Report on capital expenditure overspends by electricity network service providers

16 August 2012

AEMC

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Glossary

ACCC	Australian Competition and Consumer Commission
AER	Australian Energy Regulator
AEMC	Australian Energy Market Commission
Capex	Capital expenditure
DNSP	Distribution Network Service Provider
EBSS	Efficiency Benefit Sharing Scheme
GFC	Global Financial Crisis
GST	Goods and Services Tax
HV	High Voltage
IT	Information Technology
kV	Kilovolt
NER	National Electricity Rules
NSP	Network Service Provider
Opex	Operational and maintenance expenditure
RAB	Regulatory Asset Base
STPIS	Service Target Performance Incentive Scheme
TNSP	Transmission Network Service Provider
WACC	Weighted Average Cost of Capital

1. Introduction

The Australian Energy Market Commission (AEMC) has engaged Parsons Brinckerhoff to investigate and prepare a report on the drivers for capital expenditure (Capex) overspending by electricity network service providers.

This report sets out the findings of Parsons Brinckerhoff's review.

1.1 Background

The AEMC is currently processing a rule change request from the Australian Energy Regulator (AER) relating to various aspects of the economic regulation of electricity network services. The rule changes sought by the AER in relation to the national electricity rules (NER) can be summarised as follows:

- changes to the capital and operating expenditure frameworks;
- changes to the capital expenditure incentive (Capex) arrangements; and
- changes to the cost of capital (weighted average cost of capital - WACC) framework for determining the rate of return for network service providers.

For the purposes of this report, the key rule changes are those sought by the AER in respect of the capital expenditure incentive arrangements.

1.2 Terms of reference

The AEMC requires advice on the reasons as to why a network service provider (NSP) may need to spend more than its Capex allowance during a regulatory control period given that:

- there are mechanisms in place to deal with uncertain projects and unforeseen events in the NER which increase a NSP's allowed revenue;
- that projects identified in a NSP's proposal are not necessarily firm in terms of timing across the regulatory control period and there may be scope for deferral; and
- a NSP's priorities can change in that period.

This work will inform the AEMC's consideration of options for addressing issues with Capex incentives in the NER identified in the AEMC's directions paper. This will include whether a particular approach to Capex incentives should be prescribed in the NER or whether the NER should allow for the AER to develop a solution in line with certain principles. This work may also inform the development of principles that the AER has to follow if it is deemed appropriate that it should develop a solution.

1.3 Approach

The assignment involved:

- preparing a list of the theoretical arguments as to why a NSP may need to spend more than its Capex allowance during a regulatory period;

- meeting with a selected range of NSPs (one privately owned Distribution NSP, one government-owned Distribution NSP, one privately-owned Transmission NSP, and one publicly-owned Transmission NSP) to discuss the nature and reasons for any amount of Capex incurred by the NSP that was above the regulators forecast, or the reasons why the NSP did not overspend;
- meeting with the AER;
- provision of a draft report to the NSPs to identify any confidential information or errors of fact; and
- provision of a final report to AEMC.

1.4 Limitations

This study does not assess or seek to establish whether any actual or theoretical Capex is prudent and efficient. Just because an NSP has overspent when compared to that set out in a regulatory pricing decision, does not mean that the additional expenditure was not prudent and efficient. Conversely, any underspend of Capex compared to a regulatory pricing decision might not necessarily be optimal in terms of service outcomes such as network security or reliability.

2. Theoretical drivers of NSP Capex overspends

Transmission network service providers (TNSPs) transport electricity from Generators – who produce the electricity – to bulk supply points. Distribution network service providers (DNSPs) distribute electricity from the bulk supply points to consumers. Together, NSPs account for approximately 50% of the price of electricity.

The Capex invested by NSPs is used to create and eventually replace the assets that are used to transport electricity. Capex is also invested in non-system assets such as land, buildings, and IT.

Being natural monopolies, the revenue that NSPs may earn or the prices they may charge is regulated by an economic regulator based on forecasts of the expenditures that a prudent and efficient NSP requires to provide the required transmission or distribution services.

This section aims to identify and discuss the theoretical drivers of Capex overspends by NSPs when compared to regulatory allowances determined by Regulators in their regulatory revenue/pricing decisions. The drivers identified by Parsons Brinckerhoff have been grouped into three main categories and a brief explanation provided for each. The relevance of each driver is then explored through the case studies discussed in Section 3 of this report.

2.1 Corporate Governance

The maturity level of the organisation that is managing a network is a driver of Capex overspends. Some of the areas of corporate governance that affect the risk of overspending are discussed below.

2.1.1 Asset management capability

Effective asset management is central to an NSP's ability to forecast and control expenditure. Components of asset management relating to Capex overspend include:

- Lifecycle management – the ability to understand the condition of existing assets, expected useful life, remaining life, technical risks, degradation curves and develop effective asset renewal and replacement strategies.
- Project delivery control – the ability to budget, control and implement projects or larger programs of work. Better control means lower likelihood of cost overruns resulting from scope changes, delays and poor quality work.
- Procurement strategy – the ability to develop effective strategies which deliver efficient and prudent costs and provide target levels of service and performance.
- Resourcing strategy – the ability to secure the prudent and efficient level of resources required to implement the Capex program.
- Program management – managing the actual and forecast program during the regulatory period to target levels (regulatory allowance or otherwise). This entails understanding the impact of changes to the program compared to the regulatory allowance, and helps businesses to proactively manage the whole suite of projects

required over the period to targeted levels, including re-prioritisation where necessary.

- Investment decision making and business case approval methodology.
- Risk management.
- Corporate strategy – The ability to develop and implement an effective corporate strategy which delivers the required level of service for a prudent and efficient level of cost.

2.1.2 Forecasting, estimating and planning

Although considered an integral part of the asset management system, forecasting, estimating and planning capabilities are an important driver of potential Capex overspends. They drive the timing of and forecast accuracy for future Capex, which is usually used as the basis for the regulatory revenue/pricing decisions.

2.2 Future uncertainty

2.2.1 Assumptions about the future

Clearly the future is uncertain and forecasts will always differ from actual values. NSPs typically develop Capex forecasts around probabilistic scenarios using models which require a wide range of input assumptions.

How material those overspend or underspend situations are will depend on a number of factors affecting the accuracy of these original forecast input assumptions, some of which can be controlled by the NSP and some which cannot. For example, a change in the forecast demand for electricity affects the need to augment the capacity of the network. From the published notes (pages 3-4) from recent stakeholder workshops as part of the second round of consultation on the network regulation rule changes proposed by the AER and the group of large energy users, NSPs stated that they may overspend as a result of higher than expected peak demand. In this situation the driver of this Capex may be poor forecasting (on the part of the NSP or regulator) or unpredictable macro-economic events.

Other forecasts that are uncertain are:

- the rate of degradation of equipment, which affects the timing of asset replacements;
- the volume of new connections to the network.

In Parsons Brinckerhoff's view, the tools available for and quality of forecasting, cost estimating and planning are generally much more advanced and accurate than they were 5-10 years ago, and hence the potential for Capex overspend situations has been reduced.

2.2.2 Unpredictable events/uncontrollable costs

There are a number of unforecastable/unpredictable/unforeseen events or factors which can materially increase Capex in a NSP. Low probability, high impact events can introduce previously unknown additional Capex requirements or materially change the size, priority and timing of planned Capex. These include:

- natural disasters e.g. Victorian bush fires;

- asset class 'type' failures, where a particular set of assets fails prematurely
- macro-economic factors e.g. GDP growth, inflation (cost escalation including commodity prices and labour costs);
- changes in technology;
- changes in legislative/compliance obligations; and
- political events/political influence.

These events cause NSPs to react, and hence the NSP's ability to manage any potential impact on Capex is diminished. An organisation with strong corporate governance and well managed network would typically be able to manage these risks better.

The extent to which the regulatory framework introduces regulatory risk to Capex associated with unpredictable events will also affect the potential for Capex overspend.

2.2.3 Delivery risk

Even with appropriate cost estimation, planning and forecasting being used to form the basis of regulatory pricing decisions, there will always be a risk of overspend at the time of project delivery. In addition to actual input prices such as labour and equipment varying from forecast, a number of other factors may lead to cost overruns. These factors include unforeseen (latent) conditions at construction sites, availability of resources/equipment, poor weather, access issues, environmental requirements, safety issues and public consultation needs.

Program or project cost overruns can also be driven by changes in the responsibility for delivery of works or selected options for jointly planned projects.

2.3 Regulatory Framework

The regulatory framework that applies may impact on the incentives to overspend. In the period reviewed, expenditures in early years were subject to regulation by ACCC (for TNSPs) and State based regulators (for DNSPs), prior to the current regulation by the AER.

2.3.1 Nature of regulation

Given that NSPs operate a natural monopoly and are therefore subject to economic regulatory control to ensure that Capex is prudent and efficient, the design of the regulatory framework is a driver of the potential for Capex overspends. Some of the common regulatory mechanisms are discussed below.

Heavy vs. light regulation

A lighter, less restrictive form of regulation that involves less oversight of expenditure and less compliance may introduce greater potential for overspend than a more consequence driven, analysis intensive form of control. This is because the potential for a difference in opinion about the level of Capex required in the network under a prescriptive form of regulation is likely to be reduced. It may also be that opportunities for innovation and benefits realisation are reduced under a prescriptive form of regulation leading to inefficient investments in the longer term.

It can be argued that if a NSP was acting prudently and efficiently the different forms of regulation applied should not produce a different outcome; however, it is Parsons Brinckerhoff's view that regulation should seek to ensure that best practice asset stewardship occurs, which results in optimal service outcomes for efficient and prudent levels of expenditure through an appropriate level of oversight, approval and control.

Ex-post/Ex-ante review

The risks associated with Capex above a regulatory allowance are different depending on whether the Capex is approved before or after the event. Ex-post reviews introduce a regulatory risk that not all actual Capex invested over the period will be allowed to be recovered. Ex-ante reviews introduce a risk around the accuracy of forecasts compared to actual expenditure, which may over or under compensate the network business. The income stream is a function of the accuracy of the forecasting and estimating process to set an efficient allowance for Capex returns within the period. These forecasts will be based on assumptions that can change.

Price cap/Revenue cap

For price capped businesses, higher than forecast energy consumption will generate additional revenue that will support any requirement to fund additional Capex required to expand the network. As tariffs are predominantly consumption based, an increase in maximum demand may only have a small impact on revenues but may increase the need to bring forward planned augmentation capital expenditure.

For revenue capped businesses, an increase in peak demand or energy consumption may require more augmentation Capex than originally forecast but without any additional revenue within the period to fund it. Hence the form of regulation applied will affect the impact of Capex overspends on the business's profitability and therefore the likely response by NSPs.

Regulator's discretion and ability to appeal

Where the regulator has higher levels of discretion, and is influenced by factors other than efficient outcomes (such as political pressure to reduce network charges), there may be a higher prospect that the Capex allowance provided to network businesses will be lower than reasonable. This risk would be exacerbated if, for material matters, there is no ability to appeal the merits of the regulator's decision.

2.3.2 Reliability standards/performance incentives

NSPs are subject to a service target performance incentive scheme (STPIS). This scheme provides a reward for outperforming against targets that are based on historical performance and a penalty for underperformance. The scheme provides a potential revenue stream that might encourage Capex beyond that determined by the Regulator using a building block approach.

2.3.3 Return on Capex and depreciation

The return on Capex and the depreciation methodologies adopted by the regulator could provide an incentive to overspend on Capex.

Return on Capex is achieved through applying a rate of return (WACC) to the RAB. All actual Capex is able to be added to the RAB in an ex-ante regulatory framework as currently applies to all NSPs. This ability to earn a regulatory return on all actual Capex – regardless if

it has been provided for in the regulator's final decision – may provide an incentive to overspend where a NSPs actual cost of capital is lower than its regulatory WACC, particularly in the latter years of the regulatory control period as financing costs are borne for a shorter period.

Regulatory depreciation is currently calculated as a straight-line depreciation of an asset's value in the RAB over a specific time period. An asset remains in the RAB until fully depreciated, even if it is decommissioned or replaced earlier than the depreciation schedule. Hence, if the depreciation schedule does not match the useful life of the asset, there may be an incentive to overspend by replacing the asset earlier than the depreciation schedule where a NSPs actual cost of capital is lower than its regulatory WACC.

2.3.4 Regulatory risk

Where uncertainty of Capex recovery exists, it would imply that behaviour would be reflective of the risks involved. For example, a regulatory framework which created a risk that Capex would not be included in the RAB may affect the decision making of the NSP to look for solutions that involved less risk, such as Opex substitution and Capex deferral. In the same way, a Capex approval process used to establish without doubt the prudency and efficiency of the investments made would reduce the propensity of NSPs to incur Capex where there was doubt as to whether it would be allowed in the RAB.

Conversely, it can be argued that a regulatory framework which did not include any oversight or risks involved with inefficient or imprudent expenditure would enable the NSP to overspend Capex where there was an expected benefit to do so (by the NSP).

Any mechanisms such as contingent events[1], contingency portfolio risk allowances and Capex reopeners which reduce the risk of Capex not being funded through additional revenue streams will serve as a positive driver of Capex overspends.

Currently, mechanisms such as contingent projects and Capex reopeners for transmission allow (in limited circumstances) the potential for additional revenue streams for Capex through adjustment to the revenue cap. These mechanisms therefore reduce the prospect of large and uncertain events requiring additional Capex to be funded under the revenue allowance.

The concept of allowing a contingency portfolio risk allowance provides a program-wide contingency measure to reflect that on average, project costs will be higher than base estimates and unforseen events will occur across the program.

2.3.5 Capex (and Opex) incentives

An imbalance in incentives between Capex and Opex introduces options for NSPs to seek alternative solutions using the expenditure type which is expected to provide the most benefit to the business all other things being equal. Currently the Efficiency Benefits Sharing Scheme (EBSS) incentivises NSPs to identify and implement efficiency gains in Opex, which acts as a driver to reduce Opex. Lack of any incentives, or weaker incentives to minimise Capex or identify efficiencies in Capex will increase the potential for Capex overspend situations where this can reduce Opex.

[1] *Where the contingent event mechanism uses a minimum threshold, it has the effect of limiting the reduction of risk.*

In a recent regulatory decision the AER's consultant formed an opinion that parts of Aurora Energy's (DNSP) program would result in reliability benefits, which should result in increased STPIS incentives. Allowed Capex was reduced by removing the expenditure directed at improving reliability that was not otherwise required to achieve the Capex objectives in the NER. This reduced amount may or may not have equated to the STPIS incentive payment arising from the investment. This approach would increase the potential for overspending the Capex allowance if Aurora Energy chose to deliver the identified capital program.

Non-continuous incentives (or penalties) over a regulatory period also has the potential to drive behaviour or affect decision making. If a Capex incentive either increases or decreases over the regulatory control period, there is potential for NSPs to 'back-end' or 'front-end' Capex.

2.3.6 Regulatory mandate

Regulators have previously issued directives to NSPs to improve specific areas of the business which may require additional unforeseen Capex. An example of this was the IPART decision requiring Ausgrid to initiate a major upgrade of their asset information systems.

2.4 Financial

2.4.1 Cost of capital (regulated vs. actual)

Where the actual cost of capital within a NSP differs from the regulated value, an organisation may see benefit in either under or overspending on Capex. For example, if the actual cost of capital is higher, it may deter the NSP from overspending on Capex and seek alternative solutions to avoid insufficient returns on investment.

3. Case Studies

Four NSPs were selected as a cross-section of network businesses for review representing a mix of distribution/transmission, public/private ownership and different network characteristics such as metropolitan and provincial, namely:

- Ausgrid (www.ausgrid.com.au);
- CitiPower/Powercor (www.powercor.com.au);
- Transend (www.transend.com.au); and
- ElectraNet (www.electranet.com.au).

Parsons Brinckerhoff met with each of the businesses to discuss the relevance of the theoretical drivers of Capex overspends to their network. In addition, where data was available at the time of meeting, actual Capex data from previous and current regulatory periods was compared to regulatory allowances to establish the main reasons for any overspend or underspend situations that have occurred or likely to occur.

Section 3.1 discusses the generic differences between NSPs, while the table in Section 3.2 summarises which theoretical drivers were identified as applicable to each NSP.

Section 3.3 presents the Capex outcomes for each of the businesses, followed by common themes identified by all four NSPs in Section 3.4.

3.1 Difference in NSPs

Some of the differences in NSPs that might impact on the potential for Capex overspends, include:

- public and private ownership;
- the nature of Capex incurred by the NSP; and
- characteristics of distribution and transmission networks.

3.1.1 Public/Private ownership

Australian NSPs comprise a mix of public and private ownership. Questions have been raised as to whether the ownership structure of a network business will cause it to behave or respond to the drivers of Capex overspends in a different way. Such questions include:

- Would a publicly owned NSP be more mindful of public opinion towards energy prices and therefore be more susceptible to political influence?
- Is the WACC for a publicly owned NSP different to a privately owned NSP and if so, does this influence Capex decisions?
- Does the fact that corporate profits are delivered to private shareholders or Government accounts influence Capex decision-making?

3.1.2 Type of capital expenditure

In order to understand the possible size of overspends resulting from the theoretical drivers it is important to consider the main types of Capex incurred by NSPs. Characteristics such as the ability to reasonably forecast detailed cost estimates, scope, timing and project delivery varies for each type of Capex and for the type of network (as discussed in section 3.1.3). The drivers of Capex overspends will affect each type of Capex to different degrees.

Capex is split at the highest level into system and non-system. System Capex is typically split into growth, augmentation and replacement activities. As an example, growth Capex derived from the forecast number of new connections to the network may be more difficult to predict than replacement Capex on a mature, well managed system.

Non-system Capex includes items such as administration buildings, training and IT systems.

Within the different Capex types, the nature of a project will also influence the potential for Capex overspends. For example, the cost estimating accuracy risks around building new transmission lines are typically higher than those for transmission substation projects.

3.1.3 Distribution/transmission networks

Distribution networks differ from transmission networks in a number of ways that might affect the potential for Capex overspends. Typically, TNSP's Capex is associated with more projects that are relatively high in value with longer planning and construction lead times. The pattern of expenditure is 'lumpy' and the deferral or bringing forward in time of a single project can be significant. In contrast, DNSP's Capex is generally associated with smaller projects or programs of work. These differences impact on the potential for Capex overspends in the following ways:

- DNSPs have shorter duration of major projects from planning to implementation. This may provide DNSPs with less flexibility than TNSPs, who typically use longer planning horizons with greater flexibility to defer Capex to a subsequent regulatory control period. Given that transmission projects typically have longer lead times than distribution projects, unless an overspend situation occurred very early in the regulatory control period, it is likely that the new project will fall within the submission for the next regulatory control period.

- DNSPs face greater technical risk due to the greater number of asset classes used in the network. This increases the potential for overspend situations caused by technical risks in DNSPs.

  Distribution networks have more asset classes because they typically own zone substations, which have similar number of asset classes as transmission terminal stations, plus the devices outside the stations (ACR's, switches, fault indicators, isolators, fuses, etc.). In Tasmania, the transmission system terminates in terminal stations that have circuit breakers that feed the distribution network, i.e. no zone substations.

- DNSPs typically experience greater potential than TNSPs for variance between actual growth to forecast growth in specific locations within the network. For DNSPs, where the new load appears is more important than when it comes, as the costs incurred can vary widely based on the capacity of the local network. However, where a TNSP is accommodating a new large point load the consequences can be similar, particularly where the transmission network is already constrained.

3.2 Theoretical drivers identified by NSPs

Parsons Brinckerhoff discussed the relevance of the theoretical drivers of Capex overspends with each of the four NSPs. Table 3.1 indicates the theoretical drivers that the NSPs identified as being materially relevant to their business going forward.

Table 3.1 Drivers of Capex overspends by NSP

Theoretical drivers	Ausgrid	CitiPower/ Powercor	Transend	ElectraNet
Corporate governance				
Asset management capability	●	●	●	●
Planning, forecasting and planning capability	●	●	●	●
Future uncertainty				
Changing forecast assumptions	●	●	●	●
Input (labour, commodity and equipment) prices	●	●	●	●
Delivery risks (forecast vs. actual)	●	●	●	●
Regulatory framework				
Nature of regulation	●	●	●	●
Reliability/performance standards	●	●	●	●
Depreciation			●	
Regulatory risk	●	●	●	
Capex incentives - Capex/Opex substitution				
Regulatory mandate	●			
Financial				
Changes in the cost of capital				

Four of the theoretical drivers were found to be weak, as follows:

- Depreciation – the long lives of most network assets reduce the potential impact of variations in depreciation methodology. Much stronger decision factors exist for assessing whether to spend capital or not;
- Substitution of Capex for Opex – the EBSS provides a strong incentive not to substitute Capex for Opex;
- Regulatory mandate – expected that any significant changes will be aligned with the regulatory pricing/revenue decision; and
- Cost of capital – capital is sourced across the regulatory period making it unlikely that a significant difference will occur between that forecast and that actually incurred on average, due to short term fluctuations.

Of the material drivers, NSPs considered that a change in forecast assumptions of demand was the major driver for variations from forecast Capex.

3.3 Capital expenditure by NSP

The forecast Capex was compared to that actually spent. The DNSPs expenditures are presented first, followed by the TNSPs.

3.3.1 Ausgrid

Ausgrid is a publicly owned DNSP managing the distribution network in the CBD and surrounding urban areas of Sydney, NSW. The Independent Pricing and Regulatory Tribunal (IPART) was the economic regulator for the last regulatory control period using an ex-ante, price cap form of regulation.

Table 3.2[2] presents the Capex information provided by Ausgrid covering the 2004 – 2009 regulatory control period. It shows that, overall, Ausgrid overspent on Capex by approximately $925m (31%) compared to the benchmark expenditures set by the Regulator.

Table 3.2 Ausgrid Capex 2004-2009

	Capital expenditure in previous regulatory period ($m) $ values expressed in ($m, nominal)					
	2004/05		2005/06		2006/07	
Capital Expenditure Category	**Allowance**	**Actual**	**Allowance**	**Actual**	**Allowance**	**Actual**
Asset renewal/replacement		151.3		214.3		270.1
Augmentation to meet peak demand growth		203.5		248.2		369.5
Quality, reliability and security of supply enhancement		7.5		9.9		10.2
Environmental, safety and statutory obligations (excluding reliability)		47.0		40.9		34.2
Non-network assets		48.8		64.4		72.0
Other		0.0		0.0		0.0
Total	**452.9**	**458.1**	**497.5**	**577.7**	**681.2**	**755.9**

	Capital expenditure in previous regulatory period ($m) $ values expressed in ($m, nominal)					
	2007/08		2008/09		Total	
Capital Expenditure Category	**Allowance**	**Actual**	**Allowance**	**Actual**	**Allowance**	**Actual**
Asset renewal/replacement		273.1		312.6		**1,221.4**
Augmentation to meet peak demand growth		480.6		642.8		**1,944.5**
Quality, reliability and security of supply enhancement		13.6		25.3		**66.5**
Environmental, safety and statutory obligations (excluding reliability)		29.1		34.8		**185.9**
Non-network assets		113.8		209.8		**508.9**
Other		0.0		9.6		**9.6**
Total	**689.7**	**910.3**	**690.9**	**1,234.9**	**3,012.2**	**3,936.9**

[2] *Does not include the impact of pass through resulting from license conditions.*

Ausgrid has provided the following explanatory notes to Parsons Brinckerhoff:

> *"Cost Escalation Impact*
>
> *In the 2004 determination, under previous jurisdictional arrangements, no allowance was provided for the impact of likely real cost increases. Since then, methodologies have been developed to identify and quantify the impact of real cost movements.*
>
> *In the case of the 2004-2009 regulatory period, based on these methodologies, the impact of real cost movements on the planned capital program was an increased cost of approximately $260M which equated to a 9.5% increase over the regulatory period. This was reported as part of our 2009 Regulatory Proposal."*

The largest single contributor to the overspend was identified by Ausgrid as labour price increases. The internal labour costs are much more predictable for NSPs than their external labour costs.

> *"IT Program*
>
> *The regulatory allowance for IT Capex in the 2004-2009 regulatory period was $138M. Actual expenditure for the period was $221M, an additional expenditure of $83M (62%). There were two major reasons for this additional expenditure;*
>
> 1. *The regulator (IPART) previously identified that asset information systems were inadequate and a major upgrade and enhancement of these systems was required. The identified solution was an integrated asset management solution. This represented a major change for the organisation, the scope of which was not fully identified at the time of the regulatory proposal.*
> 2. *The dramatic increase in data storage and information processing requirements imposed by this and other information systems resulted in the need for these facilities to be relocated in a modern data centre facility. This was not foreseen in the original business case.*
>
> *These investments positioned the organisation well to manage the anticipated dramatic increase in capital expenditure that occurred in the next regulatory period. Our 2009-14 regulatory proposal noted the importance of improved IT systems in facilitating the delivery of a significant capital investment program. Our ability to deliver such a program over the period would have been impacted to the extent the systems were not in place".*

Before the 2004-2009 regulatory period there was a corporate strategy which resulted in the deferral of Capex. The net effect was the build-up of deferred maintenance which resulted in the observed overspend against the regulatory allowance in asset renewal/replacement and network augmentation categories. During our meeting, Ausgrid indicated that a driver of this Capex deferral was a political will to keep prices down.

Examples of the components of the large overspend in the 2004-2009 period include 11kV switchgear replacements, pole top substations being replaced with kiosk/underground assets.

Around 2003, there was a step change in asset management strategy which included significant improvements in data management and collection of asset condition data which then supported better analysis of failure rates, degradation curves and other technical risks. This improved asset knowledge highlighted the need for additional Capex above the

regulatory allowance in order to meet defined reliability standards and quality performance targets.

Information provided to Parsons Brinckerhoff from Ausgrid includes the following explanations:

Increased Asset Replacement Expenditure

A major contributor of the overspend in the 2004-9 period was the decision by the business that it was necessary to address asset replacement needs over the period, despite insufficient funding being provided for this purpose by the regulatory determinations

At the time of Ausgrid's 2004-2009 regulatory proposals, Ausgrid was transitioning from a period of low expenditure and the 2004-9 regulatory proposal requested modest increases in replacement Capex from previously low levels of investment. Both the distribution and transmission determinations substantially reduced replacement Capex from the levels requested in EnergyAustralia's regulatory proposals.

The overall magnitude of the reduction in allowed Capex compared with EnergyAustralia's submission amounted to approximately $300m which was a significant proportion of the identified replacement budget, for example the cut to the ex-ante transmission replacement Capex was more than 25%.

EnergyAustralia's decision to increase expenditure on asset replacement arose from a number of factors but was strongly influenced by major equipment failures which occurred at the beginning of the 2004-9 determination period. These included:

Failure of Delle Circuit breakers transmission switching stations

A Delle 132kV circuit breaker failed explosively in a major transmission switching station. This equipment had been identified for replacement in EnergyAustralia's regulatory submission but rejected by the regulator. Following identification of the failure mechanism, similar defects were found in remaining population requiring the immediate replacement of all remaining equipment of this type.

Hunters Hill Zone Failure

The failure of a 66kV minimum oil circuit breaker resulted in significant damage and an extended wide area outage. The failure was a result of a breakdown of the insulation on the equipment which resulted in an oil vapour explosion and fire which resulted in extensive substation damage.

Crows Nest Switchgear Failure

A busbar failure occurred in Reyrolle C type 11kV switchgear. This incident advanced approximately $13M in investment to repair and replace the equipment at the site. There was no significant allowance in the 2004-09 proposal for this expenditure.

As there had been no provision in Ausgrid's regulatory determinations to address these failures, there was a direct impact on expenditure in the 2004-9 period. More importantly these and other failures which occurred at the beginning of the period contributed to the realisation that increased asset replacement expenditure was required.

Within EnergyAustralia the explosive nature two of failures [sic] highlighted the potential safety risk to both staff and public resulting from this type of failure. The above incidents also resulted in significant long term outages with associated publicity and debate concerning the poor condition and performance of the electricity network.

It should be noted that these failures occurred just after the release of the Somerville report which highlighted the need for increased expenditure in the Queensland jurisdiction to provide an acceptable level of network performance in the long term.

Within NSW, government concerns over the poor performance of the network resulted in the Minster for Energy introducing licence conditions for NSW DNSPs, which mandated planning criteria and minimum standards for reliability. As a result of the introduction of these licence conditions a pass through provision of $653m was determined.

EnergyAustralia considered that in order to provide acceptable safety and network performance it was necessary that expenditure on asset replacement should also be increased to above the levels provided in the 2004 determination. It was not possible to offset the increased replacement expenditure against capacity related expenditure given the introduction of the licence conditions in 2005, with the associated need to seek additional funding for their implementation via a pass-through application.

It should be noted that further substantial increases in Ausgrid's replacement expenditure were proposed in the 2008 regulatory proposal and were accepted by the AER in the 2009-14 determination.

Strategic Property Acquisitions

At the end of the last regulatory period Ausgrid was developing plans for the replacement of a CBD substation and the need to cater for major developments in the vicinity of Sydney University. In both cases, land is extremely difficult to acquire. An opportunity arose to procure suitable sites and the decision was made in early 2009 to purchase two sites at a cost of $91M. Failure to acquire these sites would have meant either significant delays in the associated projects or a significant increase in the land cost associated with these properties.

3.3.2 CitiPower/Powercor

CitiPower and Powercor are each licenced as DNSPs in the State of Victoria. They have a common management structure and private ownership.

CitiPower

CitiPower manages the distribution network in the CBD and surrounding urban areas of Melbourne, Victoria. The Essential Services Commission of Victoria was the economic regulator for the last regulatory control period using an ex-ante, price cap form of regulation.

Table 3.3 summarises the Capex values provided by CitiPower for the 2006-2010 regulatory period. It shows that, overall, CitiPower underspent on Capex by $14m (2%) compared to the benchmark expenditures set by the Regulator. Taking customer capital contributions into account, the net underspend was $83m (18%).

Table 3.3 CitiPower Capex 2006-2010

Benchmark	2006-10 benchmark ($'000, real 2010)					
	2006	2007	2008	2009	2010	Total
Reinforcements	21,460	13,144	29,756	37,863	16,701	**118,924**
Gross demand connections	40,503	35,682	35,077	38,378	39,140	**188,780**
Gross demand related	**61,963**	**48,826**	**64,832**	**76,241**	**55,841**	**307,704**
Customer contributions	6,818	6,602	6,536	7,094	7,077	**34,128**
Net demand related	**55,145**	**42,224**	**58,296**	**69,147**	**48,764**	**273,576**
Reliability and quality maintained	31,191	45,814	27,644	25,497	28,389	**158,535**
Reliability and quality improvements	0	0	0	0	0	**0**
Environmental, safety and legal	10,538	10,788	8,151	8,073	8,437	**45,987**
Total gross system assets	**103,692**	**105,428**	**100,627**	**109,811**	**92,666**	**512,226**
Total net system assets	**96,875**	**98,826**	**94,091**	**102,717**	**85,589**	**478,098**
Standard metering	0	0	0	0	0	**0**
SCADA and network control	1,418	1,490	1,297	1,611	1,491	**7,307**
Non-network general – IT	13,959	6,460	9,829	11,266	9,567	**51,082**
Non-network general – other	1,117	1,336	1,300	1,417	1,499	**6,669**
Total non-system assets	**16,494**	**9,286**	**12,427**	**14,293**	**12,558**	**65,058**
Total non-demand related	**58,224**	**65,889**	**48,222**	**47,863**	**49,383**	**269,581**
Total gross Capex	**120,186**	**114,715**	**113,054**	**124,105**	**105,224**	**577,285**
Total Net Capex	**113,369**	**108,112**	**106,518**	**117,010**	**98,147**	**543,156**
Total O&M expenditure	40,369	41,666	41,834	42,690	43,544	**210,104**

Actual	2006-10 actual ($'000, real 2010)					
	2006	2007	2008	2009	2010	Total
Reinforcements	13,731	11,099	9,843	17,807	27,846	**80,326**
Gross demand connections	49,110	54,951	67,634	57,530	49,704	**278,930**
Gross demand related	**62,841**	**66,050**	**77,477**	**75,337**	**77,550**	**359,256**
Customer contributions	8,204	14,642	31,177	27,333	21,614	**102,970**
Net demand related	**54,637**	**51,408**	**46,300**	**48,004**	**55,936**	**256,286**
Reliability and quality maintained	29,334	20,302	29,055	42,462	40,571	**161,725**
Reliability and quality improvements	770	540	517	0	0	**1,827**
Environmental, safety and legal	2,998	319	1,405	1,084	1,393	**7,198**
Total gross system assets	**95,944**	**87,211**	**108,454**	**118,884**	**119,514**	**530,006**
Total net system assets	**87,739**	**72,570**	**77,276**	**91,551**	**97,901**	**427,037**
Standard metering	0	0	0	0	0	**0**
SCADA and network control	880	-54	879	1,511	796	**4,012**
Non-network general – IT	3,143	5,588	3,175	2,444	4,575	**18,925**
Non-network general – other	2,339	1,580	3,291	1,868	1,191	**10,269**
Total non-system assets	**6,362**	**7,115**	**7,345**	**5,823**	**6,561**	**33,206**
Total non-demand related	**39,465**	**28,276**	**38,321**	**49,369**	**48,526**	**203,956**
Total gross Capex	**102,306**	**94,326**	**115,798**	**124,706**	**126,076**	**563,212**
Total Net Capex	**94,102**	**79,684**	**84,621**	**97,374**	**104,462**	**460,242**
Total O&M expenditure	30,196	32,511	32,424	40,289	41,997	**177,417**

Variance	2006-10 variance ($'000, real 2010)					
	2006	2007	2008	2009	2010	Total
Reinforcements	-36%	-16%	-67%	-53%	67%	**-32%**
Gross demand connections	21%	54%	93%	50%	27%	**48%**
Gross demand related	**1%**	**35%**	**20%**	**-1%**	**39%**	**17%**
Customer contributions	20%	122%	377%	285%	205%	**202%**
Net demand related	**-1%**	**22%**	**-21%**	**-31%**	**15%**	**-6%**
Reliability and quality maintained	-6%	-56%	5%	67%	43%	**2%**
Reliability and quality improvements	-	-	-	-	-	**-**
Environmental, safety and legal	-72%	-97%	-83%	-87%	-83%	**-84%**
Total gross system assets	**-7%**	**-17%**	**8%**	**8%**	**29%**	**3%**
Total net system assets	**-9%**	**-27%**	**-18%**	**-11%**	**14%**	**-11%**
Standard metering	-	-	-	-	-	**-**
SCADA and network control	-38%	-104%	-32%	-6%	-47%	**-45%**
Non-network general – IT	-77%	-14%	-68%	-78%	-52%	**-63%**
Non-network general – other	109%	18%	153%	32%	-21%	**54%**
Total non-system assets	**-61%**	**-23%**	**-41%**	**-59%**	**-48%**	**-49%**
Total non-demand related	**-32%**	**-57%**	**-21%**	**3%**	**-2%**	**-24%**
Total gross Capex	**-15%**	**-18%**	**2%**	**0%**	**20%**	**-2%**
Total Net Capex	**-17%**	**-26%**	**-21%**	**-17%**	**6%**	**-15%**
Total O&M expenditure	-25%	-22%	-22%	-6%	-4%	**-16%**

Note: Data from revised submission RIN with 2010 updated for actual. Includes margins. Reconciles to RAB roll forward.

Capex under/overspends by category during the 2006-2010 are:

- An underspend of 32% of regulatory allowance or $39m on reinforcements.
    - Due to the $100m CBD reinforcement project being delayed, as a result of the unforeseen delay in the transmission project. The remainder of the project costs will be incurred during the 2011-2015 control period.
- An overspend on demand connections of 48% of allowance or $90m.
    - Due to the inaccuracy of the original forecasts.
- An underspend on environment, safety and legal of $39m, an 84% variance from the allowance.
    - Efficiencies found in the area of noise mitigation and management, where a more prudent approach was possible compared to original forecasts.
- An underspend on IT of $32m, a 63% variance from allowance.

Powercor

Powercor manages the distribution network in the western suburbs of Melbourne to the western border of the State of Victoria. The Essential Services Commission of Victoria was the economic regulator for the last regulatory control period using an ex-ante, price cap form of regulation.

Table 3.4 summarises the Capex values provide by Powercor for the 2006-2010 regulatory period. It shows that, overall, Powercor overspent on Capex by $104m (9%) compared to the benchmark expenditures set by the Regulator.

Table 3.4 Powercor Capex 2006-2010

Benchmark	2006-10 benchmark ($'000, real 2010)					
	2006	**2007**	**2008**	**2009**	**2010**	**Total**
Reinforcements	35,651	37,686	38,629	44,055	43,011	**199,033**
Gross demand connections	63,069	63,590	63,366	63,798	65,254	**319,077**
Gross demand related	**98,720**	**101,276**	**101,996**	**107,853**	**108,265**	**518,110**
Customer contributions	30,696	30,977	30,825	30,796	31,443	**154,738**
Net demand related	**68,024**	**70,299**	**71,171**	**77,056**	**76,822**	**363,372**
Reliability and quality maintained	54,594	60,964	68,004	65,486	69,888	**318,937**
Reliability and quality improvements	5,333	4,557	4,393	4,330	4,100	**22,713**
Environmental, safety and legal	19,812	19,630	19,654	16,640	16,776	**92,512**
Total gross system assets	**178,460**	**186,427**	**194,047**	**194,309**	**199,029**	**952,272**
Total net system assets	**147,763**	**155,450**	**163,222**	**163,513**	**167,586**	**797,534**
Standard metering	0	0	0	0	0	**0**
SCADA and network control	4,046	4,832	4,940	2,369	2,107	**18,294**
Non-network general – IT	13,646	15,378	14,053	13,258	9,826	**66,162**
Non-network general – other	7,739	14,286	12,808	12,705	14,844	**62,382**
Total non-system assets	**25,432**	**34,497**	**31,801**	**28,332**	**26,777**	**146,839**
Total non-demand related	**105,171**	**119,648**	**123,853**	**114,789**	**117,541**	**581,001**
Total gross Capex	**203,891**	**220,924**	**225,848**	**222,641**	**225,806**	**1,099,111**
Total Net Capex	**173,195**	**189,947**	**195,024**	**191,845**	**194,363**	**944,373**
Total O&M expenditure	135,279	138,386	141,050	144,112	147,834	**706,661**

Actual	2006-10 actual ($'000, real 2010)					
	2006	**2007**	**2008**	**2009**	**2010**	**Total**
Reinforcements	25,576	27,419	30,523	33,463	29,837	**146,818**
Gross demand connections	104,741	146,046	131,306	118,884	131,706	**632,684**
Gross demand related	**130,317**	**173,465**	**161,829**	**152,347**	**161,543**	**779,502**
Customer contributions	35,370	71,604	57,938	60,946	61,385	**287,243**
Net demand related	**94,947**	**101,861**	**103,892**	**91,401**	**100,158**	**492,258**
Reliability and quality maintained	51,307	46,476	51,108	53,085	61,023	**262,997**
Reliability and quality improvements	655	705	611	0	0	**1,971**
Environmental, safety and legal	7,957	9,044	7,142	6,614	6,855	**37,613**
Total gross system assets	**190,236**	**229,691**	**220,690**	**212,045**	**229,421**	**1,082,083**
Total net system assets	**154,866**	**158,087**	**162,752**	**151,099**	**168,036**	**794,840**
Standard metering	0	0	0	0	0	**0**
SCADA and network control	739	968	659	2,207	1,791	**6,363**
Non-network general – IT	3,802	8,291	3,830	3,806	8,476	**28,206**
Non-network general – other	28,422	14,204	17,441	11,948	14,338	**86,352**
Total non-system assets	**32,963**	**23,463**	**21,929**	**17,961**	**24,605**	**120,921**
Total non-demand related	**92,882**	**79,688**	**80,790**	**77,660**	**92,483**	**423,502**
Total gross Capex	**223,199**	**253,153**	**242,619**	**230,007**	**254,026**	**1,203,004**
Total Net Capex	**187,829**	**181,549**	**184,681**	**169,060**	**192,641**	**915,761**
Total O&M expenditure	134,771	117,817	116,441	137,256	137,734	**644,020**

Variance	2006-10 variance ($'000, real 2010)					
	2006	2007	2008	2009	2010	Total
Reinforcements	-28%	-27%	-21%	-24%	-31%	**-26%**
Gross demand connections	66%	130%	107%	86%	102%	**98%**
Gross demand related	**32%**	**71%**	**59%**	**41%**	**49%**	**50%**
Customer contributions	15%	131%	88%	98%	95%	**86%**
Net demand related	**40%**	**45%**	**46%**	**19%**	**30%**	**35%**
Reliability and quality maintained	-6%	-24%	-25%	-19%	-13%	**-18%**
Reliability and quality improvements	-88%	-85%	-86%	-100%	-100%	**-91%**
Environmental, safety and legal	-60%	-54%	-64%	-60%	-59%	**-59%**
Total gross system assets	**7%**	**23%**	**14%**	**9%**	**15%**	**14%**
Total net system assets	**5%**	**2%**	**0%**	**-8%**	**0%**	**0%**
Standard metering	-	-	-	-	-	**-**
SCADA and network control	-82%	-80%	-87%	-7%	-15%	**-65%**
Non-network general – IT	-72%	-46%	-73%	-71%	-14%	**-57%**
Non-network general – other	267%	-1%	36%	-6%	-3%	**38%**
Total non-system assets	**30%**	**-32%**	**-31%**	**-37%**	**-8%**	**-18%**
Total non-demand related	**-12%**	**-33%**	**-35%**	**-32%**	**-21%**	**-27%**
Total gross Capex	**9%**	**15%**	**7%**	**3%**	**12%**	**9%**
Total Net Capex	**8%**	**-4%**	**-5%**	**-12%**	**-1%**	**-3%**
Total O&M expenditure	0%	-15%	-17%	-5%	-7%	**-9%**

Note: Data from revised submission RIN with 2010 updated for actual. Includes margins. Reconciles to RAB roll forward.

Under/overspends for the main categories of Capex during the 2006-2010 period are:

- An underspend of 26% or $52m on reinforcements.
    - Efficiencies found at the time of implementation, and a new strategic approach to risk management meant that deferral options were identified.
- An overspend on demand connections of 98% of allowance or $314m.
    - The forecast of the demand for electricity assumed by the Regulator in its final decision on pricing for Powercor was based on the likely economic outlook that became known as the Global Financial Crisis. While little growth actually occurred, it was higher than the forecast leading to an overspend.
- An underspend on environment, safety and legal of $132m, a 30% variance from the allowance.

CitiPower/Powercor provide the following additional notes relating to historic Capex performance:

Comparison of 2006-10 Benchmark versus Actual Spend: CitiPower & Powercor Australia

Consideration of CitiPower and Powercor Australia's capital expenditure for the 2006-10 regulatory control period by reference to the benchmarks established by the ESCV requires careful analysis of the basis on which the ESCV benchmarks were set.

The ESCV determined in the 2006-10 EDPR (at p.270) to forecast gross capital expenditure at the aggregate level for the current regulatory control period. The ESCV:

> *'decided that a reasonable forecast of gross capital expenditure at the aggregate level for each distributor over the 2006-10 regulatory period is an amount that is 30 per cent greater than the historic expenditure incurred by that distributor over the 2001-04 period.'*

Thus, as noted by the ESCV on page 272 of the 2006-10 EDPR, it:

> *'determined the distributor's capital expenditure requirements for 2006-10 at an aggregate level rather than an asset category level.'*

While the ESCV calculated a forecast of capital expenditure by asset (or expenditure purpose) category, which forecasts, as the ESCV observes in the 2006-10 EDPR (at p.272), these forecasts of capital expenditure were:

> *'determined by prorating the difference between the Final Decision at an aggregate level and the expenditure cap across asset categories.'*

The 'expenditure caps' were an outcome of the ESCV's review of the distributors' capital expenditure proposals by asset category (determined by the ESCV by making a series of adjustments to those distributor proposals) and their only purpose contemplated by the ESCV (at p.273) was to 'provide a limit on the additional capital expenditure above that included in the revenue requirement for which the financing costs may be rolled into the regulatory asset base in 2011'. Significantly, the ESCV did not intend that the forecast capital expenditure by asset category would support a meaningful comparison between those forecasts and the capital expenditure incurred by the distributors in the current regulatory control period.

Accordingly, while the ESCV's approach to determining forecast capital expenditure by asset category was adequate for the ESCV's intended purposes, it did not produce forecasts of capital expenditure by asset category that provide a robust and reliable basis of comparison with distributors' capital expenditure by asset category in the current regulatory control period. Notably, the ESCV recognised that even its forecast gross capital expenditure at the aggregate level for the current regulatory control period may not reflect a distributor's capital expenditure requirements for the period. The ESCV relevantly stated (at p.271) in respect of its methodology of forecasting capital expenditure at the aggregate level by grossing up historical expenditure by 30 per cent that:

> *'[T]he Commission recognises that this approach is subject to some risk in that it is conceivable that a distributor's capital expenditure requirements during the 2006-10 period might exceed the forecast capital expenditure'.*

In summary, there was no bottom up construction by the ESCV of capital expenditure benchmarks by asset category and the ESCV's approach to determining forecast capital expenditure by asset category did not produce forecasts that support a robust and reliable comparison with actual capital expenditure by asset category.

CitiPower and Powercor Australia has therefore sought to examine and explain variations at an aggregate, as opposed to expenditure purpose, level, consistent with the approach that was taken by the ESCV to set the benchmarks in the 2006-10 EDPR.

At an aggregate level, CitiPower's actual net capital expenditure is 15 per cent below the aggregate benchmark set by the ESCV. Powercor Australia's actual net capital expenditure is marginally below the aggregate benchmark set by the ESCV (-3 per cent).

Powercor Australia

The only difference Powercor Australia would note is that relating to non-routine new customer connections, which have increased significantly due to stronger growth than the ESCV reflected into its 2006-10 EDPR. Expenditure in relation to new customer connections is not initiated by Powercor Australia and is not recurrent in nature. Rather, it is driven by customer requirements and growth from year to year. The growth in new customer connections is influenced by a range of factors including economic conditions and development demographics (i.e. major projects arising from mining, pipelines, generation and agricultural development).

Powercor Australia therefore observes that the reasons for any variations between the ESCV's decision on capital expenditure by asset (or expenditure purpose) category and Powercor Australia's capital expenditure for the relevant expenditure purpose category in the 2006-10 regulatory control period are as follows:

- *the fact that the ESCV did not prepare its forecasts of capital expenditure by asset category on the basis of a bottom up build and, thus, never provided a reliable estimate of Powercor Australia's capital expenditure requirements by expenditure purpose category for the current regulatory control period; and/or*

- *the significant increase in non-routine new customer connections experienced by Powercor Australia in the current regulatory control period, which increase was not anticipated by the ESCV at the time of the 2006-10 EDPR.*

CitiPower

CitiPower's network is unique compared to other Australian electricity networks. It is the smallest in Australia whilst having the highest load density. These factors result in CitiPower's capital expenditure being characterised by relatively few, but very large high capacity network extensions and connections. As a consequence CitiPower's capital expenditure profile cannot be characterised by a smooth trend, but rather as a series of sporadic lumpy expenditure, whereby the inclusion or deletion of one large project will significantly alter the capital expenditure trend.

At an aggregate level, CitiPower's historical capital expenditure is below the aggregate benchmark in the years 2006-09. The variance almost exclusively relates to reinforcement expenditure and in particular the deferral of the Metro 2012 project.

The deferral of the Metro 2012 project was due to the significant synergies that exist between it and the CBD Security of Supply project. The costs of undertaking each of these projects on a standalone basis, rather than together, would have been significantly greater and would not have been in the long term interests of CitiPower's customers. As such, CitiPower was committed to ensuring these projects were undertaken together.

However unlike the Metro 2012 project, the CBD Security of Supply project was not approved as part of the ESCV's Final Decision for the current regulatory control period and was required to be subject to further consultation. This additional consultation process took a further three years, with the ESCV finally approving CitiPower's CBD

Security of Supply Upgrade Plan on 18 August 2008. As a result, the large expenditure expected over the 2006-10 regulatory control period did not materialise.

CitiPower therefore observes that the reasons for variations between the ESCV's decision on capital expenditure by asset (or expenditure purpose) category and CitiPower's capital expenditure for the relevant expenditure purpose category in the 2006-10 are as follows:

- *variations in respect of all expenditure purpose categories result, in whole or in part, from the fact that the ESCV did not prepare its forecasts of CitiPower's capital expenditure by asset category on the basis of a bottom up build and, thus, never provided a reliable estimate of CitiPower's capital expenditure requirements by expenditure purpose category for the current regulatory control period; and*

- *variations in respect of the reinforcements expenditure purpose category result, in part, from the deferral of the Metro 2012 project.*

3.3.3 Transend

Transend is a publicly owned TNSP that manages the transmission network in Tasmania. The ACCC was the economic regulator for the last regulatory control period using an ex-post, revenue cap form of regulation. The AER is the economic regulator for the current regulatory control period using an ex-ante, revenue cap form of regulation. Transend's network is characterised by a high proportion of the load associated with about 4 directly connected industrial load customers. They represent approximately 40% of the network maximum demand and around 50% of the energy transmitted.

The revenue cap form of regulation, together with the present inability to charge customers in adjoining regions for use of the transmission network is a particular issue in a network with locally weak or declining growth exposed to a small number of large customers. If major loads disappear, the increase in prices for the remaining customer base can be material, introducing a 'knock-on' effect for the viability of other businesses in the region.

Table 3.5 and Table 3.6 summarise the Capex values for the 2004-2009 and the 2009-2014 regulatory periods. It shows that, overall, Transend overspent on Capex by $36.7m (11%) compared to the benchmark expenditures set by the Regulator (ACCC) for the 2004-2009 regulatory control period[3]. In the current regulatory period, Transend has underspent against the Regulator's benchmark and is forecast to underspend over the regulatory period.

Under/overspends for the main categories of Capex are:

- For the 2004-2009 period overspends related to the ACCC decision to not include any escalation factors in the forecast allowance. Transend also experienced a significant increase in input costs during the control period.
    - This period was also characterised by $50m overspend in asset renewals. This was compliance driven and occurred at the same time as an increase in asset condition knowledge and critical infrastructure security related upgrades resulting in necessary immediate Capex.

[3] *The ACCC used an ex-post form of regulation that is different to the ex-ante regulatory framework that now applies to Transend.*

- Transmission conductor dynamic ratings were also used to defer new Capex. As the cost of the special protection schemes were met by Basslink the assets are non-prescribed and hence not a source of (or prevention of) overspend on regulated Capex.

- No prescribed (regulated) capital allowance or expenditure was made for the Basslink HVDC connector. While this interconnector introduced new network requirements, these were met using non-prescribed system protection schemes to trip contracted load or generation (depending upon the energy flow across Basslink) in the event of a network element trip.

Table 3.5 Transend Capex 2004-2009

Transend regulated capital expenditure 2004-2009 under the ACCC, as commissioned ($m nominal)								
		ACCC Final Decision						
Project Category		Jan-Ju 04	04-05	05-06	06-07	07-08	08-09	Total
Network								
Development	Augmentation	2.6	46.4	10.7	51.4	5.4	2.7	**119.1**
	Connection							
	Land and easements							
	Sub-total							
Renewal	Asset renewal	16.1	29.3	38.7	39.8	38.1	32.8	**194.8**
	Physical security/compliance							
	Inventory/spares							
	Operational support systems							
	Sub-total							
Non-network	Information technology	6.3	5.7	4.9	1.2	1.4	3.4	**22.9**
	Business support							
	Sub-total							
Total		**25.0**	**81.4**	**54.2**	**92.4**	**44.9**	**38.9**	**336.8**

		Actual						
Project Category		Jan'Jun 04	04-05	05-06	06-07	07-08	08-09	Total
Network								
Development	Augmentation	0.2	3.5	14.7	36.8	3.2	11.0	**69.5**
	Connection	1.0	0.8	11.4	4.9	0.5	7.3	**26.0**
	Land and easements	0.0	0.2	0.0	3.6	0.1	0.0	**3.9**
	Sub-total	**1.2**	**4.6**	**26.2**	**45.3**	**3.9**	**18.3**	**99.4**
Renewal	Asset renewal	19.7	24.9	29.8	45.9	43.7	27.0	**190.9**
	Physical security/compliance	6.6	9.9	7.7	2.4	4.2	7.9	**38.6**
	Inventory/spares	0.0	0.0	0.0	0.1	0.2	3.4	**3.6**
	Operational support systems	1.3	2.9	0.9	1.9	3.4	2.5	**12.9**
	Sub-total	**27.5**	**37.7**	**38.4**	**50.2**	**51.5**	**40.7**	**246.0**
Non-network	Information technology	0.7	1.5	1.8	0.4	0.5	5.0	**9.9**
	Business support	0.5	8.5	1.3	0.9	3.7	3.3	**18.1**
	Sub-total	**1.2**	**10.0**	**3.1**	**1.3**	**4.2**	**8.3**	**28.0**
Total		**29.9**	**52.3**	**67.6**	**96.8**	**59.6**	**67.2**	**373.4**

Table 3.6 Transend Capex 2009-2014

Transend regulated capital expenditure 2009-2014 under the AER, as incurred ($m nominal)							
		AER Final Decision April 2009					
Project Category		2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	Total
Network							
Development	Augmentation	70.9	78.3	28.7	15.8	28.5	**222.3**
	Connection	29.0	33.0	36.0	16.3	1.7	**116.0**
	Land and easements	-	0.0	0.0	11.7	11.7	**23.5**
Renewal	Asset renewal	26.5	35.9	21.5	52.3	56.1	**192.4**
	Physical security/compliance	14.4	1.9	2.4	0.8	0.4	**19.8**
	Inventory/spares	8.9	0.3	0.5	0.2	1.0	**10.9**
	Operational support systems	4.2	4.5	3.1	3.9	6.7	**22.4**
Non-network	Information technology	2.7	5.3	3.8	2.6	3.5	**17.9**
	Business support	3.9	3.9	4.5	4.6	1.1	**18.1**
Total		**160.4**	**163.2**	**100.5**	**108.3**	**110.7**	**643.2**

		Actual Capex					
Project Category		2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	Total
Network							
Development	Augmentation	77.38	34.41				**111.79**
	Connection	10.00	24.81				**34.81**
	Land and easements	0.01	0.04				**0.05**
Renewal	Asset renewal	23.13	38.94				**62.07**
	Physical security/compliance	5.09	2.22				**7.31**
	Inventory/spares	4.19	0.11				**4.3**
	Operational support systems	1.76	0.32				**2.08**
Non-network	Information technology	2.11	4.46				**6.57**
	Business support	8.67	10.23				**18.9**
Total		**132.34**	**115.54**				**247.88**

- For the 2009-2014 period, growth forecasts were based on many factors including connection point forecasts, direct connect customer forecasts (with major customer shutdowns not predicted) and macroeconomic indicators.
    - Subsequently, some of the forecast new connection sites for local distributor, Aurora, have not been required in the period, reducing the need for new substation expenditure.
    - The Waddamanna – Lindisfarne 220kV line came in nearly $30m under the original submission forecast amount contributing to the underspend in the 2009-2011 period.
    - The GFC did increase competition with the suppliers (of labour and equipment) to Transend which has had a negative pressure on costs, compared to original forecasts.

  - Transmission conductor dynamic ratings continued to be used to release transmission capacity.

- Non-network overspends predominantly relate to the new administration and protection testing buildings which were deferred from the previous control period and cost more than original estimates.

- The Basslink HVDC connector introduced new network requirements which were partially met using dynamic ratings to defer new Capex.

3.3.4 ElectraNet

ElectraNet is a privately owned TNSP that manages the transmission network in South Australia. The AER is the economic regulator for the current 2009-13 regulatory control period using an ex ante, revenue cap form of regulation.

Table 3.7 presents the Capex information provided by ElectraNet covering the 2009-2013 regulatory control period. It shows that, overall, ElectraNet is forecast to underspend on Capex by $4m (0.5%) compared to the benchmark expenditures set by the Regulator.

Table 3.7 ElectraNet Capex 2009-2013

Comparison of capital expenditure in current regulatory period by category ($m, nominal)

Category	AER Decision	Actual/Forecast	Variance
Augmentation	304.0	348.8	**44.8**
Connection	145.1	119.0	**-26.1**
Replacement	269.5	227.8	**-41.7**
Strategic land/easements	15.8	29.4	**13.6**
Security/compliance	52.5	60.6	**8.1**
Inventory/spares	17.1	15.0	**-2.1**
Business IT	34.1	38.9	**4.8**
Buildings/facilities	12.9	7.5	**-5.4**
Total	**851.0**	**847.0**	**-4.0**

AER Allowance 2008-13 ($m, nominal)

Capital Exp by Category ($Nominal) - Planned	2009	2010	2011	2012	2013	TOTAL
Augmentation	44.6	66.0	128.2	53.5	11.8	**304.0**
Connection	37.1	37.8	37.5	21.0	11.7	**145.1**
Replacement	21.5	55.3	48.3	95.6	48.7	**269.5**
Refurbishment	0.0	0.0	0.0	0.0	0.0	**0.0**
Easement/Land	4.0	6.3	5.4	0.0	0.1	**15.8**
Security/Compliance	4.9	11.6	16.3	14.1	5.6	**52.5**
Inventory/Spares	3.4	2.4	2.6	2.6	6.0	**17.1**
Information Technology	8.8	7.5	8.4	5.7	3.7	**34.1**
Facilities	8.8	0.7	0.5	1.1	1.9	**12.9**
Total	**133.1**	**187.7**	**247.2**	**193.6**	**89.5**	**851.0**

Actual and expected capital expenditure as incurred by category ($m, nominal)

Category	2008-09	2009-10	2010-11	2011-12	2012-13	Total
Augmentation	14.3	42.5	161.8	73.1	57.2	**348.8**
Connection	11.9	20.8	28.9	22.7	34.8	**119.0**
Replacement	55.3	35.0	19.2	48.3	70.1	**227.8**
Strategic land/ easements	1.2	0.2	1.2	12.3	14.5	**29.4**
Security/compliance	3.7	8.0	11.0	14.1	23.8	**60.6**
Inventory/spares	3.8	2.4	2.2	2.4	4.1	**15.0**
Business IT	6.4	5.8	7.3	7.2	12.2	**38.9**
Buildings/facilities	0.9	2.8	0.7	1.2	1.9	**7.5**
Total	**97.4**	**117.6**	**232.3**	**181.3**	**218.6**	**847.0**

ElectraNet has provided the following explanatory information to Parsons Brinckerhoff:

"The replacement underspend resulted from a combination of the following:

- *Savings were achieved by combining some replacement works with existing projects already at those sites. While these opportunities are pursued in the planning process as a matter of course some opportunities arose within period following completion of Regulatory Test (now RIT-T) processes. For example, a decision on combining Whyalla replacement and Cultana augmentation could not be made until the regulatory test process had been completed within period.*

- *As noted above, replacement projects were aligned with augmentation projects as standard practice. Some of these projects were subsequently delayed due to a slowing of demand; e.g. Hummocks, Waterloo and Ardrossan West.*

- *Due to some large project cost increases a reprioritisation of the Capex portfolio occurred and replacement projects were delayed in favour of completing connection and augmentation projects to meet demand – 7 projects deferred beyond the current period e.g. Hummocks and several telecommunications projects.*

- *Scope changes and underspends on some projects reduced the total cost (approx. $23m).”*

The numbers provided in the document provided by ElectraNet are an aggregation of actuals to date for the period plus forecasts to the end of the regulatory period.

ElectraNet indicated that the combined Adelaide Central Reinforcement/Southern Inner Metropolitan project delivered efficiencies (in project delivery and cable procurement) not forecast for the current regulatory period. From ElectraNet:

> *“The ‘trigger’ to combine the delivery of the projects was the completion of the Regulatory Test in 2009, which post-dated the final revenue decision. Once the test demonstrated that the reinforcement of the Adelaide central region and the southern suburbs was best located at the new City West substation the projects were combined for delivery.”*

Recent advances in business processes, asset management practices including condition monitoring and planning mean that forecasting is more accurate which reduces the potential for overspend situations.

ElectraNet identified that the civil works components of previous forecasts were under-priced. Renegotiated contracts with construction contractors have resulted in material price increases which will result in cost pressures for the current regulatory period and will flow through to higher forecasts for the next regulatory period.

ElectraNet identified that brownfield projects are a factor in cost overspends in the augmentation Capex categories. In relation to these, unforeseen site complexity appears to be the main factor, impacting on cost and in some cases resulting in expanded scope, in addition to the civil cost underestimation already mentioned. Complexity is due to working with live equipment and old clearances, the increase in scope associated with ‘surprise’ finds in the construction phase and constrained sites.

Drivers of the Capex overspend in the non-system Capex category ($34.1m allowance vs. $38.9m actual/forecast) related to changing business needs forcing an increase in spend on Information Technology.

3.4 Common themes

3.4.1 Starting points

The NSPs identified that the starting point for the network in any control period is a driver of Capex overspends. For example, if a network is running close to capacity, with high asset utilisation rates, there is less scope for alternative network solutions or Capex deferral, increasing the likelihood of overspending.

Likewise for the larger, previously non-forecast programs of work, there is a compounding effect of having to locate and up-skill a workforce for the latest technology/standards/tools, etc., and there may be an issue around the availability of required resources which again provides an upward pressure on costs.

In addition, where an NSP has been involved in a large, recent program of work, they will be better informed for forecasting than a business who has been strategically deferring Capex during a period of low activity.

3.4.2 Forecasting

Although significant improvements have been made over the last 5-10 years in data cleansing, data aggregations and in the tools and models for forecasting future demand and Capex requirements, the ability to predict peak demand and energy load is increasingly more difficult. Suggested reasons for this include energy efficiency drives, air conditioning loads, increases in domestic renewable energy technologies such as solar panels and solar hot water heating. Other reasons are the impact of the Australian dollar, commodity prices and other contracts between customers and suppliers. Conversion of industrial and commercial operations and domestic premises to gas has also occurred in Tasmania at unpredictable rates.

Recent trends with the reducing useful lives attributed to some assets (from 50 years to 25 years, etc.) has the potential to affect the accuracy of forecasting Capex going forward.

Factors which materially affect accuracy of growth assumptions are exogenous shocks such as the introduction of GST which created a building spurt, or the first home buyer subsidy. Changes in the type of customers will affect accuracy of demand growth predictions.

NSPs all agreed on the importance of accurate 3rd party forecasts as inputs into their own demand projections, however, the potential for impact was dependant on how the input forecasts were used. For example, Transend's forecast is heavily influenced by the Aurora Energy forecast as sole DNSP in Tasmania and hence any deviation from the Aurora projection can have a material impact on the need for and timing of Transend transmission grid Capex.

3.4.3 Technology risks

Some asset replacements have been more costly than previously predicted in regulatory submissions given advances in technology and materials. However, this was not seen as a significant driver of overspends. There is a trend away from mechanical to electronic equipment which involves shorter useful lives and an increase in renewal expenditure in the future.

3.4.4 Implementation/delivery risk

Drivers of Capex overspends at the time of project implementation/delivery include:

- unforeseen (latent) conditions at construction sites resulting in delays and extra work;
- poor weather resulting in delays;
- finding objects which then require archaeological investigation;
- introduction of new environmental legislation;
- increased difficulty acquiring required land parcels;

- time consuming interactions with 3rd parties e.g. developments within national parks (delays of up to 2 years);
- requirements of new technologies and new standards which have changed from time of forecasting;
- requirements to re-establish contracts mid control period, at terms higher than forecast; and
- differences in cost estimation accuracy at the time of regulatory submission preparation versus implementation, which can vary by up to 5 or more years.

Given contractors costs can represent up to 80-85% of the overall cost of transmission project, it is a material driver of overspends during a control period.

The NSPs identified the importance of managing this delivery risk. In particular, the TNSPs emphasised the large potential impact on their Capex forecasts of getting this wrong given the relative size and materiality of major projects within their Capex program.

3.4.5 Cost estimation for regulatory decision making

Overspends can occur through difficulties in concept designs at time of forecast, vs. actual detailed design process which is much more detailed and has better information vs. actual outturn cost at implementation especially for larger unique projects (as opposed to generic, repetitive high volume work). For example, a forecast could have been based on doubling the size of an existing substation, but at the time of implementation a whole new substation is required due to a lack of space at the existing facility that could not be foreseen before the detailed design was started. For some very large projects, a reasonable size investment is required to improve the accuracy of the scope of works and budget.

Both Ausgrid and CitiPower/Powercor provided information about the difference between preparing initial cost estimates as part of a regulatory submission, and actual detailed design and implementation costs as part of the delivery process. For example, in high density urban/metropolitan areas actual project underground cabling options or community consultation processes can be higher by an order of magnitude compared to original estimates prepared as part of the regulatory submission process. This can be related to factors such as information availability or changes in the urban landscape or competing utility space requirements at the time of delivery.

3.4.6 Regulatory risk

NSPs noted that the potential for overspends is increased when the regulator makes significant cuts when determining the allowances for the regulatory control period. Similarly ex-post reviews create a regulatory risk of stranded assets (from a future revenue allowance perspective, as the money invested will not be recovered if it is not added to the RAB).

3.4.7 Regulatory incentives

All NSPs agreed that the current incentives are stronger for the minimisation of Opex than for Capex. Some NSPs questioned whether an EBSS for Capex would incentivise deferral. If a forecast that provided opportunities for Capex deferral was inefficient, it could adversely impact quality, safety and reliability. Asset replacement deferrals may also increase the potential for overspends in subsequent regulatory periods.

3.4.8 Deferral options

The carry-over of projects planned to be implemented in previous regulatory periods can be a driver for Capex overspends, although this was not seen to be significant. The ability to defer previously planned Capex depends largely on the assumptions previously forecast changing during the regulatory control period, although for long lead time projects, some flexibility to defer is evident.

It may be prudent to defer Capex in some circumstances. For example, a change in market conditions may mean that a proposed investment no longer passes the regulatory investment test for transmission, and should be prudently deferred.

All NSPs identified that some Capex deferral is usually possible with the substitution of additional Opex such as inspection, maintenance and testing related expenditure. This action may or may not involve increased risk of failure or decreased service quality within acceptable tolerance levels and may lead to higher total life-cycle costs.

3.4.9 Efficiencies

It is possible to identify Capex efficiencies at the time of implementation that are not obvious at the time of preparing the regulatory forecasts, thereby minimising the potential for overspends, for example, options for combining asset replacement Capex with planned new Capex. Although not specifically discussed with Ausgrid, the NSPs explained how day-to-day decision making processes include the identification of these efficiencies. The formal internal review of Capex programs is typically a regular annual or bi-annual process as part of the wider asset management planning role. We note that the extent to which efficiency options are considered as part of day-to-day Capex decision making appears to vary between NSPs.

In addition, all NSPs agreed that when close to (or over) the regulatory allowance, a business would look more closely at identifying efficiencies (or deferral options), implying that the regulatory allowance does exert some pressure on the NSPs to manage their expenditure to that limit. Parsons Brinckerhoff notes that this pressure appears stronger for privately owned NSPs than for publically owned NSPs, reflecting a strong focus on achieving bottom line financial performance.

As forecasting and estimating used in the revenue decision becomes more sophisticated the opportunity to identify further Capex efficiencies over the regulatory control period reduces, which increases the potential for Capex overspends during the regulatory control period.

3.4.10 Contingent projects

TNSPs noted that the contingent projects mechanism of the NER provides an option to exclude some relatively high value projects with uncertain timing and cost from the revenue decision. The mechanism therefore reduces Capex overspend risks around these uncertain projects, especially for the connection and augmentation asset types. However, the minimum dollar thresholds for projects to qualify as contingent projects and the need to clearly scope and define a trigger event in advance (as per the Rules) means that this mechanism does not fully address the prospect of a TNSP being required to fund a number of uncertain projects under the revenue allowance.

Since this mechanism doesn't exist for DNSPs, the potential for overspend in relation to projects that could be classed as contingent projects is higher.

3.4.11 Political/public opinion

The impact of political and public opinion of price levels, and their impact on economic prosperity, does influence board and senior management propensity to overspend on Capex.

Situations have occurred where NSPs elect not to fully recover revenue entitlements in order to minimise the price impact on customers. One of the NSPs included in the case studies indicated this has occurred recently in response to political/customer opinion and the potential negative price effects on the customer base.

3.4.12 Corporate governance

The decision to incur Capex is subject to an NSP's rigorous planning criteria and governance documentation, as well as internal approval processes (such as approval by a capital investment committee). Some businesses also undertake quarterly reviews of their actual and forecast capital and incentive returns over the regulatory period, to ensure that the program of works is managed to meet obligations and maximise business returns.

Even though such policies and procedures are designed to ensure that only efficient Capex is incurred, there is still potential for forecasts to be systemically higher than is actually required through the inclusion of margins of error (+/- x%) and contingency amounts. This provides a buffer against unforeseen expenditures, reducing the likelihood of a need to overspend on Capex.

The extent to which NSPs track and compare their Capex during a regulatory control period back to the regulatory pricing decision did appear to vary across the NSPs. For example, ElectraNet commented that if planned Capex was likely to exceed the regulatory pricing decision it would typically reassess its planned projects and look at available deferral or scope change options that can help reduce Capex. The TNSPs appeared to have greater flexibility in this area than the DNSPs primarily due to the longer lead times associated with the planning and implementation of projects which can span successive regulatory control periods.

All NSPs demonstrated at a high level that they have in place the corporate governance arrangements required to identify and control Capex if required.

3.5 Overspend drivers and mitigation measures used by network businesses

Table 3.8 shows some of the drivers of Capex overspend and some of the mitigation measures used by the NSPs.

Table 3.8 Drivers of Capex overspends and mitigation measures

Driver	Mitigation measure
Commodity prices	Expert forecasts (as part of the revenue proposal and for strategic planning), forward contracts.
Cost estimating accuracy	Develop models, benchmarking and portfolio risk factor.
Input (labour and equipment) prices	Expert forecasts, long term contracts, encourage competition between providers, smart procurement strategies.
Technical risks	Improved asset knowledge including peer knowledge sharing, condition monitoring and testing.
Growth forecasts	3rd party advice, probabilistic planning, continuous development of 'top down ' and 'bottom up' load forecasting models, use of contingent projects where applicable.
Insufficient regulatory allowances	Better revenue proposals including supporting governance processes including business case preparation. Use of contingent projects where applicable. Limited merits appeal to challenge material errors by Regulator.
Cost of debt changes	Use long term debt management covering the control period to mitigate exposure to changes in debt rates

A general consensus of opinion was concluded from the discussions with the NSPs around which of the material theoretical drivers were able to be controlled or mitigated by the NSP and which ones were not.

Most of the drivers of Capex overspends included in Table 3.8 were considered by the NSPs to be mostly within their ability to control for example:

- Corporate governance: All NSPs described robust policies and processes within their organisation which were designed reduce the potential for Capex overspend situations.
- Asset Management: All NSPs described a process of continuous improvement of their asset management system incorporating system planning, forecasting, estimating, delivery and asset condition monitoring. These developments are designed to result in increased ability to more accurately predict future Capex requirements.
- Cost of debt changes: Whereas the NSPs agreed that changes to the cost of debt could be a driver of Capex overspends (or more significantly underspends), NSPs use long term debt management to reduce these risks, and hence do not consider them material (as identified in Table 3.1)

The two drivers of Capex overspends which were discussed as generally not under the NSPs control or that were difficult for the NSPs to reduce the potential impacts of, are:

- Network growth/new connections (and related reinforcement) – Primarily a function of economic growth and macro-economic conditions, NSPs are obligated to respond and hence if forecasts differ materially from actual growth rates a Capex overspend situation will result.

- Regulatory/legal compliance – Regulatory decisions, or legislative change may require the NSP to react and increase Capex over the regulatory allowance decision limit.

3.6 Other observations

This section contains additional PB observations relating to general concepts raised during the case studies.

3.6.1 Swings and roundabouts

In practice, actual project costs will be both more than and less than original regulatory submission forecasts, so the net effect is an increase in the business's ability to offset overspending in one area against unpredicted savings or efficiencies realised in another in order to stay at or below the regulated allowance levels.

The exception to this is where low probability high impact events such as extreme weather events, or geopolitical economic shocks have a material effect on Capex. Such exceptions would be better handled by dedicated regulatory tools such as Capex reopeners.

3.6.2 Gaming of the regulatory framework

Given the long lead times involved with the larger more material programs of work or projects such as new line construction which involve land acquisition, the arguments around NSPs planning to optimise returns given the current or potential future regulatory framework are diminished. Parsons Brinckerhoff has not identified any evidence of this during the review.

In addition Parsons Brinckerhoff has found no evidence that NSPs ask for a higher Capex allowance and then minimise expenditure in order to increase profits. It is more likely, in our opinion, that regulatory uncertainty at the start of the regulatory control period limits the willingness of NSPs to commit to some Capex, in effect skewing the spend profile towards the latter stages of the regulatory period (in comparison to the spend profile included in the regulatory pricing decision).

3.6.3 Double counting

Deferral of projects, leading to revenue recovery in both regulatory periods has been observed. This is sometimes offset by unforeseen expenditures; however, Parsons Brinckerhoff has not found that the extent of deferral or unforseen expenditures is outside of that explainable by forecasting uncertainty.

Parsons Brinckerhoff identified instances where there had been no allowance or an allowance later in the period but the business had brought forward the required investment in any case.

3.6.4 Regulatory oversight

Insufficient regulatory oversight would strengthen the potential for Capex overspends through a lack of consequences, and diminished external stakeholder pressure ensuring Capex is prudent and efficient. Minimal regulatory oversight would place increased reliance on the corporate governance of businesses to enforce restraint and control, rather than the regulator.

4. Conclusions

This section draws on the information presented in this report to make conclusions. The conclusions are the opinion of Parsons Brinckerhoff and do not necessary represent the views of the NSPs.

The key characteristics of the drivers of Capex overspends identified during this review are:

- Materiality – the potential size of the additional Capex requirement;
- Frequency – the likelihood of occurrence; and
- Control – the ability to manage or mitigate the effects of the additional Capex requirement).

The combination of these driver characteristics affects the overall potential for Capex overspend situations to occur during the regulatory control period. The most material drivers of Capex overspends were identified as:

- actual network growth being higher than forecast;
- differences in forecasting/estimating/planning assumptions and actual values; and
- regulatory decision making – setting of the regulatory pricing decisions too low will impact on the ability of an NSP to deliver the required service outcomes within the targeted Capex levels.

We also conclude that since NSPs are different they respond to the drivers identified in this report differently. Differences include:

- Distribution vs. Transmission: DNSPs typically involve shorter lead time projects and therefore use a shorter planning horizon. DNSPs ability to defer some major Capex projects may be less than that of TNSPs.
- Public vs. private ownership: Drivers such as political will and public opinion are more likely to impact publicly owned NSPs than privately owned businesses.

5. Documents reviewed

Documents reviewed by Parsons Brinckerhoff during this study include:

- Economic regulation of networks rule change requests workshops, 2nd April 2012.
    - Summary of plenary session
    - Full Summaries of Workshops 1-8
- AEMC Directions Paper: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012. 2nd March 2012. AEMC
    - Submission to AEMC Directions Paper contained on http://www.aemc.gov.au/Electricity/Rule-changes/Open/Economic-Regulation-of-Network-Service-Providers-.html
- Consultant report. "Advice to the AEMC on Rule Changes". 11 February 2012. Stephen Littlechild
- Consultant report. "Preliminary Views for the AEMC". George Yarrow.
- Consultant report. "Preliminary analysis of rule change proposals". 27 February 2012. SFG Consulting.
- http://www.aemc.gov.au/Market-Reviews/Completed/review-into-the-use-of-total-factor-productivity-for-the-determination-of-prices-and-revenues.html
- http://www.electricity.tas.gov.au/draft_report
- http://www.electricity.tas.gov.au/__data/assets/pdf_file/0006/160584/Final_Report_Volume_I.pdf (Chapter 15)
- http://www.electricity.tas.gov.au/__data/assets/pdf_file/0007/160585/Final_Report_Volume_II.pdf (Part C)