Country Energy's Submission to the

Independent Pricing and Regulatory Tribunal:

Pass Through Application

For New Licence Conditions

December 2005

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Executive Summary

The Minister for Energy and Utilities introduced the new licence condition '*Design, Reliability and Performance Licence Conditions Imposed on Distribution Network Service Providers'* on 1 August 2005. The imposition of these conditions has triggered a general cost pass through event (clause 14) and specific cost pass through (clause 15) event under the Independent Pricing and Regulatory Tribunal's (the Tribunal's) '*NSW Electricity Distribution Pricing 2004/05 to 2008/09 Final Determination*' (the Determination).

The implementation of the new licence condition will increase maintenance and capital expenditure requirements. A key issue for the Tribunal is to establish an appropriate incremental expenditure allowance to ensure that Country Energy has sufficient revenues to fully meet these new obligations. While the new licence conditions stipulate that a review of the new performance conditions will be undertaken within two years, Country Energy will be required to adhere to the new requirements during this period.

Section 1 to 5 of this submission provides supporting information on the scope of asset management programs to be implemented by Country Energy and the incremental levels of expenditure in each category over the remainder of the current regulatory period that underpin the key assumptions, key drivers, and the relationship between the new licence condition standards for reliability performance, design planning criteria and the current performance of the network. These sections provide the information necessary for the tribunal to assess Country Energy's application under a general cost pass through event in accordance with clause 14 of the Determination.

Section 6 of this submission provides supporting information relating to the introduction and continued operation of customer service standards (CSS). The CSS must be met by distributors in providing distribution network services to customers. The purpose of the CSS is to provide financial recognition to customers who experience poor supply reliability from their distributor. Section 6 provides supporting information necessary for the tribunal to assess Country Energy's application under a specific cost pass through event in accordance with clause 15 of the Determination.

Required incremental full compliance works program

Rural feeder reliability remediation program

The overhead distribution network is the prime means of distributing power to customer premises. However, a significant proportion of interruptions to supply are attributed to the overhead distribution network, which is generally arranged radially with no backup. When the network was first installed, the primary objective was to provide electricity. Reliability was a secondary consideration. The cost of improving reliability in the rural distribution network by providing redundancy is generally cost prohibitive.

To fully comply with the new licence conditions, Country Energy has developed a number of initiatives that will be implemented as part of a comprehensive feeder remediation program designed to improve the reliability performance of 100 unsatisfactory rural feeders each year for the remainder of the current regulatory

period. A compliant program will require the implementation of the following incremental initiatives:

1. Advancing the replacement of bare overhead conductor on backbone lines;
2. Implementing a more extensive new and replacement program for automatic reclosers and sectionalisers;
3. Reviewing the coordination of feeder protection devices;
4. Implementing a more rigorous vegetation control program;
5. Implementing an annual helicopter inspection of all poor performing distribution lines and radial subtransmission lines;
6. More extensive application of live line pole top inspection and maintenance work on rural backbone lines;

And where economic and technically feasible;

7. Reinforcing tie capacity in rural networks to improve flexibility of supply due to load transfer restrictions; and
8. Installing new small zone substations where existing subtransmission supply is available.

The first six initiatives will be required to varying degrees as a package of works on all 100 feeders selected each year. The remaining two initiatives will be implemented generally in combination with the one or all of the other initiatives where feasible. This combination of reliability improvement initiatives will reduce the number and duration of interruptions, and number of customers affected following an interruption.

The remediation program can be achieved at an average cost of around $1.23 million per feeder. The total incremental real cost of implementing these strategies is $79.5 million per annum in capital expenditure and $43.5 million per annum in operating expenditure.

Subtransmission line and high voltage distribution reinforcement program

Country Energy complies with the requirements of the new network planning criteria for zone substations, distribution feeders in urban centres with populations less than 15,000 and in non-urban areas, and distribution substations in urban and non-urban areas. However for some subtransmission circuits and for some urban distribution feeders located in 19 regional centres with populations greater than 15,000, Country Energy does not currently comply.

An incremental network reinforcement works program involving specific projects has been developed to remedy this situation in the medium term. The individual projects aim to provide sufficient capabilities for an applicable N-1 contingency scenario.

Country Energy presently has $90 million of subtransmission reinforcement capital works that were not included in the 2004 Determination that will need to be completed to be compliant with the new requirements by 1 July 2009.

The distribution capital program submitted by Country Energy to the 2004 total cost review did not envisage the specific construction of new assets or the augmentation of existing assets in order to provide N-1 capability within major urban distribution networks. On the basis of full compliance, the required reinforcement program for urban distribution feeders will involve:

- Construction of new or the capacity uprating of existing urban distribution feeders directly out of existing zone substations;
- Extension of existing urban distribution feeders to provide interconnection with other urban feeders of sufficient capacity to create a meshed network; and
- Extension and capacity uprating of existing urban feeders through reconductoring to provide sufficient transfer capacity in order to provide alternative supply and interconnection to existing radial urban feeders.

The total incremental cost of the urban distribution network reinforcement program is estimated to be $62.5 million.

Incremental investment for full compliance works program

Country Energy has tabled below the investment programs and the level of capital and maintenance expenditure that will be required for the remainder of the current regulatory period to 2009 based on its compliance assessment of the new licence conditions. The proposed expenditures would need to be reviewed in light of Country Energy's new licence obligations.

$ million (real 2005-06)	2006-07	2007-08	2008-09
Incremental capital expenditure			
Subtransmission lines N-1	30.0	30.0	30.0
Distribution feeders N-1	20.8	20.8	20.8
Under performing rural distribution feeders	79.5	79.5	79.5
Replace bare conductor	*52.5*	*52.5*	*52.5*
New and replacement reclosers and sectionalisers	*19.0*	*19.0*	*19.0*
Installation of new rural zone substation	*5.0*	*5.0*	*5.0*
Installation of interconnection to other feeders	*3.0*	*3.0*	*3.0*
Total incremental capital expenditure	130.3	130.3	130.3
Incremental operating expenditure			
Under performing rural distribution feeders	43.5	43.5	43.5
Enhanced vegetation management	*34.5*	*34.5*	*34.5*
Live line pole top maintenance	*6.9*	*6.9*	*6.9*
Annual helicopter aerial inspection	*2.1*	*2.1*	*2.1*
Total incremental operating expenditure	43.5	43.5	43.5
Total incremental expenditure	173.8	173.8	173.8

Country Energy forecast of incremental expenditure 2006-07 to 2008-09 for a full compliance works program

Full compliance can be achieved at an incremental real cost of $130.3 million per annum in capital expenditure and $43.5 million per annum in operating expenditure. The total incremental real cost for the remaining three years of the current regulatory period is estimated to be $521.4 million.

We believe the required incremental expenditure for full compliance is representative of an efficient level of expenditure as detailed in this submission, and it can be expected to deliver the benefits suggested.

It represents additional costs to Country Energy that were not allowed for in the 2004 electricity network determination. Country Energy prepared its submission to the 2004 review on the basis that the existing levels of supply reliability would be

maintained to the end of the current regulatory period. An enhanced service offering was not offered.

Phased works program

Country Energy has developed an incremental phased program of works, subject to changes of emphasis in the licence conditions. The works program is matched to current anticipated availability of resources and prioritises the implementation of key initiatives that are expected to provide the greatest gains in terms of improvements in reliability and security of supply to 2009.

During the period to 2009, it will be our objective to continue to recruit and build an adequate resource base to complete the required works.

Rural feeder reliability remediation program

To match available resources, Country Energy would downsize its proposed incremental work programs for the bare overhead conductor replacement and vegetation control initiatives. Country Energy would fully implement all of the other rural feeder remediation initiatives as described in this submission. This phased program would be achieved through a mix of internal and external resources.

Subtransmission line and high voltage distribution reinforcement program

Subtransmission line capital works often involve long lead times due to environmental and community concerns. The phased works program takes into account the expected delays in procuring easements. It is expected that 75% of the required subtransmission line work will be completed to 2009 at an additional cost of $60 million or $20 million per annum. A 'turn-key' approach will be adopted. This program of work was rejected by Wilson Cook & Co., during the recent 2004 total cost review, even though the expenditure forecasts were aligned with capabilities to complete the necessary works as they are now. The phased works program takes into account the expectation that Country Energy's current apprenticeship recruitment program will provide an adequate resource base in the future to enable Country Energy to complete the required urban distribution network reinforcement works for all regional centres with populations greater than 15,000.

Incremental investment for a phased works program

Country Energy has tabled below the incremental real capital and maintenance expenditure for a phased program of works, subject to changes of emphasis in the licence conditions.

$ million (real 2005-06)	2006-07	2007-08	2008-09
Incremental capital expenditure			
Subtransmission lines N-1	20.0	20.0	20.0
Distribution feeders N-1	0.0	0.0	0.0
Under performing rural distribution feeders	44.5	44.5	44.5
Replace bare conductor	*17.5*	*17.5*	*17.5*
New and replacement reclosers and sectionalisers	*19.0*	*19.0*	*19.0*
Installation of new rural zone substation	*5.0*	*5.0*	*5.0*
Installation of interconnection to other feeders	*3.0*	*3.0*	*3.0*
Total incremental capital expenditure	64.5	64.5	64.5
Incremental operating expenditure			
Under performing rural distribution feeders	33.0	33.0	33.0
Enhanced vegetation management	*24.0*	*24.0*	*24.0*
Live line pole top maintenance	*6.9*	*6.9*	*6.9*
Annual helicopter aerial inspection	*2.1*	*2.1*	*2.1*
Total incremental operating expenditure	33.0	33.0	33.0
Total incremental expenditure	97.5	97.5	97.5

Country Energy forecast of incremental expenditure 2006-07 to 2008-09 for a phased works program

A phased works program can be implemented at an incremental real cost of $64.5 million per annum in capital expenditure and $33.0 million per annum in operating expenditure. The total incremental real cost for the remaining three years of the regulatory period is estimated to be $292.5 million. It represents additional costs to Country Energy that were not allowed for in the 2004 electricity network determination.

Country Energy is confident that it can complete the phased works program as it is soundly based from a resource capability perspective. The implementation of this program is expected to deliver general improvements in the reliability and security of supply during the remainder of the current regulatory period.

Further consultation

Country Energy is currently discussing with the Department of Energy, Utilities and Sustainability (DEUS) the full compliance works program and its position in relation to the availability and recruitment of resources to implement the required works program. During recent discussions with DEUS, Country Energy has proposed a change in the required timeframe for compliance extending the period to 2014.

Country Energy understands that the Tribunal will be using an engineering consultant to establish a business by business expenditure allowance. Country Energy looks forward to working with the Secretariat and the Tribunal's adviser.

1. Introduction

1.1 Country Energy's electricity distribution network

Country Energy owns and operates a distribution network serving regional and rural New South Wales. The network consists of 132,000 volt and 66,000 volt subtransmission lines that take electricity from the transmission network owned by TransGrid and Powerlink to zone substations. At the zone substations, electricity is transformed down to 22,000 volt or 11,000 volt. Electricity is then distributed from the zone substations to customers by means of high voltage distribution feeders to a point close to the customer premise where a distribution transformer then reduces the voltage down to 240 or 415 volts. Electricity is distributed to customers at this lower voltage.

The approach adopted by Country Energy for the planning and design of its network is consistent with good industry practice.

In medium to heavily populated areas, the subtransmission lines supplying zone substation are generally connected in a ring configuration so that supply will not be interrupted by a single line outage. For smaller population centres, a radial subtransmission line is typical.

The high voltage and low voltage distribution feeders are usually constructed as open wire overhead lines. An underground system is one way to achieve major reductions in the number of faults, but is costly and only justified in particular circumstances. New urban residential estates are now generally reticulated with underground cable systems.

Practical and economic considerations result in many customers being connected to the same distribution feeder. In order to separate parts of the feeder for maintenance and to restore supply to some customers in the event of a fault, the feeder is fitted with switches at strategic points to permit separation of the network.

In urban areas, high voltage distribution feeders are generally interconnected in an open ring reducing the number of customers affected by a fault while the fault is being repaired. Most of the switching devices are manually operated. Alternative high voltage and low voltage supplies are available to most urban customers.

The amount of interconnection built into the planning of rural systems is determined by the need to construct a system with an acceptable level of reliability. In rural and remote areas, the high voltage and low voltage distribution is generally operated in a radial configuration with the result that a fault on one part of the feeder will cause a loss of supply to connected customers. Interconnections with adjacent rural feeders mean that it is sometimes possible, following manual switching, to bypass a faulted section of a feeder and restore supply to downstream customers before a fault has been repaired. The degree to which this is possible depends on the level of interconnection. For short-rural feeders, some alternative high voltage supplies are available. Long-rural feeders consist of long radial lines and SWER systems that supply remote customers, with little or no interconnection.

1.2 Network design and reliability

Country Energy's distribution network has been historically planned and developed to deliver levels of reliability that depends on its design and construction, which have been based on sound and well proven engineering principles. The design and construction of the network has been influenced by intrinsic factors such as the environmental, geographical and demographic characteristics of the area and the susceptibility of different portions of the network, and the harmonisation of these factors with the economically viable cost of service provision and a level of supply that has historically been acceptable to customers. This acceptability has been largely based on expectations 'learnt' from historical performance.

Country Energy is required to utilise more overhead lines and equipment to service its customers and consequently, given the inherent overhead design of the network, it is expected that Country Energy's customers would generally receive a service reliability lower than that provided by other NSW distributors. A variation in reliability performance across Country Energy's network is inevitable given the diverse nature of the environment and the historical design and construction standards employed in the reticulation installed.

The reliability of supply to a customer is influenced in two ways, the number of interruptions encountered and the duration of those interruptions. The number of failures can be controllable to an extent by Country Energy, although it is strongly influenced by the fundamental (historical) design of the distribution network and environmental factors. The availability of alternative supplies, and the responsiveness of Country Energy's operational control and fault repair crews, influence the duration of interruptions.

The predominance of radial overhead lines impacts on the number of interruptions, as it is less reliable than underground systems. They are subjected to more faults, although fault repair times for underground systems are usually longer than overhead systems. Underground systems often have more interconnections to maintain supply during outages, which mitigates their longer repair times. Lower cost equipment, and therefore lower reliability, is generally used to transport electricity from the zone substation to the customer. As a result, most of the interruptions result from failures of either the distribution feeder from the zone substation or the low voltage supply line from the distribution substation to the customer.

Mitigation against network failure can be overcome through N-1 duplication. While this approach will increase the security of supply, it is achieved at a considerable higher cost, and generally can only be justified for the security of the subtransmission system. Beyond the zone substation, except in some high density areas, the additional cost of alternative supply routes in the distribution network is not justified.

All else being equal, the number of faults experienced on a feeder is related to the length of the overhead line exposed to hazards, which for long rural feeders strongly affects the reliability that can be achieved. The longer the feeder the more overhead line that is exposed, and consequently the more faults that can be expected to occur. Customers supplied off the same feeder can experience different reliabilities, with some customers receiving a level of reliability significantly better than the feeder average reliability, and some customers receiving a level of service below the average. Customers connected at the remote ends of a distribution feeder will generally receive a lower level of reliability than those closer to the zone substation.

There are many other reasons for perceived poor performance. Improving reliability can be made more difficult by the environmental constraints of weather, lightning, vegetation growth, and terrain, which have an influence on specific asset management strategies and plans, which in turn affect the reliability achieved. Distribution systems can be designed and maintained to provide satisfactory service in all these conditions, although the harsher the environment the greater the expenditure necessary to achieve any consistent level of reliability. Certain feeders are repeatedly low reliability feeders and therefore certain customers regularly receive a lower level of reliability because of the inherent design of the network and the particular environmental conditions in the areas.

1.3 Customer expectations

The Country Energy electrical network has been constructed to different standards over many decades, resulting in different service level capabilities. The distribution system was largely built in the 1950s and 1960s. When the distribution network was first constructed, the objective was to provide an electricity supply to as many areas as possible. While adequate at the time, the network was never designed to provide the level of service sought by customers today. To have constructed a network to achieve higher reliability at the time would have been significantly more expensive and limited, in some cases, by the availability of appropriate technology. Consequently, customer reliability expectations and the network capability are potentially mismatched.

Country Energy has observed that usage of electricity in rural areas is changing. This has given rise to significant increases in customers' expectations for reliable, safe and quality network performance. This expectation impacts most severely on those areas that historically have had lower reliability performance, such as the rural areas that have become 'urbanised' and particularly long radial lines and remote pockets of the network, which once only served small lighting and other farming and residential loads.

1.4 New licence conditions

The Department of Energy, Utilities and Sustainability (DEUS) undertake an effective role in observing the performance of Country Energy and the other NSW electricity distributors, ensuring that collective customer interests are met.

Commencing 1 August 2005, the Minister for Energy and Utilities has imposed on licences held by the NSW electricity distributors under the Electricity Supply Act 1995 additional conditions relating to reliability performance. The intention is to ensure that satisfactory levels of performance are achieved for all customers.

Country Energy has been fully supportive of the changes. The new licence conditions will encourage the achievement of improved levels of service for all customers and, at the same time, will influence the prioritisation of investment by the need to improve performance to customers on average and particularly to those customers connected to the lowest service level feeders.

The new licence conditions and customer expectations will have a strong bearing on the specific asset management strategies adopted by Country Energy to improve reliability and security of supply into the future.

Innovative actions can be taken by Country Energy to improve reliability of the poorly performing parts of the network. However satisfying these requirements and customer expectations requires a balance between implementing improvement initiatives, increased expenditure, and the availability of resources to perform the necessary work. The specific actions, expenditure requirements, and resource capabilities are discussed later in this submission.

Reliability and individual feeder standards

The new licence conditions require that a minimum average level of reliability performance by feeder type (urban, short-rural and long-rural) is maintained across the network, and a minimum level of reliability for individual feeders by feeder type is maintained. For each standard, targets have been set as tabled below for the annual average time customers may experience sustained loss of supply (SAIDI) and the annual average number of interruptions customers may experience, excluding momentary interruptions (SAIFI). Previously, the distributors determined and publish targets for the reliability of supply for the following year.

Feeder type	2005/06	2006/07	2007/08	2008/09	2009/10	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

Table 1 – SAIDI average standards for Country Energy

Feeder type	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Urban	2.00	1.96	1.92	1.88	1.84	1.80
Short-rural	3.30	3.24	3.18	3.12	3.06	3.00
Long-rural	5.00	4.90	4.80	4.70	4.60	4.50

Table 2 – SAIFI average standards for Country Energy

Feeder type	Minutes per customer
Urban	400
Short-rural	1000
Long-rural	1400

Table 3 – Individual feeder standards (minutes per customer)

Feeder type	Number per customer
Urban	6
Short-rural	8
Long-rural	10

Table 4 – Individual feeder standards (number per customer)

Country Energy's current reliability performance against these standards is described in Section 3.

Subtransmission design planning criteria

The new licence conditions also set out the design planning criteria to be used by Country Energy in planning, developing, managing and operating its subtransmission system to ensure that it meets the reliability standards and provides an adequate supply with an appropriate level of redundancy.

The design planning criteria for the subtransmission network applying to Country Energy as contained in the new licence condition is tabled below and is dependent upon the load and the time required to restore supply.

Network Element	Load Type	Load Magnitude	Security Standard	Customer Interruption time
Subtransmission lines	Urban & Non-Urban	≥ 15 MVA	N-1	< 1 minute
	Non-Urban	< 15 MVA	N	Best practice repair time
Subtransmission substation	Urban & Non-Urban	Any	N-1	< 1 minute
Zone substations	Urban & Non-Urban	≥ 15 MVA	N-1	< 1 minute
	Non-Urban	< 15 MVA	N	Best practice repair time

Table 5 – Subtransmission and zone substation design planning criteria

Distribution design planning criteria

The new licence conditions set out the design planning criteria to be used by Country Energy in planning, developing, managing and operating its distribution system to ensure that it meets the reliability standards and provides an adequate supply with an appropriate level of redundancy.

The design planning criteria for distribution networks applying to Country Energy, as contained in the new licence condition, is tabled below and is dependent upon the customer population (load) of the regional centre or town and the time required to restore supply.

Network Element	Load Type	Load Magnitude	Security Standard	Customer Interruption time
Distribution feeder	Urban (regional centres ≥ 15,000)	Any	N-1	< 4 hours
	Urban (other than regional centres < 15,000)	Any	N	Best practice repair time
	Non-urban	Any	N	Best practice repair time
Distribution substation	Urban & Non-urban	Any	N	Best practice repair time

Table 6 – Distribution design planning criteria

Country Energy must comply with the applicable subtransmission and distribution design planning criteria for all network elements from 1 July 2009 and must comply for all new network elements from 1 July 2007.

2. Network reliability improvement management

2.1 Asset management planning

The purpose of asset management is to ensure that assets are being maintained and developed to provide appropriate levels of service to meet customer needs and stakeholder expectations.

Country Energy's Network Management Plan provides for the strategic development of energy services to local communities that are served, and the provision of adequate network capacity, reliability, quality and safety of supply. It describes the services delivered; the condition of network assets; specifies reliability, security and availability objectives; and identifies plans for network development, asset replacement, refurbishment, and maintenance and reliability management over a five year time horizon. It is updated annually.

The primary aim of the plan is to effectively plan the development of the network to meet existing and future load requirements, while maintaining a reliability of supply that meets the expectations of customers and stakeholders. The plan ensures that all components of the asset management process fit together in an integrated fashion, and ensure the achievement of common performance goals in the most economically efficient way.

Country Energy has developed related documentation to support the plan that defines different components of the asset management process such as planning criteria, design and construction standards, capital investment policies and guidelines, safety and environmental policies, asset inspection and maintenance standards, vegetation management policy, bush fire mitigation, and processes for operating, fault handling and restoration. This documentation is aligned with the overall strategy document. These asset management practices ensure:

- Priorities are established in line with customer, organisational and stakeholder objectives;
- Financing and expenditure is planned and controlled in accordance with these priorities; and
- Available resources are used as effectively and efficiently as possible so that the shareholder and the community receive the most value for the money spent.

Implicit in these activities is the linkage to the corporate plan.

The Asset Management Plan is published by Country Energy in order to enable our customers to be aware of Country Energy's network plans and its reliability initiatives. On an annual basis, Country Energy provides DEUS with an electricity network performance report that is the outcome of the implementation of the plan.

2.2 Overall organisational approach and business processes

Reliability of supply is given a high priority within Country Energy and the asset management processes developed by the business have been appropriately designed to effectively deliver the required level of performance.

Country Energy has implemented a decentralised structural approach to asset management involving a 'centralised' network strategy group responsible for overall asset strategy, standards, development, and monitoring of reliability performance, and the establishment of nine geographically based management teams that manage the day to day asset management activities for the particular region.

Given the expansive geographical area covered by Country Energy, this geographic approach to asset management is required since it is not possible for a single centralised group to know the complete network. That is there is considerable variation in reliability performance across the network due to diverse environmental conditions and variations in historical design and construction standards. As such, each part of the network can be unique in its own way and decision making on expenditure and reliability improvement is improved by using local input and experience.

Each regional team is accountable for:

- Regional asset performance to ensure that the reliability and quality of supply complies with customer, organisational and stakeholder requirements and the published service standards;
- Driving local reliability improvement where cost effective;
- Distribution planning and development in the region;
- Customer connections;
- Delivering maintenance programs; and
- Key performance reporting to the centralised network strategy group.

The structure has resulted in the local ownership of feeders and local reliability improvement initiatives. However the structure relies on the interaction between the centralised network strategy group and the regional network planners, working together with the task of selecting where improvements are required to ensure that both capacity and reliability issues are considered during major work on a part of the network. The regional team will advise the asset management group of the specific feeders that require further investigation to improve performance.

The Network Reliability Group constantly monitors network performance. It was recently formed to strengthen the overall focus on improving distribution network performance and to generally coordinate the necessary improvement strategies. Systematic network performance issues are also monitored and are referred to the standards group when new design and constructions standards are required. Country Energy now has a wide variety of technical (design and construction) standards to meet particular environments. New technologies and improvements in equipment design are integrated into the standards.

Country Energy also operates a 24 hour control centre. A centralised network operations group manages the day to day operations and all planned and unplanned outages on the subtransmission and distribution networks. Call centre staff handle customer fault calls and dispatch the information to field staff for action and restoration of supply. Country Energy has progressively improved outage management, fault identification and reporting accuracy over recent years, with further improvement expected in the near future following the implementation of new distribution management systems.

2.3 Broad medium term objectives

Country Energy's broad medium-term objectives for strategic investments to improve reliability are:

- Refurbish or replace ageing network assets based on age, risk, condition, and performance;
- Investigate and identify low service performance pockets of the network;
- Implement an annual remediation program for 100 selected worst performing feeders where an improvement can readily be achieved; and
- Increase performance towards the requirements set in the new licence condition relating to network planning criteria and security of supply.

These strategies are described more fully in Section 4 and 5.

2.4 Investigation of feeder reliability performance

As shown in Section 3.1, some customers in rural and urban areas are receiving a good level of supply reliability, while others receive a less reliable supply at a level below the targets set in the new licence conditions.

The approach taken to remedy poor performing feeders looks at understanding the underlying causes of poor performance, and then developing appropriate remedies and reliability improvement strategies in order to achieve consistent and sustained long term improvement. This approach also considers broader systemic problems and trends, which if addressed, lead to more sustained performance improvements.

A key element for Country Energy has been to ensure that decisions are based on sound feeder performance information and analysis in order to establish the reasons for a particular feeder's reliability so that poor performance can be properly understood. Further, in order to understand reliability problems and the impact of reliability improvement measures, Country Energy has also developed a model to assist in the development of an appropriate investment program to achieve feeder reliability improvements. This involves the selection of feeders carefully chosen as representative of the typical rogue feeders.

It should be noted that Country Energy does not currently record operational and maintenance costs specifically at an individual feeder level so direct cost comparisons between feeders is not possible.

2.5 Proposed remediation program for "unsatisfactory reliability" feeders

Country Energy is committed to direct investment in feeders that are currently delivering the lowest service level to our customers. After careful consideration of the new licence conditions relating to reliability performance, Country Energy's submission seeks to improve performance levels towards the new licence standards for those customers connected to "unsatisfactory reliability" feeders. To date, the work carried out on low reliability feeders has been reactive in nature.

It is possible to implement an action plan and make meaningful improvements to achieve the feeder reliability performance requirements of the new licence conditions. More direct investment and the implementation of specific initiatives will deliver local performance improvements.

Country Energy has therefore developed a number of specific initiatives that will form an annual feeder remediation program for poorly performing feeders to achieve desired improvements by reducing the number of customers receiving a reliability of supply poorer than the average customer, and reducing the number of certain types of fault causes where these have proven to be particular problems. It is proposed that the package of initiatives will be implemented on all poor performing feeders, at a rate of 100 feeders each year over the current regulatory period, where an improvement can be readily achieved in terms of planned and unplanned interruptions.

To achieve this objective, Country Energy will require an incremental allowance in both operating and capital expenditure, taking account of the need to increase the resource base to complete the necessary works. Although the individual reliability and security of supply initiatives may be relatively inexpensive, on a collective basis the initiatives involve large sums of expenditure.

Before proceeding to detail the specific initiatives to be implemented, it is important to gain an understanding of the current performance of the network, particularly in non-urban areas, and the underlying causes of interruptions to supply as provided in Section 3.

The full compliance program to improve reliability in rural areas and the security of supply works programs necessary to comply with the new design planning criteria for subtransmission and distribution networks, including the cost of these programs for the remainder of the current regulatory period, is detailed in Section 4.

Section 5 details Country Energy's phased works program, subject to changes in emphasis in the licence conditions. This program has been matched to the current resource base and the prioritisation of work.

3. Current network reliability performance

3.1 Reliability performance relative to new standards

The figures below show the reliability performance for each of Country Energy's distribution feeders by feeder type (urban, short-rural and long-rural), measured against the SAIDI and SAIFI performance index contained in the new licence conditions. A number of observations can be made in reference to the figures.

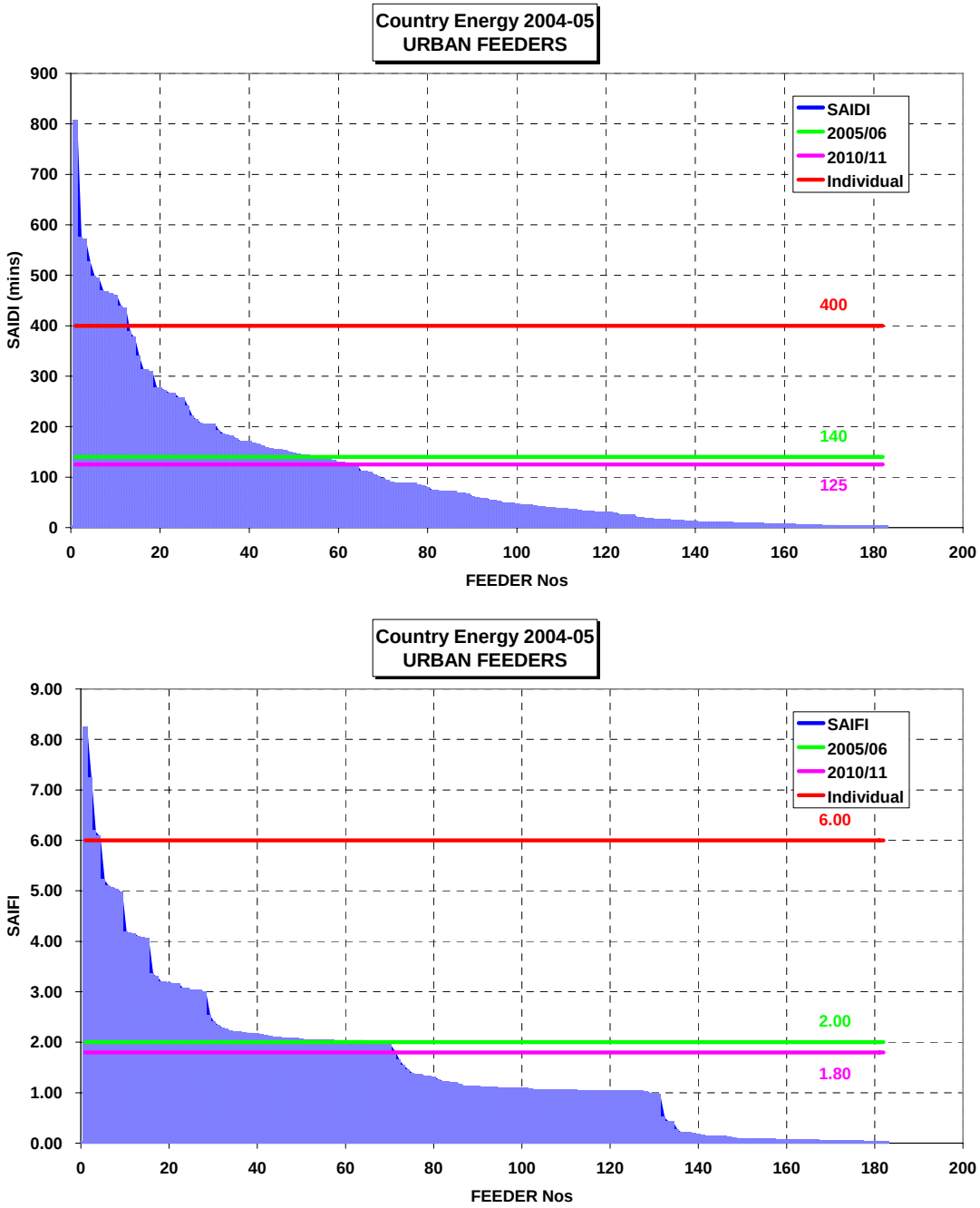

Figure 1 – Reliability performance of Urban distribution feeders measured against the new SAIDI and SAIFI standards

In urban areas, there are some 15 feeders that do not presently comply with the minimum SAIDI reliability performance targets for individual urban feeders and some 5 feeders that do not presently comply with the minimum SAIFI reliability performance targets for individual urban feeders. Further there are some 50 urban feeders where reliability exceeds the average SAIDI reliability performance standard for urban feeders and some 60 feeders where reliability exceeds the average SAIFI reliability performance standard for urban feeders, as set in the new licence condition.

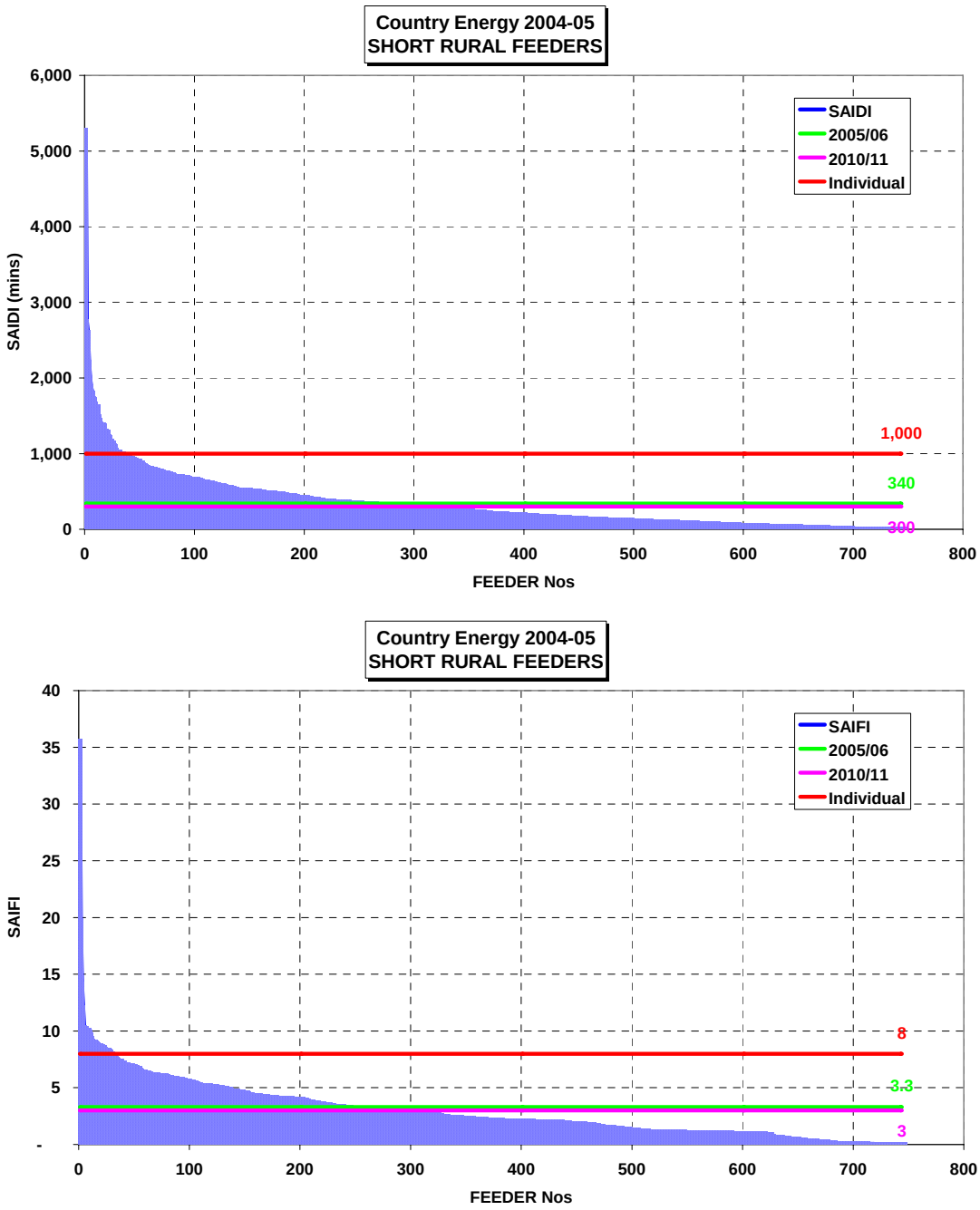

Figure 2 – Reliability performance of Short-Rural distribution feeders measured against the new SAIDI and SAIFI standards

The picture for short-rural feeders is quite different with significantly more feeders with relatively low reliability. The above figure demonstrates that there are some 40 short-rural feeders that do not presently comply with the minimum SAIDI reliability performance targets for individual short-rural feeders and some 30 feeders that do not presently comply with the minimum SAIFI reliability performance targets for individual short-rural feeders. Further there are some 300 short-rural feeders where reliability exceeds the average SAIDI reliability performance standard for short-rural feeders and some 300 short-rural feeders where reliability exceeds the average SAIFI reliability performance standard for short-rural feeders, as set in the new licence condition. A short-rural feeder is a feeder with a total route length less than 200 kilometres.

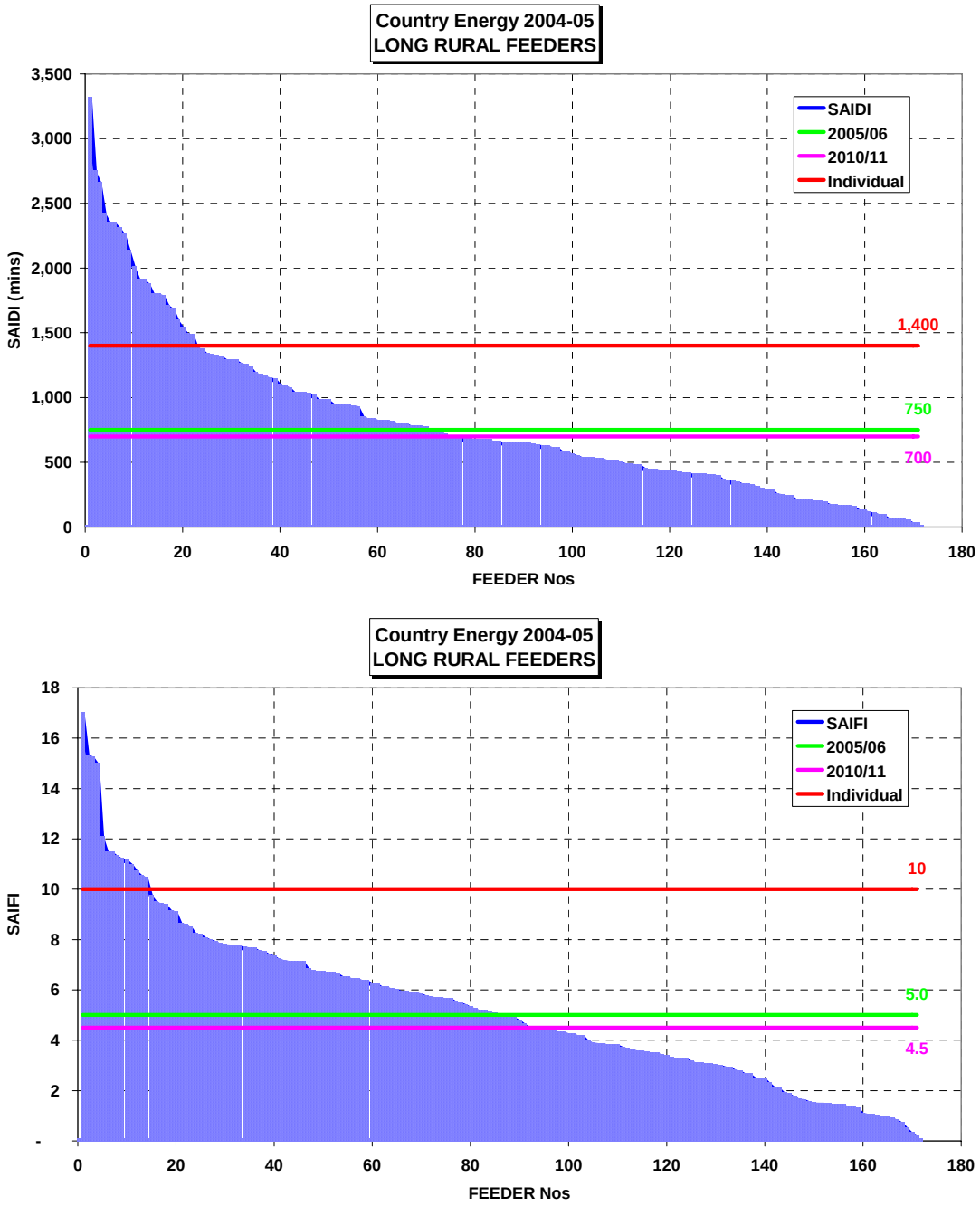

Figure 3 – Reliability performance of Long-Rural distribution feeders measured against the new SAIDI and SAIFI standards

The above figure demonstrates that there are some 25 long-rural feeders that do not presently comply with the minimum SAIDI reliability performance targets for individual long-rural feeders and some 15 feeders that do not presently comply with the minimum SAIFI reliability performance targets for individual long-rural feeders. Further there are some 70 long-rural feeders where reliability exceeds the average SAIDI reliability performance standard for long-rural feeders and some 90 long-rural feeders where reliability exceeds the average SAIFI reliability performance standard for long-rural feeders, as set in the new licence condition. A long-rural feeder is a feeder with a total route length greater than 200 kilometres.

The above figures demonstrate that Country Energy is presently not achieving some of the new reliability targets, and that the number of feeders in non-urban areas with reliability levels below the new average standards is significant.

The table below illustrates the average actual performance of the network for urban, short-rural and long-rural for the 2003-04 and 2004-05 financial years (adjusted for excluded interruptions) relative to the new minimum average performance standards for SAIDI and SAIFI as set in the new licence condition.

Average minimum reliability standards for each feeder type		New Licence Condition for 2005-06	Actual 2004-05 adjusted for excluded interruptions	Actual 2003-04 adjusted for excluded interruptions
SAIDI	Urban	140	113	113
	Short-rural	340	298	238
	Long-rural	750	555	530
SAIFI	Urban	2.0	1.53	1.74
	Short-rural	3.3	2.97	2.46
	Long-rural	5.0	4.46	3.90

Table 7 – Average network reliability per feeder type

The table shows that customers are receiving a service with reliability better than the required average level for all the different feeder types. The apparent decline in reliability levels from 2003-04 to 2004-05 is reflective of the significant ongoing improvement in reliability performance data that has been implemented by Country Energy. As reported in Country Energy's *Network Performance Report 2004-05*, these improvements are producing considerably higher percentages of outage data capture, which in turn is generating an apparent "decline" in actual performance trend. This was anticipated by PB Associates in their report *Review of NSW DNSP's Measurement and Reporting of Network Reliability*. Further improvements will be made in the 2005-06 financial year, at which time Country Energy would have achieved the full implementation of the recommendations made by PB Associates.

It is therefore important to interpret this information within the wider context of the improvements made to reporting capabilities. Country Energy believes that the underlying average trend is likely to be stable and that there is no overall improvement in the average duration or frequency of faults over the last five year period. Country Energy also believes that reliability would be at or above the average targets set in the new licence condition. However, a firm conclusion in this regard cannot be made based on actual data collected in the past, and would need to await

a period of at least one year following the full implementation of the data capture improvements.

The analysis should therefore be confined to the study of the individual performance of different feeder types throughout the network. From that information, it is apparent that Country Energy will need to improve the reliability of poor performing feeders, particularly those customers that receive a service with reliability below the required average and individual feeder level in non-urban areas. With regard to short and long-rural feeders, it is discernible that for many feeders the performance is poorer than the average reliability. This will be the focus of Country Energy's strategy to improve reliability.

In order to develop appropriate strategies to address this need, an understanding of the underlying causes of interruptions is required.

3.2 Principle causes of interruptions to supply

The figures below show the causes of interruptions to supply (frequency and customer minutes off supply) during the 2004-05 financial year and provide some understanding of the underlying causes of the interruptions to supply on Country Energy's network, and the possible actions that can be taken to improve reliability.

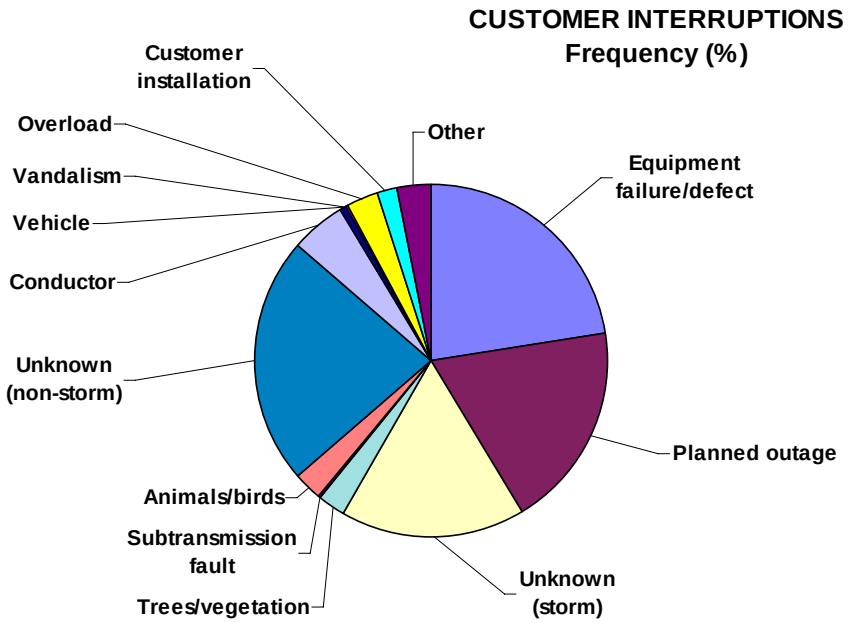

Figure 4 – Analysis of interruption frequency by cause

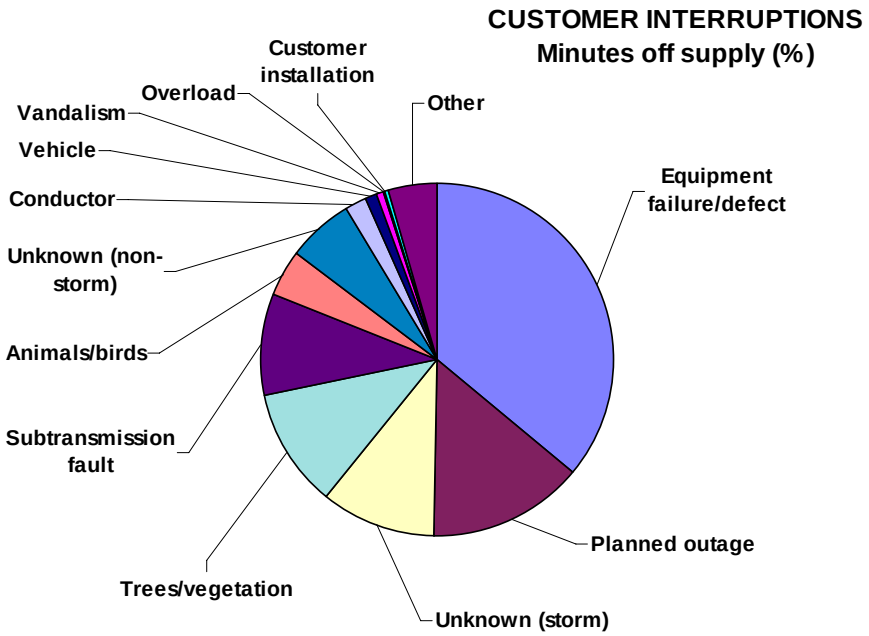

Figure 5 – Analysis of minutes off supply by cause

A number of observations can be made in reference to the above figures.

- The top causes of customer minutes off supply include equipment failure/defect 36%, planned outages 14%, trees/vegetation 11%, unknown cause (storm and non-storm conditions) 16%, subtransmission fault 10%, animal and birds 4%, high voltage conductor/ties/connectors 2%, and vandalism/third party action 1.5%.

- The top causes of customer interruption frequency include equipment failure/defect 23%, planned outages 19%, trees/vegetation 1.5%, unknown cause (storm and non-storm conditions) 40%, subtransmission fault 0.3%, animal and birds 2.5%, high voltage conductor/ties/connectors 4.8%, overload 3%, customer installation 1.8%, and vandalism/third party action 1.0%.

- A number of these outage causes are beyond Country Energy's immediate control such as storms, vandalism, some of the unknown causes, and where other third parties affect Country Energy assets. There are relatively more overhead line interruptions attributable to environmental factors.

- Faults on subtransmission circuits, although representing a small percentage of only 0.3% of the total number of interruptions, impacts a larger number of customers accounting for around 10% of all customer minutes off supply.

  The causes of these faults are as varied and extensive as the causes on the high voltage distribution system. The effect of the outages could be largely eliminated if N-1 duplication of subtransmission supply was extended to all zone substations. However the new design planning (security of supply) criteria requires this standard to be maintained only for loads that exceed 15 MVA. However performance of the radial subtransmission lines could be improved significantly through a more concentrated program of annual aerial patrols and rigorous vegetation clearing.

Faults on the high voltage and low voltage networks account for the rest, with around 85% of all faults attributable to the high voltage distribution network.

- Planned outages account for 14% of all customer minutes off supply and 19% of all interruptions. This indicates significant potential to improve reliability.

  Country Energy has been able to gradually improve the level of planned outages over recent years, reflecting in part the success in implementing live line maintenance techniques. Country Energy can further reduce its planned SAIDI in poorer performing parts of the network, without limiting the level of maintenance and reliability improvement work it undertakes, through the greater use of live line pole top inspection and maintenance work. The utilisation of small generators can also provide a supply during off load maintenance. The installation of additional interconnections between feeders will also assist.

  However, the impact on customers of planned outages is significantly lower than that of unplanned outages and it is appropriate that greater attention is made to reducing the number and duration of unplanned outages.

- Some 22% of outages resulting from equipment failures and 5% result from conductor fatigue or faulty deadends, ties, and terminations. This indicates significant potential to improve reliability and suggests that for rural areas a more thorough inspection and maintenance measure, using live line inspection and maintenance techniques, and an increased level of reconductoring of fatigued or rusted conductors may be required for rural backbone lines.

  Pole failures are a relatively minor contributor to interruptions. Country Energy replaces around 8,000 poles and reinforces around 1,000 poles each year out of a total population of 1.4 million poles. This suggests that the current inspection and maintenance measures for poles have been reasonably effective in maintaining network reliability.

- About 40% of outages and 16% of customer minutes off supply result from incidents for which no known cause is located.

  The extensive nature of the distribution network makes it difficult to locate some intermittent and transient faults. However the causes of these faults can usually be attributed to operational problems with distribution protection equipment item such as a recloser, tree/bark contact with overhead lines during windy conditions, or due to direct lightning strikes. Some of the outages can be avoidable with improved management of the settings of the feeder protection devices, increased use of reclosers, and through better tree clearance. This indicates a significant potential to improve reliability.

  Weather events such as rainfall and lightning, while more intense in certain parts of the distribution area, is likely to affect all parts of the network to a degree. Lightning is seasonal, generally prevalent in summer and can change from year to year depending on climatic conditions. Measures are undertaken by Country Energy to reduce the number of outages such as the fitting of surge diverters to transformer and cable terminations to minimise damage to transformers.

- Trees are shown to be a cause of 11% of customer outage minutes. Many of the outages resulting from unknown causes are likely to be the result of vegetation.

  During bad weather, tree and bark debris may be blown into and fall onto the line, resulting in an outage. There are many outages on many feeders and in many locations due to trees, consequently more extensive tree trimming is likely to produce a substantial improvement in reliability. Country Energy's historical practice in relation to vegetation control has been to not remove trees close to powerlines or overhanging limbs. Some of these outages can be avoided with a more rigorous approach to vegetation control including tree removal, the removal of tree limbs that overhang the conductors, and maintaining a more effective line corridor.

- Birds and animals contribute around 4% of the total customer minutes off supply and around 2.5% of outages.

  In some areas, birds and animals can be a serious problem on the feeder, causing transformer fuses to blow and sometimes equipment damage. Preventing access by animals to high voltage structures and removing the possibility of birds causing a flashover between the conductors or a conductor and part of the support structure, can be overcome by insulating parts of the network such as higher rated insulators, insulated droppers on distributions substations, surge diverters and bird proof crossarm covers. County Energy will continue to employ techniques that to an extent have been effective in eliminating these outages.

The above analysis suggests that the principle factors resulting in interruptions to supply include trees and vegetation contact with overhead lines, failure or defective line equipment, planned outages, unknowns (assumed to result mainly from vegetation, lightning and protection malfunction), subtransmission faults, and protection and conductor failures. These factors are common to most other distributors that supply into regional and rural areas. The list of principle causes has formed the basis of the proposed asset management strategies to improve performance in poorer performing areas as described in Section 4.1.

4. Incremental works program for full compliance

4.1 Rural feeder reliability remediation program

The new licence condition in relation to reliability standards is outlined in Section 1.4.

In order to determine the best combination of initiatives for application to a reliability remediation program, Country Energy analysed a number of worst performing feeders for each network type and the underlying causes of poor performance as outlined in Section 3. An assessment of the general benefits and the incremental costs of the program were also carried out.

The preventative initiatives for full compliance proposed by Country Energy to address the major causes of faults in poor performing rural areas include:

1. Advancing the replacement of bare overhead conductor on rural backbone lines (Section 4.1.1);
2. More extensive program of automatic recloser and sectionaliser installation and replacement (Section 4.1.2);
3. Review the coordination of feeder protection devices (Section 4.1.2);
4. Implementing a more rigorous vegetation control program (Section 4.1.3);
5. Annual aerial inspections of all poor performing distribution lines and radial subtransmission lines (Section 4.1.4);
6. Increasing the amount of live line pole top inspection and maintenance work on rural backbone lines (Section 4.1.5);

And where economic

7. Reinforcing tie capacity in rural networks to improve flexibility of supply due to load transfer restrictions (Section 4.1.6); and
8. Optimising the distance between zone substations and customers to reduce the length of line exposed to the potential fault causes through the construction of new small zone substations where subtransmission supply is presently available (Section 4.1.7).

The first six initiatives will be required to varying degrees as a package of works on all 100 feeders selected each year. The remaining two initiatives will be implemented generally in combination with the one or all of the other initiatives where feasible.

Short-rural and long-rural feeders will be treated on the same basis in terms of the implementation of the initiatives, even though the distribution lengths are not the same.

Country Energy will make the implementation of the remediation program one of the priorities of the business in the medium term. We do not believe there is any discretion in this strategy of initiatives in order to improve performance to achieve the new licence standards for reliability performance. Each of these strategies is described in more detail in the following sections. The cost of the full compliance program for rural feeder remediation is outlined in Section 4.1.8.

Other ongoing general programs and strategies included as part of the expenditure requirements in our submissions to the recent 2004 network determination will be evaluated through individual proposals, as described in section 4.1.9.

4.1.1 Advancing the replacement of bare overhead conductor

A significant component of Country Energy's overall network related capital investment program is the replacement and renewal of aged assets.

Network assets have a finite life and, in order to maintain or improve the level of service provided by the network, system assets must be replaced. Asset replacement expenditure increases gradually over time due to the ageing of the network. Other drivers for replacement includes those assets that are unserviceable, frequently fail in service, have significantly deteriorated to an unsafe or risky condition, or where the present-value cost of maintaining the asset exceeds the cost of replacement. These trends are already evident and will continue into the future, particularly for the ageing rural network.

The consequences of not programming the progressive replacement and renewal of aged equipment include:

- Risk of injury to staff and the public;
- Replacement requirements accumulating to levels which become unmanageable;
- Increasing maintenance costs; and
- Lower reliability resulting from poorer performing feeders and failing asset components.

Age profile

An important element in the development of asset replacement strategies is the age profile.

The general picture of Country Energy's assets shows that a large proportion of Country Energy's in-service assets were installed over a short period of time during a period of high growth and investment that can be traced back to the 1950s and 1960s. The equipment installed during this period, together with older equipment that remains in service, represents a large proportion of the network. In the older, poorer performing parts of the network, particularly in the inland areas, the Country Energy network is ageing and will require increasingly higher replacement expenditure into the future. This issue was raised by Country Energy as an important consideration in the recent 2004 determination review.

The age profile for overhead high voltage distribution lines is shown in the figure below.

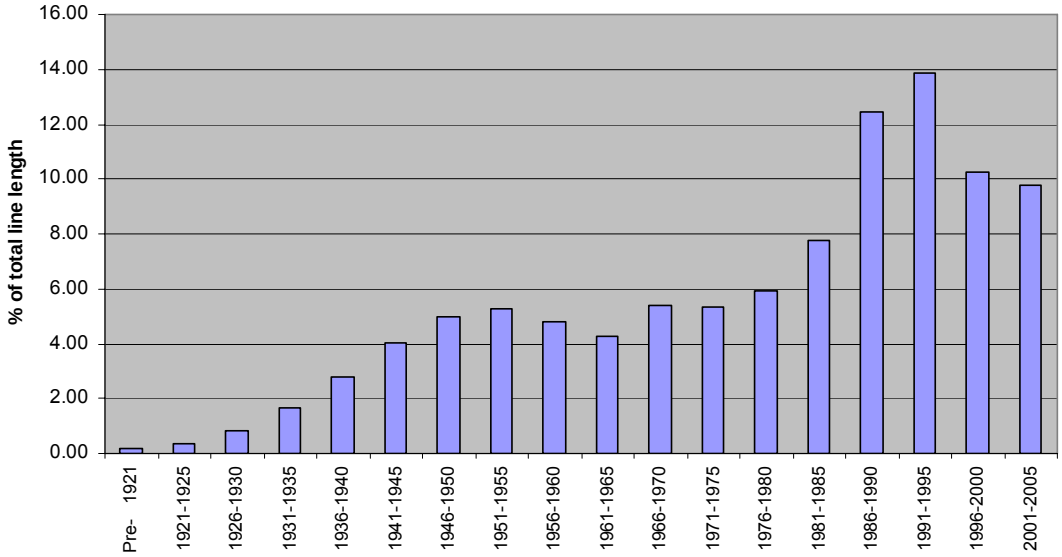

Figure 6 – Age profile of Country Energy's overhead high voltage distribution lines

The age profile shows that around 30% of all overhead distribution lines being constructed over 40 years ago. The increasing age of this asset class has the greatest impact on reliability. Country Energy's subtransmission lines have a relatively younger age profile and are not expected to require significant capital replacement over the planning horizon other than for growth and security of supply purposes.

Submission to the 2004 total cost review

In Country Energy's submission to the IPART 2004 total cost review undertaken by Wilson Cook & Co. and Meritec, individual asset replacement strategies were set out for each major category of asset.

The strategy employed by Country Energy spreads the demand for asset replacement over a manageable period to mitigate the impact on the business and customers, using a combination of age, condition and risk to smooth out resource requirements. The aim of this approach was to ensure that the remaining average age of each asset class would be generally maintained over the current regulatory period and that maintenance costs associated with these assets would remain reasonably stable over the same period. This would be achieved by implementing a replacement and refurbishment expenditure program across all asset classes, including overhead distribution lines that averaged around 1.25% of asset replacement value per annum over the regulatory period. This amount is below the 2-2.5% long term average expenditure required to replace all assets over an implied weighted average asset life of 40 to 50 years.

For overhead distribution lines (including SWER systems) the replacement expenditure requested average only 1.05% of the asset replacement value per annum over the regulatory period. No specific case was made by Country Energy for advancing any part of its asset replacement and renewal program in order to provide an enhanced reliability performance offering at the 2004 determination. For overhead

distribution lines and SWER lines, the average annual replacement capital expenditure sought was $32 million. Meritec and Wilson Cook & Co confirmed that this asset strategy was appropriate and agreed that the expenditure amount was reasonable for this asset class for the maintenance of service levels.

At the time, we believed this strategy to be a realistic and practical approach to asset management and would ensure the continuation of sensible asset replacement investment in the network taking into consideration value for all stakeholders in maintaining existing reliability levels.

Overhead distribution lines and conductor types

Country Energy has a range of distribution line voltages (33, 22, 11, 19.1, 12.7 kV and low voltage), and a range of different construction types. These lines total some 145,000 kilometres, of these 98% are wood pole lines, and 85% of the total line length is located in rural areas. As referred to earlier, a significant component of the distribution network has been in service since the 1950s and 1960s.

The design, construction and maintenance of overhead lines have followed reasonably sound industry practice, however there have been different types of practices employed by predecessor distributors. There are a wide variety of bare conductor types that have been utilised on its network.

- Generally, the overhead network in urban areas and on some main backbone rural lines at the fringe of an urban area is of an all aluminium conductor type with medium to large cross-sectional area. These conductors are robust in terms of capacity provision, are generally not susceptible to deterioration, and overall the in-service condition of these types of conductors are reasonably good.

- The types of conductors used in the rural network include a mixture of steel, aluminium steel reinforced conductor, and small cross-section copper conductors.

  The steel and copper conductors have shortcomings and limitations particularly on main backbone lines, and many faults on the rural network result directly from the small size, age and increasing fatigued nature of these conductors as demonstrated in Section 3.2.

  While conductor sizes and standards have improved over the years, the extent to which these older rural conductor designs have been upgraded has varied, particularly in the older poorer performing parts of the network where load growth has been low. Many steel conductors installed when an area was first electrified are still in service today. Steel conductors showing signs of rust are increasingly being found. Copper installed in the 1950s and 1960s is showing signs of annealing and weathering which results in a reduction of reliability. A program to identify the worst affected areas and gradually replace the conductor has been in place since the 1990s. Sections have been slowly replaced since that time.

A more proactive strategic approach to overhead line replacement

The current reactive replacement program for overhead bare conductor has generally been a valid strategy to date given the size of the Country Energy network for the

types of conductors used in rural areas. However, in order to address ageing issues, and increase performance towards the requirements of the new licence conditions, particularly in the older poorer performing parts of the network, current reliability problems cannot be overcome by continuing to replace the bare conductor (and other pole top components) on an opportunistic basis. A more strategic approach to asset management is required that includes the proactive replacement of overhead lines known to be a reliability risk. Over the next 10 years a significant portion of the overhead conductor will need replacement on a proactive basis.

In order to fully comply with the licence conditions, Country Energy will need to make an adjustment to the overhead line conductor (and pole top structure) replacement program. The specific program involves advancing the full or partial replacement of bare overhead conductor on specific sections for each of the 100 rural feeders selected annually. It is estimated that on average 15 kilometres of conductor and the associated pole structures (including poles, crossarms, insulators, and ties) where unserviceable will be replaced on each feeder. It is also necessary to construct new pole structures in between existing spans to provide statutory ground clearances. Consequently the incremental program involves reconductoring and interpoling an additional annual total of 1,500 kilometres for the 100 selected feeders per annum. The new poles and replacement conductors will reflect modern design standards.

The proposed program will increase the total average replacement expenditure across the overhead line asset class from around 1.05% of the line length per annum - as submitted to the 2004 electricity network review – to around 2.0%, a value at the expected long term replacement rate based on an average engineering life of 50 years. This adjustment is considered necessary in order to reduce the risk that the reliability aspects of the new licence conditions will be compromised by an increasing number of age related failures.

The existing pole population managed by Country Energy is more than 1.4 million strong. There are many different varieties used but they are predominantly treated and untreated hardwoods. The main failure mechanisms for these poles are decay from rotting, particularly where moisture is present, and from termite attack. In some areas, termite infestation can lead to rapid failure of poles. Country Energy continues to use wood poles as a standard.

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Statistical analysis indicates that over the next 10 years, the number of poles reaching the end of their structural lives is expected to increase. However there have been relatively fewer faults due to wooden pole failures even in known termite areas. Risks are mitigated by the regular pole inspection and staking regime that is currently in place. It is not unreasonable for staking to give an additional 10-15 years life to the poles provided the pole tops are in reasonable condition. This regime will continue in conjunction with the advanced bare conductor replacement program.

The use of concrete poles instead of timber poles is unlikely to improve feeder reliability. Concrete poles also limit the use of live line working because of its conductivity.

Incremental expenditure requirement and general benefits

The probability of failure of conductors (and pole top components) in these poorer performing regions can be reduced through a more proactive replacement program, at additional cost. Country Energy's approach to identifying and advancing the replacement of bare conductor and pole top structures is sound and is based on an

appropriate assessment of asset age profiles, standard engineering lives, asset condition, operating conditions, and the impact on reliability. These variables have been used by Country Energy to forecast an incremental asset replacement capital expenditure requirement for this asset class into the future in order to fully comply with the new licence conditions.

A capital expenditure allowance was provided by IPART in the 2004 electricity network determination for the specific replacement and/or refurbishment for each category of network assets. Country Energy's asset replacement strategy at that time was to ensure that the average remaining life of any particular asset category was maintained at a predetermined age. An enhanced reliability improvement strategy was not promoted.

Country Energy estimates that the typical cost of replacing existing bare overhead open wire with modern design conductor is $35,000 per kilometre and this estimate has been utilised as an average cost. The average annual cost of this work for each feeder on the average basis of 15 km to be replaced is estimated to be $0.525 million.

The total incremental capital expenditure for the advancement of the replacement of bare conductor and pole top components for 100 feeders is estimated to be $52.5 million per annum for the remainder of the current regulatory period. There is no anticipated material increase (or reduction) in associated maintenance costs.

The proposed incremental replacement program will significantly reduce the number of feeder faults on these feeders and provide an improved reliability of supply to connected customers.

4.1.2 Extensive program of recloser installation and replacement

An ongoing program to reduce the duration and the number of customers affected by an interruption in the rural network has been the installation of automatic circuit reclosers and sectionaliser devices. Both devices provide the benefits of isolating faults and reducing restoration times following a fault in rural areas.

The benefits of reclosers

Reclosers are installed primarily on the main rural backbones and major spur takeoff from the backbone. This arrangement increases the number of feeder sections and reduces the number of customers affected by a fault. A recloser is also normally installed between the rural and urban sections of a feeder on the outskirts of urban areas to prevent urban customers being impacted by faults in rural areas.

The recloser will automatically restore supply following a transient interruption (a fault that clears itself). This enables restoration of supply without remedial work and prevents faults at the end of a feeder disconnecting the whole feeder. This means that customers connected upstream of a newly installed recloser can expect a reliability improvement since they will not be impacted by faults further out on the feeder.

Reclosers are well proven, requiring only good design and training of operations staff to be successful. Modern reclosers equipped with electronic protection has enabled a more optimum grading and discrimination between reclosers connected in series so that faults do not impact more customers than necessary.

The benefits of sectionalisers

Sectionalisers are installed on spurs enabling more rapid sectionalising as part of fault restoration process. These devices are designed to operate in conjunction with the upstream recloser to disconnect parts of the line beyond the recloser, isolating faulty spur lines once the recloser has carried out a number of recloses and has been unable to clear the fault. These devices also provide good visual indicators for fault finding. Country Energy's sectionaliser program has been effective and devices are installed in various parts of the network. Fuses on minor spurs are also in use in some areas to contain the fault to the local spur.

New and replacement program

Country Energy will focus on improved protection of its rural network through:

- increased installation of new reclosers and sectionalisers in areas where there are current deficiencies, particularly in the northern areas;
- advancing the replacement of unserviceable aged hydraulic reclosers, particularly for the poorer performing parts of the central and southern areas; and
- installation of electronic reclosers on main backbone rural lines to improve protection coordination.

There are currently 3,340 reclosers in service across Country Energy's network, comprising 1,354 in the central and western areas, 801 in the northern area and 1,185 in the southern area. There are currently 1,525 sectionalisers in service across Country Energy's network. The profiles show an ageing asset base, with over 40% of all reclosers (the older hydraulic types) being over 40 years old.

The northern area of Country Energy's service area has the greatest number of rural distribution feeders, however the lowest number of reclosers installed, which indicates a clear deficiency in recloser and sectionaliser installations. It is also a region that is more prone to interruptions resulting from storms and trees.

Country Energy's modelling of the optimum number of reclosers and sectionalisers that can be installed along a typical rural feeder of typical length, suggests at least 10 devices should be installed along the main backbone lines, major spur/takeoff lines and minor spurs. Typically around 6 to 8 reclosers can be installed on a typical feeder. The number of reclosers that can be placed in series along a major backbone line is generally limited to no more than 3 to 4 in order to maintain protection margins.

There are some 969 feeders classified as rural (798 rural-short and 171 rural-long) in the Country Energy distribution network, suggesting that the optimum number of installed protection devices (reclosers and sectionalisers) that should be installed should be around 9,500 devices in the rural network. This compares to the total number of 4,865 reclosers and sectionalisers currently installed, indicating a general deficiency of around 4,500 in recloser and sectionalisers numbers, which will need to be rectified in the medium to long term. On the average another 4 to 5 protection devices will need to be installed on each rural feeder. The poorer performing feeders will require more reclosers and sectionalisers to be installed, on average requiring at least 4 new recloser sites and 2 new sectionaliser sites to be constructed.

Country Energy is of the firm view that the incremental work program for the 100 selected feeders can be adequately resourced given that on relative basis it is not as labour intensive as some of the other initiatives and a significant proportion of the costs involve the purchase of equipment.

Incremental expenditure requirement and general benefits

Country Energy's approach is sound and is based on an assessment of the deficiency of reclosers, particularly in the northern part of the network, and the general condition of hydraulic reclosers currently in service elsewhere. These variables have been used by Country Energy to forecast an incremental asset replacement capital expenditure requirement for this asset class into the future.

Country Energy estimates that the cost of installing a new recloser site is $40,000 and a new sectionaliser site is $15,000. These estimates have been used as an average cost. The average annual cost of this work for each feeder assuming 4 new reclosers and 2 new sectionalisers are installed/replaced is estimated to be $0.19 million.

The total incremental capital expenditure for the advancement of the recloser and sectionaliser new and replacement program for 100 feeders is estimated to be $19 million per annum for the remainder of the current regulatory period. There is no anticipated material increase (or reduction) in associated maintenance costs.

The more extensive program of fitting reclosers and sectionalisers to the rural network will have beneficial impacts in reducing restoration times and the number of customers affected following a fault in the poorer performing regions.

Review the coordination of feeder protection devices

An important related area is distribution protection and coordination. The erroneous operation of feeder protection can be a problem if the feeder protection does not operate, as designed supply restoration can be delayed. Country Energy continually reviews its distributor feeder protection policies and practices.

To ensure appropriate protection coordination, operation and optimum reliability is achieved, for each of the 100 selected feeders a protection coordination review will be undertaken including the calculation of fault levels, equipment and operating coil ratings, protection settings and grading coordination, fuse ratings, and location of fault indicators.

Country Energy has also developed feeder restoration procedures as a means to achieve a low cost and quick reduction in the duration of outages, particularly where experience has shown that it can be difficult to locate a fault or restore supply.

4.1.3 A more rigorous vegetation control program

Trees can interfere with overhead bare conductors leading to supply interruptions to electricity customers. The combination of storms and vegetation has the greatest impact on electricity reliability. Evidence presented in Section 3.2 shows that vegetation initiated outages are a major contributor to customer minutes off supply, resulting from vegetation growing into mains, trees or bark debris being blown into mains, or trees bringing down mains. Many of the 'unknown' causes can be attributed to the interaction of trees and mains.

Consequently vegetation control and the standard of tree clearance is critical to ensuring the reliable operation of Country Energy's network, particularly those parts of the network that have been constructed in areas with high levels of vegetation.

Vegetation management planning and approach

Country Energy has a vegetation management plan in place that is designed to comply with the requirements of the Electricity Supply Act, subordinate legislation and the principles outlined in the industry guide to vegetation management around powerlines ISSC3. The latter specifies the clearances to be maintained between overhead mains and trees to ensure public safety, reliability of the electricity supply, and to minimise the risk of bushfires. Country Energy's current level of vegetation management is generally consistent with good industry practice in order to maintain existing levels of reliability balanced against cost.

The clearing of vegetation from proximity to powerlines has been and will continue to remain an ongoing challenge for Country Energy in terms of improving reliability performance given the predominantly overhead power system. Factors that significantly influence vegetation management requirements and associated costs include:

- State Environmental Planning Policy, Commonwealth protected areas, national parks, state forests and threatened species;
- Climatic conditions such as seasonal rainfall;
- Geographic conditions and location (urban and rural areas);
- Vegetation species and regrowth rates;
- Existing vegetation cover;
- Clearing cycles;
- Cutting criteria;
- Degree of biological control; and
- Individual stakeholder requirements and sensitivities.

Tree clearing requirements are regulated in terms of "clearance at all times". The clearance required between an electric line and trees - "the clearance space" - is about two metres depending on the length of span and other factors. The minimum clearance space is in accordance with ISSC3 guidelines. However, the clearing cycles vary from region to region and depend on the factors listed above.

In urban areas, vegetation is generally cleared on an annual basis to ensure adequate clearances.

For lines in rural areas, Country Energy ensures that vegetation is cleared to the required dimensions at all times on a two or three year cycle. Country Energy undertakes an annual aerial inspection of overhead mains to identify and correct inadequate tree clearances and other defects before the bushfire season.

The majority of vegetation control is outsourced due to the specific nature of this activity and because generally it is more cost efficient to do so. These contracts are competitively tendered. Country Energy works closely with contractors to ensure the efficiency and effectiveness of this activity, and improve stakeholder interface.

Vegetation control in poorer performing parts of the network

Outages due to vegetation are not reducing in the poor performing areas, which is having an impact on reliability.

In some rural areas, the clearance space can be difficult in practice to maintain and vegetation will enter the clearance space between cycles. Many of these areas tend to have an aggressive environment that includes dense vegetation, high regrowth rates, and high rainfall that can drive rapid vegetation growth. There are sometimes difficulties in getting trees trimmed in a timely manner due to other priorities and landholder sensitivities.

In some cases, the original line corridors cut through timbered areas were not cleared to the proper 20 metre width for distribution feeders and large trees that require constant trimming are now present within the corridor. Historically, Country Energy has generally not removed larger trees in the corridor, or removed overhanging limbs in non-bushfire prone rural areas, primarily due to costs. It should be recognised that trees and vegetation from well outside the clearance zone can cause interruptions during storm conditions, even with the most extensive vegetation control.

In recognition of the compliance requirements of the new reliability performance licence conditions, a more focussed and concerted vegetation management program will need to be implemented by Country Energy in poorer performing sections of the network. The incremental program will include the following actions for coastal and inland rural feeders:

- Rigorous clearing of overhanging limbs and canopy across powerlines;
- Tree removal and replacement with more suitable species, and ensuring that tall trees are at a distance from the line equal to their height; and
- Maintenance of an adequate ground line corridor width of 20 metres for distribution lines.

This incremental program will allow vegetation to be controlled on a more manageable and sustainable basis to ensure that it does not encroach between cycles, and assist Country Energy to re-establish the line corridor.

Incremental expenditure requirement and general benefits

Country Energy's current budget for vegetation control in 2005-06 is $18.7 million. Approximately 80% of this cost relates to vegetation control in rural areas.

Country Energy notes from Ergon Energy's Network Management Plan 2004-2010 (available from the Queensland Competition Authority website) that it plans to implement a comprehensive package of preventative vegetation measures involving an investment between $55 million and $60 million each year over the period to 2009-10. The networks operated by Ergon Energy and Country Energy share similar characteristics, particularly in terms of environmental conditions, historical design, and the underlying factors that are faced by the respective organisations in managing and improving supply reliability. Country Energy's northern and coastal areas are very similar to Ergon Energy's in terms of vegetation type and growth, and the frequency of storms. The network assets are similar in age, while Country Energy's distribution network circuit length is some 40% longer.

Consequently, the expectation would be that Country Energy's annual spend on vegetation control should be at a similar level, if not more, if it had access to unconstrained resources.

The incremental cost of implementing the proposed enhanced vegetation works for each of the 100 individual feeders each year will depend on environmental and locational factors that influence the required works and the associated costs. However, typically it is the taller mature trees present on the extremities of the narrow corridors and the overhanging branches on wider corridors, which pose a threat to reliability that need to be addressed in order to make improvements. Country Energy's approach to estimating costs is based on an estimation of the number of trees and the number of overhanging limbs per span that will need to be removed based on experience and local knowledge. The average spend to remove trees and overhanging branches is around $7,875 per km.

The typical poor performing feeder in coastal areas has problems with outages caused by trees generally for its entire length and in inland areas around 30% of the line length is exposed to outages caused by trees. On average $345,000 per year will be needed to be spent on each of the selected 100 feeders to improve tree trimming and eliminate outages due to trees.

The total incremental maintenance expenditure for the implementation of a more rigorous vegetation control program for the annual selected 100 feeders is estimated to be $34.5 million per annum for the remainder of the current regulatory period. There is no anticipated increase (or reduction) in associated maintenance costs.

The more rigorous vegetation control program and increased tree clearing will have beneficial impacts in terms of both the number of outages and the total time off supply each year. A significant improvement could be achieved within one year for each of the feeders selected.

Alternatives to tree trimming in urban areas

In urban areas to reduce the amount and cost of tree trimming, improve reliability performance under high wind conditions, and to meet local community expectations in respect of visual aspects of tree trimming, Country Energy will continue its current program of replacing low voltage bare overhead lines with aerial bundled conductor (ABC) to minimise tree related faults. Placing the reticulation underground is the most effective way to significantly improve reliability in heavily treed areas, however installing underground cables to replace bare overhead conductors can be prohibitively expensive. The cost limits the use of undergrounding to only those parts of the distribution network where reliability is seriously impacted by trees.

4.1.4 Annual aerial patrols of all poor performing distribution and radial subtransmission lines

As mentioned earlier, Country Energy undertakes an annual aerial inspection of overhead mains, generally using fixed wing aircraft, to identify and correct inadequate tree clearances and other defects before the bushfire season. This ensures that tree clearances are such that regrowth will not occur into the clearance space within the bushfire season.

It was noted in Section 3.2 that faults on subtransmission circuits account for around 10% of all customer minutes off supply. There are some 5,780 kilometres of radial subtransmission lines within Country Energy's network.

In order to improve performance, Country Energy has recognised the need to prioritise and undertake a more thorough aerial helicopter inspection and other preparatory works in order to better manage vegetation control and identify defects in rural feeders where the network is performing poorly. The same program will be implemented for radial subtransmission lines. This will enable Country Energy to better manage the identification and correction of inadequate tree clearances and other defects, and to minimise the risks of outages to customers. The aerial inspection of poorer performing feeders and radial subtransmission lines will be carried out in conjunction with the aerial patrol during the pre-bush fire season.

Country Energy is of the firm view that this incremental work program can be adequately resourced using existing external service providers.

Incremental expenditure requirement and general benefits

Country Energy is committed to implementing a program of preventative annual aerial inspections, using helicopters, of poorer performing feeders and radial subtransmission lines.

The total incremental maintenance expenditure for the extension of the annual aerial inspection program to include all poor performing feeders and radial subtransmission lines is estimated to be $2.1 million per annum for the remainder of the current regulatory period and is a recurring cost. There is no anticipated increase (or reduction) in associated maintenance costs. We believe this expenditure to be reasonable and prudent.

The annual program of aerial patrols will have beneficial impacts in terms of both the number of outages and the total time off supply each year. A significant improvement could be achieved within one year.

4.1.5 Live line pole top inspection and maintenance of backbone lines

Asset condition deteriorates over the service life of an asset. Maintenance is intended to ensure that the assets retain their existing capability. Asset inspection criteria and associated maintenance standards (frequency, condition assessment and remedial measurers required) are important to ensure that assets are appropriately maintained. Country Energy's inspection and maintenance practices are comprehensively documented, and depending on the condition of the asset on inspection, different maintenance is carried out.

Country Energy generally inspects all its distribution assets, including pole top components, from the ground every 4 years and undertakes annual aerial patrols in fire prone areas. Pole top structures (including crossarms, insulators, and ties) deteriorate at a greater rate than poles, resulting in a higher condemnation rate. Further, because of the changes in standards over time, there are now a variety of pole top arrangements in service. Some of these arrangements have proven to have reliability problems under specific environmental conditions and due to age.

The type of pole top components used to replace deteriorated components can impact on feeder reliability. For example, both steel and timber crossarms can have

limitations that can impact feeder reliability under certain conditions. Steel crossarms can be susceptible to corrosion in exposed coastal environments and to animal and bird related faults. Timber crossarms are particularly susceptible to dry weather which can remove moisture from a wet timber crossarm, causing the timber to shrink. This loosens the bolts attaching the insulators to the crossarm that may give rise to arcing. On balance, Country Energy has decided to use steel crossarms to replace unserviceable crossarms, normally in conjunction with a timber pole.

Increasing the amount of live line pole top maintenance work carried out

There is further scope to undertake a more extensive program of live line inspection activities focussed on approximately 30 kilometres of the main backbone line of the worst performing feeders in order to clear all pole top maintenance defects, where distribution protection facilities allow these techniques to be employed. Depending on the condition of the equipment found during the live line inspection, pole top maintenance works will then be carried out live such as the replacement of damaged crossarms, tightening of pole top hardware, replacement of other components such as insulators and fitting of pole caps.

This is a new initiative aimed at significantly improving reliability for these feeders. Presently these maintenance activities are identified and rectified as part of the routine ground line inspection and maintenance program using standard techniques. The new initiative is expected to increase the detection rate of pole top maintenance defects on backbone lines for remediation and renewal.

Country Energy is of the firm view that this incremental work program can be adequately resourced using internal resources during overtime periods. Country Energy has made a significant investment in live line working skills, tools and equipment in recent years as a means to improve reliability. It has over 200 qualified live lineworkers (out of a total of approximately 900 lineworkers) across the regions that currently work a total of approximately 45 man-years of work per annum using live line techniques. This represents approximately 4% of total line work that is carried out. There is an opportunity for Country Energy to increase the utilisation of this skilled live line worker resource base. It also has a continual training program to up skill lineworkers to glove and barrier level.

Incremental expenditure requirement and general benefits

Country Energy's analysis shows that an incremental expenditure of $6.9 million per annum is required to undertake live line inspection and maintenance for 30 km of backbone line for each of the 100 feeders on the annual program. This equates to an average investment of a $69,000 per year for each of the low reliability feeders. The estimated cost has been derived based on dedicated live line crews working on weekends and completing eight poles per day.

Country Energy believes that this is justifiable expenditure as it will lead to a more focussed program of maintenance that can be reasonably expected to result in an immediate impact on feeder reliability. The greater use of live line working techniques along the major backbone of rural feeders will not only reduce the number of planned outages required for maintenance purposes, but will also help arrest the significant number of outages resulting from equipment failures and defects as exemplified in Section 3.2.

4.1.6 Interconnection to other rural feeders

Most rural feeders have few, if any, interconnection points to other feeders. There are some short-rural feeders in the network where opportunities exist to build a new tie line and to increase the capacity of the adjacent feeder, through reconductoring, in order to increase transfer capacity. This will enable customers connected beyond a fault to be backfed using an alternative feeder supply.

Incremental expenditure requirement and general benefits

The costs of installing a new interconnection and reinforcement works will depend on the particular feeder and the location of adjacent feeders. Country Energy has estimated the average cost of this work to be $750,000. It is expected that four interconnections will be built each year to address poor performing feeders for a total capital cost of $3 million.

The installation of an interconnection between adjacent feeders will reduce the time required to restore supply to customers impacted by a supply interruption.

4.1.7 Installation of a small rural zone substation

For some of the worst performing circuits there is a limit to the level of reliability that can be achieved without undertaking a major capital investment in the network, particularly where there are other demand and voltage constraints.

In some areas, depending on the availability of an existing subtransmission line, it may be possible to economically construct a smaller sized rural zone substation. Country Energy believes that this strategy provides the best option for reducing the number of customer interruptions for the worst performing feeders, particularly in situations where augmentation is also required to overcome emerging voltage or capacity constraints.

A turn-key approach will be utilised.

Incremental expenditure requirement and general benefits

The cost of establishing an additional new 10 MVA rural zone substation, connected to a nearby existing subtransmission line, is approximately $2.5 million. It is expected that two of these types of substations will be built each year for this purpose at a total capital cost of $5 million.

This strategy is expected to reduce the number of customers affected by a fault by ‘shortening’ feeders, and will reduce the number of interruptions experienced by the worst served customers at the end of a feeder. The additional advantage is the provision of additional capacity for voltage support.

4.1.8 Efficient cost of implementing reliability improvement initiatives

Expenditure allowances included in the 2004 electricity network determination

During the 2004 electricity network pricing review, the Tribunal invited the distributors to present their price-service offerings for the five year regulatory period ending June 2009 in the form of either a base case scenario or, alternatively, in the form of an enhanced scenario.

Country Energy submitted a base case service offering for the current regulatory period. The service offering was predicated on Country Energy continuing to maintain service levels for service reliability and quality in accordance with its published electricity supply standards, while targeting reductions in the mounting level of maintenance backlog, targeting requirements of an ageing asset base, and making generic improvement to the performance of those parts of the network receiving the lowest level of reliability. This would be achieved through the continuation of asset management strategies and programs. Country Energy did not propose a system wide reliability improvement case.

Accordingly, in Country Energy's expenditure submissions to the Meritec and Wilson Cook & Co. total cost review, there was no specific increase in expenditure requirements relating to an enhanced reliability performance service offering. Country Energy did include capital expenditure required for a standard asset replacement and renewal program designed to maintain existing reliability performance, although the service offering did support increased capital and maintenance expenditure in rural areas of the network for the management of backlog maintenance, and an ageing network.

At the time, we believed the asset expenditure was sound and would reasonably be expected to maintain system wide reliability levels. The published service standards at that time represented the level of service that customers would expect to receive on average without Country Energy making any specific additional expenditure to improve network service performance over the period.

Incremental expenditure requirements

In accordance with the new licence conditions, there is a requirement for the reliability of the lowest reliability feeders to be improved. Country Energy has described a package of initiatives that it will need to implement on 100 feeders each year. Country Energy has considered trade-offs between operating and capital expenditure in order to optimise efficiencies.

Table 8 shows the required reliability improvement initiatives and Country Energy's forecast of associated incremental expenditure (in current dollar terms) for the current regulatory period to 2009.

$ million (real 2005-06)	2006-07	2007-08	2008-09
Incremental capital expenditure			
Replace bare conductor	52.5	52.5	52.5
New and replacement reclosers and sectionalisers	19.0	19.0	19.0
Installation of new rural zone substations	5.0	5.0	5.0
Installation of interconnection to other feeders	3.0	3.0	3.0
Total capital expenditure	79.5	79.5	79.5
Average capital expenditure investment per feeder	0.795	0.795	0.795
Incremental operating expenditure			
Enhanced vegetation management	34.5	34.5	34.5
Live line pole top maintenance	6.9	6.9	6.9
Annual aerial inspection	2.1	2.1	2.1
Total operating expenditure	43.5	43.5	43.5
Average operating expenditure investment per feeder	0.435	0.435	0.435

Table 8 - Country Energy forecast of incremental expenditure 2006-07 to 2008-09 for full compliance to reliability standards

The forecast incremental maintenance program for the regulatory period represents our best estimates derived on a reasonable basis.

The reliability improvement can be achieved at an average total real cost of around $1.23 million per feeder. The total incremental real cost of implementing these strategies is $79.5 million per annum in capital expenditure and $43.5 million per annum in operating expenditure. This represents additional costs to Country Energy that were not allowed for in the 2004 electricity network determination.

4.1.9 Continuation of existing ongoing asset management programs

Country Energy plans to continue its other existing asset management programs to maintain reliability performance where technically and economically feasible. These programs include:

- Replacement of bare low voltage mains with aerial bundled conductor or undergrounding in urban areas;
- Installation and replacement of fuses and surge protection;
- Installation of fault indicators in strategic locations along rural feeders;
- Installation of animal and bird proofing for high voltage structures;
- Improving the accessibility to lines in remote areas;
- Replacement of obsolete equipment;
- Mitigation of pollution and salinity problems in certain geographic areas;
- Eliminating defect backlog maintenance;
- Increasing the number of standby assets;
- Increasing the penetration of remote control high voltage switches;
- Increasing the degree of segmentation, through the installation of additional isolation switches;
- Making equipment and material changes to address component types with high incidence of faults;
- Utilising mobile generators and substations;
- Using emergency call response and outage management; and
- Promoting new technologies to reduce the impact of electricity outages.

Country Energy has a good record of restoring supply to customers following an interruption. This is reflected in the average CAIDI indicator. The strengthening of local presence by Country Energy in rural and regional areas has been a key factor in this success. Since forming in July 2001, Country Energy has opened over 30 new customer service and field service centres across the network. This initiative has resulted in part from a review of the number and location of fault response crews across the network in areas known for long fault response times. The new field service centres enable local staff to be utilised in remote locations to reduce the travel time associated with attending and repairing faults in rural areas. This program will be continued in the future provided it can be carried out in a low cost way. Country Energy will continue to evaluate opportunities to establish new field service centres.

Long term major improvements in rural network reliability would require Country Energy to address fundamental design standards, network configuration, and limitations of the current rural distribution system.

4.2 Subtransmission line reinforcement program

4.2.1 The subtransmission network

The subtransmission network refers to the electrical network used for the distribution of electricity at high voltages of 132 kV, 110 kV, 66 kV and 33 kV. Country Energy's subtransmission system is extensive with a total line length exceeding 10,500 kilometres supplying more than 320 zone substations.

4.2.2 Compliance with the new licence conditions for network planning

The new licence condition in relation to planning criteria is outlined in Section 1.4.

Country Energy currently complies with the requirements of the new planning criteria for subtransmission feeders in urban and non-urban centres with loads less than 15 MVA.

The new licence conditions will impact on Country Energy in two broad situations; radially fed loads where the load exceeds 15 MVA, and ring fed loads where one of the network elements is not rated for the total load.

- Country Energy has some 217 radial subtransmission lines with a total line length of 5,790 kilometres. The majority of these lines connect to zone substations that supply loads below 15 MVA. The total radial line length supplying loads greater than 15 MVA is 628 kilometres.

- Country Energy has 4,749 kilometres of subtransmission line that are configured as ring feeders. In this total length, there are some 603 kilometres of subtransmission line where current loading exceeds the emergency rating of the line under an N-1 contingency.

Country Energy's own planning criteria requires an N-1 security of supply for the subtransmission network for all loads exceeding 15 MVA, however there is a backlog of work required to be carried out to meet this requirement. Actions can be taken by Country Energy to remedy this situation. These strategies and actions are discussed in the following sections.

4.2.3 Required subtransmission line reinforcement program

Expenditure allowances included in the 2004 electricity network determination for growth related requirements

Country Energy forecast capital expenditure in its initial 2003 submission to the 2004 electricity distribution price review was based on maintaining reliability and security of supply levels.

The initial submission highlighted the significant backlog in subtransmission capital works required to improve reliability or address those subtransmission lines that exceeded the N-1 criteria for loads greater than 15 MVA. The initial submission identified a total of $440 million of subtransmission and zone substation work. At the time, it was assessed by Country Energy that it could not complete all the identified works due to resource constraints and the full program of subtransmission lines for loads exceeding 15 MVA was not included in the current regulatory period.

Following the release of the draft determination, Country Energy submitted that it had identified extra resources and requested an additional $75 million over the current regulatory period in order to advance the planned (backlog) of subtransmission works to alleviate emerging constraints in its network.

At the time, we believed this asset strategy to be a realistic and practical approach to growth and security of supply related requirements, and would ensure the continuation of sensible capital investment in the subtransmission network taking into consideration value for all stakeholders in maintaining existing security of supply levels.

Wilson Cook and Co. reviewed this request and in its draft report wrote[1]:

> "3.4 Country Energy
>
> *Capex*
> CE advised us of its proposed adjustments in capex should MMA's forecast be adopted in IPART's final determination. In essence its adjustment comprised the advancement of subtransmission works to the extent of $75 million over the regulatory period. We noted that that amounted to an increase of 6.8% in the $1.1 billion of total capex proposed by CE in 2003 for the same period.
>
> *Alleviation of Resource Constraints*
> CE noted that its ability to undertake the full scope of potential works identified in its 2003 submissions had been constrained by its resources and that this had been a factor in determining a reasonable level of capex in that review. It advised us that various resource constraints had now been alleviated – it cited the availability of outside contractors that had previously not been expected to be available – and it advised us that it had already increased the rate of its expenditure on sub- transmission works as a result. However, we retained the same concern as Meritec in respect of CE's resource capability, taking into account the time that will be required for it to gear up for an expanded investment programme, and took the view that the magnitude of additional expenditure proposed might not be able to be achieved in the time frame.
>
> *Prioritisation of Work*
> Notwithstanding any resource constraints we separately noted that further additional expenditure is to follow after 2008/09 but at a significantly lower level – $5 million p.a. instead of the $15 million p.a. proposed during the regulatory period. We questioned the difference between these rates of spending and noted the reason given by the company – the need for short-term alleviation of network constraints. Our view, however, was that the removal of constraints was (or should have been) prioritised and reflected in the 2003 estimates already and thus that there was reduced justification for advancement of the additional expenditures on that ground.
>
> *Conclusion*
> Considering these two factors we accepted that additional expenditure would be required under the higher-growth forecasts and that it was correctly identified as sub-transmission related; but we rejected the prioritisation argument and opted, instead, for a more balanced spread of expenditure over the coming ten years. We therefore decided that the additional expenditure agreed to as reasonable and efficient should be reduced to an annual rate of $10 million p.a. in the regulatory period – a total of $50 million compared with the company's request of

[1] Wilson Cook & Co., Review of Revised Operating and Capital Expenditures of DNSPs (Draft Report), April 2004, pages 12-13.

> $75 million – and increased to $10 million p.a. in the subsequent five years instead of being weighted so heavily in the coming regulatory period.
>
> In reaching our conclusion we noted that the rate of application of capital per unit of growth reduced under MMA's higher-growth forecast as follows:
>
> - Dollars of investment per MWh of growth under CE's medium-growth forecast: $443;
> compared with
> - Dollars of investment per MWh of growth under MMA's (higher) forecast: $421.
>
> As in the previous cases the comparison shows a favourable movement and thus gave us an added level of comfort in our conclusion."

However this statement of reasonableness and the recommended additional annual $10 million increase in subtransmission related capital expenditure was not translated to the Wilson Cook & Co final report, in which Wilson Cook indicated that it was not supportive of the additional capital expenditure due to the following reasons[2]:

- A lack of definition in the expenditures needed to match load growth in the high growth areas referred to.
- A lack of new information or circumstances, other than the relief of resource constraints, to warrant the work. As new factors did not appear to be the driver of the further investment requested, Wilson Cook presumed that the most important works were (or should have been) prioritised and allowed for adequately in Country Energy's original capital expenditure projections.
- Reservations about the extent to which resource constraints have actually been relieved and the speed with which the DNSP could gear up for, and implement the increased levels of construction work entailed.

The subtransmission capital works backlog

As a result, the additional annual $10 million in subtransmission capital expenditure that was originally supported by Wilson Cook & Co. in its draft report was not included in its final report and the IPART determination of capital expenditure requirements for Country Energy. Consequently this work has not been carried out and has added further to Country Energy's backlog of subtransmission line capital work, which will need to be rectified in order to enable it to achieve the requirements of the new licence conditions.

4.2.4 Efficient cost of implementing the incremental subtransmission reinforcement program

Following the release of the new licence conditions, Country Energy undertook a review to identify the specific projects needed in order to comply with the new planning criteria. Country Energy presently has $120 million of subtransmission capital works that will be necessary if Country Energy was required to comply with the new requirements by 1 July 2009 and resources to complete the work were readily available. This is the minimum level required in order to meet required N-1 criteria. Of this, $30 million was included in the current determination and will be completed by Country Energy over the remainder of the current regulatory period.

[2] Wilson Cook & Co., Review of Revised Operating and Capital Expenditures of DNSPs (Final Report), May 2004, pages 22.

The remaining $90 million will need to be completed by Country Energy as part of the incremental capital works program in order to comply with the new licence conditions.

In order to initiate the incremental subtransmission line reinforcement program, Country Energy has increased its capital works program in the current financial year by bringing forward some of the subtransmission line work required to meet the licence requirements. In general, work to be completed during 2005-06 will be of a low cost nature involving line route identification, environmental assessments and community consultation. This preparatory work will allow a major step increase in capital expenditure to the end of the regulatory period.

4.3 High voltage distribution network reinforcement program

4.3.1 The high voltage distribution network

The distribution network refers to the electrical network used for the distribution of electricity at high voltages of 11 kV, 22 kV, 33 kV, 12.7 kV SWER and 19.1 kV SWER, and low voltage of 240/480 and 240/415 volt.

Country Energy's distribution network planning and capital investment framework has been driven more by technical drivers than pure economic drivers.

Urban areas

Many parts of the high voltage distribution system, in particular in urban areas, although constructed generally as meshed systems, are operated as single radial feeder systems by using manually-operated normally open points in the mesh. Following a fault, supply can be restored within some switching time. The normally open points reduce the amount of equipment exposed to failure on any feeder circuit, and ensure that, in the event of a system failure, or during scheduled maintenance periods, the normally open points can be closed and another opened in order to minimise the total load that is disconnected. A customer connected to any part of a feeder requires all components between their connection point and supply point to be operating. Series components may include overhead bare conductor lines, underground cables, protective devices, air break switches and the like. In practice, complete loss of supply can occur for a fault anywhere within the feeder protection zone. After the fault has been located and isolated, supply can be restored to all customers before the fault isolation point. Customer loads beyond the fault isolation point can only be restored after the faulty component has been repaired, unless tie facilities are available to transfer the load to an adjacent feeder. This is typical of distribution systems supplying low to medium density areas.

- *Commercial centres*

  The most common form of network configuration supplying commercial centres of larger regional cities and towns consists of a radial high voltage feeder with a series of manually switched ring main units (RMU) supplying distribution substations of various sizes. Substations supplying commercial loads are typically fitted with one or two transformers. The system typically has tie points to other high voltage feeders. Feeders in these medium density areas are typically underground, which provides high reliability due to an extremely low outage rate. A similar configuration with primarily overhead feeders is typically provided for heavy industrial areas, hospitals and major shopping centres. In general, an

underground meshed network is only justified in city commercial business centres where there is high density load requiring high security and reliability of supply.

Typically meshed networks provide a strong supply system with low source impedance. This results in relatively few network dips or supply quality problems. Multi-feeder networks may be used in other areas of high load density, or for critical loads.

- *Urban residential areas*

For urban residential areas, the network configuration varies and is generally radial with underground and overhead sections depending on housing estate requirements. Due to the density of load, alternative high voltage supply from adjacent feeders is fairly common and is generally arranged as a loop-in loop-out configuration. Substations supplying residential loads are typically fitted with a single transformer and are located fairly close together. Alternative high and low voltage supply is manually switched. For pole mounted transformers, a tee-off from an overhead or underground feeder is the normal arrangement (no alternative high voltage supply). Reliability, voltage and ratings are generally not a problem, but loads are generally higher in new underground estates.

- *Urban industrial areas*

For urban industrial areas, load densities can vary considerably, from warehouses with virtually no load to major factories. For large point loads there is typically a customer distribution substation and a dedicated feeder network from a zone substation. Loads falling into this category include large factories, process plants, major shopping centres and hospitals. The arrangement and redundancy provided in customer substations varies in accordance with customer requirements. For light industry and commercial, these areas are fed from radial overhead and underground networks with fused or RMU supply to distribution transformers. Feeders are generally 5 km long.

Short-Rural areas

For rural residential supply in expanding areas, which are typically located on urban fringes and in rapidly developing areas, the existing network is typically an old rural overhead high voltage feeder which may have been upgraded in capacity to meet the expanding load. The configuration is typically radial with limited alternative high voltage supply. As mentioned earlier in this submission, the impact of a radial network is the occurrence of outages on occasions with supply being restored within some switching time. Repair times are generally longer due to distances involved. Sometimes there is some network flexibility where parts of the network will be able to be transferred so that only a small portion of the load will not be able to be restored. The real problem with backup in rural areas is more often voltage rather then current rating and the issue then becomes more the maintenance of voltage during the load transfer period. Consequently voltage regulation can be a problem and as previously discussed in Section 1.2, reliability performance is generally poorer in the short-rural and long-rural parts of the network.

Long-Rural areas

For rural remote customers, these areas are typically characterised by extremely long feeders in locations that are not rapidly growing. Feeders are exclusively radial

and of overhead construction. Feeder ties and as such alternative high voltage supply in many cases is non-existent. Conductors are generally of steel and although loads may not be large the distances can be enormous (> 400-500 kilometres of total route length). It is not uncommon to find SWER systems servicing more remote regions.

4.3.2 Compliance with the new licence conditions for network planning

The new licence condition in relation to planning criteria is outlined in Section 1.4.

Country Energy currently complies with the requirements of the new planning criteria for distribution feeders in urban centres with populations less than 15,000 and in non-urban areas. Country Energy also complies with the requirements relating to distribution substations in urban and non-urban areas.

However in some urban centres, with populations greater than 15,000, Country Energy does not currently comply with the new planning criteria. Actions can be taken by Country Energy to remedy this situation. These strategies and actions are discussed in the following sections.

4.3.3 Required high voltage distribution network reinforcement program

After careful consideration of the new licence conditions and the current network configuration in the 19 regional centres with populations exceeding 15,000, Country Energy has developed a specific network reinforcement program as detailed below. On the basis of the availability of resources to carry out the works, significant augmentation will be required in order to comply before the end of the current regulatory period.

The specific elements of this program include:

- Construction of new or the capacity uprating of existing urban distribution feeders directly out of existing zone substations (‘zone substation feeder’);
- Extension of existing urban distribution feeders to provide interconnection with other urban feeders of sufficient capacity to create a meshed network (‘urban interconnection’); and
- Extension and capacity uprating of existing urban feeders through reconductoring to provide sufficient transfer capacity in order to provide alternative supply and interconnection to existing radial urban feeders (‘urban radial feeder’).

These strategies aim to provide sufficient capabilities in the specific urban areas for an applicable N-1 contingency scenario.

The ‘zone substation feeder’ strategy is designed to increase capacity out of zone substations where thermal ratings will exceed current design capability.

The ‘interconnection’ and ‘urban radial feeder’ strategies are interwoven with asset redundancy. Redundant assets are those assets that are effectively under utilised whenever the network is operating normally. They provide capacity or interconnection support as part of contingency management during an outage or following the failure of some other assets. Depending on the nature, configuration and switching arrangements of redundant assets, they could mean that the outage is not actually seen by any customers, they enable many more customers to be restored rapidly by switching operations (rather than being interrupted until the fault is

repaired), and they accelerate the restoration process. In other words, redundancy can reduce the frequency, duration and the extent of the customer outage. In the past the construction of urban distribution ties, where they did not previously exist, has been achieved (in the medium to longer term) through urban fringe housing estate works. In some cases, ties can be technically and economically justified in rural areas on the basis of reliability improvement as discussed in Section 4.1.6.

The Country Energy program and estimation of costs is based on actual projects to be completed. Individual projects have been identified and costed. Comparisons were made between existing capability and the required N-1 security performance requirements of the major distribution networks in major regional centres. This process produced the related network augmentation and reinforcement projects.

4.3.4 Efficient cost of implementing the required distribution reinforcement program

Country Energy's estimate of efficient costs to fully comply with the new licence condition for distribution network planning criteria is provided below. The specific targeted opportunities developed by Country Energy for improving and complying with the new security of supply requirements of the new licence condition for population centres greater than 15,000 is provided together with the estimated kilometre length of feeders that will require augmentation or new construction for each of the three strategies. This is the minimum level required in order to meet required N-1 criteria and has been spread over the remaining three years of the regulatory period for the full compliance program.

Regional areas and centres with population > 15,000	Zone substation feeder work		Urban interconnector work		Urban radial feeder work		Total capex
	km	$m	km	$m	km	$m	$m
	395	37.5	155	10.0	130	15.0	**62.5**

Table 9 – Full compliance program to provide N-1 security of supply for distribution feeders in major regional centres

Expenditure allowances included in the 2004 electricity network determination for distribution growth related requirements

In Country Energy's submission to the 2004 total cost review undertaken by Wilson Cook and Meritec for IPART, distribution growth related programs were detailed for each major category of asset.

The strategy was primarily focussed on the growth areas of the northern and southern coastal corridors and the larger regional centres, where new construction or augmentation would be required arising from:

- increasing load growth in these areas;
- greater urbanisation of rural areas; and
- increasing use of energy intensive plant and equipment by customers.

Prior to this, a large proportion of demand growth had not necessitated significant augmentation and reinforcement of the existing network. The previously submitted

program was designed to meet this continued demand growth or where the utilisation of existing assets was approaching accepted maximum levels.

The submitted program to the 2004 total cost review did not include the construction of new assets or augmentation of existing high voltage distribution assets to improve security of supply to an N-1 capability within major urban distribution networks. Expenditure on growth over the current regulatory period was predicted to remain relatively constant, despite some variability in customer numbers and demand growth over this period.

4.4 Incremental investment for full compliance works program

Country Energy has tabled below the investment programs and the level of capital and maintenance expenditure that will be required for the remainder of the current regulatory period to 2009 based on its compliance assessment of the new licence conditions. The proposed expenditures would need to be reviewed in light of these obligations.

$ million (real 2005-06)	2006-07	2007-08	2008-09
Incremental capital expenditure			
Subtransmission lines N-1	30.0	30.0	30.0
Distribution feeders N-1	20.8	20.8	20.8
Under performing rural distribution feeders	79.5	79.5	79.5
Replace bare conductor	*52.5*	*52.5*	*52.5*
New and replacement reclosers and sectionalisers	*19.0*	*19.0*	*19.0*
Installation of new rural zone substation	*5.0*	*5.0*	*5.0*
Installation of interconnection to other feeders	*3.0*	*3.0*	*3.0*
Total incremental capital expenditure	130.3	130.3	130.3
Incremental operating expenditure			
Under performing rural distribution feeders	43.5	43.5	43.5
Enhanced vegetation management	*34.5*	*34.5*	*34.5*
Live line pole top maintenance	*6.9*	*6.9*	*6.9*
Annual helicopter aerial inspection	*2.1*	*2.1*	*2.1*
Total incremental operating expenditure	43.5	43.5	43.5
Total incremental expenditure	173.8	173.8	173.8

Table 10 - Country Energy forecast of incremental expenditure 2006-07 to 2008-09 for a full compliance works program

Full compliance can be achieved at an incremental real cost of $130.3 million per annum in capital expenditure and $43.5 million per annum in operating expenditure. The total incremental real cost for the remaining three years of the regulatory period is estimated to be $521.4 million.

We believe the required incremental expenditure for full compliance to be representative of an efficient level of expenditure, and it can be expected to deliver the benefits suggested. It represents additional costs to Country Energy that were not allowed for in the 2004 electricity network determination. Country Energy prepared its submission to the 2004 review on the basis that the existing levels of supply reliability would be maintained to the end of the current regulatory period. An enhanced service offering was not offered.

5. Phased works program

Country Energy has developed an incremental phased program of works, subject to changes of emphasis in the licence conditions. The works program is matched to current availability of resources and prioritises the implementation of key initiatives that are expected to provide the greatest gains in terms of improvements in reliability and security of supply to 2009.

During the period to 2009, it will be our objective to continue to recruit and build an adequate resource base to complete the required works.

Internal and external resources

Country Energy Networks employs a mixture of in-house and externally contracted labour resources for the provision of asset management services. An internal Service Delivery business unit supports the Networks business structure.

The training and retention of skill levels in the rural electricity distribution industry is of vital concern to Country Energy, and a key consideration is the resourcing of activities outside the business. It is our view that there needs to be a balance struck between the use of in-house technical expertise and contracting external services in order to retain ongoing knowledge of both the condition and maintenance requirements of the assets.

In-house resources are retained primarily for core asset inspection and maintenance work, fault finding and repair functions, and internally funded distribution construction works. The internal Country Energy Service Delivery business unit maintains all assets outside of zone substations and manages the major asset inspection, maintenance and vegetation management, and internally funded distribution capital works. This resource base has been multi-skilled and developed to deliver a range of functions in constructing, maintaining, and operating a rural network. Country Energy has in place apprentice recruitment and training programs that will supplement existing labour resources in the future.

For some maintenance and inspection activities, Country Energy's in-house resources are supplemented by external resources to handle peak work demands or undertake more specialised tasks such as asset inspection and vegetation control. Vegetation control is primarily outsourced due to the specific nature of this work activity and the specialist skills involved.

5.1 Rural feeder reliability remediation program

In Section 4.1, Country Energy described the preventative initiatives to address the major causes of faults in poor performing areas in order to improve performance to achieve the new licence condition standards for reliability.

To match available resources, Country Energy would downsize its proposed incremental work programs for the bare overhead conductor replacement and vegetation control initiatives, as described below. Country Energy would fully implement all the other rural feeder remediation initiatives described in Section 4.1. This phased program would be achieved through a mix of internal and external resources.

Bare overhead conductor initiative

In section 4.1.1, Country Energy has outlined a strategic approach involving the implementation of an expanded overhead line (and pole top structure) replacement program in order to comply with the new licence conditions. To achieve this outcome, Country Energy will need to increase the current overhead line replacement program by some 1,500 kilometres for an overall replacement rate of around 2%. However, to match the resource base, the phased program involves the replacement of on average 5 kilometres of conductor and the associated pole structures (including poles, crossarms, insulators, and ties) where unserviceable on each of the 100 selected feeders. Reconductoring and interpoling would be carried out for an additional annual total of 500 kilometres for the 100 selected feeders. Country Energy believes that the phased program can be adequately resourced.

The phased program will increase the total average replacement expenditure across the overhead line asset class from around 1.05% of the line length per annum to around 1.5%, a value that moves the overhead line replacement rate closer to the expected long term average.

The average annual cost of this work for each feeder on the average basis of 5 km of the backbone line to be replaced is estimated to be $0.175 million.

The total incremental capital expenditure of the modified resource matched program for the advancement of the replacement of bare conductor and pole top components for 100 feeders is estimated to be $17.5 million per annum for the remainder of the current regulatory period. There is no anticipated material increase (or reduction) in associated maintenance costs.

Vegetation control initiative

In Section 4.1.3, Country Energy described a program involving an extensive program of more rigorous clearing of overhanging limbs and canopy across powerlines, tree removal, and the maintenance of an adequate ground line corridor for the 100 selected coastal and inland rural feeders in order to comply with the new licence conditions.

In the phased program, Country Energy will focus on the major backbone lines of 100 selected feeders in inland areas, representing on average of around 30 km of line per feeder, and 80% of the line length in coastal areas, representing on average around 30 km of line length that has significant problems with trees.

Country Energy believes that the extra resources to undertake this incremental vegetation control program for 100 feeders each year can be acquired using external service providers. We believe that external service providers to be the most efficient means of delivering the proposed program.

An increase in maintenance expenditure will be required in order to maintain an appropriate level of sustainable vegetation control to move towards the new reliability standards. On average $240,000 per year will need to be spent on each of the selected 100 feeders. The total incremental maintenance expenditure for the implementation of the modified incremental vegetation control program for the 100 selected feeders is estimated to be $24 million per annum for the remainder of the

current regulatory period. There is no anticipated increase (or reduction) in associated maintenance costs.

We believe this expenditure to be reasonable and prudent in light of similar programs implemented by other like distributors.

Incremental expenditure requirements for a phased rural reliability remediation program

Subject to a change in emphasis in licence conditions, Country Energy has described a downsized package of initiatives that it would implement on 100 feeders each year. The program is expected to lead to a significant improvement in performance to the poorest served customers.

Table 11 shows the reliability improvement strategies and Country Energy's forecast of associated incremental real expenditure for the current regulatory period to 2009.

$ million (real 2005-06)	2006-07	2007-08	2008-09
Incremental capital expenditure			
Replace bare conductor	17.5	17.5	17.5
New and replacement reclosers and sectionalisers	19.0	19.0	19.0
Installation of new rural zone substations	5.0	5.0	5.0
Installation of interconnection to other feeders	3.0	3.0	3.0
Total capital expenditure	44.5	44.5	44.5
Average capital expenditure investment per feeder	0.45	0.45	0.45
Incremental operating expenditure			
Enhanced vegetation management	24.0	24.0	24.0
Live line pole top maintenance	6.9	6.9	6.9
Annual aerial inspection	2.1	2.1	2.1
Total operating expenditure	33.0	33.0	33.0
Average operating expenditure investment per feeder	0.33	0.33	0.33

Table 11 - Country Energy forecast of incremental expenditure 2006-07 to 2008-09 for a phased reliability remediation program

The forecast incremental maintenance program for the regulatory period represents our best estimates derived on a reasonable basis. The initiatives have been analysed by Country Energy and represent the appropriate options for reducing the number and duration of interruptions for the worst performing circuits. Application of these initiatives will result in significant immediate improvement in performance.

The total incremental real cost of implementing these strategies is $44.5 million per annum in capital expenditure and $33 million per annum in operating expenditure. This represents additional costs to Country Energy that were not allowed for in the 2004 electricity network determination.

5.2 Subtransmission line reinforcement program

As discussed in Section 4.2, in order to comply with the requirements of the new licence condition relating to network design and security for subtransmission lines, it will be necessary for Country Energy to increase its total capital expenditure by $90 million for the remainder of the current regulatory period.

Country Energy has access to the necessary resources to successfully implement the program. For subtransmission capital projects, Country Energy has adopted an EPC 'turn-key' contracting/resourcing practice for major subtransmission capital works. In our previous submission to the 2004 determination, forecasts for subtransmission related capital were deliberately 'limited' to align with the availability of resources to complete the necessary works. That issue has now been resolved and will enable Country Energy to contract out and complete more projects. This approach of using external resources is expected to enable Country Energy to undertake and complete the necessary incremental projects over the regulatory period.

Subtransmission line capital works often involve long lead times due to environmental and community concerns. The phased works program takes into account the expected delays in procuring easements. It is expected that 75% of the required subtransmission line work as described in Section 4.2.4 will be completed to 2009 at an additional cost of $60 million or $20 million per annum. A ‘turn-key’ approach will be adopted. This program of work was rejected by Wilson Cook & Co., during the recent 2004 total cost review, even though the expenditure forecasts were aligned with capabilities to complete the necessary works as they are now.

Country Energy expects to commence a large number of these projects during 2005-06. This will allow many of the easements to be procured during 2006-07 and construction works to commence during 2007-08.

5.3 High voltage distribution network reinforcement program

As discussed in Section 4.3, in order to comply with the requirements of the new licence condition relating to network design and security for high voltage distribution networks, it will be necessary for Country Energy to increase its total capital expenditure by $62.5 million for the remainder of the current regulatory period.

Striking an appropriate balance between expenditure requirements, outsourcing and internal resource management will ensure long term reliability and security of supply. As part of a medium term strategy to ensure appropriate levels of internal resources are recruited and skilled up to meet the resource demands of our future investment program, Country Energy has implemented a successful apprenticeship program which has seen more than 350 new apprentices start with Country Energy since 2001 across the network, covering a wide range disciplines such as line work, electrical technicians, underground cable jointers, and communications. Many of the apprentices will be graduating into positions across the network. Country Energy is planning a fresh intake of 72 apprentices during the current financial year.

The phased works program takes into account the expectation that Country Energy’s current apprenticeship recruitment program would provide an adequate resource base in the future to enable Country Energy to complete the required urban distribution network reinforcement works for all regional centres with populations greater than 15,000.

Consequently the incremental subtransmission capital works and the completion of the modified rural feeder remediation works program would be the focus of Country Energy over the current regulatory period to 2009.

5.4 Incremental investment for a phased works program

Country Energy has tabled below the incremental real capital and maintenance expenditure for a phased program of works, subject to changes of emphasis in the licence conditions.

$ million (real 2005-06)	2006-07	2007-08	2008-09
Incremental capital expenditure			
Subtransmission lines N-1	20.0	20.0	20.0
Distribution feeders N-1	0.0	0.0	0.0
Under performing rural distribution feeders	44.5	44.5	44.5
Replace bare conductor	*17.5*	*17.5*	*17.5*
New and replacement reclosers and sectionalisers	*19.0*	*19.0*	*19.0*
Installation of new rural zone substation	*5.0*	*5.0*	*5.0*
Installation of interconnection to other feeders	*3.0*	*3.0*	*3.0*
Total incremental capital expenditure	64.5	64.5	64.5
Incremental operating expenditure			
Under performing rural distribution feeders	33.0	33.0	33.0
Enhanced vegetation management	*24.0*	*24.0*	*24.0*
Live line pole top maintenance	*6.9*	*6.9*	*6.9*
Annual helicopter aerial inspection	*2.1*	*2.1*	*2.1*
Total incremental operating expenditure	33.0	33.0	33.0
Total incremental expenditure	97.5	97.5	97.5

Table 12 - Country Energy forecast of incremental expenditure 2006-07 to 2008-09 for a phased works program

New investment in the network should not exceed the amount that would be invested by a prudent service provider, acting efficiently, in accordance with accepted good industry practice, and achieving the lowest sustainable cost of delivering services. Country Energy believes that the amounts as proposed are consistent with a robust, realistic and prudent asset management planning, and resource capabilities.

A phased works program can be implemented at an incremental real cost of $64.5 million per annum in capital expenditure and $33.0 million per annum in operating expenditure. The total incremental real cost for the remaining three years of the regulatory period is estimated to be $292.5 million. This represents additional costs to Country Energy that were not allowed for in the 2004 electricity network determination.

Country Energy is confident that it can complete the works program as it is soundly based from an engineering and resource capability perspective. The implementation of this program is expected to deliver general improvements in the reliability and security of supply during the remainder of the current regulatory period.

5.5 Further consultation with DEUS

Country Energy is currently discussing with DEUS the full compliance works program and its position in relation to the availability and recruitment of resources to implement the required works programs. During recent discussions with DEUS, Country Energy has proposed a change in the required timeframe for compliance extending the period to 2014.

6. Customer Service Standards Specific Pass Through Event

6.1 Overview

The Minister for Energy and Utilities introduced the new licence condition '*Design, Reliability and Performance Licence Conditions Imposed on Distribution Network Service Providers'* on 1 August 2005. Included in this licence condition were a set of customer service standards (CSS) that must be met by distributors in providing distribution network services to customers. The imposition of the CSS has triggered a specific cost pass through event under the Independent Pricing and Regulatory Tribunal's (the Tribunal's) '*NSW Electricity Distribution Pricing 2004/05 to 2008/09 Final Determination*' (the Determination).

A common message received from our customers is that reliability in the poorer performing service areas should improve. Consequently the improvement of reliability in Country Energy's rural network forms a key focus of our full compliance works program as detailed in Section 4.1.

6.2 Details of Specific Pass Through Event

Condition 17 of the licence conditions sets out the obligations imposed on Country Energy in relation to CSS, while Schedule 5 of the licence conditions sets out the CSS thresholds that will trigger a customer payment under condition 17.

Interruption Duration Standards

Condition 17.1 sets out the requirements for the interruption duration standards and states that:

'A licence holder must pay the sum of $80 (including GST) to a customer where the licence holder exceeds the interruption duration standard at the customer's premises…'

Table 13 below shows the interruption duration standards relevant to Country Energy customers as set out in Table 1 of Schedule 5.

Type of area in which customer's premises is located	Interruption duration standard (hours)
Non-metro urban	18
Non-metro rural	24

Table 13: Interruption duration standards

Interruption Frequency Standards

Condition 17.2 sets out the requirements for interruption frequency standards and states that:

'A licence holder must pay the sum of $80 (including GST) to a customer where the licence holder exceeds the interruption frequency standard at the customer's premises in a financial year…'

Table 14 below shows the interruption frequency standards relevant to Country Energy customers set out in Table 1 of Schedule 5 is as follows:

Type of area in which customer's premises is located	Interruption frequency standard (number of interruptions)	
	From 1 July 2006 to 30 June 2008	After 1 July 2008
Non-metro urban	12	9
Non-metro rural	20	15

Table 14: Interruption frequency standards

Definitions and Exclusions

The definitions applicable to the areas in which the customer's premises are located can be found in condition 19 of the licence conditions.

Non-metro urban is defined in the licence conditions as '*any urban area outside of the Greater Sydney Metropolitan Area with a population exceeding 5,000.*' Non-metro rural is *'all areas outside of the Greater Sydney Metropolitan Area other than non-metro urban areas*.'

Clause 3 of Schedule 5 also sets out of the types of interruptions that are excluded in calculating the interruption duration and frequency standards. Clause 3 of Schedule 5 states that:

> *'In calculating the interruption duration standard or the interruption frequency standard the following types of interruptions (and no others) are excluded:*
>
> *(a) an interruption of a duration of one minute or less;*
>
> *(b) an interruption resulting from the following external causes:*
>
> *(i) a shortfall in generation;*
>
> *(ii) a failure or instability of the shared transmission system;*
>
> *(iii) a request or direction from the State Emergency Service; or*
>
> *(iv) a failure of another licence holder's distribution system.*
>
> *(c) a planned interruption;*
>
> *(d) an interruption within a region in which a natural disaster has occurred and:*
>
> *(i) the Minister responsible for administering the State Emergency Service Act has notified the Commonwealth of the occurrence of an eligible disaster under the Natural Disaster Relief Arrangements in respect of that natural disaster for that region; and*
>
> *(ii) the interruption occurred during the period for which the Natural Disaster Relief Arrangements have been notified.*
>
> *(e) an interruption caused by a storm which is categorised by the Bureau of Meteorology as a "severe storm".*

(f) *an interruption caused by third party actions other than animal or vegetation interference (e.g. vehicle-hit-pole, vandalism) where the interruption is not also caused by any failure of the licence holder to comply with relevant plans, codes, guides or standards (e.g. low conductor clearance).'*

Limits on Annual Number and Level of Payments

Conditions 17.5 and 17.6 of the licence conditions limit the total amount of payments that can be made to each customer per premise. Condition 17.5 states that *'A licence holder is required to make only one payment of $80 to a customer per premises in a financial year for exceeding the interruption frequency standard*', while condition 17.6 limits the amount of annual payments to any one customer per premise to $320.

Commencement and Communication Requirements of Licence Conditions

The requirements under condition 17 take effect from 1 July 2006, except for condition 17.4. Condition 17.4 stipulates the requirement for Country Energy to annually make customers aware of the availability of payments, and requires Country Energy to advise customers in writing of the terms of condition 17 prior to 1 July 2006.

Reporting Requirements

Conditions 18.5 and 18.17 of the licence conditions set out the requirements in relation to reporting of CSS obligations. From 1 July 2007, Country Energy must submit quarterly CSS reports to the Minister within one month of the end of each quarter, for the preceding quarter and the previous 12 month period setting out the number of payments made under condition 17 to customers serviced from each feeder type, the number of claims under condition 17 by category and the number of rejected claims under condition 17 by category. The first report will be due by 31 July 2007.

6.3 Eligible Pass Through Amount

The eligible pass through amount calculated by Country Energy in respect of the specific pass through event is $3.6 million. The eligible pass through amount represents the increase in incremental costs that have been, and will be, incurred during the current regulatory period to 30 June 2009 as a direct result of the specific pass through event described above.

6.4 Specific Pass Through Amount

Table 15 below sets out the specific pass through amount proposed by Country Energy to be recovered over the remainder of the regulatory period by year and category of expenditure.

Expenditure Category $ million (real 2005-06)	2006/07	2007/08	2008/09	Total
Interruption Frequency Standard	0.3	0.3	2.0	2.6
Interruption Duration Standard	0.1	0.1	0.1	0.3
Administration and Communications	0.3	0.2	0.2	0.7
Total Expenditure	**0.8**	**0.6**	**2.3**	**3.6**

Columns may not add due to rounding

Table 15: Specific pass through amounts for customer service standards

The specific pass through amount proposed by Country Energy is equal to the eligible pass through amount due to the fact that all of the costs are made up of operating expenditure only. Country Energy is proposing to recover the specific pass through amount from customers over the regulatory period aligned with the anticipated level of annual CSS payments and other incurred costs. The expected step increase in payments in 2008-09 reflects the imposition of a more onerous target for interruption frequency standard as shown in table 14.

6.5 Incremental Costs of Imposed Customer Service Standards

The imposition of the CSS on 1 August 2005 will result in consequential incremental cost increases for Country Energy. The costs fall largely into two areas, CSS payments to customers, and administration and communications expenditure.

6.5.1 CSS Payments

Country Energy's 2004/2005 reliability data has been analysed and utilised to establish the cost base for CSS payments. The allowed interruption exclusions have been omitted in accordance with clause 3 of schedule 5 of the licence conditions described above in section 6.2.

Country Energy currently records outages to a feeder section, not to a customer premise or distribution transformer as the current reliability data information technology system is limited by its substation to premise connectivity. Country Energy intends to finalise the implementation of its Distribution Management System (DMS) including the data enhancement project linking a customer premise to distribution substation before 1 July 2006. The DMS will then be able to record outages at the distribution substation level. This more accurate data set will ensure that customer claims for CSS compensation can be linked to the affected substation.

Country Energy has adopted the definitions for non metro urban and non metro rural customers as contained in schedule 5 of the imposed licence conditions and described in section 6.2 above in calculating the eligible pass through amount. To determine if a town has a population above 5,000 Country Energy has utilised figures from the 2001 Census published by the Australian Bureau of Statistics (ABS). There were 45 centres in Country Energy's distribution area that had populations greater than 5,000 in 2001. An additional adjustment of 10% has also been made for towns that were slightly under 5,000 in population in 2001 but will increase and become classified as non metro urban centres during the 2004/05 to 2008/2009 determination period.

There is no definitive way of identifying the boundaries of each of these towns to create an effective non metro urban and non metro rural split. Country Energy believes a suitable methodology is that, if a customer is connected to an urban feeder in a town with a population greater than 5,000 or to the first section of a rural short or long feeder emanating from these towns, then these customers will be deemed to be non metro urban. Customers that reside in towns with a population less than 5,000 or beyond the first section of a rural short or long feeder will be classified as non metro rural customers. This methodology will ensure consistency when processing claims.

Using the assumptions above in its analysis, Country Energy has estimated the level of CSS payments that it will make to customers on an annual basis over the remainder of the regulatory period. The total estimate for the remainder of the regulatory period is $2.9 million. These forecast payments are shown in table 15 above.

6.5.2 *Administration and Communications Expenditure*

The successful implementation of the new licence conditions for CSS will require a comprehensive external and internal communication strategy to satisfy the requirements of condition 17.4 of the licence conditions described above in section 6.2.

Country Energy is well positioned to deliver a regionally focused communication program to all our customers. The most efficient communication mediums will be utilised to ensure that all our customers are informed regarding the new licence conditions. It is fundamental to Country Energy's customer service objectives that claims for poor reliability can be easily processed and payments for breaches can be completed within the required time frame. Our decentralised management structure makes local management responsible for managing the day to day activities for their particular region, and will allow for prudent internal procedures to be developed for the efficient processing of reliability compensation claims.

During the 2005/2006 financial year Country Energy will be deploying a dedicated project team. One of the project team primary focuses will be to ensure that data recorded in the DMS during network outages accurately reflects the duration and the number of customers affected by the network outage. There will also be reporting mechanisms developed to ensure compliance with the licence conditions described above in section 6.2.

The annual and total costs to implement Country Energy's administration and communications plans, including costs already incurred, are illustrated in table 15 above. The total estimate for the remainder of the regulatory period is $0.7 million. Administration and communications expenditure relates to spending on staff wages and related overheads, travel, training of staff, and the comprehensive communications package that will be sent out to customers to notify them of the terms of and availability of payments under condition 17.

7. Pass through Amount

The implementation of the new licence condition will increase maintenance and capital expenditure requirements. In addition, the CCS must be met by distributors in providing distribution network services to customers.

A key issue for the Tribunal is to establish an appropriate incremental expenditure allowance to ensure that Country Energy has sufficient revenues to fully meet these new obligations.

This section contains the positive pass through amount that Country Energy proposes to pas through to customers based on the incremental expenditure identified, resulting from the imposition of the licence conditions.

Recovery of revenues matched to year of expenditure is proposed as a general principle to ensure that Country Energy's is able to meet its licence obligations.

7.1 Full Compliance Works Program Pass Through Amount

The eligible pass through amount calculated by Country Energy in respect of the full compliance program is $521.3 million. The eligible pass through amount represents the increase in incremental costs that will be incurred over the remainder of the current regulatory period to 30 June 2009 as a direct result of the imposition of the licence conditions.

Table 16 below sets out the positive pass through amount under the full compliance program to be recovered over the remainder of the regulatory period by year and type.

Building Blocks **$ million (real 2005-06)**	**2006/07**	**2007/08**	**2008/09**	**Total**
Operating Costs	43.5	43.5	43.5	130.5
Return on Capital	4.5	15.4	25.5	45.4
Return of Capital	1.3	3.9	6.5	11.7
Total Incremental Revenue Requirement	**49.3**	**62.8**	**75.5**	**187.6**

Columns and rows may not add due to rounding

Table 16 Full compliance works program pass through amount under clause 14

The positive pass through amount reflects the calculated revenue requirement of the eligible pass through amount of $521.3 million. The return on capital was calculated using the 7.0% real pre tax rate of return from the 2004 electricity distribution pricing determination applied to the forecast capital expenditure. The return of capital was calculated using an average asset life of 50 years applied to the forecast capital expenditure.

7.2 Customer Service Standards Pass Through Amount

The eligible pass through amount calculated by Country Energy in respect of the CSS is $3.6 million. The eligible pass through amount represents the increase in

incremental costs that will be incurred over the remainder of the current regulatory period to 30 June 2009 as a direct result of the imposition of the licence conditions.

Table 17 below sets out the specific pass through amount under the CSS obligations to be recovered over the remainder of the regulatory period by year and type.

Building Blocks $ million (real 2005-06)	**2006/07**	**2007/08**	**2008/09**	**Total**
Operating Costs	0.8	0.6	2.3	3.6
Total Incremental Revenue Requirement	**0.8**	**0.6**	**2.3**	**3.6**

Columns and rows may not add due to rounding

Table 17 Customer service standards pass through amount under clause 15

7.3 Total pass through amount

Table 18 sets out the total eligible pass through amount calculated by Country Energy relating to:

- Full compliance works program, and
- Customer service standards

Building Blocks $ million (real 2005-06)	**2006/07**	**2007/08**	**2008/09**	**Total**
Full compliance works program	49.3	62.8	75.5	187.6
Customer Service Standards	0.8	0.6	2.3	3.6
Total incremental revenue Requirement	**50.1**	**63.4**	**77.8**	**191.2**