Office of the Tasmanian Energy Regulator

Aurora Energy

Office of Energy Planning and Conservation

Joint Working Group Draft Report

Distribution Network Performance Standards

Volume I – Summary of Proposals and Overview

November 2006

Printed November 2006
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FOREWORD

Much as we all would like to have an electricity supply that never fails, the reality is that sometimes it does fail. Avoiding failures altogether would be prohibitively costly. It is however possible to limit failures, both in number and duration, through judicious design, well directed maintenance and responsive recovery processes. This report is about the development of new electricity distribution performance standards or, from an electricity user's point of view, standards for the reliability of supply.

Distribution performance standards:

- ensure reasonable levels of electricity supply reliability;
- define what the community may expect; and
- guide investment in electricity distribution infrastructure to correct those sections operating below standard.

The proposed performance standards outlined in this Draft Report have been developed by a joint working group, comprising representatives of the Office of the Tasmanian Energy Regulator, the Office of Energy Planning and Conservation within the Department of Infrastructure, Energy and Resources, and Aurora Energy Pty Ltd.

The Working Group welcomes comments on any matters raised within this Draft Report. In particular, we seek advice on the appropriateness of the application of differing performance standards to different Tasmanian communities relative to the level of their electricity consumption, the classifications and boundaries we have used to differentiate between communities, and the reliability standards we are proposing, in terms of the average number and duration of electricity supply interruptions each year.

After taking account of issues and comments raised in submissions, the Working Group will make final recommendations on performance standards for the distribution network, which will form a basis for the Regulator in costing the electricity services provided by Aurora Energy in the next Pricing Determination.

Peter Stolp

JOINT WORKING GROUP CHAIR

3 November 2006

SUMMARY OF PROPOSALS

The distribution network performance standards proposed in this report are based upon consideration of the value of electricity to Tasmanian communities. The proposed standards are based on electricity use density, which is seen as a significant indicator of the social and commercial importance of electricity to a community. The new standards make use of significant developments that have taken place in recent years in our ability to gather and make use of information about the electricity distribution network.

Grouping Customers by Communities

The performance standards proposed by the Working Group are based on grouping customers into individual communities, and classifying each community according to the nature of its electricity use.

This represents a departure from a traditional asset management approach to distribution standards, where customers are grouped according to the nature of the infrastructure that provides their supply. Currently, distribution reliability standards in Tasmania are based on categories of supply feeder, where customers are connected to feeder classified as central business district (CBD), urban or rural.

Five community categories are proposed:

- critical infrastructure, which covers a small part of the Hobart CBD encompassing most State Centres for emergency services and disaster recovery;
- high density commercial, which includes all major commercial centres;
- urban, which also includes significant regional centres;
- higher density rural; and
- lower density rural.

Two New Classifications

The standards proposed by the Working Group significantly improve upon the existing standards, and alter the way in which customers are grouped, so that communities, rather than feeders, are classified. The Working Group proposes introducing two new categories: a critical infrastructure classification, recognising that the community places a very high value on reliability and security of supply to critical areas; and a higher density rural classification, comprising around 30 000 customers previously classified as rural, and covering peri-urban development and rural activities that have a high consumption of electricity.

Expanded CBD and Urban Classifications

The Working Group has generally set standards assuming that the average performance of the distribution network is adequate, though recognising that there are some areas where reliability is poor. The proposed standards however significantly extend the coverage of the existing CBD and urban categories, so that improvements in reliability will cover these areas with an upgraded classification.

While CBD feeders are currently only defined as being in central Hobart and Launceston, the proposed standards broaden this to include high density commercial districts in Burnie, Devonport, Glenorchy, Kings Meadows, Kingston and Rosny. Similarly, the urban category has been expanded from four in Hobart, Launceston, Devonport and Burnie to now cover 32 separate communities, including significant regional centres such as New Norfolk, Queenstown and Ulverstone, which are currently classified as rural. This has increased the number of electricity users in designated urban areas by 30 per cent.

Statewide and Individual Community Standards

The proposals made by the Working Group include standards for all customers within a classification, and for each individual community within that classification. This will ensure that the needs of communities receiving poor performance are not overlooked due to averaging. The proposals include standards for the number and duration of outages, as per the current distribution reliability standards. The proposed standards for each classification are generally not more demanding than those currently operating, as the Working Group considers that the average level of reliability being delivered is appropriate. The expansion of the urban and business categories, however, will increase the number of customers who can expect higher levels of reliability, and the creation of standards for individual communities will address isolated areas of poor performance.

Minimum Reliability for Individual Customers

The Working Group proposes that the existing standards be maintained for the Guaranteed Service Level (GSL) scheme, whereby individual customers receive an $80 payment for prolonged or too frequent outages. The extension of the urban category for area standards would result in an expansion of the number of urban customers under the GSL scheme.

Customer Equity

There is a balance between the level of reliability that should be provided and levels of electricity use. Where electricity use density is high the infrastructure cost per unit of electricity delivered is low and reliability is high. As we move further away from the main electricity supply points towards areas where electricity density is low, the infrastructure cost increases and reliability reduces. Equity in treatment of different community categories is therefore achieved by balancing infrastructure cost against reliability.

A comparative index of present day capital value of infrastructure for each unit of electricity delivered is:

Community category	Capital value index
Critical infrastructure	0.3
High density commercial	0.4
Urban and regional centres	1.0
Higher density rural	3.0
Lower density rural	8.2

The table shows that it costs eight times as much to provide a unit of electricity in lower density rural areas than it does in an urban area. Since all customers on the same tariff pay the same rate irrespective of location, the reliability of supply in such areas is less than that in urban areas.

Affordable to Deliver

Aurora Energy has derived an approximate cost to deliver the proposed standards, and found that it would be within the normal bounds of annual expenditure on network reliability. An estimated capital amount of $13.3 million would be required to meet the proposed area standards, amounting to 0.02 c/kWh if annualised and spread over the entire distribution tariff base, which equates to around 0.31 per cent of current distribution tariffs, or around $2 per customer per year.

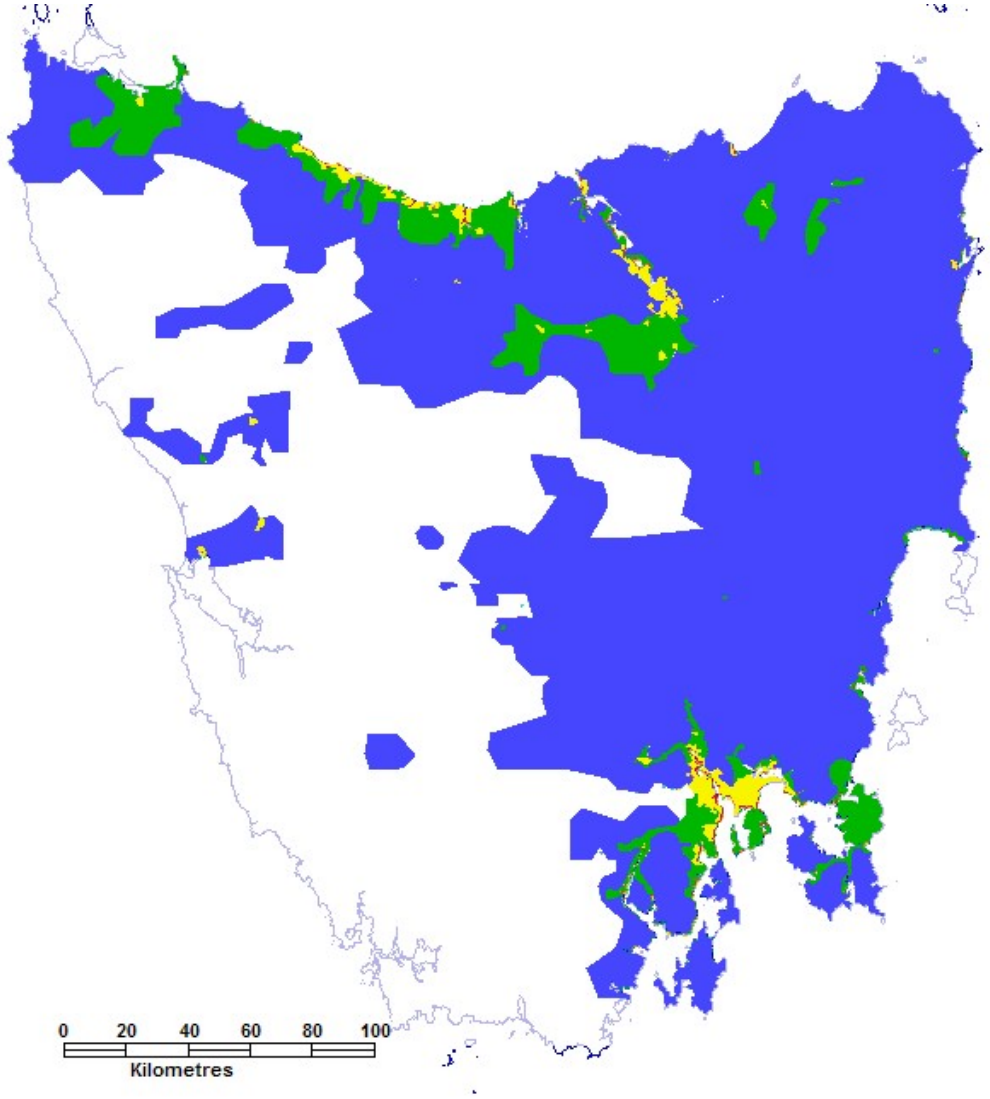
Aurora Energy have also estimated that extending the GSL urban standards to the expanded urban classification would result in an additional $165 000 of payments per year, or an increase of around 30 per cent.

Proposed Standards

The minimum performance standards proposed are:

Community category	Frequency standard (Maximum average number of supply interruptions per year)		Duration standard (Maximum total time without electricity in a year measured in minutes)	
	For the category	For each community	For the category	For each community
Critical infrastructure	0.2	0.2	30	30
High density commercial	1	2	60	120
Urban and regional centres	2	4	120	240
Higher density rural	4	6	480	600
Lower density rural	6	8	600	720

Proposed Areas



Critical Infrastructure
High Density Commercial
Urban and Regional Centres
Higher Density Rural
Lower Density Rural

Area Name	Number of Installations	Area Name	Number of Installations
Critical Infrastructure			
Hobart Critical	2 200		
High Density Commercial			
Burnie CBD	540	Kings Meadows	140
Devonport CBD	500	Kingston Commercial	130
Glenorchy Commercial	270	Launceston CBD	1 380
Hobart CBD	3 420	Rosny Commercial	520
Urban and Regional Centres			
Bridport	880	New Norfolk	2 030
Brighton	600	Perth	1 000
Burnie - Penguin	8 160	Port Sorell	2 100
Deloraine	1 230	Queenstown	1 120
Devonport	11 610	Rosebery	590
Georgetown	1 650	Scottsdale Urban	940
Hadspen	740	Sheffield	490
Hobart Urban	103 550	Smithton	1 830
Huonville	590	Somerset - Wynyard	3 710
Kingston - Blackmans Bay	8 060	Sorell	850
Latrobe	1 130	St Helens	790
Launceston Urban	38 990	Strahan	460
Lewisham - Dodges Ferry	1 520	Tamar South	2 590
Longford	1 330	Turners Beach	890
Margate - Snug	1 120	Ulverstone	4 840
Midway Point	920	Westbury	600
Higher Density Rural			
Beaconsfield - Beauty Point	1 220	Longford Rural	2 290
Bicheno	480	Meander Valley	940
Brighton Rural	740	Oatlands	320
Cambridge - Richmond	730	Penna	240
Campbell Town	480	Pirates Bay - Nubeena - Port Arthur	1 250

Area Name	Number of Installations	Area Name	Number of Installations
Coles Bay	420	Primrose Sands	720
Copping - Dunalley	510	Scottsdale Rural	580
Cradle Coast	7 650	Sidmouth - Deviot	570
Derby - Ringarooma	440	Smithton Rural	2 470
Devon Hills-Evandale	1 010	South Arm	1 820
Dilston - Windemere	240	St Marys	170
Forcett - Dodges Ferry	260	Swansea	280
Forestier Peninsula	420	Triabunna - Orford	1 260
Geeveston - Franklin	960	Wayatina	40
Granton-Magra	640	Winnaleah	120
Huon-Channel	3 300	Zeehan	450
Huonville - Cygnet	400		
Lower Density Rural			
Bothwell Rural	220	North Coast	920
Bruny Island	900	North East Rural	2 240
Burnie Rural	1 570	North West	1 760
Channel Rural	2 150	Oatlands - Buckland	1 120
Coal Valley Rural	880	Railton Rural	3 840
Cressy - Blessington Rural	1 690	Ross Rural	510
Derwent Valley Rural	2 500	Sorell - Dunalley	550
Dover Rural	720	St Helens Rural	1 890
Far North East Rural	640	Tamar East Rural	1 800
Fingal Valley Rural	680	Tamar West	2 290
George Town Industrial	10	Tasman Peninsula	670
Highlands	390	Triabunna - St Marys	850
Huon Rural	1 330	West Coast	320
Kempton Rural	880		

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VOLUME I

1 INTRODUCTION

In setting price controls for a monopoly service provider, there is a concern that the entity may reduce costs (and thus increase profits) at the expense of service quality. To prevent this behaviour, regulators may link price with service quality by, amongst other approaches, requiring average and minimum standards of service.

Aurora Energy is the monopoly provider of electricity distribution network services in mainland Tasmania and, as such, the price and standards for distribution services are regulated by the Tasmanian Energy Regulator (the Regulator). The Regulator's objectives are set out in the *Electricity Supply Industry Act 1995* (ESI Act). They include "to promote efficiency and competition in the electricity supply industry" and "to protect the interest of consumers of electricity". The Act also requires that the Regulator must not unfairly discriminate between electricity entities, customers for electricity or other persons. Under Tasmania's policy of uniform electricity distribution charges for small customers, there is an equitable balance such that urban consumers do not unduly subsidise consumers in higher cost supply areas (e.g. remote rural) to the same level of reliability. In determining network performance requirements, however, there may be broader community and social objectives that the community considers should be taken into account.

At present the ESI Act charges the Regulator with the responsibility for determining reliability standards; these are currently specified in the Tasmanian Electricity Code. It is possible, however, for the State Government to directly specify reliability requirements for the State. Alternatively, the Regulator may set performance standards through the 2007 Determination of maximum prices for electricity distribution services. In the latter case, the Regulator is bound by the specific requirements of the ESI Act in regard to his functions, powers and duties of administrative fairness. On the other hand, in setting performance regulations through legislation or regulation, the Government, while bound by the scope and purpose of the Act, may adopt a broader set of public purpose objectives.

There is uncertainty as to whether the Regulator or the Government will set the performance standards in the future. A joint Working Group comprising representatives from the office of the Regulator, the Office of Energy Planning and Conservation in the Department of Infrastructure, Energy and Resources (DIER), and Aurora Energy has consequently been established to develop a proposal for distribution reliability standards. Terms of reference for the Working Group were developed by the Regulator in consultation with the Deputy Secretary, Energy and Resources, DIER, and the General Manager, Network Division of Aurora Energy. This report constitutes the Working Group's recommendations in regard to distribution performance, or reliability, standards.

1.1 The Working Group's Approach

In developing distribution performance standards for the State, the Working Group adopted the approach that reliability standards should be appropriately matched to the nature of individual communities, their value of electricity supply reliability, and the cost to provide this level of reliability to that particular community. This represents a significant departure from previous approaches to distribution standards, which have been largely based on the nature of the distribution network, rather than the disparate communities that it serves.

In setting new standards, the Working Group was cognisant of the need to account for the changing nature of communities around the State, increasing reliance on electricity supply and ongoing investment in the distribution network. The Working Group has developed a methodology for defining communities and their reliability standards that is flexible and can accommodate change in underlying demographics in subsequent iterations of standard-setting. This has allowed the Working Group to take a longer-term view of the nature of communities, including demographic changes such as coastal urbanisation, and set standards that will be suitable until 2012, but within a broader planning vision extending to 2020.

The Working Group has consulted with local councils and regional development authorities to ensure that the described nature of individual communities is appropriate, and that anticipated changes such as significant urban or commercial developments are included so as to "future proof" the standards until 2012. The methodology developed will account for unanticipated and endogenous demographic change if applied to revised data at a later date.

1.2 Structure of the Draft Report

This Draft Report is published in two parts. The principles that have been used in designing the reliability standards, a description of the scheme proposed and an overview of the implications of its implementation, are contained in the first volume, as a non-technical stand-alone document. A description of methodological issues and the approach taken to statistical analysis, detailed descriptions of reliability regions and a breakdown of the likely cost to implement the proposed standards are included as Appendices, and published in a separate volume.

The first volume contains five sections, the first of which is this introduction. The second section of this volume describes current jurisdictional arrangements for distribution network performance standards, outlining the existing framework and commenting on experience in employing the standards.

Section three details the Working Group's proposal for a new framework for distribution network reliability standards, based on individual communities. The section includes a description of the scheme and the principles upon which it is based.

Section four presents the Working Group's recommendations in terms of reliability standards, for the frequency and duration of electricity outages on the distribution network.

The fifth section presents the Working Group's estimate of the likely cost of implementing the proposed standards; given that meeting them would require improvement in reliability and investment in the network in some areas. The Working Group estimates that Aurora Energy's annual expenditure on reliability projects would not increase.

Part two contains appendices to the Draft Report. Appendix A includes the Working Group's terms of reference, while Appendix B is a detailed description of the methodology used in determining the proposed standards. Appendix C consists of a complete list of proposed reliability regions. Appendix D contains technical definitions of reliability measures. Appendix E includes a breakdown of the estimated cost required to raise reliability in each community to meet the proposed standards. Appendix F presents a series of histograms representing the historical performance of each proposed region averaged over the last five years.

1.3 Invitation for Submissions

The Working Group has produced this Draft Report for consultation with the community before it settles its recommendations. The Working Group encourages submissions on any matters contained in this proposal.

In particular, the Working Group seeks comment on its approach and proposals in regard to:

- the classification of areas, including the differing standards of reliability being applied to differing categories relative to the cost to serve the various area types;
- the area boundaries, noting that the nature of land use and electricity consumption is constantly changing, and that the proposed standards will need to be appropriate until 2012; and
- the standards themselves, in terms of the number and duration of outages that might reasonably be endured by customers, relative to the cost to improve reliability; the Working Group's assumption that current reliability is on average acceptable, and the appropriateness of continuing the current GSL scheme.

Submissions will be published on the Regulator's website, on behalf of the joint Working Group. Any submissions, or parts of submissions, for which the author requests confidentiality, will be treated accordingly and not published. Those parts of a submission that are requested to be kept confidential should be submitted as an attachment to that part suitable for publication.

To facilitate publication on the Regulator's website, electronic submissions are preferred.

Submissions should be lodged with the Regulator by 1 December 2006, to:

office@energyregulator.tas.gov.au

or by mail to:

Office of the Tasmanian Energy Regulator

GPO Box 770 Hobart Tas 7001

2 CURRENT FRAMEWORK

2.1 Overview of Existing Performance Standards

Distribution network performance standards in Tasmania are presently set in three ways:

- for individual feeders (11kV and 22kV supply lines), by supply area categories (CBD, Urban and Other) through the Tasmanian Electricity Code (TEC);
- by Statewide averages – the 2003 Price Determination sets Statewide average reliability targets with financial penalties and bonuses for variations from the them; and
- through guaranteed service levels (GSL) where payments are made to individual customers for below-minimum customer experience of performance.

These are described separately below.

2.2 Feeder Performance Measures

2.2.1 Scheme Description

Electricity reliability is commonly measured in two ways – by the average number of interruptions a customer experiences in a year and by the average total time without supply to a customer within a year. These two measures are presented as SAIFI (system average interruption frequency index) and SAIDI (system average interruption duration index).

Section 8.6.11(a) of the TEC stipulates performance levels for feeders, classified by supply area categories. The feeder performance standards include SAIFI and SAIDI targets for the average of all feeders within a supply area category, as well as lower bounds of reliability for each category, within which 95 per cent of individual feeders in that category are expected to perform. The average and lower bound standards for each supply area category and the number of feeders in each category are given in Table 2.1. The TEC requires that a DNSP must use reasonable endeavours to meet these standards, and no incentive payments (bonuses or penalties) have been attached to these standards under the current Price Determination.

Table 2.1. TEC feeder supply area category reliability standards

Supply area category	Number of feeders (at 30 June 2006)	Average reliability		Lower bound of reliability	
		Annual number of supply interruptions	Annual total interruption duration	Annual number of supply interruptions	Annual total interruption duration
CBD	20	1	30 mins	2	60 mins
Urban	116	2	120 mins	4	240 mins
Rural	133	6	480 mins	9	720 mins

Supply area category averages are calculated as the sum of SAIFI or SAIDI for all feeders within the category, divided by the number of feeders. Consequently, the load on an individual feeder does not weight these averages.

2.2.2 Design Principles

The TEC feeder standards, based on supply area category, incorporate and apply the principle that the cost to serve is higher in less dense areas, and that these areas therefore can expect a lower level of reliability as a matter of equity.

Classifying feeders as one of CBD, urban or rural represented a meaningful approximation of the nature of the area served by the feeder, though was based on a broad average of the topography of the area supplied. The feeder standards were established such that some recognition of varying topography and associated cost to serve was provided, and were set and measured at locations on the network where it was technically feasible for Aurora Energy to collect reliable information.

Establishing both average and lower bound performance standards recognised that, while the average for feeders in a category may meet the standard, some individual feeders may be performing badly.

2.2.3 Experience and Limitations

While the TEC feeder standards provide a basic recognition of the implicit equity in reducing expectations relative to increased cost to serve, limitations have emerged in enforcing them. In the 2003 Price Investigation Final Report, the Regulator noted that:

> the Regulator is of the view that the TEC specifications are poorly targeted in that performance may vary greatly along feeders, and a reported average performance may mask areas of significant under-performance. They take no account of the variation of the customer or load density within feeder classes (which are indicators of both cost to serve and revenue per feeder kilometre) and it may be an efficient economic and equitable outcome that the performance on certain low-density feeders is less than the specified minimum. Conversely,

> minimum performance on feeders with a relatively high customer or load density may be below an economically efficient level.[1]

Experience with the scheme has consistently demonstrated that supply area category averages of feeder SAIFI and SAIDI tend to fall well within the average reliability targets, while the percentage of individual feeders not meeting the lower bound of reliability in each category is often in excess of five per cent. Further, the small number of feeders in the CBD category results in significant variation in the percentage of non-compliant feeders with only a small change in the number of feeders below the lower bound. The ascription of supply area categories to feeders also precludes differentiation of varying types of loads on a single feeder; for example a feeder classified as rural may also supply regional centres or urban fringes, as well as a significant rural load. The limitations of technology and data collection prevented a more discriminating approach being taken when the TEC standards were developed.

Averaging feeder performance by the number of feeders, rather than the total connected kVA or consumption on the feeder, also presents a weakness in the TEC standards, as noted by the Regulator in the 2003 Price Investigation Final Report. The percentage of feeders failing to meet the lower bound is not as significant as, say, the number of customers or total connected kVA failing to meet the standards.

There is an implicit assumption in the design of the TEC feeder standards that all customers connected to a single feeder will receive the same level of supply reliability. In reality, sound asset management practices can involve sectionalising feeders with reclosers, and Aurora Energy has invested significant resources in protecting the main trunk such that a fault on a spur line does not necessarily result in a trip of the whole feeder. Such an outcome, where reliability is allowed to vary at different points along a feeder, may be desirable from a network management point of view and may be economically efficient, but is not contemplated by the TEC standards.

2.3 2003 Price Determination Statewide Averages

2.3.1 Scheme Description

The most recent Price Determination in 2003 set Statewide SAIFI and SAIDI targets, together with a financial incentive scheme that rewarded Aurora Energy for bettering the targets, or penalised it for failing to meet them. The SAIFI and SAIDI targets for the five years of the Determination are shown in Table 2.2.

The Determination attached a penalty or reward of $26 000 per minute of SAIDI over or under the target, and $26 000 per hundredth SAIFI over or under the target (in $2002). Maximum penalties or rewards per annum were set at $800 000 for each

[1] OTTER, *Investigation of Prices for Electricity Distribution Services and Retail Tariffs on Mainland Tasmania – Final Report and Proposed Maximum Prices*, September 2003, p 108.

of SAIFI and SAIDI, or a combined total of around 1.25 per cent of Aurora Energy's annual aggregate revenue requirement (AARR).

Table 2.2. SAIDI and SAIFI targets established in the 2003 Price Determination

	2003	2004	2005	2006	2007
SAIFI (number of interruptions)	2.153	2.123	2.015	1.910	1.817
SAIDI (minutes)	185.0	181.0	165.5	154.0	144.4

The 12-month average SAIFI and SAIDI standards were set, and performance reported, exclusive of major events against which the Regulator considered it was not reasonable for Aurora Energy to mitigate.

2.3.2 Design Principles

The performance targets established in the 2003 Price Determination were designed to reflect significant localised performance improvements in specific, under performing areas, coupled with general improvement in other areas at a consistent level of reliable supply. The 2003 Price Investigation Final Report noted:

> The primary objective of introducing an incentive scheme to the next Determination is to see an improvement in the performance seen by all customers. Whilst an improvement in the average performance would reflect this outcome, such an improvement could be obtained with no alteration to performance experienced by customers at the extremes where the willingness to pay for improved performance is greater. Thus it is the objective of the Regulator to see an improvement in performance for the poorest performing areas leading to an overall improvement in average performance.[2]

The targets were derived by establishing a base case, 'business as usual' level of reliability of general improvement, which was then reduced by the estimated benefits of specific remedial capital projects to ameliorate known poor reliability on the 20 worst performing feeders across the state. Specific improvements in reliability performance were captured at a statewide level, as outlined in the Price Investigation Final Report:

> Improvement of performance experienced by the worst-off customers will flow through to an improvement of performance on a regional/geographic basis, by supply area category, right through to the statewide averages.[3]

The exclusion of statistically defined major events, commonly termed Major Event Days (MEDs), coupled with the removal of outages caused by other parts of the electricity system (generation and transmission) and outages requested by the customer, was designed to capture the underlying performance of the distribution

[2] OTTER, *Price Investigation – Final Report*, p 110.

[3] *Ibid.*, p 113.

network itself, and reduce the impact of statistically random events, such as major storms, on the incentive scheme.

The Price Determination standards were set as point average targets, with penalties or bonuses accruing with variation from these targets.

2.3.3 Experience and Limitations

To date, Aurora Energy has incurred a penalty for exceeding both SAIFI and SAIDI targets in every year of the Determination. The target and actual statewide average performance of the distribution network is given in Table 2.3.

Table 2.3. Target and actual statewide average SAIFI and SAIDI, 2003-06, excluding MEDs

		2003	2004	2005	2006
SAIFI (number of interruptions)	Target	2.15	2.12	2.02	1.91
	Actual	2.22	2.45	2.09	1.96
SAIDI (minutes)	Target	185	181	166	154
	Actual	193	216	170	182

The cumulative financial penalties imposed on Aurora Energy under the Price Determination over the four years to date amount to $1.35 million for SAIFI and $1.95 million for SAIDI (in $2002).

Experience has demonstrated that, while using statewide averages to capture improvements in areas of lower reliability does work, there is a high level of statistical 'noise' in this method, such that the impact of random events (eg weather events) has the potential to mask the reductions in SAIFI and SAIDI accruing from improvement projects. This is particularly the case where the magnitude of the variability in the system is similar to the magnitude of the improvements, making observation of asset-related performance improvements statistically impossible. The scheme has also shown itself to be vulnerable if errors are made in establishing baseline performance: if the baseline is set incorrectly, the use of point targets makes it highly likely that the scheme will produce an unbalanced outcome. Over time, such statistical anomalies might even out, but the relatively short period of any determination does not provide adequate time for this to occur.

Further, rolling up reliability improvements into reducing statewide performance targets diminishes the ability of the scheme to monitor and induce improvements in reliability in particular areas. Whilst the targets have been set based on an assumed pattern of reliability improvement in particular areas, the measures themselves do not reflect the reliability being delivered to these areas. It is possible that the targets could be met, but the desired improvements in areas of poor reliability are not achieved, particularly given the impact of random events (for instance, benign weather affecting most of the network could reduce the statewide average, even if specific performance improvements have not been delivered).

Whilst the design principles underpinning the calculation of statewide reliability targets may take into account differing expectations of reliability in different parts of the network, it would be desirable to make this an explicit attribute of the scheme. In reality, the design of this scheme as implemented in the 2003 Price Determination focussed on improving the 20 worst performing areas overall, and none of the projects that contributed to reducing the statewide average were intended to provide a higher level of reliability to areas of higher customer density.

2.4 Guaranteed Service Levels

2.4.1 Scheme Description

Section 8.5 of the TEC authorises the Regulator to establish a minimum level of network reliability to be provided to a customer, and requires a DNSP to comply with these standards once established. Exercising this authority, the Regulator has published a set of GSL standards, which requires Aurora Energy to make a payment of $80 to a customer, if that customer's supply is:

- not restored within 12 hours of an interruption first commencing (supply restoration payment);
- interrupted on more than nine occasions in any 12 month period, where the customer lives in an urban area (low reliability payment); or
- interrupted on more than 15 occasions in any 12 month period, where the customer lives outside an urban area (low reliability payment).

Momentary interruptions (less than one minute) and customer- and safety-initiated interruptions (by request, non-payment, unsafe installation, etc) are not included in the scheme. Further, for low reliability payments, outages preceding the outage that results in a payment are subsequently excluded; that is, when a customer receives a low reliability payment, the 'count' of outages is reset.

A DNSP may apply to the Regulator to excuse an obligation to make a GSL payment under extenuating circumstances, being an interruption arising from:

- load shedding due to a shortage in electricity generation;
- an emergency restriction notice issued by the Minister; or
- widespread events that impact on the distribution network to such an extent that, in the opinion of the Regulator, the DNSP is not able to reasonably mitigate against them.

2.4.2 Design Principles

Both the TEC feeder standards and the 2003 Price Determination targets utilise averaging of individual customers' experience of reliability, in the former case averaging all customers on each feeder, and in the latter case averaging all customers across the State. It is intrinsic in any averaging process that some individual

customers may be experiencing very poor reliability, even if the average is within defined standards.

The GSL scheme was introduced in recognition of this deficiency, and to formalise a tacit expectation that there is a minimum level of supply reliability required by customers and expected by the community.[4] The scheme is also intended to direct the DNSP's attention to areas receiving particularly poor performance, given the financial incentives established in the 2003 Price Determination operated on statewide averages as explained in the Price Investigation Final Report:

> Giving an incentive to a distributor to improve overall system performance should have a positive effect on most customers, but may not see improvements for customers receiving the worst performance. Thus, instituting a guaranteed service level (GSL) scheme for customers experiencing an inferior level of performance would ensure that the distributor focuses its efforts on poor performing areas as well as improving overall performance.[5]

The GSL payment amounts were not designed to reflect the customer value of reliability, which will vary significantly between customers, but rather to provide recognition of the impact of frequent or prolonged interruptions on customers, and encourage the DNSP to attend to recurring problems or restore supply in as expeditious a manner as possible when an outage does occur.

2.4.3 Experience and Limitations

Experience in using the GSL scheme has been generally positive, with the outcomes fitting the intended principles. The effective implementation of the scheme has required system development work for Aurora Energy, which was anticipated in the Price Investigation Final Report:

> Whilst the present system in Tasmania does not allow for such payments to be automated, it is highly desirable that this be the case and the implementation of a fully automated customer rebate system should be a priority for Aurora. On this basis, the Regulator has included provision for additional capital and operating expenditures to enable an automated system to be developed.[6]

The development of this system, as funded under the 2003 Price Determination, is progressing and will allow Aurora Energy to establish the data that links customers to the facilities that serve them. This work will be completed by mid-2007. In addition to facilitating the effective operation of the GSL scheme, this information allows for network performance monitoring based on customers, or aggregations of customers, rather than averages based on network assets, such as transformers or

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[4] OTTER, *Guaranteed Service Level Principles*, October 2003, p 3.

[5] OTTER, *Price Investigation – Final Report*, p 113.

[6] *Ibid*., p 123.

feeders. This step change in information availability has enabled the design of the distribution network performance standards proposed in this report.

3 PROPOSED FRAMEWORK

3.1 Scheme Description

The terms of reference require that the Working Group:

(1) Establish an analytical method for determining the boundaries of geographic regions that may have different performance standards from neighbouring regions. It is desirable that the same definitions of regions will be used for the individual customer performance (GSL scheme) and for use in the incentive part of the Pricing Determination.... The regions should take account of demographics; ie the number and nature of the customers, an assessment of the value of reliability to the customers, the relative size of customer loads, contribution to the State economy and strategic significance….

(2) Group the regions into a small number of categories (suggested no more than five). For example, each region could be categorised as either CBD, urban, rural or remote.

(3) Develop a set of performance measures; some suitable for groups of customers and some suitable for measuring the performance experienced by an individual customer. The measures for groups of customers should include SAIDI and SAIFI. The group should also consider whether MAIFI is appropriate to include in the performance measures.[7] Performance standards for individual customers should be expressed in terms of the number of outages per year and the duration of an individual outage (as currently defined in the GSL scheme). While the performance measures for individuals and groups will be separate, they are correlated and consistency between them is required.

(4) Develop performance targets for each category as well as a minimum acceptable performance level. The minimum acceptable performance level will be that level at which, if not met by any region in the category, the Regulator would expect immediate attention. The working group will also need to set the minimum acceptable level of performance for individual users in each category, which will be used in the GSL scheme.

As noted above, Aurora has invested in performance monitoring systems that are capable of recording reliability data at the distribution transformer level, and are in the process of mapping individual customer connections to distribution transformers, with completion of this expected in mid-2007. This forms a complete asset map of

[7] The working group is also invited to propose variations on the present 12 month rolling average for reporting SAIDI and SAIFI if the working group considers such a change has significant benefits.

the distribution network from substation to small, local groups of customers, which allows for a step change in the design of network reliability performance standards. In implementing the terms of reference and grouping customers by geographic region, the Working Group has been able to define regions and standards that are independent of the physical infrastructure of the network. This technical capability of data collection within the network, and grouping of customers by regions, defines the fundamental approach to these proposed standards.

3.1.1 Communities and Areas

In accordance with the terms of reference, the scheme proposes the establishment of a number of regions. The Working Group proposes four area categories, the boundaries of which are defined on the basis of annual electricity consumption density:

- High Density Commercial – areas of high annual consumption commensurate with the CBDs of the State's cities;
- Urban and Regional Centres – a city, town or other urban centre with annual electricity consumption at or higher than the electricity consumption density within the existing urban areas under the GSL scheme;
- Higher Density Rural – higher consumption rural areas and low-density peri-urban areas; and
- Lower Density Rural – the remaining regions of the State.

An additional category was also defined, though on the basis of its required level of network security, rather than electricity consumption:

- Critical Infrastructure – an area of concentrated critical infrastructure where a network solution for enhanced reliability is an efficient solution.

The methodology used for defining the areas and allocating each to the appropriate category is outlined in Appendix B. Recommended areas and classifications are presented in section 4 and Appendix C.

3.1.2 Reliability Standards

The scheme includes average outage frequency and outage duration standards for each area classification (classification standards), average outage frequency and outage duration standards for each individual area relative to their classification (area standards), and minimum standards (that is, upper limits on outage frequency and outage duration) that must be delivered to individual customers for the annual number and duration of interruptions.

Recommended reliability standards for each area category are presented in section 4.

The terms of reference require the Working Group to consider the inclusion of standards relating to momentary interruptions (interruptions less than one minute). After consideration, standards for momentary interruptions were not developed, however an approach to monitoring these interruptions, and building a suitable data

set on which to base standards in the future, was agreed. Momentary interruptions are detailed more fully in Appendix B.

3.2 Design Principles

To meet the terms of reference, the principles that the Working Group incorporated to develop these reliability standards were:

- that it is equitable to have different reliability standards for distinctly different types of communities;
- that like communities should receive like levels of supply reliability;
- that current average performance is generally acceptable to the community in relation to the community's willingness to pay for improved reliability, noting that there exist areas of poor performance;
- that communities receiving a level of supply reliability lower than that appropriate for the nature of that community should be individually recognised by the standards; and
- that there exists a minimum level of supply reliability that a DNSP should provide to all customers.

Each of these principles is described below.

3.2.1 Customer Equity in Reliability of Supply

The Regulator noted in the 2003 Price Investigation Final Report that:

> Costs of supply vary considerably but, in broad terms, reflect customer density with urban areas being less expensive per customer to serve than rural areas. The tradeoff for uniform tariffs is differentiated levels of reliability, with the network standards or targets in all jurisdictions setting lower levels of reliability in the higher cost non-urban areas. However, little work has been done to establish whether current standards are equitable or whether they properly reflect the cost/service mix.[8]

The Working Group examined whether the proposition that less dense areas might receive lower levels of reliability than more dense areas is in fact equitable. Its conclusions are outlined in this section.

The *Electricity Supply Industry (Price Control) Regulations 2003* include matters that the Regulator must consider in making a declared electrical service price determination. Regulation 33(d) stipulates that the Regulator must consider:

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[8] OTTER, *Price Investigation – Final Report*, p 108.

> the principle that the distribution tariff for small customers belonging to a particular class (other than the distribution tariff relating to the supply of electricity to small customers on King Island or Flinders Island) is to be uniform, regardless of where in mainland Tasmania the customer is supplied with electricity.

Consequently, all customers of a particular class pay the same tariffs to receive supply from the distribution network, regardless of their location or the cost of assets required to supply them.

However, the cost to serve customers in less dense areas of the network (either customer density or electricity consumption density) is significantly higher than the cost to serve customers in more dense areas. Further, the cost to construct or maintain the network to provide a level of reliability to low density areas is greater than the cost to provide the same level of reliability to higher density areas: as the distance from injection points increase, line lengths rise and the network becomes increasingly exposed to sources of supply interruption. As such, providing equivalent levels of reliability to urban and rural customers, where they pay the same distribution tariffs, would involve a tacit cross-subsidy between the two customer groups.

To indicate the extent of this cross-subsidy, Aurora Energy estimated the replacement cost of the distribution network for each region category, and calculated a value per average annual consumption (GWh) of the network in each category. The ratios of these costs between categories are presented in Table 3.1.

Table 3.1. Distribution network replacement cost per unit average annual consumption: relativities by region category

	High Density Commercial	Urban and Regional Centres	Higher Density Rural	Lower Density Rural
Ratio relative to Urban	0.4	1.0	3.0	8.2
Ratio relative to preceding category	1.0	2.7	3.0	2.8

Table 3.1 demonstrates that the value of the network per unit electricity sold increases by a factor of between two and three with each change in electricity consumption density category. The impact of customer contributions to new connections has only a slight impact on these relativities.

Given that Regulation 33(d) for the Price Control Regulations requires uniform distribution tariffs, the relativities shown in Table 3.1 suggest that it would be equitable for reliability standards in urban areas to be more lenient than those in high density commercial areas; for standards in higher density rural areas to be less than those in urban areas, and so on.

3.2.2 Like Communities Should Receive Like Levels of Reliability

This is also a self-evident issue of equity. Current standards recognise the distinction of CBD for Launceston and Hobart, and urban communities for Launceston, Hobart, Devonport and Burnie. The principle of equity suggests that other commercial areas, and urban areas and significant regional centres should experience similar levels of service, where the nature of electricity use is similar.

3.2.3 Current Average Performance is Acceptable

In determining the appropriate level of reliability delivered through the distribution network, the Regulator needs to balance the cost of supplying that reliability against the cost of outages that would otherwise be incurred. Where the value that the community places on improved reliability is in excess of the cost to improve reliability, there exists a case for making the requisite expenditure to improve reliability.

It is difficult to correctly establish customers' value of reliability. In the first instance, each customer will have their own value, and expenditure on reliability funded through tariffs thus becomes a cross subsidy made to those with a high value from those with a low value. Secondly, there is no consistent or dependable mechanism for broadly assessing customers' values of reliability. Aurora Energy and the Regulator are often required to rely on anecdotal evidence, benchmarking and community views to assess whether current reliability is matched appropriately to customer values.

The Department of Economic Development (DED) has recently released a report on economic drivers and constraints within Tasmania, which provides some evidence that, in general, business customers are satisfied that electricity reliability is appropriate compared to cost. In a survey of 1 323 Tasmanian business enterprises, only three per cent listed "access to reliable electricity" as a significant constraint on business investment, while 14 per cent included "energy costs" as a significant constraint.[9] On a regional basis, the report notes, "the electricity supply was considered unreliable in the North East," with ten per cent of respondents in that region including this as a significant constraint on investment. This was not a sufficiently high response to classify electricity reliability as a top-five constraint within the region, and the survey was conducted soon after a significant weather-related outage had occurred. In South Eastern Tasmania, 14 per cent of respondents, and 23 per cent of small businesses, included energy costs as a significant constraint on investment.[10]

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[9] Department of Economic Development, *Regional Economic Development and Investment Plans – Report*, June 2006, p 38.

[10] *Ibid*., pp 3, 47, 82.

In the residential sector, the Regulator and Aurora Energy are more reliant on anecdotal evidence, but recent experience of customer complaints does not indicate significant dissatisfaction with reliability levels relative to willingness to pay.

Based on this assessment, the Working Group considered it appropriate that current average reliability be used to establish standards, and that regions receiving consistently lower performance than average should represent the primary focus of Aurora Energy's reliability work, and hence the objective of the proposed standards.

3.2.4 Communities Receiving Low Reliability of Supply

Under the existing performance standards, improvements to the network targeted at communities receiving inadequate power supply reliability are implicitly required of Aurora Energy both through its behaviour as a responsible network service provider, and to reduce the average performance measures to meet the various targets in the standards. While this expectation is implicit within the current standards, and as outlined above is a fundamental design principle of the targets set in the 2003 Price Determination, the Working Group considers that the new standards should explicitly recognise areas of historically poor performance and oblige a DNSP to address the issues causing poor supply reliability.[11] This principle will make Aurora Energy's behaviour as driven by the reliability standards more transparent to consumers, as well as better enabling the community to understand the standards as applied to it.

As noted above, the reliability performance targets established in the 2003 Price Determination were derived based on a principle of reducing the statewide averages of SAIFI and SAIDI by improving the reliability of the 20 worst-performing feeders in the network. While this approach did recognise the need to redress poor performing areas of the network, this was not an explicit feature of the standards themselves, and it inherently precluded assessing reliability relative to varying customer expectations. By identifying the 20 worst performing feeders based on absolute performance, the reliability of supply relative to reasonable expectations of appropriate reliability for specific communities (which may vary from community to community) was discounted.

The identification of regions and grouping of individual communities into categories allows for standards to recognise variability in reasonable expectation of reliability standards. This approach allows not only for the identification of areas that are receiving poor performance compared to the rest of the State, but also assesses performance relative to similar areas of the State. As such, reliability improvements can be targeted at areas where performance is not simply poor in an absolute sense, but where the level of reliability is inappropriately low relative to the nature of the community.

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[11] The Working Group notes that analysis conducted through setting these new standards demonstrates that Aurora Energy's reliability improvement program, as approved by the Regulator in the 2003 Price Determination, has in fact been well targeted at improving reliability in the worst performing areas, and the change in focus to explicitly recognise areas receiving poor reliability is not intended to suggest that work to date has failed to acknowledge or address these issues.

3.2.5 Minimum Levels of Supply Reliability

The Working Group reiterated the view that any standards that involve averaging customer experience of reliability leaves open the possibility that some individual customers may be experiencing very poor reliability even if standards are being met. This observation underpins the existing GSL scheme, and it was considered appropriate that the principle of minimum individual customer reliability standards be maintained. The justification for inclusion of minimum standards for supply reliability is the same as that applied to the GSL scheme that currently operates, as outlined in section 2.

3.3 Interstate Comparisons

It is common practice for jurisdictions and jurisdictional regulators around Australia to compare the reliability of supply provided by DNSPs. In doing so, common classifications for reliability areas have been defined, generally based on the load density of feeders.

The Working Group draws attention to the fact that the standards here proposed would not be comparable with other jurisdictions on this common basis. The definitions established for High Density Commercial and Urban and Regional Centres areas have a far broader basis than the CDB and Urban classifications used for national data comparison.

The Working Group considers that, in delivering the outcomes desired of reliability standards, this proposal is preferable to classifications used for common reliability reporting between jurisdictions. The Working Group emphasises that the proposed standards are not suitable for the purpose of interstate comparisons. To maintain a common basis for inter-jurisdictional comparisons, the Regulator may consider requiring ongoing reporting against agreed national measures.

4 PROPOSED STANDARDS

4.1 Performance Standards

The Working Group proposes that reliability standards for the distribution network be established as outlined below, for the defined area categories. The methodology used to derive these targets is given in Appendix B.

4.1.1 Average Annual Number of Interruptions

The working group proposes average classification and individual community performance standards for the average annual number of interruptions as outlined in Table 4.1. The Group proposes that the annual average number of outages for the whole of the distribution network in each category should be less than the standard in column A, and the distribution network annual number of outages of each individual community should be less than its relevant classification standard in column B. Derivations of these targets are provided in Appendix B.

Table 4.1. Proposed distribution network annual outage standards

Category	Classification standard (number of interruptions) (A)	Area standard (number of interruptions) (B)
Critical Infrastructure	0.2	0.2
High Density Commercial	1	2
Urban and Regional Centres	2	4
Higher Density Rural	4	6
Lower Density Rural	6	8

4.1.2 Average Annual Duration of Interruptions

The working group proposes average classification and individual community performance standards for the average annual duration of interruptions as outlined in Table 4.2. The Group proposes that the annual average cumulative outage duration for the whole of the distribution network in each category should be less than the standard in column C, and the distribution network annual cumulative outage duration for each individual community should be less than its relevant category standard in column D. Derivations of the targets are provided in Appendix B.

Table 4.2. Proposed distribution network annual duration standards

Category	Outage duration classification standard (mins) (C)	Outage duration area standard (mins) (D)
Critical Infrastructure	30	30
High Density Commercial	60	120
Urban and Regional Centres	120	240
Higher Density Rural	480	600
Lower Density Rural	600	720

4.1.3 Minimum Supply Reliability for Individual Customers

The Working Group proposes that the existing standards in terms of the Guaranteed Service Level (GSL) scheme be maintained, given that this scheme is widely supported. The Working Group proposes that the existing standards for the Urban GSL classification be applied to the new categories of Critical Infrastructure, High Density Commercial and Urban, and that the existing standards for the Rural GSL classification be applied to the new Higher Density Rural and Lower Density Rural categories. The existing GSL standards are outlined in section 2 and are repeated in Box 4.1 for completeness.

Box 4.1. Proposed Guaranteed Service Level standards

Supply restoration payments and low reliability payments

A Distributor must make a supply restoration payment of $80.00 to each Customer for each interruption in the supply of electricity to the Customer's electrical installation supply address that is not restored within 12 hours of the interruption first commencing.

A Distributor must make a low reliability payment of $80.00 to:

- any Customer who is supplied electricity in an urban and regional centres, high density commercial or critical infrastructure area and who experiences more than 9 interruptions; and
- any other Customer who experiences more than 15 interruptions;

in supply to the Customer's electrical installation supply address in any 12 month period excluding outages preceding and including the outage that leads to a payment under this clause.

The Working Group proposes that the existing exemptions be maintained, such that momentary interruptions (less than one minute) and customer- and safety-initiated interruptions (by request, non-payment, unsafe installation, etc) are not included in

the scheme. The Working Group also proposes that the current provision whereby a DNSP may apply to the Regulator to excuse an obligation to make a GSL payment under extenuating circumstances (eg severe weather events) be maintained.

4.2 Areas

The methodology outlined in Appendix B produced 102 discrete communities, or areas. An overview of the categories and areas is presented in Table 4.3, with details outlined below. A full list of proposed communities is included in Appendix C. Details of the historical reliability performance of each category and area are given in Appendix F.

Detailed maps of these regions are available from the Regulator's website at www.energyregulator.tas.gov.au.

Table 4.3. Summary of proposed reliability categories

Category	Number of regions	Number of installations	Proportion of installations (%)	Proportion of consumption (%)
Critical Infrastructure	1	2 200	0.8	5.8
High Density Commercial	8	6 900	2.7	6.8
Urban and Regional Centres	32	188 800	72.7	69.3
Higher Density Rural	33	30 600	11.8	10.9
Lower Density Rural	27	31 100	12.0	7.2

4.2.1 Critical Infrastructure

The Critical Infrastructure area is defined as that area of the Hobart CBD containing emergency services in Melville Street, Royal Hobart Hospital, ABC Centre, Executive Government Buildings, State Parliament, Telstra Mobile Exchange, Hydro Tasmania's Head Office and Aurora Energy's 24 Hour Fault and Operations Centre.

This area's recent experience of reliability is around the same as the proposed standards. The Working Group considers that this is acceptable.

4.2.2 High Density Commercial

Eight High Density Commercial areas were defined, in Hobart, Launceston, Burnie, Devonport, Rosny, Glenorchy, King's Meadows and Kingston. This significantly expands the two areas in Hobart and Launceston included in the TEC 'CBD' reliability framework.

These eight areas have an average annual electricity consumption of 314 GWh, or slightly less than 40 GWh each. This represents around 6.8 per cent of total consumption, while the 6 900 installations within the category accounts for only 2.7 per cent of installations within the State.

The Kingston and Kings Meadows commercial areas exhibit fundamentally different properties to the other High Density Commercial areas. Their annual consumption (4 GWh and 8 GWh respectively) are significantly less than the other High Density Commercial areas, and the nature of the network in these regions remains fundamentally suburban. The Working Group considered changing these regions to an Urban and Regional Centres classification, as their consumption sits between typical Urban and Regional Centres and High Density Commercial. However, the Working Group concluded that owing to the growth nature of both areas, and the reliance of surrounding communities on these areas, a High Density Commercial classification was appropriate.

Assessing the last five years' reliability data against the proposed standards indicates that Devonport, Kingston and Kings Meadows would be non-compliant. Aurora Energy has submitted an indicative capital work plan that would improve reliability in these areas to meet the standards. Aurora Energy has also submitted that reliability in Kingston would be improved to within the proposed standards if capacity were upgraded.

4.2.3 Urban and Regional Centres

The methodology produced 32 urban and significant regional areas, dispersed throughout the State. Covering around 188 800 installations, this category encompasses over 70 per cent of installations and accounts for almost 70 per cent of annual electricity consumption.[12]

Under the current distribution performance standards classifications, only customers in Hobart and Launceston can be classed as urban. The proposal expands this definition to include significant regional centres, as outlined in Appendix C.

Aurora Energy advises that 14 areas would require network improvement to meet the proposed standards, as outlined in Appendix E.

4.2.4 Higher Density Rural

The Working Group proposes the establishment of 33 Higher Density Rural areas, accounting for around 12 per cent of installations and electricity consumption. This category covers in excess of 30 600 installations, all of whom are classified as rural customers under the existing reliability standards.

Assessed against the last five years' reliability, eight Higher Density Rural areas would require network improvement to meet the proposed standards, as outlined in Appendix E.

[12] Setting aside large industrial consumption, as outlined in Appendix B.

4.2.5 Lower Density Rural

Slightly more than 31 000 installations would be classified as Lower Density Rural under these proposed standards, grouped into 27 areas. This represents 12 per cent of installations, and accounts for only seven per cent of total electricity consumption.

Under the proposed standards, four areas would be non-compliant based on historical reliability.

5 RELIABILITY UPGRADE COSTS

5.1 Indicative Costs to Upgrade Supply Reliability

Aurora Energy has estimated the likely expenditure required for it to deliver the proposed reliability standards, both in terms of the capital projects necessary to upgrade the network to meet the minimum SAIFI and SAIDI standards, and the likely increase in GSL payments arising from an increase in urban customers.

5.1.1 Capital Costs

A DNSP outlays expenditure on capital projects for a number of reasons, including upgrading the capacity of the network to provide for customer growth, and to provide a more secure or reliable supply to customers. Frequently these objectives overlap: for example a project primarily driven by the need to provide greater capacity, such as a new injection point from the transmission system, might also provide better reliability to existing customers. It is not a straightforward matter to assess the cost that is likely to be incurred by Aurora Energy to upgrade the network to meet proposed reliability standards, as reliability might be improved in consequence of other projects, or targeted reliability improvements might not represent the most efficient investment in the network, if capacity work will be required in the near future.

In assessing the likely cost to upgrade the network to meet the proposed standards, Aurora Energy has estimated the incremental cost of applying common distribution network reliability solutions. Where major projects might be required for other purposes that will have a consequential impact on reliability, such as subtransmission lines or new substations, these costs have not been included within this analysis. The cost included here are the incremental costs of ensuring reliability meets the proposed standards.

Aurora Energy estimates that slightly under $13.3 million would be required for capital projects to meet the proposed reliability standards. This represents a level of expenditure roughly in accord with historical levels for this category of work. Annualised and spread over the entire distribution network customer base, this level of expenditure amounts to around 0.31 per cent of average distribution tariffs, or about $2 per customer per annum.

An indicative list of capital projects required to bring individual area reliability within the proposed standards is given in Appendix E.

5.1.2 Guaranteed Service Levels

Aurora Energy completed a simulation of the number and cost of GSL payments that would be made with the proposed GSL classifications, using customer reliability data available since the GSL scheme was introduced on 1 July 2003. Assuming a similar level of network reliability to that since the introduction of the GSL scheme, the simulation predicted that under the expanded urban classification there would have been an additional $165 000 in GSL payments (or slightly more than 2 000 payments) per year. This represents a 31 per cent increase in the estimated liability of the scheme when compared to the $532 000 actually expended per year to date.