0)	(2.9)	(2.2)	(13.2)
PB total adjustment		(5.7)	(22.8)	(25.1)	(29.0)	(38.5)	(121.1)
TransGrid Submitted ex-ante capex		531.9	465.9	579.2	552.3	420.6	2,549.8
PB total adjustment - %		(1.1%)	(4.9%)	(4.3%)	(5.3%)	(9.2%)	(4.8%)

Source: PB analysis.

The impact of the changes associated with the revised load forecast, the agreed adjustments and PB's recommendations are detailed in Table 4-12 with reference to TransGrid's original revenue proposal. The total adjustment results in a 7.5% reduction in TransGrid's original ex-ante capital expenditure of $2.63b.

Table 4-12 – Summary of PB's recommended adjustments to TransGrid's original forecast capex proposal.

Expenditure $m (real 2007/08)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
TransGrid Original Capex Proposal (2007 APR)	536.8	495.9	748.0	523.8	322.3	2626.8
Agreed Adjustments	(1.8)	(1.6)	(2.6)	(1.8)	(1.0)	(8.9)
Impact of 2008 APR forecast	(3.1)	(28.4)	(166.2)	30.3	99.3	(68.1)
TransGrid Revised Capex	531.9	465.9	579.2	552.3	420.6	2549.8
PB Adjustments	(5.7)	(22.8)	(25.1)	(29.0)	(38.5)	(121.1)
PB Recommended Capex (2008 APR)	526.2	443.1	554.1	523.2	382.1	2428.7
PB Total Adjustment % (2008 APR)	(1.1%)	(4.9%)	(4.3%)	(5.3%)	(9.2%)	(4.8%)
Total Change from original Proposal	(10.6)	(52.8)	(193.9)	(0.6)	59.8	(198.1)
% Change From Original Proposal	(2.0%)	(10.7%)	(25.9%)	(0.1%)	18.5%	(7.5%)

Source: PB analysis.

5. IMPACT OF THE 2008 APR ON OPERATIONAL EXPENDITURE

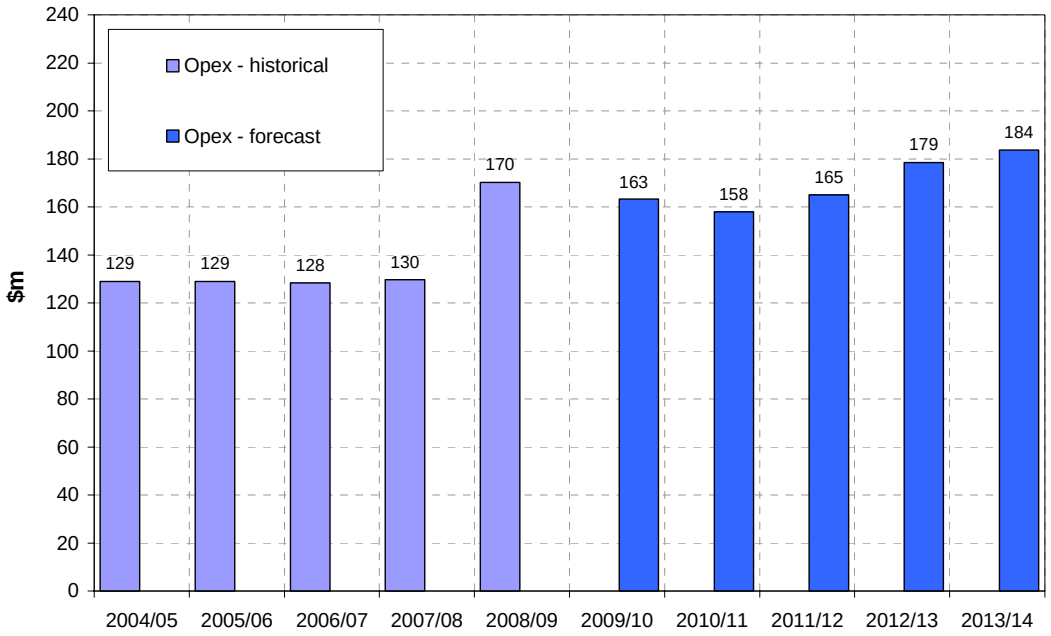
In this section of the report we briefly restate PB's key recommendations relating to operational expenditure as contained in the main report, and we detail the impact of the 2008 APR on TransGrid's forecast operational expenditures. The focus of this section is on those recommendations that are affected by the 2008 APR. We also restate the recommended efficient annual operational expenditure for the regulatory period 2009/10 to 2013/14 based on the 2007 APR, and present our revised efficient annual operational expenditure based on the 2008 APR impact. The methodology adopted to carry out this revision is explained in the following section.

5.1 REVIEW OF THE EXPENDITURE PROGRAM

In this section we provide a summary of the historical and forecast opex expenditure proposals made by TransGrid for the period 2009/10-2013/14, based on the 2007 APR. This section reflects the findings described in Section 3 of the main PB report and represents the baseline for the assessment of the impact of the revised forecast contained in TransGrid's 2008 APR.

As shown by the trend in Figure 5-1, TransGrid has increased its operating maintenance expenditure program slightly since 2008/09. The five-year forecast total is $849m (real 2007/08) and this represents an increase in real terms of 24% compared with the current period spend of $686m. The expenditure is comprised of a controllable component that includes around $367m associated with maintenance, $102m for business management, around $289 for operation, grid planning, corporate and regulatory management, etc, and another $91m for other non-controllable opex, including network support provisions.

Figure 5-1 – TransGrid actual and forecast operating expenditure (real 07/08).



Source: PB analysis - Note 1: The additional opex spend in the 08/09 period relates to additional network support cost associated with a project in Western Sydney.

The calculation of the opex requirement undertaken by TransGrid contains a portion that is proportional to the RAB. As the RAB is influenced by the specific projects occurring in each

year, the opex requirement will be affected by changes in the timing of the forecast capital expenditure. Hence the opex requirement is influenced by the 2008 APR.

5.2 FORECAST OPERATING EXPENDITURE

TransGrid has used an opex model to forecast future annual operating expenditures by determining efficient base year expenditures and escalating these expenditures to reflect the impact of real increases in costs expected during the next regulatory period, as well as the costs associated with operating and maintaining the additional assets that will be commissioned during that period. The 2008 APR has an impact on the proposed capital works program and this in turn influences the timing and quantum of new assets scheduled for commissioning during the next regulatory period.

In the TransGrid opex model, the impact of the asset growth on operating expenditure forecasts is calculated by increasing annual forecasts by the ratio of new assets commissioned annually to the current replacement cost of the TransGrid network. The capital works detailed in the 2008 APR result in a revised project commissioning timetable, and this changes the annual growth ratios for each asset class. This is the only impact the 2008 APR has on forecast operating expenditures, but it requires every controllable operating expenditure forecast in the PB Main report to be revised as asset growth in built into every forecast.

5.2.1 Asset escalation

The effective asset growth based on an as commissioned basis for the 2007 TransGrid APR is shown in

Table 5-1 and the revised effective asset growth resulting from the publication of the 2008 APR is shown in Table 5-2. The annual and total variations between the effective asset growth used to forecast opex in the main report (2007 APR) and the effective asset growth inherent in the 2008 APR are shown in Table 5-3.

The values are expressed in 2006/07 dollars as all the modelling is carried out in these dollars and each cost category forecast is converted into 2007/08 dollars for reporting purposes.

Table 5-1 – 2007 APR effective asset growth (as commissioned).

$06/07m	09/10	10/11	11/12	12/13	13/14
Transmission Lines	74.50	41.45	154.20	256.34	9.77
Substations	375.24	61.20	176.77	75.17	105.93
Communications	25.41	4.98	10.12	3.41	10.16
Secondary Systems	18.52	10.81	9.16	5.13	3.95
Land and Easements	15.98	5.65	61.96	68.10	53.46
Total	509.65	124.09	412.21	408.15	183.27

Source: TransGrid.

Table 5-2 – 2008 APR effective asset growth (as commissioned).

$06/07m	09/10	10/11	11/12	12/13	13/14
Transmission Lines	74.50	41.45	143.56	262.76	9.77
Substations	385.30	56.24	69.71	167.69	45.02
Communications	25.60	4.85	8.61	4.40	9.30
Secondary Systems	18.79	10.81	8.11	5.65	2.11
Land and Easements	15.98	5.65	61.96	68.10	53.46
Total	520.17	119.00	291.95	508.60	119.66

Source: TransGrid.

In total, the publication of the 2008 APR has resulted in $77.99m (06/07) reduction in forecast capital works scheduled for commissioning during the next regulatory period as shown in Table 5-3. This reduction in effective asset growth represents a 4.76% reduction compared to the effective asset growth associated with the 2007 APR which is incorporated in the modelling in the main report.

Table 5-3 – comparison of 2007 APR to 2008 APR total annual effective asset growth (as commissioned).

$06/07m	09/10	10/11	11/12	12/13	13/14	Total
2007 APR	509.65	124.09	412.21	408.15	183.27	1637.36
2008 APR	520.17	119.01	291.95	508.61	119.66	1559.39
Variation	10.52	(5.09)	(120.26)	100.45	(63.61)	(77.99)
Percentage change	2.06%	(4.10%)	(29.17%)	24.61%	(34.71%)	(4.76%)

Source: PB analysis.

Conclusion

The adoption of the capital expenditure program inherent in the 2008 APR results in a $77.99m (06/07) reduction in effective asset growth over the next regulatory period based on the proposed TransGrid capital works program.

5.3 AGREED REVISED BASE ANNUAL OPERATING EXPENDITURES

As detailed in the main report, consultations held between TransGrid, AER staff and PB identified 4 issues which impacted on forecast operating expenditures. It was agreed that these issues should be incorporated into the TransGrid opex model and the revised base

controllable operating cost forecasts were modelled. This is further discussed in section 7.3 of the main report.

Table 5-4 shows the agreed revised base annual controllable operating forecasts that PB and TransGrid agree represents a reasonable starting point for the main report. The modelling is based on the 2007 APR and version 4.5a of TransGrid's opex model. The impact of PB's recommendations in the main report is based on these revised forecasts.

Table 5-4 – Agreed revised annual controllable operational expenditure forecasts based on the 2007 APR.

Expenditure $m (real 2007/08)	09/10	10/11	11/12	12/13	13/14	Total
Opex model version 4.5a forecast expenditures	131.49	140.58	144.91	156.54	161.52	735.04

Source: TransGrid and PB analysis.

Table 5-5 below, details the revised agreed annual base controllable operating expenditures and the variations compared to those based on the 2007 APR.

The 2008 APR impact

The calculation of the revised annual controllable operating costs are based on the TransGrid's opex model version 4.6b which is essentially TransGrid's opex model version 4.5a revised to reflect the effective asset growth based on the 2008 APR.

The modelling indicates an annual variation in forecast controllable operating expenditures ranging from zero to 0.65%, but the total variation in forecast operating expenditures over the five year period is a negative 0.13%.

Table 5-5 – Comparison of agreed base controllable operational expenditures based on the 2007 and 2008 APR.

$07/08m	09/10	10/11	11/12	12/13	13/14	Total
2007 APR	131.49	140.58	144.91	156.54	161.52	735.04
2008 APR	131.49	140.69	144.97	155.53	161.37	734.05
Variation	0	0.11	0.06	(1.01)	(0.15)	(0.99)
Percentage change	0%	0.08%	0.04%	(0.65%)	(0.09%)	(0.13%)

Source: TransGrid and PB analysis.

Conclusion

The adoption of the 2008 APR results in total forecast controllable operating costs of $734.05m (07/08) which is a reduction of $990,000 (07/08) over the forecasts based on the 2007 APR associated with agreed revised base operating expenditures. This reduction represents 0.13% of the forecasts based on the 2007 APR.

5.4 PB ADJUSTMENTS TO CONTROLLABLE OPERATING FORECASTS

Whilst PB is generally of the view that the methodology, modelling assumption and inputs incorporated into version 4.5a of TransGrid's opex model are reasonable, there are two issues which we believe have an impact on the forecast operating expenditures not included in TransGrid's modelling.

In the main report PB recommended two adjustments to TransGrid's controllable forecast operating costs; firstly an adjustment based on revising the current replacement cost of the TransGrid network to more accurately reflect current costs, and secondly an adjustment to the forecast defects expenditure associated with the commissioning of new assets during the next regulatory period to more accurately reflect the substantially reduced operating costs associated with maintaining and operating new assets. The quantum of these recommended adjustments are affected by the adoption of the 2008 APR.

In the following sections we discuss these two issues further, along with the recommended variations in the annual forecast controllable operating expenditures and we show the revised adjustments compared to the original recommendations detailed in the main report.

5.4.1 Current asset base replacement cost

The TransGrid opex model calculates the additional operating expenditures required to operate and maintain the new assets commissioned during the next regulatory period. The method used to forecast the additional operating expenditures is to increase the operating forecasts by the ratio of the value of the new assets to the current replacement cost of the existing TransGrid network. PB agrees with this methodology as the proposed capital works programs create the new assets that will need to be operated and maintained.

PB contends that regulatory roll forward numbers used by TransGrid from 2004/05 to determine the current replacement cost of their existing network do not necessarily reflect current construction costs. In the TransGrid opex model, the current replacement cost of the existing asset base has been determined by using a revaluation of the optimised replacement value as at 30th June 2004. Since 2004, the replacement value has been adjusted to take into account movements such as additions and disposals and indexation at 2.49% each year (in accordance with CPI allowed in ACCC Decision 2005). PB believes that the resultant value of $6.851b (06/07) which has been used in the opex model is too low and that this has an adverse effect on the forecast operating expenditures i.e. the forecasts are higher than may be required.

PB requested TransGrid to calculate the current replacement cost of the existing asset base by applying the real escalation in construction and property costs experienced since 2004. These real increases are shown in Table 5-6.

Table 5-6 – Real cost escalation and CPI from 2004/05 to 2006/07.

Expenditure $m (real 07/08)	04/05	05/06	06/07
Network Escalation (real)	2.81%	4.95%	6.15%
Property Escalation (real)	4.10%	4.10%	4.10%
CPI	2.36%	2.98%	2.44%

Source: TransGrid and PB analysis.

Applying these real cost escalation factors to the revaluation of the optimised replacement value as at 30th June 2004 results in a 14% increase in the replacement values of the TransGrid network from the value used in version 4.5a of the TransGrid opex model, namely $6.851b (06/07). This revised replacement cost of the network, $7.814b (06/07), has been modelled in version 4.5b2 of the TransGrid opex model and the results of this modelling are shown in Table 5-7. These results reflect the impact of new assets based on the capital works programs as submitted in TransGrid's submission and hence needs to be remodelled under the 2008 APR. Table 5-7 also shows the impact of this variation on forecast controllable operational expenditures in isolation.

Table 5-7 – Forecast controllable operational expenditures based on TransGrid's and PB's recommended network replacement cost and the 2007 APR.

Expenditure $m (real 07/08)	09/10	10/11	11/12	12/13	13/14	Total
Forecast controllable opex based on TransGrid's network replacement cost	131.49	140.58	144.91	156.54	161.52	735.04
Forecast opex controllable based on PB's recommended network replacement cost	131.15	139.56	143.73	154.92	159.55	728.91
Variation	(0.34)	(1.02)	(1.18)	(1.62)	(1.97)	(6.13)

Source: TransGrid and PB analysis.

Recommendation

PB recommends that the forecast additional operational expenditures be calculated in the TransGrid opex model using a current replacement value of the existing network of $7.814b (06/07) as we believe this value is representative of the significant real increases in construction and land costs that have occurred since the 2004 revaluation.

The 2008 APR impact

As detailed in the main report, PB calculated the impact of changing the current replacement cost of the TransGrid network to reflect increases in construction costs since 2004 using the TransGrid opex model. To calculate the impact of the 2008 APR on these calculations the value of the TransGrid network in 2006/07 was changed to $7.814b (06/07) in version 4.6b of the opex model. As shown in Table 5-8, this change results in a total reduction of $.88m (07/08) in forecast controllable operating costs over the next regulatory period, which represents a 0.12% reduction over the recommended reduction based on the 2007 APR. The calculation has been done with all other model variables unchanged.

Table 5-8 – Comparison of PB recommended controllable opex adjustments based on the 2007 and 2008 APR resulting from revised asset replacement costs.

$07/08m	09/10	10/11	11/12	12/13	13/14	Total
2007 APR	131.15	139.56	143.73	154.92	159.55	728.91
2008 APR	131.15	139.66	143.79	154.02	159.41	728.03
Variation	0.00	0.10	0.06	(0.90)	(0.14)	(0.88)

Percentage change	0%	0.07%	0.04%	(0.06%)	(0.09%)	(0.12%)

Source: PB analysis.

In order show the full impact of the revised TransGrid 2006/07 network replacement cost we have included Table 5-9 which details the impact of the 2008 APR on PB recommended forecast controllable opex and the agreed forecast opex calculated in the main report using version 4.5a of the TransGrid opex model.

Table 5-9 – PB recommended controllable opex adjustments based on the 2008 APR compared to agreed base opex forecasts shown in main report.

$07/08m	09/10	10/11	11/12	12/13	13/14	Total
Agreed forecast opex based on version 4.5a	131.49	140.58	144.91	156.54	161.52	735.04
Forecast opex based on 2008 APR	131.15	139.66	143.79	154.02	159.41	728.03
Variation	(0.34)	(0.92)	(1.12)	(2.52)	(2.11)	(7.01)

Source: PB analysis.

Conclusion

The impact of the adoption of the 2008 APR on PB's recommended increase in the current replacement cost of the TransGrid network is a total reduction of $7.01m (07/08) in forecast controllable operating expenditure forecasts compared to the agreed forecast operating expenditures based on the 2007 APR.

PB's recommended controllable operating expenditure for the next regulatory period based on the recommended network replacement cost of $7.814b (06/07), and the 2008 APR is $728.03m (07/08). This is a further reduction of $0.9m (07/08) compared to the reduction calculated in the main report based on the 2007 APR.

5.4.2 Asset growth escalation

PB is of the opinion that growth in operational expenditures is intrinsically linked to forecast growth related capital works programs, as these programs result in additional new assets that require both maintenance and operating effort. However, TransGrid's opex model assumes that the amount of additional operating expenditures is directly related to the increase in new assets under management. PB notes that TransGrid does apply economy of scale factors when calculating the impact of these new assets on forecast operating expenditures, but these efficiency factors relate to the ability of an existing business to integrate the management of additional asset efficiently.

The TransGrid opex model assumes that the business is operating under a 'business as usual' scenario. PB contend that if the forecast growth related capital works programs are the same as those in the period up until the 2006/07 base year, then the model outputs would be reasonable. However, the forecast growth-related capital works programs are significantly larger than those in place up until 2006/07, and we believe that this has an impact on the reasonableness of the opex forecasts the current model produces.

To clarify our view, we believe that the overwhelming majority of the new assets scheduled for commissioning during the next regulatory period will not require any defect rectification

expenditures during that period. Based on this assumption, we have calculated the defect rectification forecast expenditures using version 4.5a of the TransGrid opex model both with and without the growth capex escalators to determine the variation in annual forecast expenditures. We recommend that the difference between these two amounts be deducted from the TransGrid forecast operational expenditures.

Whilst it may be argued that these new assets could produce some minor number of defects during the next regulatory period, PB believes that the reduced routine maintenance resulting from the effects of new technology will offset these minor costs. For example, new transmission lines constructed using concrete poles will not require any ground line inspection and maintenance for at least two inspection cycles, whereas the opex modelling projects maintenance ratios base predominantly on wood poles inspection regimes.

The results of these calculations are shown in Table 5-10. They are based on the capital works program as submitted in the original TransGrid submission, and the results will be different under the 2008 APR. In addition the impact of our recommendation has been modelled in isolation, and modelling our two recommendations concurrently will produce different outcomes.

Table 5-10 – Forecast defect rectification costs associated with assets proposed to be commissioned during next regulatory period based on the 2007 APR.

Expenditure $m (real 07/08)	09/10	10/11	11/12	12/13	13/14	Total
Defect rectification costs without capex growth	24.61	26.38	26.17	28.57	28.01	133.74
Defect rectification costs including capex growth	24.61	29.31	29.71	33.78	34.33	151.74
Variation	0.00	(2.93)	(3.54)	(5.21)	(6.32)	(18.00)

Source: PB analysis.

PB's modelling indicates that the inclusion of the growth-related assets proposed to be constructed during the next regulatory period in TransGrid's opex model, results in additional defect rectification forecast expenditure of $18m (07/08) over the five year period.

Recommendation

PB recommends that the defect rectification included in the TransGrid opex model resulting from the new growth assets proposed to be commissioned during the next regulatory period be removed from the annual operating forecasts.

The 2008 APR impact

As detailed in the main report, PB contends that newly constructed assets should not require defect rectification expenditures over the remainder of the regulatory period in which they are commissioned. We believe assets constructed to have an operational life in excess of 40 years should not require any defect rectification during the first few years of their service lives. We acknowledge that these new assets will require both operating and routine maintenance expenditures and we do not recommended any adjustments to these forecasts.

In order to calculate the impact of our recommendation, version 4.6b of TransGrid's opex model was run both with and without asset growth, and the annual defect forecasts summated. The difference between these two forecasts represents the defect expenditures incorporated in the modelling as a result of the commissioning of the new assets. The

outcome of this modelling is shown in Table 5-11. The modelling was carried out using the TransGrid network replacement cost so that the recommended variation is shown in isolation.

Table 5-11 – Defect expenditures with and without asset growth based on 2008 APR.

$07/08m	09/10	10/11	11/12	12/13	13/14	Total
Defect expenditures with asset growth	24.61	29.37	29.74	33.31	34.25	151.28
Defect expenditures without asset growth	24.61	26.38	26.17	28.57	28.01	133.74
Variation	0	2.99	3.57	4.74	6.24	17.54

Source: PB analysis.

Conclusion

PB's recommended reduction in total forecast operational expenditure resulting from the commissioning of new asset during the next regulatory period is $17.54m (07/08) based on the capital works program under the 2008 APR. This reduction compares to the $18.00m (07/08) reduction recommended in the main report.

5.5 CONTROLLABLE OPEX RECOMMENDATIONS

PB recommends that the two adjustments to the TransGrid opex model detailed in sections 5.4.1 and 5.4.2 be incorporated to forecast future operational expenditures. These adjustments are associated with escalating the 2004 value of TransGrid's asset base to reflect actual real cost increases and removing the forecast defect rectification costs associated with the assets proposed to be commissioned during the next regulatory period.

In order to determine the combined impact of these two recommendations PB has re-run version 4.5b(2) of TransGrid's opex model which facilitates adjusting the replacement cost of the existing TransGrid asset base. The model was run twice, with and without the growth factors, in order to determine the change in defect rectification costs associated with the commissioning of the proposed new assets during the next regulatory period. Table 5-12 shows the annual defect rectification forecasts for the assets proposed to be commissioned during the next regulatory period combined with the impact of the revised existing asset base valuation.

Table 5-12 – Forecast defect rectification costs associated with assets proposed to be commissioned during the next regulatory period based on PB's recommended network replacement cost and the 2007 APR.

Expenditure $m (real 07/08)	09/10	10/11	11/12	12/13	13/14	Total
Defect rectification costs without capex growth	24.44	26.21	26.01	28.40	27.83	132.89
Defect rectification costs including capex growth	24.44	28.80	29.14	33.03	33.45	148.86
Variation	0.00	(2.59)	(3.13)	(4.63)	(5.62)	(15.97)

Source: PB analysis.

In order to calculate our recommended annual operational expenditure forecasts, version 4.5b(2) of TransGrid's opex model was re-run after revising the asset base valuation to $7.814b (06/07) to reflect our recommendation, and then deducting our recommended adjustment for defect rectification of the newly commissioned assets. The result of these calculations is shown in Table 5-13 which sets out PB's recommended annual operational expenditure forecasts for the next regulatory period.

Table 5-13 – PB recommended controllable opex forecasts.

Expenditure $m (real 07/08)	09/10	10/11	11/12	12/13	13/14	Total
Opex model version 4.5a forecast operational expenditure (revised asset value)	131.15	139.56	143.73	154.92	159.55	728.91
Recommended Defect rectification adjustments	-	(2.59)	(3.13)	(4.63)	(5.62)	(15.97)
PB Recommended opex allowances	131.15	136.97	140.60	150.29	153.93	712.94

Source: PB analysis.

Recommendation

Table 5-14 shows the PB recommended annual controllable operational expenditure forecasts, the agreed TransGrid forecasts based on the TransGrid model version 4.5a, and the variances. PB recommends an additional total reduction in forecast expenditures of $22.1m (07/08) over the five year period compared to the revised forecasts incorporating the agreed variations.

Table 5-14 – Comparison of PB's recommended annual controllable operational forecasts to the TransGrid agreed forecasts (version 4.5a of the opex model).

Expenditure $m (real 07/08)	09/10	10/11	11/12	12/13	13/14	Total
PB recommended annual operational expenditure	131.15	136.97	140.60	150.29	153.93	712.94
TransGrid agreed annual operational expenditure forecasts.(version 4.5a)	131.49	140.58	144.91	156.54	161.52	735.04
Variation	(0.34)	(3.61)	(4.31)	(6.25)	(7.59)	(22.1)

Source: PB analysis.

The 2008 APR impact

As detailed in the main report and discussed above, the two recommended adjustments to TransGrid's forecast operational expenditures have been modelled independently above, and

in order to calculate our total recommended opex adjustment these two recommendations have to be modelled concurrently.

The recommended defect reductions have been modelled using TransGrid's opex model with the value of the replacement cost of the network altered to $7.814b (06/07) as detailed in Section 7.71 of the main report. The results of this modelling are shown in Table 5-15 below.

Table 5-15 – Defect expenditures with and without asset growth based on 2008 APR and recommended revised network replacement value.

$07/08m	09/10	10/11	11/12	12/13	13/14	Total
Defect expenditures with asset growth	24.45	28.87	29.19	32.63	33.42	148.56
Defect expenditures without asset growth	24.45	26.22	26.01	28.41	27.84	132.93
Variation	-	2.65	3.18	4.22	5.58	15.63

Source: PB analysis.

PB's recommended controllable operating expenditure forecasts for the next regulatory period are shown in Table 5-16. In total the combined impact of the adoption of the 2008 APR is a further recommended reduction of $0.54m (07/08) in controllable operating costs over the five year period. PB's total recommended forecast operating expenditure for the period is $712.40m (07/08) for the next regulatory period.

Table 5-16 – PB's recommended controllable opex forecast based on the 2008 APR.

$07/08m	09/10	10/11	11/12	12/13	13/14	Total
Forecast opex expenditures revised replacement cost	131.15	139.66	143.79	154.02	159.41	728.03
Recommended defect adjustments	-	2.65	3.18	4.22	5.58	15.63
PB recommended controllable opex forecasts (2008 APR)	131.15	137.01	140.61	149.80	153.83	712.40

Source: PB analysis.

5.6 TOTAL OPERATIONAL EXPENDITURE RECOMMENDATION

As presented in the main report, Table 5-17 below summarises PB's recommendations for operational expenditure based on the 2007 APR. Included in this table are debt and equity raising costs. PB's scope for this review did not extend to debt and equity raising costs and therefore PB makes no recommendation in respect of these costs. TransGrid's proposed debt and equity raising costs are included in the table below for completeness only.

Table 5-17 – Total operational expenditure recommendation based on the 2007 APR.

Expenditure $m (real 07/08)	09/10	10/11	11/12	12/13	13/14	Total
TransGrid's proposal						
Controllable opex	135.2	144.4	149.7	161.8	166.5	757.6
Debt raising	3.7	4.0	4.3	4.8	5.1	21.9
Equity raising	0.9	1.7	3.1	4.0	4.2	13.9
Self-insurance	1.9	1.9	1.9	1.9	1.9	9.5
Network Support	21.5	6.0	6.0	6.0	6.0	45.5
Total regulatory opex	163.2	158.0	165.1	178.5	183.7	848.5
PB's recommendation						
Controllable opex	131.15	136.97	140.6	150.29	153.93	712.9
Debt raising	3.7	4	4.3	4.8	5.1	21.9
Equity raising	0.9	1.7	3.1	4	4.2	13.9
Self-insurance	3.13	3.13	3.13	3.13	3.13	15.65
Network Support	21.5	6	6	6	6	45.5
Total regulatory opex	160.4	151.8	157.1	168.2	172.4	809.9
Variation	(2.8)	(6.2)	(7.9)	(10.3)	(11.3)	(38.5)

Source: PB and TransGrid.

The 2008 APR impact

Total operational expenditure recommendations based on the 2008 APR are summarised in Table 5-18, below. Included in this table are debt and equity raising costs. PB's scope for this review did not extend to reviewing these costs hence TransGrid's forecast debt and equity raising costs are included for completeness only.

Table 5-18 – Total operational expenditure recommendation.

Expenditure $m (real 07/08)	09/10	10/11	11/12	12/13	13/14	Total
TransGrid's proposal						
Controllable opex	135.2	144.4	149.7	161.8	166.5	757.6
Debt raising	3.7	4.0	4.3	4.8	5.1	21.9
Equity raising	0.9	1.7	3.1	4.0	4.2	13.9
Self-insurance	1.9	1.9	1.9	1.9	1.9	9.5
Network Support	21.5	6.0	6.0	6.0	6.0	45.5
Total regulatory opex	163.2	158.0	165.1	178.5	183.7	848.5
PB's recommendation						
Controllable opex	131.15	137.01	140.61	149.8	153.83	712.4
Debt raising	3.7	4	4.3	4.8	5.1	21.9
Equity raising	0.9	1.7	3.1	4	4.2	13.9
Self-insurance	3.13	3.13	3.13	3.13	3.13	15.65
Network Support	21.5	6	6	6	6	45.5
Total regulatory opex	160.4	151.8	157.1	167.7	172.3	809.3
Variation	(2.9)	(6.2)	(8.0)	(10.8)	(11.5)	(39.4)

Source: PB and TransGrid.

6. IMPACT OF THE 2008 APR ON SERVICE STANDARDS

PB undertook a review of the targets, parameter weighting, caps and collars proposed by TransGrid for the Service Target Performance Incentive Scheme (STPIS). PB concluded that the processes used by TransGrid to record historical performance data and the processes used to determine the proposed values were consistent and reasonable.

A small number of adjustments were recommended with regard to the treatment of exclusions, the correction for capital works outages, clerical corrections to the historical performance data and minor rounding inconsistencies. These corrections are discussed in section 8 of the original PB report.

On the basis of our review, PB recommends that the values for the six performance parameters shown in Table 6-1 be included in TransGrid's performance incentive scheme.

Table 6-1 – Recommended performance incentive scheme under the 2007 APR.

Measure	Unit	Max penalty	Start penalty	Target	Start bonus	Max bonus	Weighting (%)
Transmission line availability	%	98.99	99.20	99.20	99.20	99.31	20
Transformer availability	%	97.26	98.55	98.55	98.55	98.83	15
Reactive plant availability	%	98.65	99.13	99.13	99.13	99.33	10
Loss of supply events > 0.05 system minutes	number	7	4	4	4	2	25
Loss of supply events > 0.25 system minutes	number	2	1	1	1	0	10
Average outage duration (capped 7 days)	minutes	999	824	824	824	649	20

Source: PB analysis.

PB notes that these values for the circuit availability parameters have been calculated with reference to the outage hours associated with the capital works included in TransGrid's original revenue proposal. Therefore, the recommended values are affected by the changes to the capital works program arising from the 2008 APR.

6.1.1 Impact of 2008 APR

Under the 2008 APR forecast the timing of the outages associated with the Bannaby-South Creek 500kV line is altered. This affects the correction for capital works associated with the circuit availability parameters.

With regard to the magnitude of the change, TransGrid has advised that 3½ months of the 8 month outage scheduled for 2014 would occur within the 2009/10-2013/14 regulatory period.

The remaining outage hours would occur in the subsequent regulatory period. This outage equates to 2568 hours[35].

The timing of plant commissioning is also changed for a number of projects. This affects the asset growth resulting in a small reduction in the target for the Reactive Plant Availability parameter due to a reduction in the number of reactive plant items commissioned over the 2009/10-2013/14 regulatory period.

Table 6-2 – Recommended performance incentive scheme under the 2008 APR.

Measure	Unit	Max penalty	Start penalty	Target	Start bonus	Max bonus	Weighting (%)
Transmission line availability	%	99.05[a]	99.26	99.26	99.26	99.36	20
Transformer availability	%	97.26	98.55	98.55	98.55	98.84	15
Reactive plant availability	%	98.65[a]	99.12	99.12	99.12	99.33	10
Loss of supply events > 0.05 system minutes	number	7	4	4	4	2	25
Loss of supply events > 0.25 system minutes	number	2	1	1	1	0	10
Average outage duration (capped 7 days)	minutes	999	824	824	824	649	20

[a]*these values have been corrected for minor rounding discrepancies in TransGrid's submitted documentation.*

Source: PB analysis.

PB notes that the values for the circuit availability parameters only have been calculated with reference to the outage hours associated with the capital works included in TransGrid's original revenue proposal. Therefore, no changes to the Loss of Supply and Average Outage Duration parameters are recommended.

35 TransGrid 5567.doc, Lines+Sub-500kV:Bannaby-Souyth Creek, August 2008.

7. CONCLUSIONS AND RECOMMENDATIONS

PB has undertaken review of TransGrid's revenue proposal[36] for the AER. The outcomes of this work are documented in our main report which presents our independent review of TransGrid[37]. During the course of PB's review, TransGrid published its 2008 Annual Planning Report (2008 APR).

PB has been engaged by the AER to complete a supplementary review of TransGrid in order to assess the impact of the 2008 APR on TransGrid's revenue proposal. This report presents the findings of our supplementary review and focuses specifically on TransGrid's capex, opex, and service standards proposals in the light of the changes between the 2007 APR and the 2008 APR.

Our approach to the review is to firstly ascertain the key changes between the 2007 APR and the 2008 APR, which is addressed in section 3. Based on our understanding of these key changes, PB reviewed TransGrid's capex, opex, and service standards proposals with the aim of forming an independent view on these changes in light of our main report findings.

In assessing the changes arising from the issue of the 2008 APR, PB has reviewed the changes in the load forecast between 2007 and 2008. From this review PB are of the opinion that the impact of the 2008 forecast is a deferral of a least one year for demand driven projects in the early part to the forecast period, and a deferral of at least two years for project in the latter part of the forecast period. It is also our view that the greater difference between the high, medium and low scenarios in the 2008 forecasts (compared with 2007) represents greater uncertainty in project timing and that this will correspond to a spread of the forecast commissioning dates across the planning scenarios.

The generation planting scenarios used by TransGrid in its main system planning are fundamental to a large proportion of the ex-ante capex proposal. In PB's review of the generation planting scenarios, we note that the scenario probabilities have not changed under the 2008 APR. We also note that ROAM's revision of the generation planting scenarios concluded that magnitude of new entry generation would reduce by 380MW to 680MW with a significant oversupply of generating capacity in the early years of the forecast period[38]. It is PB's view that these changes are broadly in line with the reduction in the 2008 load forecast.

In light of the our review of the 2008 load forecast, the scenario probabilities and the generation planting scenarios, PB is of the view that these changes would lead to a reasonable number of load driven projects being deferred. In our high level review of the ex-ante capex portfolio, we note that within TransGrid's ex-ante capex portfolio, 40 projects that are load driven. We also note that the timing of 32% of load driven projects is constrained by factors such as generation planting[39], and that the timing of 68% of the load driven projects that are not constrained changes under the 2008 APR.

In considering TransGrid's application of the 2008 load forecast, and the revised generation planting scenarios, PB is of the view that in cases where the timing impact on the project is marginal TransGrid has been conservative in its treatment of these changes by retaining the project within the original commissioning year. Notwithstanding this conservative treatment,

36 TransGrid 2008, "TransGrid Revenue Proposal 1 July 2009 - 30 June 2014", 31 May 2008.

37 PB, 2008, "TransGrid Revenue Reset - An independent review, Prepared for the Australian Energy Regulator".

38 ROAM Consulting, 2008, "National Electricity Market Forecasting - Scenario review for Revenue Reset with Garnaut Review and Green Paper", 4 August 2008, Ref No. Trg00011, page 17-19.

39 Refer Table 8-4 for details.

PB is of the opinion that the proposed changes in the ex-ante capex portfolio are reasonable, and in line with the 2008 forecast as well as ROAM's revised generation planting scenarios.

Following our review of the 2008 APR, PB considered the impact of the findings of this review on our detailed findings presented in our main report. Sections 4, 5, and 6 present our detailed review of the impacts for capex, opex and service standards respectively. The key outcomes of this review are:

- Table 4-8 summarises the total change in the ex-ante capital expenditure allowance arising from the 2008 APR. The impact of the 2008 APR has been assessed and PB is of the view that TransGrid has generally applied a reasonable approach in assessing the impact of the 2008 APR. PB recommends an additional adjustment of $4.0m be applied to TransGrid's proposed $68.1m change arising from the revised timing. This results in a total $72.1m adjustment from TransGrid's original ex-ante capex proposal associated with the 2008 APR
- Table 4-1summarises PB's recommendations for capital expenditure based on the 2007 APR as presented in our main report. In our main report PB recommends a reduction of $128.6m in TransGrid's ex-ante capex proposal. This recommended adjustment represents a reduction of $119.7m (4.6%) when normalised for consistency with the 2008 APR submission. The impact of the 2008 APR has been assessed, (refer section 4 above) and PB recommendations are summarised in Table 4-11. PB's recommendations result in a total reduction of $121.1m (4.8%) to TransGrid's revised ex-ante capex proposal
- Table 4-12 reconciles the changes associated with the revised load forecast, PB's recommendations and the agreed adjustments to the total ex-ante capital expenditure contained in TransGrid's original revenue proposal. The total adjustment results in a $198.1m (7.5%) reduction in TransGrid's original ex-ante capital proposal of $2,626.8m to $2,428.7m
- Table 5-17 summarises PB's recommendations for operational expenditure based on the 2007 APR as presented in our main report. In our main report PB has recommended a total reduction of $38.5m in TransGrid's opex expenditure proposal. The impact of the 2008 APR has been assessed (refer section 5 above) and PB recommends a total reduction of $39.4m in TransGrid's opex expenditure proposal
- Table 6-1 summarises PB recommendations for the service target performance incentive scheme (STPIS) based on the 2007 APR as presented in our main report. TransGrid has submitted updated outage forecasts and availability parameter values based on the 2008 APR. PB has assessed the updated forecasts and values (refer section 6 above) and based on TransGrid's submission, PB's recommendations for the STPIS are presented in Table 6-2. The changes are a small increase in the transmission line availability, and a small reduction in the reactive plant availability to reflect the changes in the ex-ante capital works portfolio.

8. APPENDICES

APPENDIX A
EX-ANTE PROJECTS BY PRIMARY DRIVER GROUPING

8.1 EX-ANTE PROJECTS BY PRIMARY DRIVER GROUPING

The following tables show TransGrid's ex-ante project portfolio grouped by the type of primary driver. The commissioning dates given in the tables are consistent with TransGrid's revenue proposal for the medium growth scenario. For projects that are load driven (refer Table 8-4), the revised commissioning dates based on the 2008 APR are also included. Note the following excludes replacement projects, and main system projects.

The projects listed in Table 8-1 are required to meet a defined obligation not related to load growth and the load forecast scenarios. Projects related to SCADA and telecommunications needs, NER compliance, metering, etc.

Table 8-1 – Projects required to meet a defined obligation.

Project ID	Project name	Commissioning date	Comment
9048	SCADA Replacement & Augmentation	2010	Committed. To meet NEMMCO PSDCS Standard
5603	Comms New England Microwave radio	2013	
5830	Comms South NSW Microwave Radio	2011	
5607	Comms SW NSW Microwave & Satellite	2011	
6154	Comms Beryl SCADA Microwave Radio	2012	
9055	Comms Network Upgrade (various)	2010	Committed
9080	Comms Voice Over Internet Protocol	2010	Committed
5886	Points on Wave 330kV Sub Cap Bank Repm't	2014	
5605	Protection & Metering- Reactive Metering	2015	
6117	Quality supply monitoring (various)	2014	
6235	Real time line rating systems	2010	
5606	SCADA Replacement & Augmentation	2011	CB Sync check
6246	SCADA Replacement & Augmentation	2011	Coleambally
6247	SCADA Replacement & Augmentation	2013	Cooma
6248	SCADA Replacement & Augmentation	2012	Deniliquin
6249	SCADA Replacement & Augmentation	2011	Finley
6250	SCADA Replacement & Augmentation	2013	Tenterfield
6251	SCADA Replacement & Augmentation	2011	Tumut
6252	SCADA Replacement & Augmentation	2012	Yanco
6277	SCADA Replacement & Augmentation	2011	Albury
6278	SCADA Replacement & Augmentation	2011	ANM
6375	SCADA Replacement & Augmentation	2012	Wagga
6376	SCADA Replacement & Augmentation	2012	Tamworth 132
6437	SCADA Replacement & Augmentation	2014	Hume
6113	Trip Scheme - System protection scheme	2012	
5601	Comms - Albury, ANM, Hume	2011	

Source: TransGrid 2008, "Movement of Projects" undated document page 4-5 (file Project Drivers.pdf).

The projects listed in Table 8-2 are committed projects and consequently the commissioning date cannot change. Hence these projects are not related to load growth and load forecast scenarios.

Table 8-2 – Committed projects.

Project ID	Project name	Commissioning date	Comment
9135	Munmorah & Vales Pt 330kV Upgrade	2010	Committed Augmentation
9045	Coffs Harbour 132kV Transformers	2010	Committed Augmentation
9127	Coffs Harbour -Kempsey 132kV Conversion	2010	Committed Augmentation
9216	Sydney South 330kV Transformer No.1&2	2010	Committed Augmentation
9217	Sydney Sth 330kV Transformer No3&4	2010	Committed Augmentation
9257	Wagga North 132kV Substation	2010	Committed Augmentation
9280	Wollar-Wellington 330kV development	2010	Committed Augmentation
9286	Wollar-Wellington 330kV development	2010	Committed Augmentation
9246	Koolkhan 132kV Sub 3rd Transformer	2010	Committed Augmentation
9230	Tomago 330kV Transformer	2010	Committed Augmentation
9204	Canberra 132kV Tunnel Board Replacement	2010	Committed project
9090	Dapto Line Switchbay & Fault Level	2010	Committed project
9275	Williamsdale 330kV Substation	2010	Committed Augmentation

Source: TransGrid 2008, "Movement of Projects" undated document page 6 (file Project Drivers.pdf).

The projects listed in Table 8-3 are non-load driven projects such as easement acquisitions, busbar rearrangements, customer connection works. Consequently the commissioning dates of these projects are not related to load growth and load forecast scenarios, but are driven by customer requirements and works scheduling needs.

Table 8-3 – Non-load driven projects.

Project ID	Project name	Commissioning date	Comment
6115	Hawkesbury 500kV Substation site acquisition	2012	Strategic land acquisition
6263	Beaconsfield West 330kV Substation Busbar	2017	Strategic land acquisition
6102	Liddell 330kV Sub No.84 line connection	2010	Enhance connection and busbar reliability
6106	Newcastle 330kV Sub bus coupling	2010	Enhance Busbar Reliability
6103	Sydney Sth 330kV bus couple	2011	Enhance Busbar Reliability
6105	Sydney West 330kV bus couple	2011	Enhance Busbar Reliability
6108	Eraring & Kemps Creek 500kV Sub Transformer radiator	2013	Standardise transformer ratings
9191	Haymarket Sub EA 132KV cables	2010	Customer Connection
6157	Beryl 132kV Sub2 x 66kV bays	2014	Customer Connection
5131	Cooma 132kV bay	2011	Customer Connection
5992	Hawks Nest 132kV Substation	2011	Customer Connection
5588	Herons Creek 132kV Substation	2012	Customer Connection
6431	Lismore 132kV Substation line bay	2012	Customer Connection
6272	Munmorah 132kV Sub new busbar	2012	Customer Connection
6293	Murray-Guthega 132kV Lines upgrade	2012	Customer Connection
5738	Nabiac 132kV Sub Establishment	2011	Customer Connection
6274	Newcastle 330kV Sub 132kV bay	2011	Customer Connection
6156	Pt Macquarie 132kV Sub 2x33 kV bays	2011	Customer Connection

Project ID	Project name	Commissioning date	Comment
6304	Tomago-Brandy Hill tee 132kV Lines	2013	Customer Connection
6162	Tumut 132kV Sub 66kV bay	2014	Customer Connection
6271	Vales Point 132kV Sub new busbar	2012	Customer Connection
6212	Wellington 132kV Sub new line bay	2012	Customer Connection
6174	Williamsdale 330kV Sub 32kV line bay	2012	Customer Connection
6223	Vineyard 132kV Sub 2 new line bays	2012	Customer Connection

Source: TransGrid 2008, "Movement of Projects" undated document page 7-8 (file Project Drivers.pdf).

The projects listed in Table 8-4 are load driven projects and their commission dates could move with load growth under the load forecast scenarios. Variation in commissioning date is impacted by the forecast scenarios, as well as other requirements such as work programming.

Table 8-4 – Load driven projects.

Project ID	Project name	Comm. date (2007 APR)	Comm. date (2008 APR)	Comment
3978	Kemps Creek-Liverpool 330kV Lines	2013	2013	Can move with scenarios - Dates only change under low growth scenarios by one year
4188	Holroyd- Sydney West 330kV line	2012	2013	Can move with scenarios – High / Medium / Low Was 2013 2013 2013 Now 2012 2013 2014
4213	Holroyd 330kV Substation	2012	2013	Can move with scenarios – High / Medium / Low Was 2013 2013 2013 Now 2012 2013 2014
5558	Cap Banks-132kV:Albury 48MVAr	2016	2017	Can move with scenarios – High / Medium / Low Was 2015 2016 2017 Now 2015 2017 2018
5559	Yass-Cowra 999 132kV Lines	2017	2019	Can move with scenarios – High / Medium / Low Was 2016 2017 2108 Now 2018 2019 2021
5562	Snowy-Yass/ Canberra 330kV Lines upgrade	2013	2013	Can move with scenarios – does not change under scenarios due to generation planting.
5567	Lines+Subs-500kV:Bannaby-South Creek D/C	2014	2015	Can move with scenarios – However, TransGrid has advised that further analysis of the ROAM February 2008 scenarios under the 2007 APR forecast has shown timing as 2014/15 for scenario 16. Also dependent on a number of other factors including the timing of the retirement of Munmorah Power Station.
5568	Hunter Valley - Central Coast 500kV Lines	2017	2014[1]	Can move with scenarios[1] – easements only
5616	Cowra 132kV Sub Transformers	2010	2010	Existing limitation - project cannot be delivered earlier.

Project ID	Project name	Comm. date (2007 APR)	Comm. date (2008 APR)	Comment
5618	Transformers-132/33kV:Yanco Transformer Replm't	2013	2013	Can move with scenarios - driven primarily by asset condition issues.
5860	Tarro-Stroud 132kV Lines	2013	2013	Existing constraint
5889	Sydney East 330kV Sub No.4 Transformer	2011	2013	Can move with scenarios – High / Medium / Low Was 2011 2011 2011 Now 2012 2103 2013
5890	Tamworth 132kV Sub Transformer Replacement	2013	2013	Can move with scenarios – dates only change under low growth scenarios by one year High / Medium / Low Was 2013 2013 2103 Now 2013 2013 2014
5950	Sydney North 330kV Sub No.5 Transformer	2010	2010	Can move with scenarios – dates only change under low growth scenarios by one year High / Medium / Low Was 2010 2010 2010 Now 2010 2010 2011
5990	Armidale-Coffs Harbour 96C 132kV Line upgrade	2011	2011	Can move with scenarios – moves forward under the high load growth scenario but it is not practicable to complete earlier than Nov 2010. The low load growth scenario is insufficient to delay the project.
5995	Chullora 330kV Sub Establishment	2013	2013	Can move with scenarios – dates only change under low growth scenarios by one year High / Medium / Low Was 2013 2013 2013 Now 2013 2013 2014
5999	Coffs Harbour 330kV Sub 2nd Transformer	2012	2013	Can move with scenarios – High / Medium / Low Was 2013 2013 2013 Now 2013 2013 2014
6001	Waratah West 330kV Sub 2nd Transformer & 95N Conversion	2011	2011	Constraint dependent on Tomago 330/132 kV substation commissioning in Nov 2009 – not load growth scenarios.
6006	Taree-Pt Macquarie 132kV Lines	2018	2020	Can move with scenarios – High / Medium / Low Was 2017 2018 2019 Now 2016 2020 2021
6008	Stroud-Taree 132kV Lines (330kV Construction)	2016	2016	Existing constraint
6096	Beaconsfield West 132kV Capacitor Bank	2011	2011	Work coordinated with EA for Nov 2010 - not dependent on load growth scenarios.
6098	Tamworth/ Armidale SVC	2016	2015	Can move with scenarios - commissioning date is affected by the level of generation planting in the system north of Liddell – increases under the 2008 APR scenarios (compared to 2007 APR scenarios).

Project ID	Project name	Comm. date (2007 APR)	Comm. date (2008 APR)	Comment
6152	Canberra 132kV Capacitor Bank No.1	2013	2013	Can move with scenarios - does not change under scenarios due to generation planting.
6182	Darlington Pt-Colleambally 132kV Line duplication	2015	2017	Can move with scenarios – High Medium Low Was 2014 2015 2016 Now 2016 2017 2019
6204	Holroyd-Chullora 330kV Cable	2013	2013	Can move with scenarios – dates only change under low growth scenarios by one year High Medium Low Was 2013 2013 2103 Now 2013 2013 2014
6241	Sydney Area Cap Banks 200MVAr No.1	2013	2013	Does not change under scenarios due to generation planting.
6259	Tomago to Tarro area 330kV Lines	2013	2013	Existing constraint
6266	Tomago 330kV 3rd Transformer	2013	2014	Can move with scenarios High Medium Low Was 2013 2013 2013 Now 2014 2014 2015
6275	Bamarang 330kV establishment	2014	2014	Date governed by sensitive area access - not load growth scenarios.
6316	Vineyard 330kV No.3 Transformer (375MVA)	2012	2010	Can move with scenarios – Integral Energy's Vineyard load forecast increased in APR2008 bringing the timing for the third transformer forward by 2 years – High Medium Low Was 2012 2012 2012 Now 2010 2010 2011
6380	Albury-Mulwala Lines-Trip Scheme	2010	2010	Can move with scenarios – dates only change under low growth scenarios by one year High Medium Low Was 2010 2010 2010 Now 2010 2010 2011
6381	Canberra 132kV Cap Banks (new, 4th bank)	2010	2010	Can move with scenarios - does not change under scenarios due to generation planting.
6382	Yass 132kV Cap Banks (new 80MVAr)	2011	2011	Can move with scenarios - does not change under scenarios due to generation planting.
6383	Canberra 330kV Cap Banks 200MVAr	2010	2010	Can move with scenarios - does not change under scenarios due to generation planting.
6384	Sydney Area Cap Banks 200MVAr No.2	2014	2014	Can move with scenarios – dates change as follows: - scenario 16: 2015 - scenario 14: 2014 - other scenarios unchanged
6388	Sydney Area Cap Banks 80MVAr	2014	2014	Can move with scenarios - does not change under scenarios due to generation planting.

Project ID	Project name	Comm. date (2007 APR)	Comm. date (2008 APR)	Comment
6394	Orange North 132kV Sub Establishment	2012	2012	Existing constraint
9095	Dumaresq-Lismore 330kV Line	2012	2012	Imminent constraint (around 2010)
9098	Glen Innes - Inverell 132kV Line	2010	2010	Existing constraint
9123	Manildra - Parkes 132kV Line	2011	2011	Existing constraint

Note 1: The construction component of this project has been deleted from the ex-ante capex but the easement element has been retained.

Source: TransGrid 2008, "Movement of Projects" undated document page 9-12 (file Project Drivers.pdf).