Australian Energy Market Commission

REVIEW

ISSUES PAPER - NSW WORKSTREAM

Review of Distribution Reliability Outcomes and Standards

Commissioners
Pierce
Henderson
Spalding

3 November 2011

Inquiries

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

E: aemc@aemc.gov.au
T: (02) 8296 7800
F: (02) 8296 7899

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About the AEMC

The Council of Australian Governments, through its Ministerial Council on Energy (MCE), established the Australian Energy Market Commission (AEMC) in July 2005. The AEMC has two principal functions. We make and amend the national electricity and gas rules, and we conduct independent reviews of the energy markets for the MCE.

Executive summary

Distribution network investment has been a significant contributor to rising electricity bills in recent years. Improvements to distribution reliability standards have potentially been driving some of the increased distribution network investment.

The NSW Government in particular has concerns about the impact of network expenditure on energy bills in NSW with respect to the costs attributable to NSW distribution reliability levels imposed on NSW Distribution Network Service Providers (DNSPs). The *Design, Reliability and Performance Licence Conditions for NSW DNSPs* introduced mandated network design planning criteria and reliability standards to NSW DNSPs in 2005. Prior to the introduction of the licence conditions, the NSW DNSPs were responsible for determining the appropriate level of reliability for their customers. The licence conditions accelerated upgrades to the distribution networks to achieve improved network design planning criteria by 1 July 2014, and meet generally decreasing outage duration and frequency targets between 2005 and 2010.

In light of the impacts of reliability related network expenditure on energy bills, the Ministerial Council of Energy (MCE) directed the Australian Energy Market Commission (AEMC) to undertake a review of NSW distribution reliability outcomes. The AEMC is required to provide a framework and information for the NSW Government to decide whether the existing NSW distribution licence conditions should be amended to reflect different reliability outcomes. This information will help the NSW Government to determine the level of reliability that most effectively balances the costs of incremental investment and ongoing maintenance with the benefits of reliability. Any changes to the NSW distribution reliability outcomes would apply from the start of the next NSW distribution regulatory control period on 1 July 2014.

The MCE has also directed the AEMC to undertake a national review of frameworks and methodologies for achieving distribution reliability outcomes. The AEMC previously noted in its *Review of National Framework for Electricity Distribution Network Planning and Expansion* that there is a lack of consistency and transparency in how distribution reliability outcomes are determined. Distribution reliability outcomes are currently set separately for each of the National Electricity Market (NEM) jurisdictions by jurisdictional regulators, relevant government bodies or DNSPs themselves, under different frameworks that are in place for each jurisdiction.

As part of the national workstream for this review, the AEMC will provide an analysis of the different approaches to achieving distribution reliability across the NEM. We will also assess the costs and benefits of the different approaches with respect to how different reliability outcomes balance the cost of delivering the reliability outcome with customers' willingness to pay. Based on this analysis, the AEMC will consider if there is merit in developing a nationally consistent framework for expressing, delivering, and reporting on distribution reliability outcomes.

Given the links between the two workstreams, the AEMC will undertake them in parallel. However the NSW workstream will commence prior to the national

workstream so that conclusions on NSW distribution reliability outcomes are reached in time for the next regulatory control period commencing in July 2014.

This issues paper commences the first stage of the NSW workstream and sets out for comment the proposed scope and approach for this workstream.

The Commission welcomes the views of interested parties in relation to any of the matters discussed in this document. To help focus responses, we have set out a number of specific questions in each chapter. These are replicated below. In particular, we are requesting stakeholder views about:

- whether we have identified the scope of the issues appropriately;
- the approach we intend to take.

Responses to those questions, or other issues raised by this paper, are welcome by Thursday, 1 December 2011.

Question 1	**Terms of reference for the NSW workstream**
a) Are there any other issues which should be considered within the scope of the MCE's terms of reference?	
Question 2	**Required considerations during the NSW workstream**
a) Should the AEMC have regard to any other factors to those outlined in the MCE's terms of reference in undertaking the NSW workstream?	
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a) Should customer service standards be considered within the scope of the NSW workstream?	
Question 4	**Best practice national and international approaches to distribution reliability**
a) Are there any other criteria we should take into account in reviewing national and international approaches to distribution reliability?	
Question 5	**Selection of alternative scenarios for NSW distribution reliability outcomes**
a) What scenarios should be considered? What kinds of changes to the components in the existing NSW distribution licence conditions should be assessed?	

Question 6 Estimating the costs of meeting alternative distribution reliability outcomes

a) Are any other factors likely to affect the degree of accuracy of the cost estimates? What measures could be taken to improve the accuracy of the estimates?

b) Should we consider any other factors in estimating the costs of meeting the alternative distribution reliability outcomes?

Question 7 Estimating the willingness of NSW customers to pay for distribution reliability

a) Are there any potential issues with the use of AEMO's Victorian VCR methodology in estimating the willingness of NSW customers to pay? If so, how should the Victorian VCR methodology be adapted to ensure that it reflects the characteristics of NSW customers?

b) Should additional or alternative customer types to the customer types used by AEMO (that is, residential, industrial, commercial and agricultural) be considered?

c) Should willingness to pay by customer type be further segmented by distribution area or feeder type? If so, for which customer types would this be most relevant and feasible?

Question 8 Cost-benefit assessment of alternative scenarios for NSW distribution reliability outcomes

a) Should we consider any other factors in our cost-benefit assessment of alternative scenarios for NSW distribution reliability outcomes?

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1 Introduction

On 30 August 2011 the Ministerial Council on Energy (MCE) directed the Australian Energy Market Commission (AEMC) to undertake a Review of Distribution Reliability Outcomes and Standards.

The review will have two separate workstreams, working to separate (but overlapping) timetables:

- a review of the distribution reliability outcomes in NSW ("NSW workstream"); and
- a review of the frameworks across the NEM for the delivery of distribution reliability outcomes ("national workstream").

This issues paper commences the first stage of the NSW workstream and sets out the proposed scope and approach for the workstream for comment.

1.1 Purpose of the review

The MCE's objectives and requirements for each workstream of the review are outlined below. Chapter 2 discusses the MCE's terms of reference for the NSW workstream in detail.

1.1.1 NSW workstream

The NSW Government has requested the MCE to direct the AEMC to undertake a review of NSW distribution reliability outcomes in response to the concerns of the NSW Government about the impact of network expenditure on energy bills for NSW customers. Increased revenue allowances for DNSPs have been the most significant driver of increases to electricity bills in recent years, and distribution reliability requirements in NSW are one factor which has been driving the level of network investment.[1]

This workstream will provide a framework and information for the NSW Government to decide whether the existing NSW distribution licence conditions should be amended to reflect different reliability outcomes. The AEMC is required to provide advice on how the NSW Government can seek to ensure that distribution networks deliver a

1 Increased revenue allowances for DNSPs have contributed around 60 per cent of the increases to regulated retail prices in NSW, which have risen by up to 50 per cent for the period 1 July 2009 to 30 June 2012 . IPART, http://www.ipart.nsw.gov.au/files/Market-based%20electricity%20purchase%20cost%20allowance%20-%202009%20review%20-%20Final%20Report%20and%20Determination%20-%20May%202009.PDF, http://www.ipart.nsw.gov.au/files/Final%20Report%20-%20Review%20of%20regulated%20retail%20tariffs%20and%20charges%20for%20electricity%202010%20to%202013%20-%20March%202010.PDF

level of reliability that most effectively balances the costs of incremental investment and ongoing maintenance with the benefits of reliability. Any changes to the NSW distribution reliability outcomes would apply from the start of the next NSW distribution regulatory control period on 1 July 2014.

1.1.2 National workstream

The MCE has directed the AEMC to undertake a national review of frameworks and methodologies for achieving distribution reliability outcomes.

This review is partly a response to the AEMC's suggestion that the MCE initiate a review of the methodology underpinning security and reliability in our 2009 *Review of National Framework for Electricity Distribution Network Planning and Expansion*. Distribution reliability outcomes are currently set separately for each NEM jurisdiction by jurisdictional regulators, relevant government bodies or individual DNSPs, and different approaches are used between jurisdictions. It is appropriate for certain reliability outcomes to differ across jurisdictions due to differing regional issues and variations in operating environments, consistent with the Australian Energy Market Agreement (AEMA).[2] However the lack of consistency in expressing, delivering and reporting on reliability outcomes may be adversely impacting the efficiency and timelines of network investments and making it difficult for non-network providers to operate on a NEM-wide basis.[3]

The MCE's terms of reference also note that the Energy Ministers seek to ensure that there is an effective balance between ensuring sufficient investment in distribution networks to maintain reliability, and pricing outcomes for customers. In requesting the AEMC to undertake this workstream, the Energy Ministers noted that outcomes from recent distribution regulatory determinations have been a significant contributor to retail electricity price rises.[4]

The national workstream requires the AEMC to provide an analysis of the different approaches to achieving distribution reliability across the NEM. We have also been requested to assess the cost and benefits of the different approaches with respect to how different reliability outcomes balance consumers' willingness to pay and the cost of delivering the reliability outcomes. Based on this analysis, the AEMC has been asked to consider if there is merit in developing a nationally consistent framework for expressing, delivering, and reporting on distribution reliability outcomes.

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2 The AEMA was entered into by the Commonwealth and each state and territory of Australia on 30 June 2004, and most recently amended on 2 July 2009. It promotes an open and competitive national energy market in the long term interests of consumers with regard to the price, quality and reliability of electricity and gas services, and establishes a framework for reforming the energy markets.

3 AEMC, *Final Report for the Review of National Framework for Electricity Distribution Network Planning and Expansion,* September 2009, p xii.

4 MCE, Terms of Reference, *Review of Distribution Reliability Outcomes and Standards*.

Following the completion of this work and publication of a draft report, the MCE may request the AEMC to develop a best practice framework that delivers nationally consistent reliability outcomes that could be voluntarily adopted or used as a reference by the jurisdictions to amend aspects of the existing approaches. Further details on the national workstream will be outlined in our issues paper for this workstream which will be published in July 2012.

1.2 Timing and interactions between workstreams

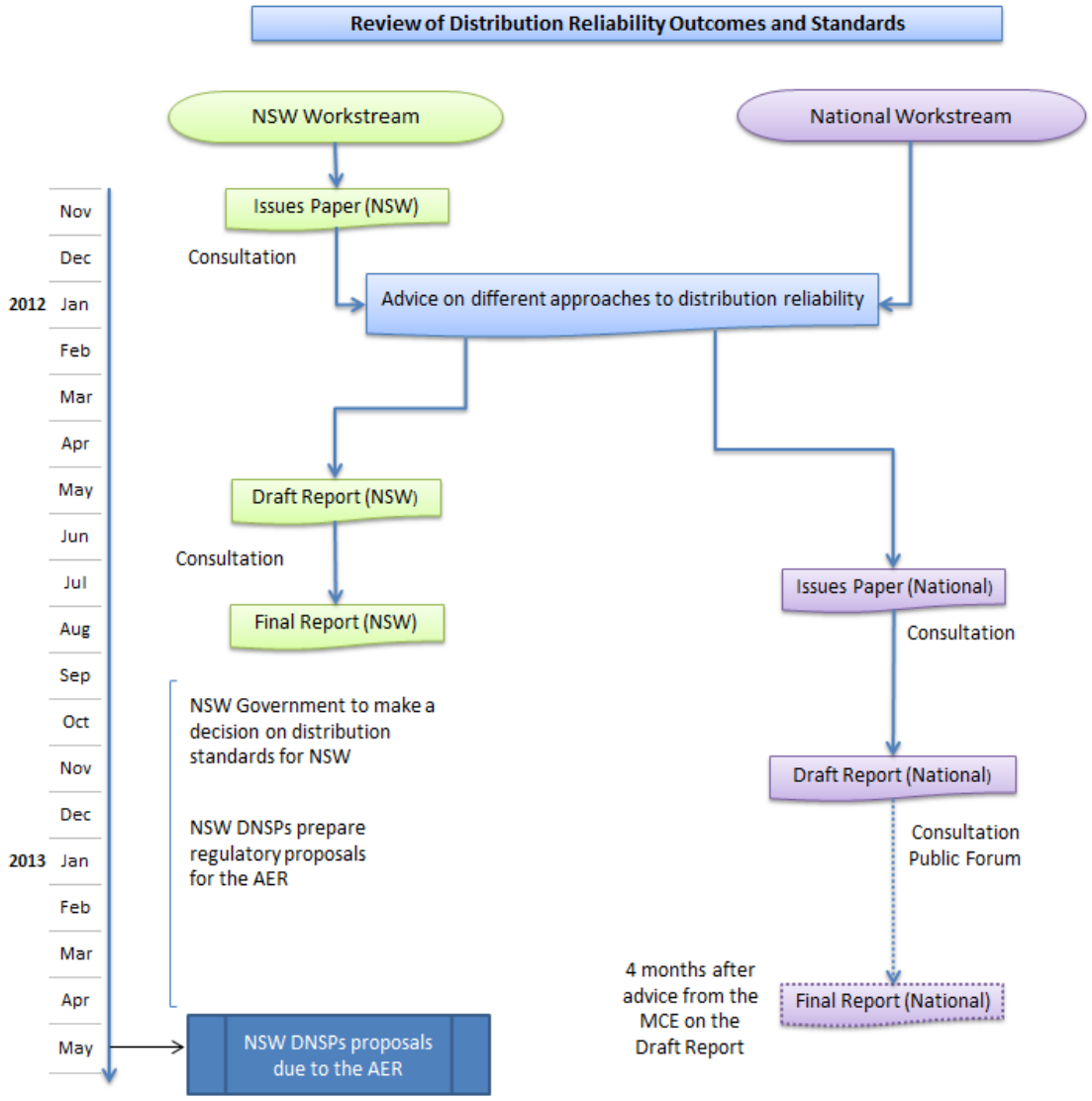
Figure 1.1 shows the relationship and the indicative timing of the two workstreams. While there are some links between the two workstreams, their objectives are fundamentally different. The NSW workstream will provide advice on the costs and benefits of alternative *outcomes* or *levels* of distribution reliability in NSW, while the focus of the national workstream is on the *frameworks* or *approaches* to determining distribution reliability outcomes across the NEM.

Figure 1.1 also shows that the NSW workstream will commence prior to the national workstream. This is because the NSW Government needs to make any changes to the NSW distribution reliability outcomes in time for the next distribution regulatory control period commencing on 1 July 2014, so that:

- the NSW DNSPs' can prepare their regulatory proposals to meet the new outcomes (due to the Australian Energy Regulator (AER) in May 2013); and
- the AER's regulatory determinations take into account the costs (or cost savings) of meeting the new outcomes for each NSW DNSP.

The timing in Figure 1.1 shows different timeframes to those set out in the MCE's terms of reference due to delays in confirming the funding that was necessary to commence the workstream. The dates for the deliverables relating to the national workstream are also later than the timeframes in the MCE's terms of reference because we are prioritising the NSW workstream so that the licence conditions may be amended (if necessary) in time for the next NSW distribution regulatory control period. The timeframes for the national review are currently indicative and will be confirmed in the issues paper for the national workstream, which is expected to be released by July 2012.

Figure 1.1 Relationship between the NSW and national workstreams



1.3 The stakeholder engagement process for both workstreams

In conducting the review, the MCE's terms of reference require us to consult with a range of stakeholders including:

- jurisdictional Ministers responsible for setting distribution reliability standards;
- jurisdictional representatives and the Standing Committee of Officials for Energy Ministers;
- jurisdictional regulatory bodies;
- the AER;
- the Australian Energy Market Operator (AEMO);
- network companies;

- market participants; and
- customers and their representatives.

1.3.1 How to make a submission

The closing date for submissions to this issues paper is 1 December 2011.

Submissions must be on letterhead (if submitted on behalf of an organisation), signed and dated. Submissions should quote project number "EPR0027" and may be lodged online at www.aemc.gov.au or by mail to:

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

1.4 Structure of this paper

The remainder of the issues paper is structured as follows:

- Chapter 2 discusses the terms of reference and the scope of the review
- Chapter 3 provides an overview of the characteristics of each distribution network in NSW, and explains the current reliability requirements in for NSW DNSPs;
- Chapter 4 discusses our proposed approach to assessing the costs and benefits of alternative reliability outcomes in NSW;
- Appendix A is provides a map of the NSW distribution networks;
- Appendix B shows compliance with NSW design planning criteria and recent reliability performance for each DNSP; and
- Appendix C provides information on related reviews.

2 Terms of reference for the NSW workstream

This Chapter outlines further details on the MCE's terms of reference and required considerations for the NSW workstream. It also outlines a number of questions for stakeholder comment regarding the scope of the NSW workstream. Further discussion on how we intend to approach the NSW workstream is set out in Chapter 4.

2.1 Terms of reference for the NSW workstream

As outlined in Chapter 1, the objective of the NSW workstream is to provide information on the costs and benefits of a range of NSW distribution reliability outcomes. The NSW Government will then use this information to determine if changes to the distribution reliability outcomes should be made, and if so, the changes to the distribution licence conditions that are required to achieve these outcomes. Further discussion regarding the steps that the terms of reference requires us to undertake in the NSW workstream are outlined below.

2.1.1 Consider best practice national and international reliability standards and outcomes

The MCE has requested we consider best practice national and international reliability standards and outcomes during the NSW workstream. We are required to take into account the extent to which these approaches consider the costs of incremental investment and maintenance, community expectations, and the willingness of customers to pay in setting standards and outcomes. This work will be relevant to both the NSW workstream and the national workstream.

2.1.2 Verify the appropriateness of the current expression and structure of NSW distribution reliability outcomes

We are required to verify that the current expression of distribution reliability standards in the NSW licence conditions remains appropriate. In particular, the MCE has requested we consider whether the classification of customer groups, regions and the expression of the reliability standard, provides a reasonable basis for setting future standards.

Issues relating to this task

The existing NSW distribution licence conditions include schedules relating to a number of factors which contribute to the distribution reliability outcomes which are achieved, including design planning criteria, reliability standards, individual feeder standards and customer service standards. As all of the schedules contribute in part to the distribution reliability outcomes in NSW, we intend to consider the expression and structure of all of the schedules, rather than just confining our analysis to the reliability standards as set out in the MCE's terms of reference. Further discussion on the

requirements in the existing NSW distribution licence conditions is outlined in Chapter 3.

As the timeframe for the NSW workstream is constrained, significant changes to the expression and structure of the existing outcomes in the distribution licence conditions cannot be considered. If fundamental issues with the expression and structure of the existing outcomes emerge during the NSW workstream, these issues and options for change, could be considered during the national workstream.

The NSW workstream will focus on the NSW distribution reliability outcomes in the NSW distribution licence conditions only. As a result, changes to requirements in the National Electricity Rules (NER) such as the AER's Service Target Performance Incentive Scheme (STPIS) will not be considered, although we will have regard to this Scheme and any other relevant NER requirements in our analysis.

The MCE's terms of reference refers to the AEMC undertaking a review of the NSW "distribution network reliability and quality of service licence conditions." The term "quality of service" is usually used in the electricity context to refer to the technical specifications of electricity supply such as the voltage level, frequency, and harmonic content. As the existing NSW distribution licence conditions do not include any requirements relating to the quality of service, this is considered outside the scope of the NSW workstream.

We propose that services which are not core to the NSW distribution reliability outcomes, such as street lighting and metering, also be considered outside the scope of the NSW workstream. We propose that the NSW workstream only consider distribution services which are classified as standard control services by the AER.[5]

2.1.3 Estimate the costs of achieving a range of different distribution reliability outcomes

The MCE's terms of reference request the AEMC to estimate the "efficient costs" of achieving alternative distribution reliability outcomes that are both higher and lower than the existing outcomes. In estimating these costs we are required to consider the investment to date by the NSW DNSPs, and any planned investment for the remainder of the current regulatory control period, to achieve the reliability outcomes in the existing NSW distribution licence conditions. We are also required to take into account the information to be provided by each NSW DNSP, expert analysis and any other relevant information, such as evidence from other jurisdictions.

Issues relating to this task

In estimating the costs of alternative distribution reliability outcomes, we intend to estimate the likely deliverable costs of achieving each alternative reliability outcome.

5 Standard control services reflect distribution services which are provided to all customers (eg the distribution of electricity to end users) and services where revenues are more tightly regulated by the AER due to the limited competition in the markets for these services.

This will provide the NSW Government with a realistic estimate of the costs involved in meeting different reliability outcomes for each NSW DNSP.

In developing cost estimates, we will request each of the NSW DNSPs to provide an estimate of the incremental costs or savings of meeting each scenario for alternative distribution reliability outcomes. This information will then be reviewed by the AEMC and external consultants to assess whether the cost estimates provided represent a realistic estimate of the likely costs or savings of achieving each alternative reliability outcome.

We consider that the AER's distribution determination process is the most appropriate forum for the assessment of the efficient level of a DNSP's costs. Further, an assessment of the efficient level of costs is not likely to be feasible in the timeframe for the NSW workstream.

2.1.4 Estimate the willingness of the NSW community to pay for a range of reliability outcomes

The MCE has requested we estimate the willingness of the NSW community to pay for a range of reliability outcomes. In undertaking this task, we are required to take into account the characteristics and differing risk profiles of different types of customers and regions in NSW. This assessment will allow us to compare the cost of different distribution reliability outcomes with the value placed on reliability by different customer types.

2.1.5 Advise on the costs and benefits of a range of alternative distribution reliability outcomes

The final component of the NSW workstream will involve comparing the estimated costs of different possible reliability outcomes with the evidence about the reliability outcomes that the NSW community would find acceptable and is willing to pay for. The AEMC is requested to set out advice on the costs and benefits of the range of distribution reliability outcomes that the NSW Government should consider. We are also required to take into account the impact of different possible reliability outcomes on electricity prices, energy security, and other relevant factors.

Issues relating to this task

The AEMC will not be recommending specific changes to the NSW distribution licence conditions as part of its advice. Also, the potential for alternative distribution reliability outcomes in other jurisdictions will not be considered during this workstream.

Question 1 Terms of reference for the NSW workstream

a) Are there any other issues which should be considered within the scope of the MCE's terms of reference?

2.2 Required considerations for the NSW workstream

The MCE's terms of reference sets out a range of factors that the AEMC must consider and take into account in undertaking the NSW workstream. These factors include:

- the expectations of NSW electricity consumers;
- the characteristics and differing risk profiles of different types of customers and regions in NSW;
- investment to date by NSW DNSPs to achieve the existing reliability standards in the NSW licence conditions, and the levels of reliability expected to be achieved by the end of the current regulatory control period (at 30 June 2014);
- information to be provided by the NSW DNSPs as to their assessment of the costs of achieving a range of different reliability outcomes that are both higher and lower than the current outcomes;
- reliability standards and outcomes in place in other jurisdictions; and
- the Australian Energy Market Operator's (AEMO's) work on developing a National Value of Customer Reliability.[6]

In addition to the factors outlined above, in undertaking both the NSW workstream and the national workstream, the AEMC is required to have regard to:

- the National Electricity Objective;[7]
- the proposed national framework for distribution network planning and expansion, including the Regulatory Investment Test for Distribution;[8]
- the role of the AER in administering the current frameworks and how this impacts on how reliability standards are set and managed, including the AER's STPIS and the Guaranteed Service Level arrangements in relevant jurisdictions;
- any relevant transmission provisions;
- reporting to the AER on target setting of reliability performance under Chapter 6 of the NER;

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6 AEMO is currently developing its final recommendations on a *National Value of Customer Reliability*. Further details can be found at: http://www.aemo.com.au/planning/vcr.html

7 The National Electricity Objective is set out in section 7 of the National Electricity Law in the *National Electricity (South Australia) Act 1996*.

8 The AEMC is currently assessing a rule change request from the MCE to implement a national framework for distribution network planning and expansion. Further details on this rule change proposal can be found here: http://www.aemc.gov.au/Electricity/Rule-changes/Open/Distribution-Network-Planning-and-Expansion-Framework.html

- when released, the MCE's response to the AEMC's Transmission Reliability Standards Review;[9]
- other relevant reviews and Rule change determinations; and
- any other relevant information.

We will also have regard to the submissions we receive and the views of stakeholders in developing our advice. Further details on related work to the NSW workstream is discussed in Appendix C.

Question 2 Required considerations during the NSW workstream

a) Should the AEMC have regard to any other factors to those outlined in the MCE's terms of reference in undertaking the NSW workstream?

9 A copy of the AEMC's *Updated Final Report for the Transmission Reliability Standards Review* is available at: http://www.aemc.gov.au/Market-Reviews/Completed/Transmission-Reliability-Standards-Review.html

3 Current framework for distribution reliability in NSW

Reliability refers to the extent to which customers have a continuous electricity supply. Interruptions to continuous supply can be of varying duration from fractions of a second to several hours, depending on the cause and what has to be done to restore supply. Reliability performance varies across different networks due to the different conditions under which they operate.

This Chapter provides an overview of the characteristics of the distribution networks in NSW. It also describes the current reliability requirements for NSW DNSPs under the NSW distribution licence conditions and the NER.

3.1 Characteristics of the three distribution networks in NSW

There are three separate distribution networks in NSW which cover different geographical areas across the state. Each distribution network is operated by a NSW Government-owned DNSP:

- Ausgrid (formerly EnergyAustralia), which operates the distribution network covering eastern Sydney, the Central Coast, the Newcastle area, and the Hunter Valley;
- Endeavour Energy (formerly Integral Energy), which covers Greater Western Sydney, the Blue Mountains, the Southern Highlands, the Illawarra and the South Coast; and
- Essential Energy (formerly Country Energy), which covers the remainder of NSW.[10]

The table below summarises some of the key characteristics of each NSW distribution network. At the end of 2009/10, Ausgrid supplied over 1.6 million customers, which was roughly twice the number of customers of Endeavour Energy and Essential Energy, which each supplied between 800,000 and 900,000 customers. The distribution networks of Ausgrid and Endeavour Energy each cover roughly 2.5% of NSW's area, and the Essential Energy distribution network covers the remaining 95%. A map showing the distribution networks is included in Appendix A.

10 Prior to the NSW Energy Reform process the NSW Government-owned DNSPs also operated retail businesses. On 1 March 2011, the retail businesses were sold along with their existing brand names (EnergyAustralia, Integral Energy and Country Energy). The DNSPs were rebranded as Ausgrid, Endeavour Energy and Essential Energy respectively from this date.

Table 3.1 Key characteristics of NSW distribution networks (at 30 June 2010)

	Ausgrid	Endeavour Energy	Essential Energy
Area (square metres)	22,000	24,500	762,000
Line length (km)	49,546	33,579	189,823
Number of customers	1,605,635	866,724	801,913
Energy received to year end (GWh)	31,812	18,251	13,076
Asset Base (billion, $2009)	$8.43	$3.74	$4.38
Investment - 2009 - 2015 (billion, $2009)	$7.83	$2.72	$3.83

Sources: EnergyAustralia, *2009/10 Network Performance Report*, Country Energy, *Electricity Network Performance Report 2009-10*, Endeavour Energy, *Electricity Performance Report, 2009-10*, AER, *State of the Energy Market 2010,* p 50.

The AEMC notes that the NSW Government has commenced a process to merge the three DNSPs into two. However to date limited details have been released about the timing and structure of the merger.[11]

3.2 Approaches to setting distribution reliability outcomes

The planning criteria in NSW are predominately "deterministic" which means that the need for investment is established when it is likely that the planning design criteria in the licence conditions will not be met. Network augmentations are then chosen by DNSPs on the basis of least cost. In contrast to deterministic planning criteria, probabilistic planning measures the benefit of the augmentation, for example, through a value of customer reliability (VCR), to assess whether an augmentation should proceed, rather than applying pre-determined criteria. A VCR is used to value the benefits of a proposed network upgrade so they can be compared to the costs of the upgrade. Investments only proceed if the benefits outweigh the costs. Victoria is the only jurisdiction which uses a strictly probabilistic planning approach, however

11 NSW Government, Budget Paper No. 3: Trade and Investment, Regional Infrastructure and Services Cluster, September 2011, http://www.budget.nsw.gov.au/__data/assets/pdf_file/0003/18255/bp3_08tiris.pdf, The Hon Chris Hartcher MP, Media Release, *Government announces non-frontline staff recruitment freeze*, 15 May 2011, http://www.dtiris.nsw.gov.au/__data/assets/pdf_file/0010/389809/govt-announces-non-frontline-staff-recruitment-freeze.pdf

Tasmania also incorporates probabilistic elements. Approaches which are generally deterministic are used in all other NEM jurisdictions.[12]

3.3 Current NSW distribution licence conditions

The current NSW licence conditions for NSW DNSPs were set by the Minister for Energy under the *Electricity Supply Act 1995* (NSW) and came into effect on 1 December 2007.[13] They replaced the NSW licence conditions which were introduced by the Minister on 1 August 2005 following power outages in Sydney's CBD.

Prior to 2005, there were no mandated design or reliability outcomes for NSW DNSPs. The NSW DNSPs were responsible for determining the appropriate level of reliability for their customers. The licence conditions accelerated upgrades to the distribution networks to achieve improved network design planning criteria by 1 July 2014, and meet generally decreasing outage duration and frequency standards between 2005 and 2010. Appendix A shows the proportion of the network that is currently compliant with the design planning criteria, and recent reliability performance against the reliability standards.

The NSW licence conditions include requirements relating to design planning criteria (schedule 1), reliability standards (schedule 2), individual feeder standards (schedule 3), and customer service standards (schedule 4). The elements of the licence conditions, and how they drive distribution reliability outcomes are summarised in Figure 3.1. It shows that the design planning criteria, the reliability standards and the individual feeder standards have the greatest influence on DNSP distribution reliability planning and reliability outcomes. Therefore we consider schedules 1-3 to be within the scope of the NSW workstream as each of them will have a bearing on the reliability performance of a DNSP.

As discussed in Chapter 2, the timeframe for the NSW workstream does not allow for fundamental changes to the structure of the NSW licence conditions, therefore we consider that this is outside the scope of the NSW workstream. However, changes to the content of these required outcomes (for example, the duration and frequency of outages for different feeder types, definition of "excluded interruptions") will be assessed. If fundamental issues with the expression and structure of the outcomes emerge during the NSW workstream, these issues and options for change, could be considered during the national workstream.

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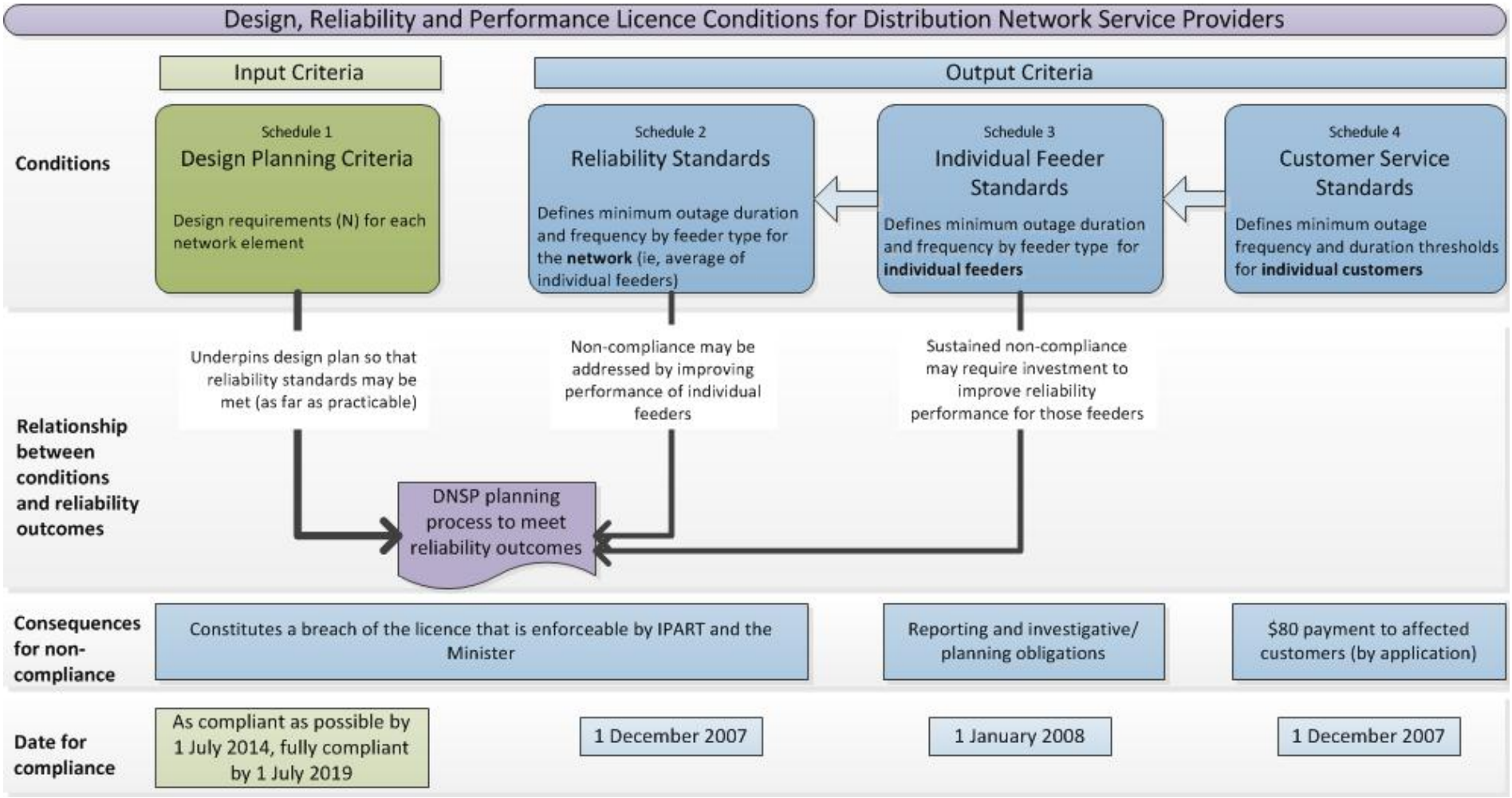
12 Sinclair Knight Merz, *Advice on Development of a National Framework for Electricity Distribution Network Planning and Expansion*, http://www.aemc.gov.au/Media/docs/Advice%20on%20Development%20of%20a%20National%20Framework%20for%20Electricity%20Distribution%20Network%20Planning%20and%20Expansion%20-%20Sinclair%20Knight%20Merz-2c48e440-e961-4276-be4d-59f5ea566bc2-0.pdf

13 Ian Mcdonald, MLC Minister for Energy, *Design, Reliability and Performance Licence Conditions for Distribution Network Service Providers*, 1 December 2007, http://www.ipart.nsw.gov.au/electricity/documents/DesignReliabilityandPerformanceLicenceConditionsforDNSPs-23November2007.PDF. Referred to as *NSW licence conditions*.

Each of the licence conditions are also described in more detail in the following sections.

Figure 3.1 NSW Licence Conditions and Reliability Outcomes



3.3.1 Design planning criteria

The design planning criteria are input criteria that describe how the network must be built in the longer term, to maintain or restore supply if a network element is taken out of service. The DNSPs have different design planning criteria for different parts of their networks. There are back up supply arrangements or "redundancy" in some parts of the network that enables supply to be maintained, or restored quickly, in the event of a network element being taken out of service. The level of redundancy depends on the total amount of load being serviced,[14] and the geographic locality of the load.

As a general rule, most subtransmission parts of the network have redundancy, but there is often less redundancy in the medium and low voltage parts of the network. There are also other factors. For example, an underground cable supply would typically be expected to suffer less outages than an overhead power line, but may take longer to repair if there is a cable failure.[15]

The design planning criteria are described using N-x terminology, where N is the number of system elements. A power system comprising N elements that is resistant to a single component being out of service is said to be reliable to N-1. This means that all customer loads will continue to be supplied even with one bulk power system element out of service. A system that is reliable to N-2 will be resistant to two system components being out of service, and therefore provides a higher level of security. However a reliable to N-2 network will be more expensive to build, operate and maintain than a reliable to N-1 network. The licence conditions specify that for sub transmission lines, the CBD of Sydney is to be reliable to N-2, urban and non urban loads above 10 mega volt amperes (MVA) are to be secured with reliable to N-1, and smaller loads to N-0.

The current licence conditions require the DNSPs to be as compliant as reasonably practicable in relation to all network elements by 1 July 2014, and be fully compliant by 1 July 2019. Each DNSP must submit an annual design planning criteria report to the Minister detailing its strategy to meet the design planning criteria, and the progress made. While the design planning criteria might identify the need for a future upgrade (due to expected load growth) part of the DNSP planning process is to first undertake a demand management process to see if the load growth can be slowed so that capital expenditure may be deferred. A DNSP may only apply higher design planning criteria where it considers it prudent to do so, with respect to the actual configuration and condition of the network elements and the likely impact of alternative investment options.[16]

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14 The network is categorised into sub transmission line, sub transmission station, zone substation, distribution feeder, and distribution substation.

15 Energy Networks Association, *ENA Customer Guide to Electricity Supply*, 2008, http://www.ausgrid.com.au/Common/Our-network/Network-regulation-and-reports/~/media/Files/Network/Regulations%20and%20Reports/ENAcustomerguideelectricitysupply.ashx

16 *NSW licence conditions*, Cl 14.6.

Figure 3.2 Schedule 1 - Design planning criteria

Network Element	*Load Type*	*Forecast Demand or Expected Demand*	*Security Standard*	*Customer Interruption Time*
Sub Transmission Line	CBD	Any	N-2[6]	Nil for 1st credible contingency <1 hr for 2nd credible contingency
	Urban & Non-Urban	≥ 10 *MVA*	N-1[1]	< 1 minute
	Urban & Non-Urban	< 10 *MVA*	N[2]	*Best practice repair time*
Sub Transmission Substation	CBD	Any	N-2[6]	Nil for 1st credible contingency <1 hr for 2nd credible contingency
	Urban & Non-Urban	Any	N-1	< 1 minute
Zone Substation	CBD	Any	N-2[6]	Nil for 1st credible contingency <1 hr for 2nd credible contingency
	Urban & Non-Urban	≥ 10*MVA*	N-1[1]	< 1 minute
	Urban & Non-Urban	< 10 *MVA*	N[2]	*Best practice repair time*
Distribution Feeder	CBD	Any	N-1[3]	Nil
	Urban	Any	N-1[4]	< 4 Hours[5]
	Non-Urban	Any	N	*Best practice repair time*
Distribution Substation	CBD	Any	N-1[3]	Nil
	Urban & Non-Urban	Any	N[7]	*Best practice repair time*

Design planning criteria have a significant impact on the distribution reliability outcomes that are achieved in NSW and the capital expenditure which is required to meet these outcomes. When compared to changes in other components of the existing distribution reliability licence conditions, changes in the design planning criteria are likely to have the largest impact on the planning processes used by the NSW DNSPs and are also likely to affect the reliability performance of the greatest proportion of NSW consumers. The planning criteria should generally allow the DNSP to meet the reliability standards.

3.3.2 Reliability standards

The reliability standards are the key output criteria for reliability performance. The reliability standards define minimum average reliability performance, by feeder type, for each distribution network.[17] The effect of amending reliability standards for individual customers would vary, depending on the current performance of the feeders in their area relative to the standard and the overall performance of feeders of that type across the DNSP's network. Changes in the distribution reliability standards are likely to most affect the reliability performance of feeders which are operating significantly above or below the standard, as these feeders are likely to contribute most to the average performance of these feeder types.

17 The NSW licence conditions specify four different feeder types: CBD, urban, short-rural and long rural.

The reliability measures included in the NSW licence conditions are:

- SAIDI - System Average Interruption Duration Index – the total number of minutes all customers are without electricity supply in a year averaged over all customers. An interruption of 1 hour per year equates to a reliability level of 99.989%. If this were to increase to 1½ hours, the reliability would be 99.983%.

- SAIFI - System Average Interruption Frequency Index – the total number of times all customers have their electricity supply interrupted in a year averaged over all customers.

The NSW DNSPs have been required to meet decreasing SAIDI and SAIFI standards each year between 2005/06 and 2010/11, with the exception of Endeavour's short rural feeder standards, which have remained constant. The reliability standards are being held constant from 2010/11 onwards for each DNSP for each feeder type. There are separate standards for each DNSP - the only standards set at the same level are for the Ausgrid and Endeavour Energy urban standards.

From 2010/11 the SAIDI standard ranges from an average of 45 minutes of interruption time per year for Ausgrid's CBD feeders, to an average of 700 minutes (11 hours and 20 minutes) per year for long-rural feeders in Ausgrid's and Essential Energy's networks. The SAIFI standards range from an average of 0.3 interruptions per year for Ausgrid's CBD feeders, to an average of 6 interruptions for Ausgrid's long rural feeders. The reliability standards in the NSW licence conditions are shown in Figure 3.3.

The DNSPs must report quarterly to the Minister against the reliability standards, including reasons for non-compliance, and annually provide an independently audited report to the Minister and IPART.[18]

The NSW distribution licence conditions include definitions which affect the distribution reliability outcomes which are achieved and how distribution reliability outcomes are reported. For example, the standards relate to unplanned interruptions only, and exclude a range of other interruptions.[19] Changes to these definitions may allow the NSW DNSPs greater flexibility or constrain how they meet their required distribution reliability outcomes. As a result, the definitions in the NSW distribution licence conditions are considered within the scope of this workstream.

18 *NSW Licence Conditions*, Cl 18.7-18.8.

19 Excluded interruptions are defined in Schedule 4 of the licence conditions. Planned interruptions occur when DNSPs need to interrupt supply to connect new customers or carry out planned maintenance or repairs to network equipment. DNSPs are generally required to provide two days notice of their intent to conduct planned maintenance.

Figure 3.3 Schedule 2 - Reliability standards

1. SAIDI average standards

SAIDI – Average Reliability Duration Standards (Minutes per *customer*)						
EnergyAustralia						
Feeder Type	**2005/06**	**2006/07**	**2007/08**	**2008/09**	**2009/10**	**From 2010/11**
CBD	60	57	54	51	48	45
Urban	90	88	86	84	82	80
Short-rural	400	380	360	340	320	300
Long-rural	900	860	820	780	740	700
Integral Energy						
Feeder Type	**2005/06**	**2006/07**	**2007/08**	**2008/09**	**2009/10**	**From 2010/11**
Urban	90	88	86	84	82	80
Short-rural	300	300	300	300	300	300
Long-rural	n/a	n/a	n/a	n/a	n/a	n/a
Country Energy						
Feeder Type	**2005/06**	**2006/07**	**2007/08**	**2008/09**	**2009/10**	**From 2010/11**
Urban	140	137	134	131	128	125
Short-rural	340	332	324	316	308	300
Long-rural	750	740	730	720	710	700

2. *SAIFI average standards*

SAIFI – Average Reliability Frequency Standards (Number per *customer*)						
EnergyAustralia						
Feeder Type	**2005/06**	**2006/07**	**2007/08**	**2008/09**	**2009/10**	**From 2010/11**
CBD	0.35	0.34	0.33	0.32	0.31	0.3
Urban	1.3	1.28	1.26	1.24	1.22	1.2
Short-rural	4.4	4.2	3.9	3.7	3.4	3.2
Long-rural	8.5	8	7.5	7	6.5	6
Integral Energy						
Feeder Type	**2005/06**	**2006/07**	**2007/08**	**2008/09**	**2009/10**	**From 2010/11**
Urban	1.3	1.28	1.26	1.24	1.22	1.2
Short-rural	2.8	2.8	2.8	2.8	2.8	2.8
Long-rural	n/a	n/a	n/a	n/a	n/a	n/a
Country Energy						
Feeder Type	**2005/06**	**2006/07**	**2007/08**	**2008/09**	**2009/10**	**From 2010/11**
Urban	2	1.96	1.92	1.88	1.84	1.8
Short-rural	3.3	3.24	3.18	3.12	3.06	3.0
Long-rural	5	4.9	4.8	4.7	4.6	4.5

3.3.3 Individual feeder standards

The licence conditions require the DNSPs to comply with a set of minimum SAIDI and SAIFI standards for individual feeders, which have applied since 1 January 2008. Like the reliability standards, the individual feeder standards are different for each DNSP and for CBD, Urban, Short-rural and Long-rural feeders.

Figure 3.4 Schedule 3 - Individual feeder standards

1. SAIDI Individual Feeder Standards

SAIDI – Standards (Minutes per *customer*)	
EnergyAustralia	
Feeder Type	**Minutes per *customer***
CBD	100
Urban	350
Short-rural	1000
Long-rural	1400
Integral Energy	
Feeder Type	**Minutes per *customer***
Urban	350
Short-rural	1000
Long-rural	1400
Country Energy	
Feeder Type	**Minutes per *customer***
Urban	400
Short-rural	1000
Long-rural	1400

2. SAIFI Individual Feeder Standards

SAIFI – Standards (Number per *customer*)	
EnergyAustralia	
Feeder Type	**Number per *customer***
CBD	1.4
Urban	4
Short-rural	8
Long-rural	10
Integral Energy	
Feeder Type	**Number per *customer***
Urban	4
Short-rural	8
Long-rural	10
Country Energy	
Feeder Type	**Number per *customer***
Urban	6
Short-rural	8
Long-rural	10

The DNSP must also provide an independently audited performance report against the individual feeder standards to IPART and the Minister on an annual basis.[20] If a DNSP exceeds the individual standard for any 12 month period ending in March, June, September or December the DNSP must:

- investigate and report to the Minister on the causes for exceeding the standard; and
- identify, and complete operational actions required to meet the standard, and develop a project plan for non operational actions required, including non-network solutions.[21]

20 *NSW Licence Conditions*, Cl 18.7-18.8.

21 *NSW Licence Conditions*, Schedule 3, Cl 16, Cl 18.4.

Changes in individual feeder standards are likely to impact pockets of individual customers, rather than a significant proportion of NSW consumers. As the individual feeder standards set the minimum standards for the reliability performance for each feeder, changes in the individual feeder standards would have impacts for consumers in areas with the worst reliability performance in NSW. In some cases, changes in the individual feeder standards may not have a material effect on the overall capital expenditure of the NSW DNSPs, but may have a significant impact on consumers living in areas with poor reliability of supply.

We consider that the individual feeder standards are within the scope of the NSW workstream, as they contribute to the distribution reliability outcomes for NSW consumers, along with the design planning criteria and the distribution reliability standards.

3.3.4 Customer service standards

The current licence conditions also include customer service standards. DNSPs are required to provide financial recognition to customers who have experienced poor reliability of supply. Upon application, a DNSP must pay $80 (and a maximum of $320 in any one financial year) to a customer if they experience:

- an interruption greater than 12 hours (metropolitan) or 18 hours (non-metropolitan); or
- four interruptions greater than four hours in a financial year (metropolitan) or four interruptions greater than five hours (non- metropolitan).[22]

The customer service standards are not directly related to the distribution reliability outcomes that are achieved and do not have a significant impact on the investment undertaken by the NSW DNSPs to ensure compliance with the distribution licence conditions. As a result, we propose that the customer service standards are outside the scope of the NSW workstream.

Question 3 Customer service standards

a) Should customer service standards be considered within the scope of the NSW workstream?

3.4 Distribution reliability requirements in the NER

From the next regulatory control period commencing 1 July 2014, the NSW DNSPs are expected to be subject to the STPIS requirements under the NER.[23] The STPIS provides a financial incentive for DNSPs to maintain and improve service performance by

22 *NSW Licence Conditions*, Cl 17, Schedule 5.

23 Clause 6.6.2 in Chapter 6 of the NER. AER, *Electricity distribution network service providers Service target performance incentive scheme*, November 2009.

assigning rewards or penalties to a DNSP where performance is better or worse than the target performance level.[24] The performance standards are established at the commencement of the regulatory control period, and are based on the average performance over the past five years. Incentive rates for reliability parameters are based on customers' willingness to pay for service improvements. The scheme allows a DNSP to earn an annual bonus of up to five per cent of its revenue. A DNSP will receive a financial penalty where actual performance is below target performance. The DNSPs' regulatory proposal to the AER must contain a description of how the STPIS should apply for the regulatory control period.

For the current regulatory control period, the NSW DNSPs' obligations with respect to the STPIS are limited to providing annual performance data to the AER. This information will inform the STPIS performance standards for NSW DNSPs from 1 July 2014.

3.5 How reliability outcomes are funded

The AER is responsible for regulating the revenues of all the DNSPs in the NEM in accordance with the NER.[25] The AER sets capital and operating allowances for NSW DNSPs so they can meet the reliability outcomes in the NSW licence conditions. These allowances form the basis for network tariffs charged to retailers, and are ultimately recovered through customers' electricity bills

The AER will make a new five year revenue determination for NSW DNSPs that will commence on 1 July 2014. As outlined in Chapter 1, if the NSW Government decides to change the NSW reliability outcomes, the new outcomes would need to be in place in time to allow the DNSPs to incorporate any costs (or cost savings) associated with meeting the new outcomes in their regulatory proposals for the next period. These regulatory proposals are due to be submitted to the AER in May 2013.[26]

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24 The STPIS also contains a guaranteed service level (GSL) component through which the DNSPs must provide payment to customers that have received poor service. The national GSL requirements do not apply where a State scheme is in place. A key difference between the NSW licence conditions and the GSL payments under the STPIS is that the STPIS requires payments to be made to customers automatically as opposed to on application from the customer.

25 We note on 20 October 2011 the AEMC initiated a series of rule change proposals received from the AER) in relation to the economic regulation of electricity network businesses. These are not relevant to this review.

26 We note that in accordance with 6.10.3 of the NER, the DNSP may make submit a revised regulatory proposal to the AER up to 30 days after the publication of the AER's draft distribution determination. A revised regulatory proposal may incorporate changes to address matters raised by the draft distribution determination or it may be required by the AER. This process may be used to incorporate late changes to NSW distribution reliability outcomes.

4 Approach to the NSW workstream

This Chapter sets out our proposed approach to assessing the costs and benefits of alternative scenarios for NSW distribution reliability outcomes. It also outlines a number of questions for stakeholder comment.

A summary of our proposed approach is outlined in Figure 4.1, with each step discussed in further detail below.

Figure 4.1 Proposed approach for NSW workstream

4.1 Best practice national and international approaches to distribution reliability

The MCE has requested that the AEMC consider best practice national and international reliability standards and outcomes in undertaking the NSW workstream. We intend to consider the current approaches that apply in each jurisdiction in Australia, in addition to a number of other jurisdictions internationally. Deterministic and probabilistic approaches to distribution reliability will be considered.

For each jurisdiction we will consider:

- the methodology for setting distribution reliability outcomes;
- the measures used (for example, SAIDI and SAIFI);
- how the requirements for distribution reliability outcomes are expressed and structured (for example, customer categories and feeder types used);
- any relevant customer service standards and outcomes; and
- the institutional arrangements that apply (for example, the process for amending the approach to, and level of, the distribution reliability outcomes, and reporting requirements).

We will take into account the following factors in reviewing each approach:

- historic levels of distribution reliability performance;

- indicative costs of achieving the distribution reliability outcomes, where information is available;
- the extent to which the distribution reliability outcomes reflect community expectations and willingness to pay;
- the strength of the governance arrangements (for example, whether the body who sets the outcomes is independent from the body which must meet the outcomes);
- the level of transparency in relation to how the distribution reliability outcomes are set and applied; and
- the level of accountability of DNSPs in relation to compliance with the required outcomes.

We will provide a paper to the MCE on best practice national and international approaches to delivering distribution reliability outcomes in January 2012. This paper will also be published on the AEMC's website. This work will be used for both the NSW workstream and the national workstream. For the NSW workstream it will be used in the development of a cost-benefit approach on alternative NSW distribution reliability outcomes, while for the national workstream it will be used to inform the issues paper.

Question 4 Best practice national and international approaches to distribution reliability

a) Are there any other criteria we should take into account in reviewing national and international approaches to distribution reliability?

4.2 Appropriateness of the existing framework for NSW distribution reliability outcomes

Prior to considering the costs and benefits of alternative scenarios for distribution reliability outcomes in NSW, we will verify whether the current framework for distribution reliability outcomes in the NSW distribution licence conditions provides a reasonable basis for setting future reliability outcomes in NSW. We will only assess whether the current expression and structure of the outcomes are fit for purpose rather than whether they represent the best way to express the outcomes, due to the limited timeframes for the NSW workstream. If issues are identified with the current framework for NSW distribution reliability outcomes, options to address these issues could be addressed as part of the national workstream.

We note that the NSW Government has commenced a process to merge the three NSW DNSPs into two DNSPs.[27] However, as limited details of the merger have been

27 NSW Government, *NSW 2011-12 Budget Papers*, Trade and Investment , Regional Services and Infrastructure Cluster, 6 September 2011, pg. 8-6.

provided to date, we will continue to treat the NSW DNSPs as three separate DNSPs. The timeframes for the NSW workstream are unlikely to allow us to take the merger into account if further details are subsequently released.

4.3 Selection of alternative scenarios for NSW distribution reliability outcomes

We have been requested by the MCE to have regard to distribution reliability outcomes which are both higher and lower than the existing outcomes for distribution reliability in NSW. We intend to consider three to four alternative scenarios for each NSW DNSP. This will allow us to assess each scenario in a sufficient level of detail. It will also minimise the information required from each NSW DNSP and the time required by the DNSPs to compile this information.

We propose to consider one scenario which will provide for higher distribution reliability outcomes for each NSW DNSP and two to three scenarios which will result in lower distribution reliability outcomes. We consider that this range will provide sufficient information to the NSW Government on possible options for changes to the existing outcomes. As the timeframes for the NSW workstream are relatively constrained, each alternative distribution reliability outcome will need to be considered at a reasonably high level. We are proposing to consider each alternative distribution reliability outcome in terms of the incremental costs or cost savings that may be required to achieve each outcome relative to the existing requirements. This will allow comparisons to be made between the alternative distribution reliability outcomes.

We are seeking stakeholder feedback on the possible scenarios for alternative distribution reliability outcomes that we should assess. Scenarios could be based on changes in any one of the components of the existing distribution licence conditions or changes in a combination of different components in the conditions.

The impact of changes in definitions (for example, "excluded interruptions") or a part of a component in the licence conditions (for example, a change in the SAIDI or SAIFI for one feeder type) could also be assessed. The scenarios we develop will need to be able to be applied in practice by each NSW DNSP from 1 July 2014 and DNSPs should be able to comply with any new requirements in a reasonable timeframe.

Question 5 Selection of alternative scenarios for NSW distribution reliability outcomes

a) What scenarios should be considered? What kinds of changes to the components in the existing NSW distribution licence conditions should be assessed?

4.4 Estimating the costs of meeting alternative distribution reliability outcomes

Estimating the costs of meeting each alternative distribution reliability outcome will comprise a key component of our advice. As discussed in Chapter 2, the AEMC intends to estimate the likely deliverable costs of achieving each alternative distribution reliability outcome. This will provide the NSW Government with a realistic estimate of the costs involved in meeting different reliability outcomes for each NSW DNSP.

The efficiency and prudency of any expenditure which is proposed by a NSW DNSP will be considered by the AER through the distribution determination process. Any changes to the NSW distribution reliability outcomes will be made prior to the next regulatory control period. This will allow the AER to consider the efficiency of the NSW DNSPs' proposed expenditure to meet these outcomes. The AER's distribution determination process is the most appropriate forum for the assessment of the efficient costs of network expenditure, as it provides a sufficient timeframe and level of scrutiny. The AER's assessment of the efficient level of costs is also key to its role in determining the maximum allowed revenue over the next regulatory control period for each DNSP.

In addition to the limited timeframe for the NSW workstream, there are a number of factors which may limit the accuracy of estimating the costs of achieving each alternative distribution reliability outcome. These factors include:

- **The long timeframe required for compliance with a change in distribution reliability outcomes**. A long lead time is generally required to achieve significant changes in distribution reliability outcomes. For instance, to achieve the most recent changes to the NSW distribution licence conditions in 2007, NSW DNSPs have been provided until 2014 to be reasonably compliant with the design planning criteria and until 2019 to be fully compliant.

  Estimating the likely costs of meeting a change in reliability outcomes over several years will require a number of assumptions to be made, particularly in relation to the changes in the costs of the materials and labour. Scenarios which involve more incremental changes to the existing reliability outcomes are likely to require a shorter implementation timeframe and may allow costs to be estimated with a higher degree of accuracy. In contrast, more significant changes to the existing reliability outcomes will require a longer implementation timeframe and will require more assumptions to be made, which may reduce the accuracy of our estimates.

- **Determining the allocation of costs**. Capital expenditure by DNSPs is affected by a number of different drivers, including the need to meet load growth, the replacement of aging assets, and the need to meet regulatory requirements. This may make it difficult to accurately isolate the costs associated with meeting a change in required distribution reliability outcomes. For instance, an increase in load growth may require a DNSP to undertake additional investment to maintain

compliance with the design planning criteria, as the design planning criteria specify the maximum demand that can be carried on specific network elements.

Consistent assumptions around future load growth and asset replacement under each scenario will be required to allow the effect of changes in distribution reliability outcomes to be assessed. For these reasons, each alternative distribution reliability outcome will be considered in terms of the incremental costs or cost savings required to meet each outcome to allow the possible change in costs to be compared.

Scenarios which provide for lower levels of distribution reliability may result in some cost savings for the NSW DNSPs. However cost savings may be limited and may not eventuate for a number of years due to the current and planned capital expenditure by the NSW DNSPs over the remainder of the regulatory control period to meet the existing distribution licence conditions.

As the current licence conditions require the NSW DNSPs to be reasonably compliant with the design planning criteria by 2014, it is likely that a significant proportion of the capital expenditure required to ensure compliance has already been allocated or spent by the DNSPs. Further, the long life of distribution assets, which in many cases is 30-40 years, may mean that the full impact of a reduction in distribution reliability outcomes may not be seen until these assets require replacement or augmentation to accommodate load growth. This reflects the 'lumpy' nature of distribution assets, in that the capacity of the network can only be increased in relatively large increments.

As a result, any reduction in distribution reliability outcomes is unlikely to result in any significant cost savings in the next regulatory control period. Conversely, even a small increase in required distribution reliability outcomes may require a DNSP to install additional assets, if the existing assets are close to their capacity.

4.4.1 Approach to estimating costs

In developing cost estimates, we will request each of the NSW DNSPs to provide an estimate of the incremental costs or savings of meeting each scenario for alternative distribution reliability outcomes. This information will then be reviewed by the AEMC and external consultants to assess whether the cost estimates provided represent a realistic estimate of the likely costs or savings of achieving each alternative reliability outcome. Given the time constraints of the NSW workstream, our review of the cost estimates will need to be undertaken at a reasonably high level.

Where necessary, we will request further information from the NSW DNSPs or other relevant bodies such as the AER and IPART to assist our assessment. We will assess both the capital expenditure and operational expenditure required to achieve each of the alternative reliability outcomes.

In assessing the costs or savings of achieving the alternative reliability outcomes, we propose to take into account the following factors for each NSW DNSP:

- The characteristics and risk profile of their network (for example, the density of load and future load growth and susceptibility to extreme weather events).
- Current and planned capital expenditure, and the associated operational and maintenance expenditure, that will be incurred to meet the existing distribution licence conditions for the remainder of the current regulatory control period (until 30 June 2014).
- The degree to which capital expenditure can be attributed as a direct result of the need to meet existing distribution licence conditions, as distinct from other drivers such as demand growth.
- The likely capital expenditure and operational expenditure (or cost savings) that may be required or result from the need to meet each scenario for alternative distribution reliability outcomes.
- Asset management and demand management practices that may be required or result from the need to meet each distribution reliability scenario.
- The current planning processes used, and how any changes in required distribution reliability outcomes may affect these processes.
- The scope and ability of the DNSPs to provide cost estimates for each scenario, and the time it may take them to prepare these estimates.
- The likely timeframes required to become compliant with each scenario for alternative distribution reliability outcomes.

Question 6 Estimating the costs of meeting alternative distribution reliability outcomes

a) Are any other factors likely to affect the degree of accuracy of the cost estimates? What measures could be taken to improve the accuracy of the estimates?

b) Should we consider any other factors in estimating the costs of meeting the alternative distribution reliability outcomes?

4.5 Estimating the willingness of NSW customers to pay for distribution reliability

Estimating the willingness of NSW customers to pay for distribution reliability outcomes will form another key input into our assessment of the costs and benefits of alternative distribution reliability outcomes. The objective of estimating the willingness of NSW customers to pay is to provide a measure of the benefits associated with different reliability outcomes. The price that customers are willing to pay for the

reliability of their electricity supply can also be considered in terms of the costs incurred by customers from interruptions to their power supply (that is, the value of lost load).

The willingness of customers to pay is difficult to quantify due to its subjective nature. Some customers may also have limited experience with longer supply interruptions, which may affect the accuracy of results.

The value of reliability differs with the characteristics of each customer and also with the characteristics of each interruption. Customer characteristics that may have an impact on how reliability is valued includes factors such as the type of customer, the nature of their activities, whether they have access to alternative energy sources, and their demographics (for example, income level and age), amongst other factors. For example, where customers place a high value on reliability, these customers may take additional steps to secure their own reliability such as installing back up generators.

The characteristics of an interruption that may affect the value of reliability includes the duration, frequency, timing, and location of a supply interruption. The degree to which customers are informed about the interruption prior to its occurrence will also affect the value of reliability. A number of other factors such as whether the reason for the interruption is evident to the customer (for example, poor weather) and the level of information that is provided to a customer following an outage regarding re-connection, may also affect the value placed on reliability. As any measure of the willingness to pay will represent an average of surveyed customer responses, it will not be able to fully reflect each of these factors.

4.5.1 Existing measures of willingness to pay

There are currently no NSW specific estimates of the willingness of customers to pay. However, AEMO is currently undertaking a project to assess whether a national VCR should be developed, which would involve developing state based VCRs in NSW, Queensland, Tasmania and South Australia in addition to Victoria.[28]

The only widely used estimate of willingness to pay in Australia is AEMO's estimate of the Victorian VCR, which is updated each year. The Victorian VCR is used by Victorian transmission businesses to assess whether network augmentations should proceed. It is also used by Victorian distribution businesses, as there are currently no distribution specific estimates of VCR available for Victoria. Under the probabilistic planning approach used in Victoria augmentations only proceed where the benefits of the augmentation, which includes the customer value of the reliability improvements, are greater than the cost of the augmentation. AEMO's current estimate of the Victorian VCR for each customer type and on a state wide basis is outlined below in Table 4.1.[29]

28 Further details on AEMO's development of a national VCR can be found here: http://www.aemo.com.au/planning/vcr.html

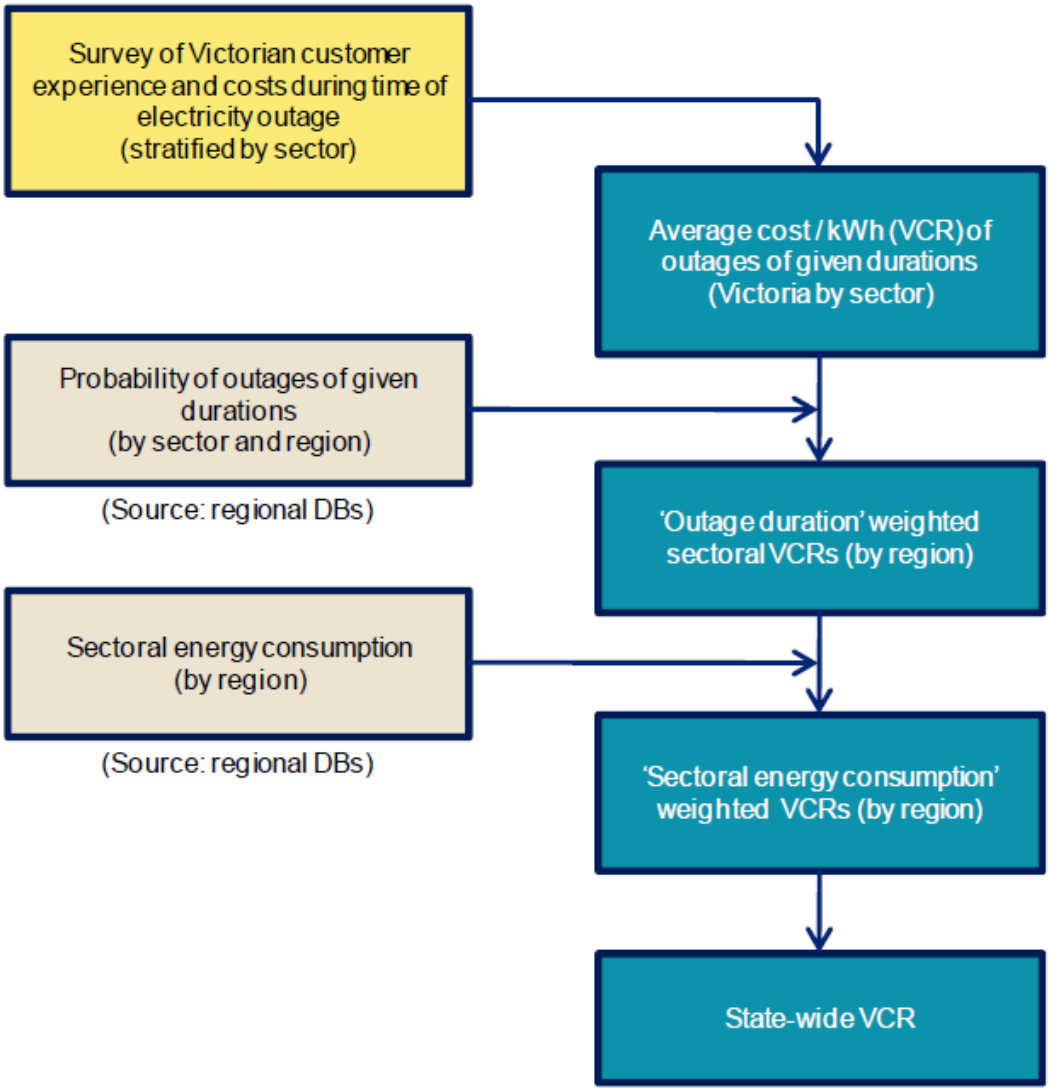
29 AEMO, *2011 Victorian Annual Planning Report*, 24 June 2011.

Table 4.1 AEMO's 2011 estimate of the Victorian VCR

Customer type	$/kWh ($2010/11)
Residential	23.80
Agricultural	130.26
Commercial	103.77
Industrial	41.24
Victorian state wide weighted average	57.88

AEMO's assessment of the Victorian VCR is based on the costs of different types of interruptions for different customer types. Four customer types are used by AEMO - agricultural, residential, industrial and commercial consumers. For residential customers, survey questions are based on the substitute goods and services that they might consume to mitigate the impacts of supply interruptions (for example, the costs of replacing the contents of fridges and freezer and going out for dinner). For the other sectors, respondents are asked for the direct costs associated with each interruption scenario (e.g. foregone sales, value of lost production etc). VCRs for each customer type are then developed by weighting the cost of each interruption against the probability of the interruption occurring based on historical outages. A state VCR is then calculated by weighting the VCRs of each customer type by their proportion of annual state consumption. Surveys are generally carried out every five years, with the Victorian VCR indexed between surveys to reflect current income growth and consumption shares. A summary of AEMO's methodology for the Victorian VCR is below in Figure 4.2.

Figure 4.2 AEMO's methodology for the calculation of the Victorian VCR



4.5.2 Approach to estimating the willingness of NSW customers to pay

In light of the previous work AEMO has undertaken to develop its methodology for the Victorian VCR, we propose to use AEMO's methodology to estimate the willingness of NSW customers to pay. This approach would reduce the time involved to develop our methodology, and may provide for more robust results than a methodology which has not been previously tested. It would also provide for consistency with AEMO's Victorian VCR and any national VCR which is developed. This would allow reliability benefits to be valued under a common approach across jurisdictions. Further, given the short timeframes for the NSW workstream, there is not sufficient time for us to develop an alternative methodology.

We welcome comments on how AEMO's Victorian VCR methodology could be adapted so that it is suitable to estimate the value of distribution reliability (as the Victorian VCR is used to measure transmission reliability) and to ensure that any specific characteristics of NSW customers are taken into account. In particular, we are interested in whether the customer types used by AEMO (that is, residential, industrial, commercial and agricultural) are appropriate for NSW or whether additional or alternative customer types would be more suitable.

AEMO's Victorian VCR is based on an average VCR across the state. We consider that it would be useful to develop specific estimates of the willingness to pay for each NSW distribution network. This will allow us to develop an assessment for each NSW DNSP which sets out the costs of meeting each alternative distribution reliability outcome against the willingness of customers to pay in that network.

4.5.3 Sampling methodology

The methodology we use will also take into account how the willingness of NSW customers to pay is likely to vary across NSW. If customer types are likely to value reliability similarly, regardless of their location or population density, a state-wide willingness to pay for each customer type could be developed. This is the approach used by AEMO for the Victorian VCR. These measures could then be weighted by the composition of customer types in each distribution network to develop a willingness to pay which is specific for each DNSP.

However, if willingness to pay is likely to vary by location or population density, customer types may be segmented further by distribution area or feeder type.

The value of customer reliability may vary by distribution area or feeder type for some customer types, and not for others. It is only appropriate to further segment customer types where variation in the value of customer reliability is likely. We also note that it may be difficult to obtain statistically significant samples for large industrial or commercial customers by distribution area or feeder type, due to small customer numbers for these customer types.

As we break the NSW community into smaller segments, a larger overall sample size that will be required to obtain statistically significant results for each customer segment. For example, segmenting the community by the three NSW distribution networks for each customer type will require a sample size three times as large than if the NSW community is only segmented by customer type if it is to be statistically significant.

Segmenting customer types by distribution networks

It would be appropriate to segment customer types by distribution networks if it is considered likely that customers between distribution networks are likely to value reliability differently but customer types within distribution networks are likely to value reliability in a similar way. For example, this approach would be appropriate if residential customers within Endeavour Energy's network have a similar value of reliability, but residential customers in Ausgrid's network value reliability differently. This may be the case if there are common factors over a geographic region, such as climate or income that cause material variations in the value of customer reliability between distribution networks.

If customer types are assessed by distribution network, statistically significant samples of customer types would be collected from each of the three distribution areas. Where there is likely to be an insufficient sample size for specific customer types within each distribution network, samples of customer types from a state wide basis could be collected.

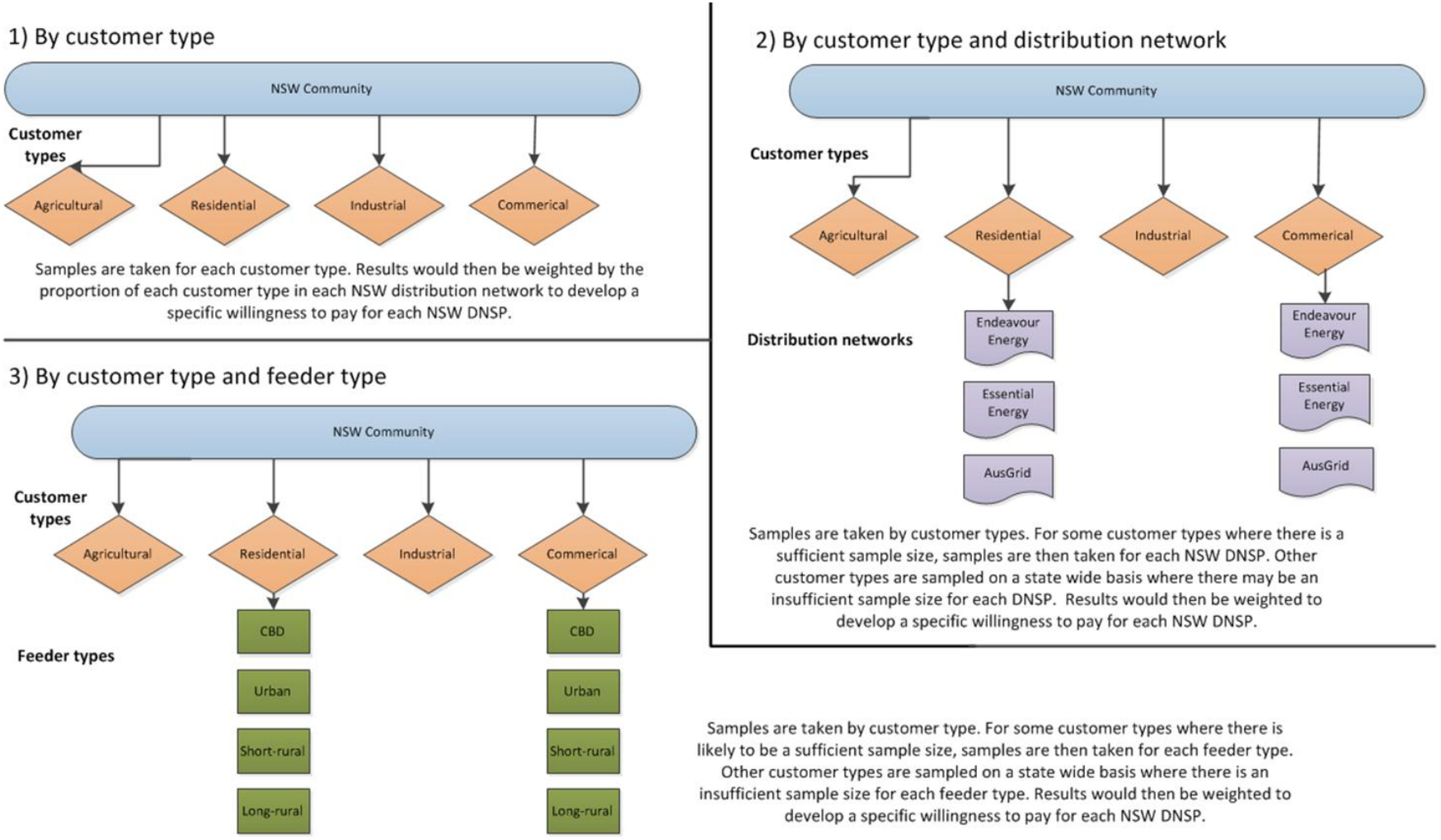
Segmenting customer types by feeder type

The feeder types reflect geographical density and include CBD, Urban, Short-rural and Long-rural categories. All three NSW DNSPs have a mixture of feeder types within their networks. Segmenting each customer type by feeder type is appropriate if the value of customer reliability is likely to be different in areas of different population density. For example, this would be appropriate if residential customers supplied by Urban feeders are likely to have a different willingness to pay than residential customers supplied by Long-rural feeders for reasons relating to income, outage history, or any other factors.

If the value of customer reliability is likely to vary within distribution networks with population density for some customer types, statistically significant samples of customer types by each feeder type could be collected. A VCR for each DNSP could then be calculated by weighting the VCRs for each customer types by feeder type with the customer composition and feeder type composition of the DNSP. An assessment of the willingness to pay by feeder type may be a more lengthy process, but would provide greater detail on the willingness of customer types to pay within each distribution network. Where there is likely to be an insufficient sample size for each customer type by feeder type, state based samples for specific customer types could be used.

Figure 4.3 below outlines possible options for sampling methodologies for the calculation of the willingness of NSW customers to pay.

Figure 4.3 Sampling methodology options



Question 7 Estimating the willingness of NSW customers to pay for distribution reliability

a) Are there any potential issues with the use of AEMO's Victorian VCR methodology in estimating the willingness of NSW customers to pay? If so, how should the Victorian VCR methodology be adapted to ensure that it reflects the characteristics of NSW customers?

b) Should additional or alternative customer types to the customer types used by AEMO (that is, residential, industrial, commercial and agricultural) be considered?

c) Should willingness to pay by customer type be further segmented by distribution area or feeder type? If so, for which customer types would this be most relevant and feasible?

4.6 Advising on the costs and benefits of alternative scenarios for NSW distribution reliability outcomes

We will bring together our advice on the cost of achieving each alternative distribution reliability outcome with a comparison of the willingness of different customer types to pay for distribution reliability. This advice will be outlined for each NSW DNSP for each alternative distribution reliability outcome considered. This will provide the NSW Government with detailed information on the costs and benefits of a range of distribution reliability outcomes which can be used to make a decision as to whether the outcomes should be changed and how the distribution licence conditions should be amended to achieve these outcomes.

The MCE has also requested we assess the impact of each alternative distribution reliability outcome on retail electricity prices, security of supply and any other factors considered relevant. We suggest that it would also be relevant to consider the implementation requirements associated with any change in NSW distribution reliability outcomes. This would take into account the time required for NSW DNSPs to comply with the change in required outcomes and any changes to planning and reporting processes that may be necessary. We would welcome stakeholder comments on any other factors which could be considered as part of our assessment.

Question 8 Cost-benefit assessment of alternative scenarios for NSW distribution reliability outcomes

a) Should we consider any other factors in our cost-benefit assessment of alternative scenarios for NSW distribution reliability outcomes?

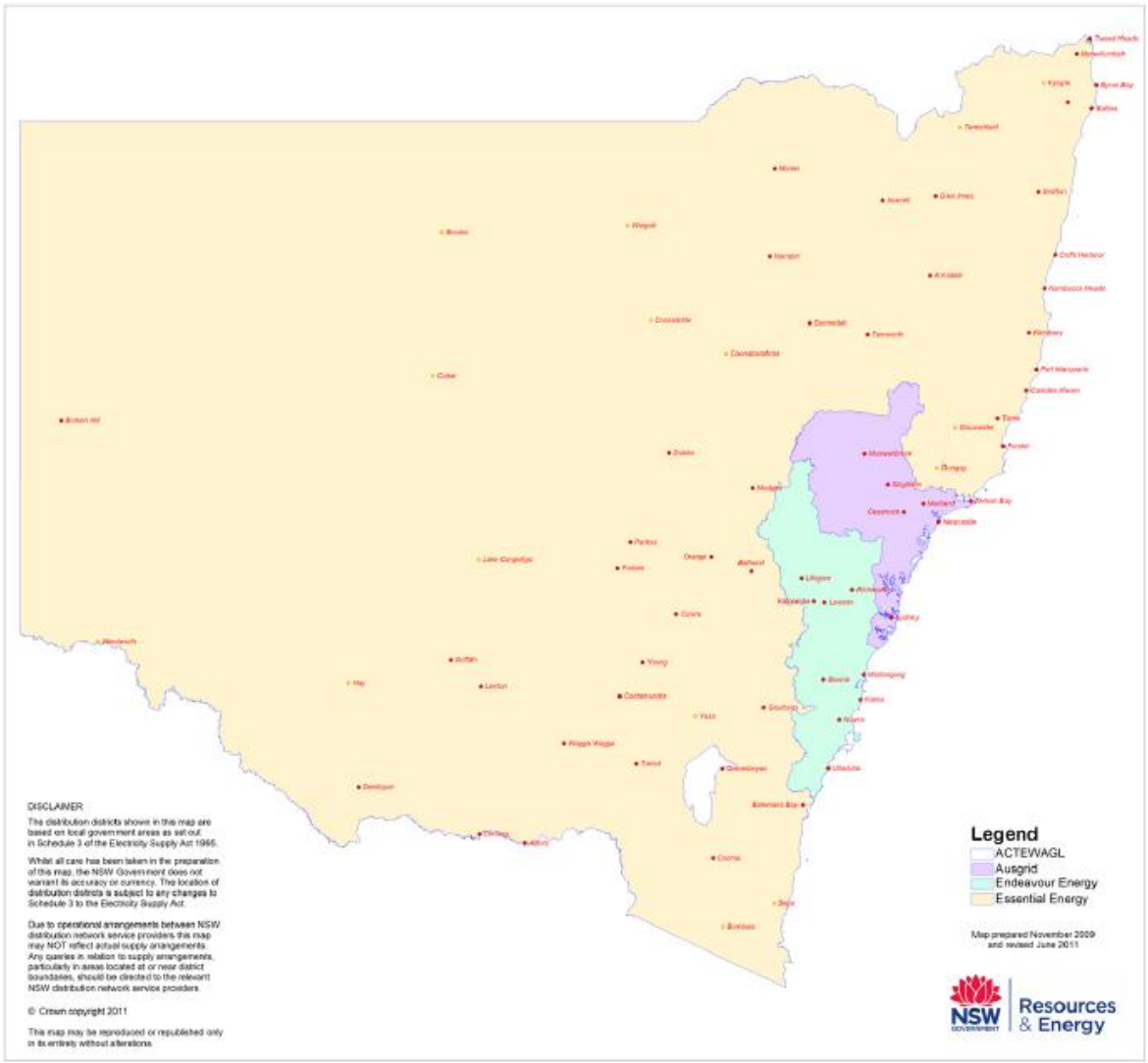
Abbreviations

AEMA	Australian Energy Market Agreement
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
GSL	guaranteed service level
MCE	Ministerial Council on Energy
MVA	mega volt amperes
NER	National Electricity Rules
RIT-D	Regulatory Investment Test for Distribution
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
STPIS	Service Target Performance Incentive Scheme
VCR	value of customer reliability

A Map of the NSW distribution networks

Figure A.1 shows the three NSW distribution networks. The ActewAGL network for the ACT that is also shown on this map is not within the scope of the review.

Figure A.1 Map of the NSW distribution networks



B Compliance with NSW design planning criteria and recent reliability performance

B.1 Compliance with NSW design planning criteria

Table B.1 shows the percentage of distribution feeders and distribution substations that are not compliant with the design planning criteria at June 2010.

Table B.1 Percentage of distribution feeders and distribution substations not compliant with the design planning criteria (June 2010)

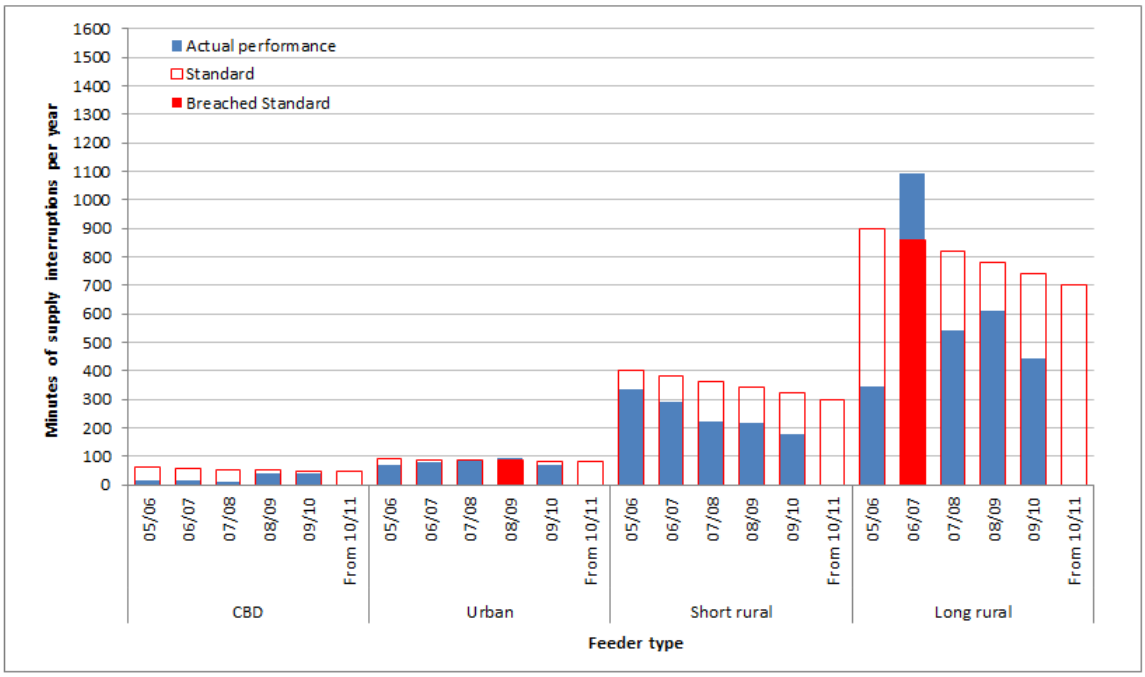
	Ausgrid (%)	Endeavour Energy (%)	Essential Energy (%)
Distribution feeders			
CBD	1.1	N/A	N/A
Urban	5.1	25.2	48.3
Non urban	8.8	0	4.9
Distribution substations			
CBD	.7	N/A	N/A
Urban and non urban	1.5	2.9	.2

Source: EnergyAustralia, *2009/10 Network Performance Report;* Endeavour Energy, *Endeavour Energy Electricity Network Performance Report 2009-2010*; Essential Energy, *Electricity Network Performance Report 2009-2010.*

B.2 Recent reliability performance

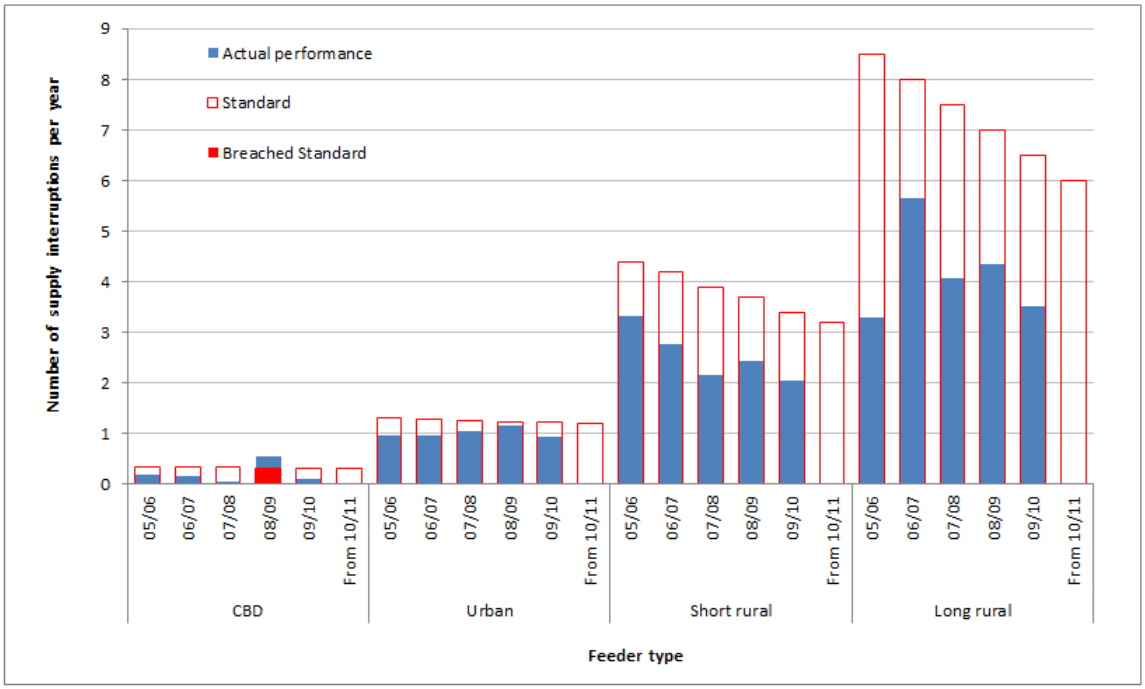
Figures B.1 to B.4 below show that reliability performance of the DNSPs has generally exceeded the reliability standards in the licence conditions. Endeavour Energy and Essential Energy have met all reliability standards since 2005/06. Ausgrid breached the long rural SAIDI standard in 06/07 and in 2008/09 it breached the urban SAIDI standard and the CBD SAIFI standard.

Figure B.1 Ausgrid - SAIDI Performance (2005/06 - 2010/11)



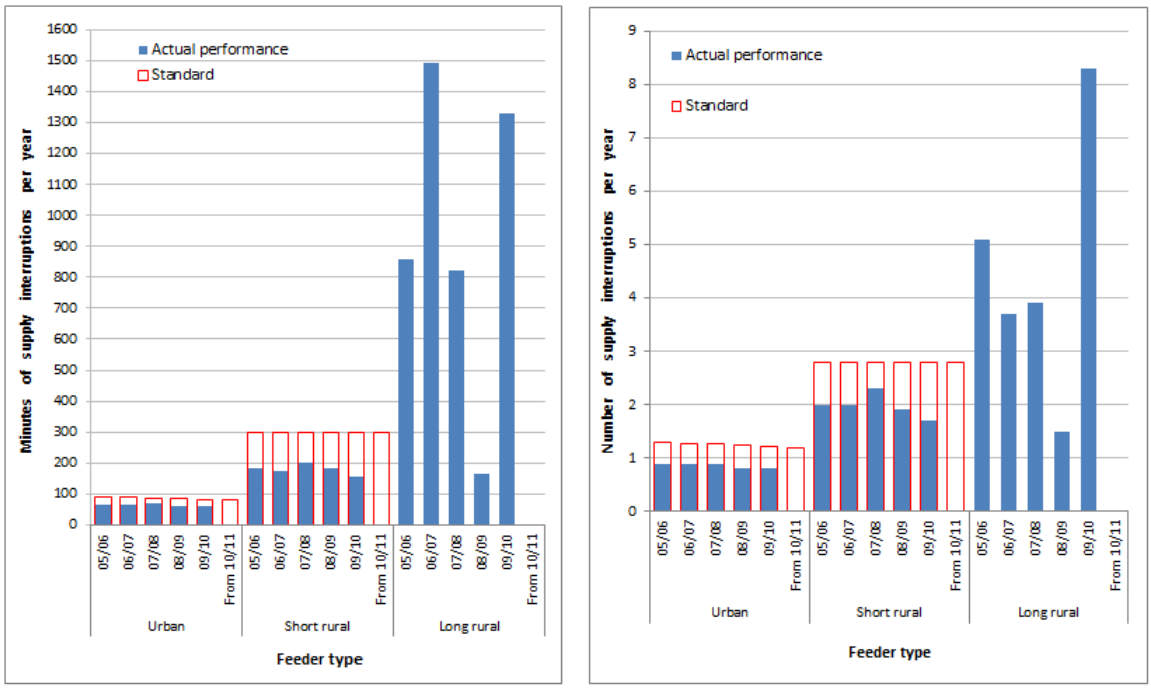
Source: EnergyAustralia, *2009/10 Network Performance Report.*

Figure B.2 Ausgrid - SAIFI Performance (2005/06 - 2010/11)



Source: EnergyAustralia, *2009/10 Network Performance Report.*

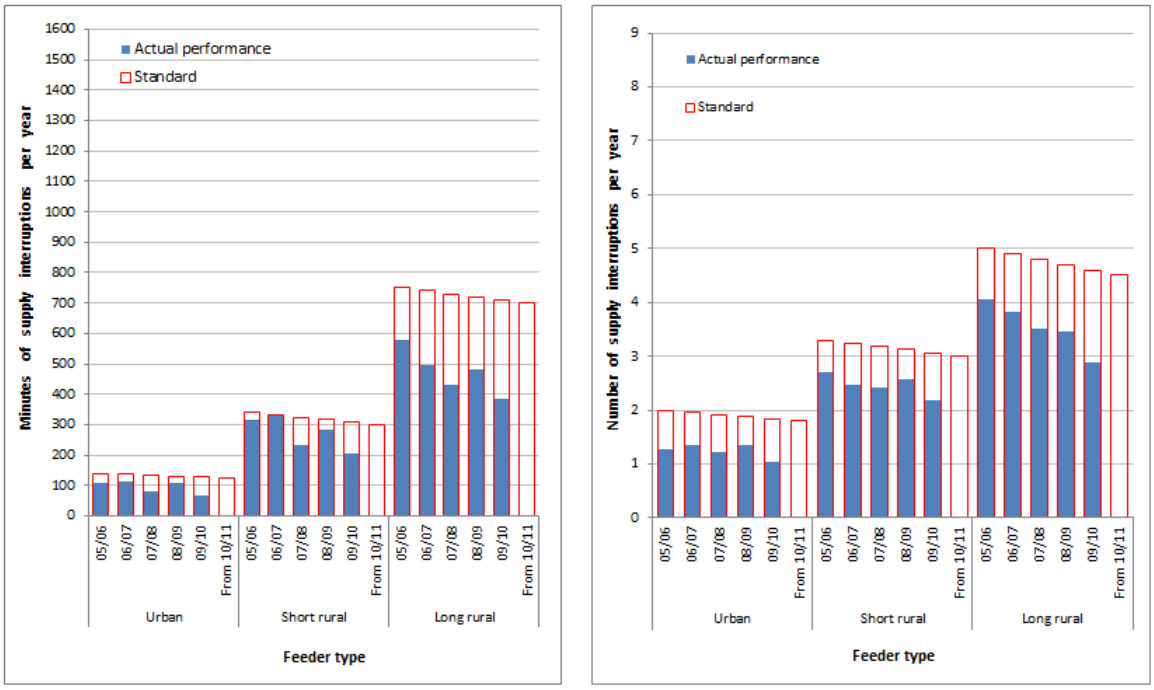
Figure B.3 Endeavour Energy - SAIDI and SAIFI Performance (2005/06 - 2010/11)



Source: Endeavour Energy, *Endeavour Energy Electricity Network Performance Report 2009-2010*.

Note: There are no reliability targets for long feeders for Endeavour Energy, because there is only one long feeder. It is subject to the schedule 2 individual feeder standards.

Figure B.4 Essential Energy - SAIDI and SAIFI Performance (2005/06 - 2010/11)



Source: Essential Energy, *Electricity Network Performance Report 2009-2010.*

C Recent and ongoing related work

C.1 *Review of National Framework for Electricity Distribution Network Planning and Expansion*

As indicated in section 1.1 the AEMC conducted a *Review of National Framework for Electricity Distribution Network Planning and Expansion* in 2009. As part of this Review, the AEMC proposed a detailed national framework for distribution network planning and expansion, including:

- DNSP Annual Planning and Reporting requirements which would replace current jurisdictional requirements for planning and reporting. National reporting requirements are proposed to include high level information on reliability performance standards and compliance against those standards.

- A Regulatory Investment Test for Distribution (RIT-D) which would replace the current Regulatory Test in the Rules. The RIT-D would require DNSPs to undertake a case by case project assessment process to identify the most economic option when considering network expansions and augmentations, subject to meeting jurisdictional reliability standards. Practically, this would mean that only incremental reliability benefits delivered in addition to jurisdictional reliability standards would require quantification. For investments that are required to meet jurisdictional reliability standards, DNSPs would be required to choose the investment option which minimises net economic costs.

The AEMC is currently considering a rule change request from the MCE in relation to these recommendations. A consultation paper for these Rule changes was released on 29 September 2011. The MCE has requested the AEMC have regard to the rule change request in conducting both the NSW and national workstreams.

C.2 *Transmission Reliability Standards Review*

The MCE's terms of reference require the AEMC to have regard to the MCE's response to the AEMC's *Transmission Reliability Standards Review* when the response is released. The AEMC's *Transmission Reliability Standards Review* was submitted to the MCE in September 2008 and contained recommendations for a national framework to promote consistency in the form of transmission reliability standards.[30] Consistency in the form of standards between the transmission and distribution networks may facilitate least-cost joint planning to deliver the appropriate level of reliability at each connection point.

30 AEMC, *Transmission Reliability Standards Review*, REL0017, http://www.aemc.gov.au/Market-Reviews/Completed/Transmission-Reliability-Standards-Review.html

C.3 Network regulation rule changes

The AER submitted a range of rule change proposals to the AEMC in September 2011, which relate to the framework for the regulation of distribution and transmission revenues under Chapters 6 and 6A of the NER. The proposed changes are not considered to have an impact on NSW distribution reliability outcomes and are also being assessed by the AEMC under a separate rule change process. Therefore these proposed changes are outside the scope of the NSW workstream.