



**PB ASSOCIATES**

**REVIEW OF 2006 ASSET MANAGEMENT PLAN**

**Unison Networks Ltd**

**Prepared for**

**COMMERCE COMMISSION**

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## 1. INTRODUCTION

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On 9 September 2005 the Commerce Commission (Commission) published its intention to declare control on Unison Network Ltd's (Unison) electricity distribution services. This triggered a public consultation on the proposal, which has included:

- a review of 41 submissions, which were received by the Commission on or before 21 October 2005, on the Commission's intention to declare control;
- a public conference held in Wellington, Rotorua, Taupo and Napier over the period 17 November 2005 to 6 December 2005; and
- a review of 12 cross-submissions, which were received by the Commission on or before 21 December 2005, addressing issues raised at the public conference.

While the public consultation process has been completed, the Commission has still to decide whether or not it intends to proceed with its intention to declare control. The delay in making this decision is primarily due to the fact that, in parallel with the public consultation process, the Commission has been negotiating with Unison on the terms of an administrative settlement that, if agreed by the two parties, would avoid a declaration of control.

Parsons Brinckerhoff Associates (PB Associates) has, throughout this process, been advising the Commission on technical and engineering issues related to the declaration of control and the possible administrative settlement. This work included a three day visit to Unison from 1-3 May 2006, to review Unison's in-house processes related to asset management and the valuation of its assets.

On 1 September 2006 Unison submitted a revised Administrative Settlement Proposal to the Commission. Appendix B of this revised Administrative Settlement Proposal is a comprehensive report entitled "Unison's Asset Management Approach Practices and Outcomes"<sup>1</sup>

Unison has also disclosed its Asset Management Plan covering the 10-year period from 1 April 2006 to 31 March 2016<sup>2</sup>, as required by the Commission's Information Disclosure Requirements. PB Associates has been asked to undertake a desk top review of this Asset Management Plan in the context of the Administrative Settlement Proposal, and this report presents the result of this review.

More specifically this review considers the following issues:

- whether the service level targets published in the Asset Management Plan are reasonable and the extent to which they are consistent with Unison's historic service levels and the criteria that apply to Unison under the Commission's targeted control regime;
- whether Unison's operations and maintenance plans are consistent with the best industry asset management practices and whether the operations and maintenance budget in the asset management plan is reasonable;
- whether Unison's capital expenditure plans are consistent with the best industry practice and whether the capital expenditure budget is reasonable;

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<sup>1</sup> *Unison's Asset Management Approach, Performance and Outcomes, Report submitted to the Commerce Commission in Support of Unison's Settlement Proposal*, Unison Networks Ltd, 29 May 2006.

<sup>2</sup> *Asset Management Plan*, Unison Networks Ltd, August 2006.

- the extent to which Unison's asset management performance in the 2005/06 financial year was consistent with the plans and targets set out in Unison's 2005 Asset Management Plan.

In undertaking this review we have not only considered the content of the disclosed asset management plan but have also relied, where necessary, on the contents of the Administrative Settlement Proposal and the findings of our three day visit to Unison in May 2006.

## 2. SERVICE LEVELS

### 2.1 COMPLIANCE WITH NETWORK RELIABILITY CRITERIA

The Commission's targeted control regime uses SAIDI<sup>3</sup> and SAIFI<sup>4</sup> measured across the entire network as the primary indicators of network reliability. The reliability criteria of the quality threshold that applies to Unison for each year of the 5-year period 1 April 2004 to 31 March 2009 are set out in the Commerce Act (Electricity Distribution Threshold Notice) 2004 and are as follows:

- For each year of the 2004-2009 regulatory period, SAIDI (when measured over the whole network) must not exceed the disclosed average annual SAIDI for the network over the five year period from 1 April 1998 to 31 March 2003. For Unison, this equates to a SAIDI of **152.7 minutes**.
- For each year of the 2004-2009 regulatory period, SAIFI (when measured over the whole network) must not exceed the disclosed average annual SAIFI for the network over the five year period from 1 April 1998 to 31 March 2003. For Unison, this equates to a SAIFI of **2.39 interruptions**.

In its 2004 Threshold Compliance Statement<sup>5</sup> Unison notes that these reliability criteria had to be derived from incomplete data. Specifically:

- For the Hawkes Bay network no data was available for April and May 1998 since Unison changed its fault recording system over that period. The Threshold Compliance Statement says that Unison extrapolated from the ten months of data available for the 1999 year but does not give any further details about how this was done. However given the short time period, we consider that any error is unlikely to be material.
- For the Rotorua and Taupo networks, Unison has relied on data made available to it by United Networks at the time of its acquisition of these networks. As no information was available prior to July 2000, Unison has used average data for the subsequent period. We note that the error that this has introduced could be significant. Furthermore it is not known whether the figure used by Unison in determining the reliability criteria is high or low compared to what it would have been if a complete data set had been available.
- In both its 2004 and 2005 Threshold Compliance Statements, Unison noted the difficulties it experienced in obtaining the customer numbers required to determine the historic SAIDI and SAIFI figures on which the criteria were based. In its 2005 Threshold Compliance Statement<sup>6</sup> it states: *Customer numbers used in the historical SAIDI and SAIFI calculations have been sourced from disclosure information on the Hawke's Bay distribution network and from information supplied during the acquisition process for the Rotorua and Taupo distribution networks.* We comment that this gives little confidence in the accuracy of this data. An accurate measurement of SAIDI and SAIFI requires the actual number of customers affected by each individual fault to be known, which in turn requires a sophisticated customer information system to be available. It would seem that accurate information on affected customer numbers may not have been available

<sup>3</sup> SAIDI (System Average Interruption Duration Index) measures the total minutes off supply of the average customer in any particular year. For regulatory purposes only planned and unplanned outages originating within the distribution network are taken into account.

<sup>4</sup> SAIFI (System Average Interruption Frequency Index) measures the number of times that the average customer loses supply in any particular year. For regulatory purposes only planned and unplanned outages originating within the distribution network are taken into account.

<sup>5</sup> *Threshold Compliance Statement for the Second Assessment Date, 31 March 2004*; Unison Networks Ltd.

<sup>6</sup> *Threshold Compliance Statement for the Assessment Period Ending 31 March 2005*; Unison Networks Ltd.

at the time of the fault, in which case the reliability criteria would be based on estimated, rather than measured, data.

While not used in the Commission's targeted control regime, a third commonly used measure of network reliability is CAIDI (Customer Average Interruption Duration Index), which measures the average time in minutes taken to restore supply to a customer, once supply is lost. While CAIDI can be derived from SAIFI and SAIDI in accordance with the equation,

$$\text{SAIDI} = \text{SAIFI} \times \text{CAIDI}$$

it is useful to look at CAIDI separately from SAIDI or SAIFI since CAIDI is, arguably, the reliability indicator over which management has the greatest degree of control<sup>7</sup>.

Unison's actual reliability performance indicators for the three years to 31 March 2006 are given in Table 1.

**Table 1: Actual Reliability Performance Indicators**

Year ending 31 March	2004	2005	2006
SAIDI	201.6	155.3	133.8
SAIFI	2.39	3.21	2.82
CAIDI	84.4	48.4	47.4

It can be seen from Table 1 that Unison has not fully met its reliability criteria in any of the last three years. These non-compliances are discussed below.

In the year to 31 March 2004 Unison complied with the SAIFI criterion but exceeded the SAIDI criterion by 35%. In its Threshold Compliance Statement it attributes the non-compliance to severe weather experienced in February 2004. Information supplied to Unison by the National Institute of Water and Atmospheric Research (NIWA) showed that February 2004 had rainfall approximately 300% of the February average with a wind gradient across the North Island being the strongest ever for a February and the third strongest of any month in over 60 years of records.

Furthermore the outages experienced in February 2004 were an order of magnitude greater than outages suffered in a typical month of February as shown in Table 2 below.

**Table 2: February Network Reliability 2001-2004**

Period	No of Faults	SAIDI
February 2001	15	2.06
February 2002	28	5.78
February 2003	23	4.97
February 2004	134	57.66

Unison states that most of the faults that occurred during the extreme weather in February 2004 were as a result of vegetation problems. This extreme weather event also caused other distribution businesses to exceed their reliability thresholds. Trees outside of the industry accepted safe clearance corridor fell on lines as a result of high wind. Significant problems were also experienced with wind blown branches and debris

<sup>7</sup> This is because SAIFI will, to a greater or lesser extent, be influenced by events in the external environment, over which management has no control. On the other hand CAIDI is influenced only by the design of the network, to the extent that it influences restoration time to customer connections outside the section of the network where the fault is located, and the time required to locate and repair the fault.

damaging lines. This imposed prolonged and widespread outages to Unison's customers, particularly on the Rotorua and Taupo distribution networks.

Unison has calculated that if the extreme weather experienced in February 2004 was excluded from the SAIDI figures by reducing the February 2004 figures to the average SAIDI in the previous 5 years the annual SAIDI for the period to 31 March 2004 would have been 149 minutes. Had a similar adjustment been applied to SAIFI, this would have reduced to 2.0. With these adjustments Unison would have easily complied with its reliability criteria.

In the year to 31 March 2005, Unison failed to comply with either reliability criterion, although the non-compliance with the SAIDI criterion was only marginal, due to a significant reduction in fault restoration time. Unison's Threshold Compliance Statement attributes this compliance failure to:

- a severe rainstorm that hit the Hawkes Bay region on 18 October 2004 and caused extensive flooding in the Napier area. The rainstorm was extensively reported in the press at the time due to the hail damage it caused to apples and stone fruit. The worst hit area was Tamatea in Napier where rain exceeded the theoretical maximum. The flooding caused faults on ground mounted transformers, which could not be repaired until flood waters receded. The impact of these events calculated to a SAIDI value of 19 minutes or 12% of the criterion. Had this event not occurred then Unison would have comfortably met its SAIDI criterion;
- a tree incident on a 33 kV line causing an outage to 13,413 customers, or an estimated contribution to SAIFI of about 0.13. We consider this to be a controllable event since we would expect distribution businesses to carefully manage vegetation in situations where a fault can potentially affect a large number of customers ; and
- a lightning strike in the Taupo region causing an outage to 9,624 customers, or an estimated contribution to SAIFI of about 0.09.

Unison concluded in its 2005 Threshold Compliance Statement that its *poor SAIFI performance appeared to be a statistical variation arising from specific but random environmental circumstances*. It does not argue that this non-compliance was caused by a single abnormally severe weather event.

In the year to 31 March 2006, Unison comfortably complied with its SAIDI criterion but failed to comply with the SAIFI criterion, even though its performance was significantly better than the previous year. Once again, Unison does not attempt to justify this SAIFI performance on the basis of extreme events. Its 2006 Threshold Compliance Statement states that, based on its current understanding of the network and given the past design, architecture and investment practices for Hawke's Bay, Rotorua and Taupo, Unison believes the reliability it achieved to be appropriate. It is confident that the asset management strategies it has put in place will have a positive impact on the reported SAIFI in the future.

Unison has already advised the Commission in Appendix B of its Administrative Settlement Proposal that it does not expect to meet its quality threshold in 2007 due to the impact of the severe storm that hit much of the country in June 2006.

## 2.2 PROPOSED REVISION OF QUALITY THRESHOLD

In Appendix B of Unison's Administrative Settlement Proposal it introduces the concept of a network signature, which is determined by such factors as the network's inherent design methodology, historical maintenance practices and the type of customers connected. Unison is supportive in principle of the approach of basing the reliability criteria of the quality threshold on five years of data, which it considers to be another way

of defining the network signature. It argues that it is very costly to change a network signature since it involves capital expenditure to fundamentally change the way the network is designed and operated.

We agree with the concept of a network signature to the extent that it is fundamentally a function of network design. For example, a bare wire overhead line will always be prone to faults from flying tree branches in storm conditions. In order to eliminate this problem it would be necessary to insulate the conductors, which amounts to a fundamental and costly change in design. We consider that, while it is always possible to make incremental improvements to reliability, in accordance with the law of diminishing returns there comes a time when further reliability improvement is not economic or cost effective. The level of reliability achieved at this point is conceptually the best realistically possible level of reliability for a particular network signature.

While Unison acknowledges in Section 8 of its Administrative Settlement Proposal that the Commission will not change its existing reliability criteria, it argues in Appendix B of the same document that, because of the problems with the reliability data over the period on which the reliability criteria is based (as discussed in Section 2.1), the Commission's reliability criteria are below the minimum reliability for Unison's network signature. To overcome this problem it proposes that the Commission apply revised reliability criteria, based on the average reliability achieved over the three years from 1 April 2003 to 31 March 2006. These three years have been chosen since they are the only three years for which Unison has reliable outage data. On this basis its proposed revised reliability criteria are shown in Table 3.

**Table 3: Proposed Revised Reliability Criteria**

Indicator	Current Criterion	Proposed Criterion
SAIDI	152.7	163.6
SAIFI	2.39	2.81

Attached to Appendix B of the Administrative Settlement Proposal is a report from LECG Limited supporting this proposal. While we accept the accuracy of the analysis, the report contains only a very superficial discussion on the rationale for changing Unison's reliability criteria in the context of the Commission's targeted control regime.

In order to inform our assessment of Unison's proposal to change its reliability criteria, we have compared Unison's proposed criteria with the reliability performance of selected lines businesses service both rural and urban areas for the year to 31 March 2005. This comparison is shown in Table 4. Lines businesses with primarily urban networks have not been included in the analysis. We believe such a comparison is valid since most New Zealand distribution businesses use similar network designs. The table also shows the percentage of underground network for each business. As underground lines are inherently more reliable than overhead we would expect that lines businesses with a higher percentage of underground lines to be generally more reliable.

The table further shows the customer density of the individual utilities. This is indicative of the proportion of urban distribution within each network, in that networks with a higher customer density can generally be expected to have a higher proportion of urban distribution. Distribution networks in urban areas are generally more reliable than rural networks.



**Table 4: Distribution Business Reliability Performance to 31 March 2005**

Lines Business	Percent Underground	Customers per km	SAIDI	SAIFI
Alpine Energy	13.0	7.6	69.0	1.0
Aurora Energy	23.8	14.7	80.5	1.5
Buller Electricity	2.9	6.9	129.0	1.2
Centralines	2.1	4.5	171.4	4.4
Counties Power	14.0	10.1	59.6	2.1
Eastland Network	8.8	6.9	281.0	2.1
Electra	28.4	18.4	28.2	1.6
Electricity Ashburton	11.6	5.5	132.7	1.2
Horizon Energy Distribution	17.2	9.8	353.0	2.5
MainPower	12.9	7.0	99.3	0.9
Marlborough Lines	8.8	7.1	213.2	1.9
Network Tasman	19.6	10.3	146.3	1.7
Network Waitaki	3.5	5.9	104.9	1.4
Northpower	9.5	9.2	96.6	2.1
OtagoNet Joint Venture	0.4	3.3	173.8	1.7
Powerco	19.6	11.9	194.6	2.7
Scanpower	5.8	7.8	71.3	0.8
The Lines Company	5.5	5.3	225.6	3.0
The Power Company	2.6	3.8	125.5	3.0
Top Energy	14.9	7.1	382.5	4.6
<b>Unison</b>	<b>36.3</b>	<b>11.2</b>	<b>155.0</b>	<b>3.2</b>
Waipa Networks	9.7	10.9	162.2	3.1
WEL Networks	30.1	15.5	87.7	1.7
Westpower	6.3	6.0	259.9	3.2
<b>Average</b>	<b>12.8</b>	<b>8.6</b>	<b>158.5</b>	<b>2.2</b>

Source: PricewaterhouseCoopers

It can be seen from Table 4 that Unison's SAIDI was about the average for all distribution businesses for the year examined. We note also that, once corrections have been made for claimed extreme events, Unison has not exceeded its current SAIDI criterion in any of the three years from 1 April 2003.

On the other hand, even though Unison has the highest percentage of underground cable of all the distribution businesses examined, its current SAIFI criterion of 2.39 is 9% higher than the average for all the utilities examined. Its proposed new SAIFI criterion of 2.81 is 28% higher than the average and was bettered by 17 of the 24 distribution businesses examined.

As expected, Table 4 generally confirms that networks with a higher customer density tend to be more reliable, particularly in respect of SAIFI. However, with the exception of Waipa Networks, all networks with a similar customer density to Unison have a significantly better SAIFI.

While Unison has exceeded its SAIFI criterion in the years ending 31 March 2005, and 31 March 2006, in our view it has not established that there is a substantial problem with the criterion as currently set. We note also that network reliability can be volatile, and that

Unison did meet the SAIFI criterion in the year ending 31 March 2004, even before a correction was made for the extreme weather event that occurred in that year.

Unison's SAIDI performance is comparatively better than its SAIFI, which indicates that it performs better than most in minimising the duration of outages after they have occurred. Nevertheless 15 of the 24 businesses examined, including Unison itself, bettered the proposed new SAIDI criterion of 163.4 minutes.

On the basis of the above analysis we recommend that no change be made to Unison's current SAIDI or SAIFI threshold criteria.

### **2.3 ASSET MANAGEMENT PLAN SERVICE LEVEL TARGETS**

The service level targets included in Unison's 2006 asset management plan are shown below.

**Supply Reliability: Total Service Interruptions**

Stakeholder	Measure	Target
Consumers	Network SAIDI	< 163.6
Consumers	Network SAIFI	< 2.81
Consumers	Network CAIDI	< 58

**Supply Reliability: Unplanned Service Interruptions**

Stakeholder	Measure	Target <sup>(1)</sup>
Urban	Restoration within 3 hours of notification of Interruption	≤ 20 events exceed
Rural	Restoration within 6 hours of notification of Interruption	≤ 10 events exceed
Remote Rural	Restoration within 12 hours of notification of Interruption	≤ 5 events exceed
Urban	No more than 4 unplanned Interruptions per annum	≤ 1 Feeders exceed
Rural	No more than 10 unplanned Interruptions per annum	≤ 1 Feeders exceed
Remote Rural	No more than 20 unplanned Interruptions per annum	≤ 1 Feeders exceed

**Supply Reliability: Improvements to 10 Worst Feeders**

Stakeholder	Measure	Target <sup>(2)</sup>
Consumers	Improve Reliability of Rotoma Feeder	20% improvement
Consumers	Improve Reliability of Ben Lomond Feeder	20% improvement
Consumers	Improve Reliability of Kaharoa Feeder	20% improvement
Consumers	Improve Reliability of Okere Feeder	10% improvement
Consumers	Improve Reliability of Tarawera Feeder	5% improvement
Consumers	Improve Reliability of Fordlands Feeder	5% improvement
Consumers	Improve Reliability of Clayton Feeder	5% improvement
Consumers	Improve Reliability of Western Heights Feeder	20% improvement
Consumers	Improve Reliability of Pukehangi Feeder	10% improvement

**Power Quality**

Stakeholder	Measure	Target
Consumers	Supply of compliant voltage levels to consumers	>99.95% compliance
Consumers	Upgrade all identified supply points to achieve compliance	100% compliance

**Stakeholder Service**

Stakeholder	Measure	Target
All	Respond to all reasonable information requests within 5 days	100% compliance
Consultants	Clearly defined connection standards and policies	Compliance
Consumers	Unison to give 4 days notice to Consumers (HB) for outages	100% compliance
Consumers	Respond to Power Quality/Interruption investigations within 7 Working Days	100% compliance
Consumers	Issue of ICPs	TBA <sup>(3)</sup>
Contractors	Timely/continuous delivery of works to minimise business risks	Compliance
Councils	Compliance to District Plan requirements	Compliance
Govt Agencies	Compliance with Regulatory requirements	Compliance

Stakeholder	Measure	Target
Lenders	Compliance with lending covenants	Compliance
Owners	Return on Shareholder funds	> 4.1% <sup>(4)</sup>
Retailers	Respond to retailers within 10 minutes of new information becoming available (outages > 20 customers).	100% compliance
Retailers	Unison to give 10 days notice to Retailers (T/R) for outages	100% compliance
Sys Op	Compliance with Asset Capability Statement	Compliance
Unison Board	Compliance with Regulatory requirements	Compliance
Unison Staff	Annual Staff Climate Survey	≥ 80% satisfaction

**Efficiency Indicators**

Stakeholder	Measure	Target
Consumers	Maintain physical system losses at an acceptable level	< 6% <sup>(5)</sup>
Consumers	Maintain effective distribution capacity utilisation	≥ 31%
Consumers	Manage network Load Factor	≥ 60%
Consumers	Provide compliant steady state supply voltage	± 6% of nominal
Consumers	Maintain Direct + Indirect regulated costs at an efficient level	≤ \$2,083/km <sup>(6)</sup>
Sys Op	Maintain compliance - GXP Power Factor	> 0.95

<sup>(1)</sup> Calculated using the same event selection criteria as required for Information Disclosure.

<sup>(2)</sup> Feeder level SAIFI, calculated using the same criteria as required for Information Disclosure.

<sup>(3)</sup> Unison is currently aligning processes across its operating regions to be more consistent. As part of this review, a more consistent measure of stakeholder satisfaction with the connection process to Unison's networks will be established.

<sup>(4)</sup> Projected "Return on Shareholders Funds" for 2007/8 and 2008/9 are 4.3% and 4.4% respectively, with an expected average of 4.3% for the planning period.

<sup>(5)</sup> Unison believes this is a reasonable measure for a lines business to consider when operating using best practice, but notes that there is no incentive for ELB's to actively manage losses on the network in the current regulatory environment. Further, under the short planning horizons specified in the ODV handbook, an ELB can be penalised by installing larger conductors to reduce system losses, leading to higher levels of asset optimisation.

<sup>(6)</sup> Projected real costs for 2007/8 and 2008/9 are \$2,077 /km and \$2,071 /km respectively, with an expected average of \$2,057 /km for the planning period.

Thus is a very comprehensive range of key performance targets that cover all the main areas of the business. We have the following specific comments.

- The supply reliability targets for total service interruptions are Unison's proposed revised reliability criteria, which have not been approved by the Commission. We have recommended in Section 2.2 that these targets not be accepted.
- The Electricity Information Disclosure Handbook requires that all indicators be defined so that the asset management plan is a self contained document. This has not been done. We also note that there is no indication as to the way that many of the indicators are to be measured – for example it is not clear how Unison intends to measure compliance with the efficiency indicator *provide compliant steady state supply voltage*.
- We commend Unison for setting different unplanned supply interruption targets for different parts of the network since such targets are more meaningful to customers. We note that Unison has reported its actual performance against its 2005 targets in Section 8.1 of the asset management plan.
- We also commend Unison for specifically addressing the performance of its worst 10 feeders. This is consistent with industry practice in Victoria, for example.

However, we would have liked to see the actual performance levels of these feeders reported as this would have been more meaningful to stakeholders.

- We think it is appropriate that Unison set a system loss target. We do not agree that the optimisation process specified in the ODV Handbook removes any incentive for a lines business to manage losses on the network. Clause 2.19 of the ODV Handbook specifically provides for life cycle costing to be used as the basis for determining the most efficient design and also for the cost of losses to be taken into account in this analysis.

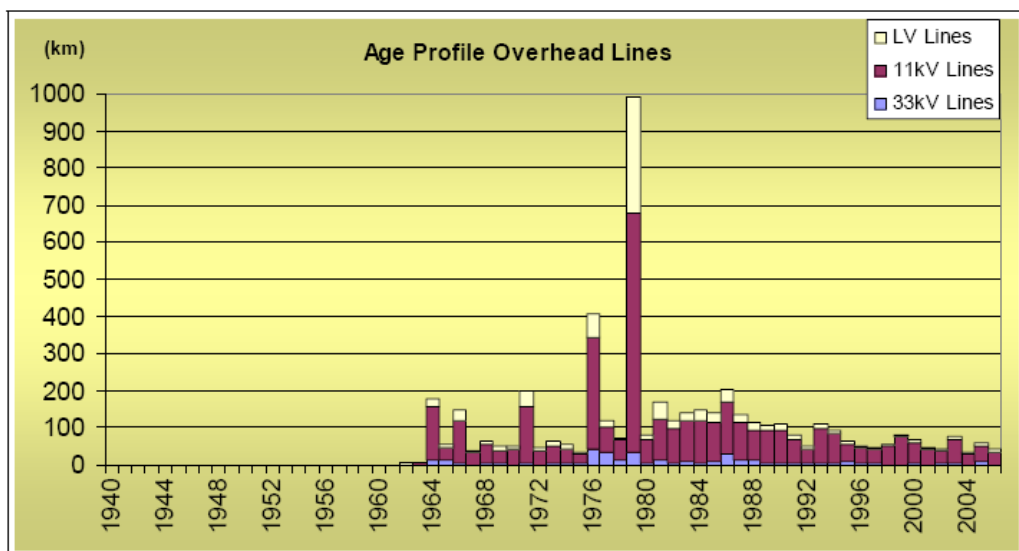
### 3. MAINTENANCE AND RENEWALS

#### 3.1 ASSET AGE AND CONDITION

Section 3.7 of the asset management plan includes an overview of Unison's fixed asset base. This overview includes a high level description and age profile of the main asset categories. It is well developed and presented and demonstrates a good engineering understanding of the asset base.

The age of many of Unison's overhead lines, underground cables and distribution transformers is unknown and an assessed age has been used for these assets. This gives a very "peaky" age profile as shown in Figure 1.

**Figure 1: Age Profile of Overhead Lines**



Unison states in its Asset Management Plan that the peak in 1979 is an assumed average date for those lines where the commissioning date is unknown, but it has not stated the basis on which this age assumption was made. A fuller explanation on how this assumption was made would have been useful, particularly as the age profiles underpin the LeverEdge analysis that Unison relies on as the basis for developing its asset renewal budget. It would also have been useful if Unison had commented in more detail on the quality of the data available for the different areas of its network. However, while we acknowledge that that the peak shown for 1979 does not exist in reality, we are not suggesting that the average age of the assets assumed by Unison is unrealistic.

The age profiles for underground cables and distribution transformers show similar peaks, with an underground cable peak occurring in 1982, and a distribution transformer peak occurring in 1980. Unison comments that it is actively improving the quality of its asset data as it completes its condition assessment cycles. This should be possible in the case of distribution transformers, which generally include the year of manufacture on the name plate, and concrete pole lines where the date of pole manufacture is usually stamped on the pole.

The fact that so much information on asset ages is still unknown would indicate that a structured programme of asset inspections has only recently been introduced. It is reasonable to expect that network reliability will improve as this inspection programme becomes more mature and problems identified during these asset inspections are routinely addressed prior to the failure of the asset.

Section 3.7.1 of the asset management plan also provides high level asset quantities, the replacement cost (RC) and depreciated replacement cost (DRC) for the different asset categories. Two valuations are provided, each with a valuation date of 31 March 2006. The first valuation is an FRS-3 valuation based on current equipment procurement costs and the installation of assets in the normal course of business. This recognises that in the normal course of business Unison installs many new assets on a small scale or incremental basis and that very often additional costs must be incurred, for example through the use of live line construction techniques, to maintain supply while installation proceeds. Where costs are materially different for different installation conditions, Unison used the average cost, weighted by the proportion of the total amount of work currently undertaken for each installation condition. The second valuation is based on the economy of scale and installation conditions specified in the ODV Handbook, but is not based on the standard replacement costs and multipliers set out in Appendix A of the Handbook.

In our view the FRS-3 valuation provides a useful basis for estimating the capital expenditure in the asset management plan budgets, which should logically be based on current costs and actual installation conditions. However since the second valuation does not rely on the standard costs and multipliers in the ODV Handbook, it is inconsistent with the requirements of the Commission's information disclosure regime.

### 3.2 LIFE CYCLE ASSET MANAGEMENT

Section 6 of the asset management plan is devoted to life cycle asset management. Each asset type is considered in turn with a description of the overall condition of the asset population and a more detailed examination of the types of failure being experienced. Strategies to deal with these failures and maintain the serviceability of the asset type are then discussed. This section is well written and reflects a good understanding of the characteristics and deficiencies of the asset base. The strategies described to address these problems and maintain the integrity of the asset base are consistent with good engineering practice.

The chapter also provides a very high level description of the principles behind the LeverEdge modelling used to determine the overall budget for asset renewal but insufficient information was provided to allow an independent assessment as to whether the proposed significant increase in asset renewal expenditure is justified.

Overall we consider Unison's life cycle asset management practices to be sound and consistent with good industry practice.

### 3.3 MAINTENANCE AND RENEWAL BUDGET

Actual and budgeted expenditure on maintenance is shown in Table 5 below.

**Table 5: Projected Maintenance Expenditure**

(\$000)	2004/05	2005/06	2006/07	2007/08	2008/09
<b>2004 AMP<sup>1</sup></b>	5,814	5,499	5,456	5,172	5,141
<b>2005 AMP<sup>2</sup></b>		6,079	6,167	5,989	5,950
<b>2006 AMP<sup>3</sup></b>			7,258	7,394	7,532
<b>Actual<sup>2</sup></b>		6,862			

Notes: 1. Real 2004 currency  
2. Real 2005 currency  
3. Real 2006 currency

It can be seen from Table 5 that the planned level of maintenance expenditure has progressively increased. Furthermore, while up until its 2006 asset management plan Unison had expected its maintenance expenditure to stabilise and then decrease over

time, the 2006 plan shows a continuing increase in its real level of expenditure as the size and value of the asset base increases. We believe this is appropriate, particularly as Unison's reliability, particularly SAIFI, is relatively poor compared to that of similar utilities and ongoing expenditure on network maintenance is needed to improve this.

We would have liked to see the maintenance budget disaggregated further since this would have provided a higher level of transparency as to the impact of different maintenance activities. Such a breakdown could have shown, for example, that a significant proportion of the operation and maintenance expenditure budget is dedicated to vegetation control, which may over time result in a significant improvement in Unison's reliability indicators.

We also note that Unison's maintenance budget includes the so-called "black hole" expenditure related to the cost of modifying an asset to obtain incremental improvements in service level without extending an asset's economic life or capacity. Examples of expenditure in this category include changing a line configuration from flat to delta to reduce bird induced phase to phase faults and the installation of "Bird-Be-Gone" to discourage birds perching on power poles.

Overall we consider Unison's operational expenditure budget to be appropriate. Operations and maintenance activities are well managed and carefully planned with the result that expenditure is well targeted.

Actual and budget expenditure on asset renewals is shown in Table 6. While asset renewal is technically a capital expenditure, it is treated as a maintenance expenditure in the asset management plan, consistent with the way renewals are managed internally within the business. This is appropriate.

**Table 6: Projected Asset Renewal Expenditure**

(\$000)	2004/05	2005/06	2006/07	2007/08	2008/09
<b>2004 AMP<sup>1</sup></b>	6,076	8,503	11,078	11,465	11,533
<b>2005 AMP<sup>2</sup></b>		8,567	11,285	11,599	10,880
<b>2006 AMP<sup>3</sup></b>			13,800	15,800	17,500
<b>Actual<sup>2</sup></b>		8,776			

Notes: 1. Real 2004 currency  
2. Real 2005 currency  
3. Real 2006 currency

It can be seen from Table 6 that Unison has increased its forecast asset renewal expenditure substantially in its 2006 Asset Management Plan, as a result of the LeverEdge analysis. Its plan is to ramp the asset renewal expenditure up over a 4-year period to a level of \$18.5 million per year and then to sustain the expenditure at this level throughout the remainder of the planning period. Hence the 2006 plan introduces significantly higher levels of asset renewal expenditure over time. For example the asset renewal expenditure budget for 2013/14 is \$18.5 million in the 2006 asset management plan compared to \$6.6 million in the 2005 plan. We anticipate that, if this proposed higher level of asset renewal expenditure is sustained over an extended time period, the level of network reliability should improve to levels comparable with, or better than, those delivered by similar distribution businesses, as shown in Table 4.

It should also be noted that the 2006 Asset Management Plan budget is based on the replacement costs in Unison's 2006 FRS-3 asset valuation whereas the earlier budgets were based on the standard ODV replacement costs, which are significantly lower. Hence only a portion of the anticipated increase in the replacement cost budget from 2006/07 onwards can be attributed to a higher level of asset replacement activity.

We have the following comments on the LeverEdge model.



- The rationale for the LeverEdge model for determining the asset renewal costs appears generally sound. However, the model output is sensitive to the assumed discount rate and the assumed ratio of reactive to preventive cost. We consider the reactive to preventive cost ratio to be reasonable but have not assessed the 5.8% discount rate used in the model.
- The model does not account for the write-off of the residual asset value if an asset is replaced early. If the value of this write-off is added to the preventive replacement cost assumed in the model, it would reduce the required asset renewal budget by reducing the reactive to preventive cost ratio assumed for a particular asset at a particular time.
- The approach to asset renewal forecasting used by Unison assumes that the only reason for renewing an asset is to avoid asset failure. In practice assets are renewed for other reasons, including network augmentation and overhead to underground conversion. If due account is taken of this “collateral” renewal of assets, Unison’s forecast asset renewal requirement would reduce.

While we accept the underlying conclusion that asset renewal costs must be significantly increased above historical levels, we believe that there is scope to reduce the asset renewal budget below the level proposed by LeverEdge without significantly impacting the level of supply reliability. We suggest therefore that the LeverEdge analysis be considered the upper bound of an acceptable range of asset renewal expenditure.

We note that there is no comparison between the budgeted asset renewal expenditure in the 2005 Asset Management Plan and that in the 2006 plan, and as a result there is no explanation for the significant increase in the forecast. Indeed, when compared with the 2005 plan, the 2006 plan includes targets indicating lower network reliability despite a higher asset renewal budget. As this planning is counter-intuitive, in that a higher budget would normally be expected to deliver improved network reliability, a stakeholder comparing the two plans, without further explanation, would be confused as to what is happening.

The Electricity Information Disclosure Handbook does not require asset management plans to include explanations of significant changes in the expenditure forecasts from previous plans. Nevertheless we think such explanations should have been provided since they would have provided a higher level of transparency and would have reassured stakeholders that these changes were based on an appropriate and reasoned analysis and were consistent with good electricity industry practice.

Overall we consider that Unison’s operations and maintenance expenditure is well managed and appropriately targeted and we note that Unison is planning a significant increase in its expenditure on asset renewal. In our view there is little more that Unison can reasonably do in the short term to remedy past breaches of its quality threshold and we do not consider that the Commission needs to take further action in respect of these breaches. However it would be appropriate for the Commission to closely monitor Unison’s reliability performance going forward.

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## 4. OTHER CAPITAL EXPENDITURE

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### 4.1 NETWORK AUGMENTATION

Section 5 of Unison's Asset Management Plan covers network development, and in particular, network augmentation. This section of the asset management plan includes:

- a description of the criteria and assumptions used for planning network augmentations, including the security criteria used as a basis for planning network design;
- a description of the methodology used to prioritise network augmentation projects. It is noted that Unison is currently developing a tool to formalise this process, and the basis for the tool is described. We consider this to be a useful enhancement to Unison's network development planning, consistent with best industry practice;
- a description of the Unison's load forecasting methodology and a load forecast throughout the planning period for each grid exit point and each zone substation;
- a very brief commentary on non-network projects. This is a very superficial treatment and indicates that non-network approaches to addressing network constraints are not considered in any depth;
- a comprehensive scan of the network to identify network constraints that will arise over the planning period, based on the load forecast and the planning criteria; and
- a summary of the major projects to meet the constraints identified over the planning period. A detailed list of projects, subdivided into augmentation, reliability, renewals, compliance and underground conversion is given for 2006/07, while less comprehensive project lists are provided for later years. However, individual project costs are not included.

We consider the sections on network augmentation to be of high quality except for the superficial explanations provided in the short term network development plan. The Electricity Information Disclosure Handbook requires that the following information be included in the network development plan:

*For projects where decisions have been made the reasons for choosing the selected option should be stated. For other projects planned to start on the next five years alternative options should be discussed, including the potential for non-network approaches to be more effective than network augmentations.*

*Capital budgets should be provided, broken down sufficiently to allow an understanding of expenditure on all the main types of development projects. ... The cost of major development projects should be separately identified in the capital budget.*

While a brief reason is given for all projects identified in the network development plan, there is very little discussion of different project alternatives. The capital expenditure budget is broken down into the following line items:

Customer driven;  
Augmentation;  
Asset renewals;  
Underground conversion.

We consider that significantly more detailed breakdowns of the augmentation and asset renewals asset categories should have been provided. Both these budgets were developed from a top down analysis to form a basis for an Administrative Settlement Proposal. While this is appropriate, we believe the Asset Management Plan should have included a bottom up analysis that allocated this expenditure in more detail.

Unison's projected network augmentation budget is shown in Table 7.

**Table 7: Projected Network Augmentation Expenditure**

(\$000)	2004/05	2005/06	2006/07	2007/08	2008/09
<b>2004 AMP<sup>1</sup></b>	4,259	6,738	5,941	3,434	3,221
<b>2005 AMP<sup>2</sup></b>		6,547	3,068	2,653	3,256
<b>2006 AMP<sup>3</sup></b>			5,600	6,273	5,286
<b>Actual<sup>2</sup></b>		2,345			

Notes: 1. Real 2004 currency  
2. Real 2005 currency  
3. Real 2006 currency

Table 7 shows that network augmentation expenditure in 2005/06 was only 36% of budget. The only explanation provided in the 2006 asset management plan was that a *number of projects issued in 2005/06 have carried over into the 2006/07 financial year.*

We are concerned about Unison's ability to deliver its network augmentation programme. When we visited Unison in May 2006 the position of Network Development Manager was vacant. Furthermore, while a number of network development projects had been identified to improve network security, no work had been done on developing or designing these projects. This was in spite of the fact that such projects have a long lead time before construction can commence, as they often involve the construction of assets on land not owned by Unison, and consequently require community consultation and resource management issues to be addressed.

We have also reviewed the top down methodology used by Unison to forecast its network augmentation requirements and believe that it may understate the requirement over the medium to longer term<sup>8</sup>. This is consistent with the fact that expenditures higher than the calculated average requirement of \$4.9 million per year have been forecast through to 2008/09.

## 4.2 NETWORK EXTENSION

Network extension projects involve extensions the existing network to connect new customers. Unison's Asset Management Plan states that growth in customer connections is expected to continue at a rate comparable with previous years. Subdivision connections are expected to reduce in volumes from the previous two years as the domestic housing market slows. Hence the forward projections in the asset management plan are only estimates as actual rates are very difficult to predict with any degree of precision.

We note that the cost of network extensions is largely covered by capital contributions, which will vary with the level of activity. This will cushion the impact of the actually level of activity on Unison's annual budgets.

Unison's projected network extension budget is shown in Table 8.

<sup>8</sup> This methodology is not described in the 2006 asset management plan but is described in Section 6.3.2 of Appendix B of Unison's Administrative Settlement Offer. It forecasts an average requirement of \$4.9 million per annum over the ten year period to 2014/15.

**Table 8: Projected Network Extension Expenditure**

(\$000)	2004/05	2005/06	2006/07	2007/08	2008/09
<b>2004 AMP<sup>1</sup></b>	4,115	4,184	4,243	4,298	4,271
<b>2005 AMP<sup>2</sup></b>		4,320	4,380	4,436	4,512
<b>2006 AMP<sup>3</sup></b>			6,200	6,200	6,200
<b>Actual<sup>2</sup></b>		10,272			

Notes: 1. Real 2004 currency  
2. Real 2005 currency  
3. Real 2006 currency

### 4.3 UNDERGROUND CONVERSION

The Asset Management Plan states that, where a third party requests that existing urban residential or commercial reticulation be replaced with underground cabling ahead of its economic life this request will be accepted if a financial contribution equating to the foregone economic life of the asset is made by that third party.

Further when the existing overhead reticulation in urban residential areas has reached the end of its economic life, which is generally dictated by the condition of the poles, the merits of renewing the existing infrastructure with underground reticulation are considered. The level of community benefit is considered as well as opportunities to reduce costs by combining construction works with other service providers or council redevelopment projects.

The Administrative Settlement Proposal further states that a programme is in place to underground all the existing urban residential areas in Hastings and Napier over the next 10-15 years. This programme is prioritised based on condition assessments of the overhead lines, exposure of overhead lines and to ensure work is conducted in conjunction with other civil works.

In Rotorua, the Rotorua Energy Consumer Trust contributes to the underground conversion of specific areas to enhance aesthetics.

The budget for underground conversion reflects a decrease in activity, which is a reflection of the resource constraints in the contracting market. In addition the Rotorua Energy Consumer Trust has indicated that it does not foresee any projects for the 2006/07 financial year.

Unison's projected underground conversion expenditure is shown in Table 9.

**Table 9: Projected Underground Conversion Expenditure**

(\$000)	2004/05	2005/06	2006/07	2007/08	2008/09
<b>2004 AMP<sup>1</sup></b>	3,057	2,985	3,028	2,334	2,334
<b>2005 AMP<sup>2</sup></b>		4,322	4,154	4,132	3,449
<b>2006 AMP<sup>3</sup></b>			1,500	1,500	1,500
<b>Actual<sup>2</sup></b>		3,947			

Notes: 1. Real 2004 currency  
2. Real 2005 currency  
3. Real 2006 currency

The budget in Table 9 corresponds with Unison's understanding with its owner, the Hawkes Bay Power Consumers' Trust. The plan is to reduce expenditure on underground conversions over the next three years to free up resources to implement the increased asset renewal and augmentation expenditure. Expenditure is planned to

increase to \$5 million per year after 2008/09, when the Napier-Hastings undergrounding programme will begin in earnest.

It is not clear exactly what the budget in Table 9 represents. It needs to be clarified whether it is the total cost of the work, or the cost net of the third party financial contribution. We consider that the Hawkes Bay Power Consumers' Trust should be treated the same way as any other third party wishing to support underground conversion. This would require that any Trust contribution to underground conversion should be treated as a dividend to the Trust rather than a Unison funded capital expenditure.

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## 5. CONCLUSIONS AND RECOMMENDATIONS

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### 5.1 CONCLUSIONS

Our main conclusions from this review are:

- Unison's Asset Management Plan is of good quality and generally consistent with the requirements of the Electricity Information Disclosure Handbook. However we believe that in some areas further detail should have been included. In particular, there was insufficient analysis supporting the network development plan and insufficient disaggregation of the network augmentation budget to fully meet the requirements of the Handbook.
- The Electricity Information Disclosure Handbook does not require asset management plans to include explanations of significant changes from previous plans. Nevertheless we think such explanations should have been provided since they would have provided a higher level of transparency and would have reassured stakeholders that these changes were based on an appropriate and reasoned analysis and were consistent with good electricity industry practice.
- The existing reliability criteria that apply to Unison are reasonable when compared with the reliability performance of similar lines businesses. There is therefore no reason for these to be relaxed.
- While we accept the underlying conclusion that asset renewal costs must be significantly increased above historical levels, we believe that there is scope to reduce the asset renewal budget below the level proposed by LeverEdge without significantly impacting the level of supply reliability. We suggest therefore that the LeverEdge analysis be considered the upper bound of an acceptable range of asset renewal expenditure.
- We are concerned about Unison's ability to deliver its network augmentation programme. When we visited Unison in May 2006 the position of Network Development Manager was vacant. Furthermore, while a number of network development projects had been identified to improve network security, no work had been done on designing or implementing these projects. This was in spite of the fact that such projects have a long lead time before construction can commence as they often involve the construction of assets on land not owned by Unison.
- We have also reviewed the top down methodology used by Unison to forecast its network augmentation requirements and believe that it may understate the requirement over the medium to longer term. This is consistent with the fact that expenditures higher than the average requirement of \$4.9 million per year have been forecast through to 2008/09.
- Unison's reliability of supply will be impacted by magnitude of its operations, asset renewal and network augmentation expenditures and also by the efficiency with which these expenditures are targeted and applied. We consider that Unison's current asset management practices in respect of the management of its maintenance and asset renewal budgets are appropriate and in accordance with good industry practice. On this basis we consider there is little more that Unison can reasonably do in the short term to remedy past breaches of its quality threshold and we do not consider that the Commission needs to take further action in respect of these breaches
- Nevertheless, we have concerns about the management of Unison's network augmentation budget. This budget will also have an impact on network reliability,

particularly over time. The Commission should therefore monitor Unison's performance in respect of network augmentation, as well as maintenance and asset renewal.

- It is not clear exactly what the underground conversion budget represents. It needs to be clarified whether it is the total cost of the work, or the cost net of the third party financial contribution. We consider that the Hawkes Bay Power Consumers' Trust should be treated the same way as any other third party wishing to support underground conversion, and any Trust contribution should be treated as a dividend to the Trust rather than a Unison funded capital expenditure.

## 5.2 RECOMMENDATIONS

We recommend that:

- the Commission make no change Unison's current reliability criteria. We expect Unison's reliability to improve over time in response to the increased level of expenditure and holding the threshold at its present level will increase the incentives on Unison to ensure that the additional expenditure is efficient and appropriately targeted;
- the Commission take no further action in respect of Unison's past breaches of its reliability criteria; and
- the Commission monitor in particular the adequacy of Unison's maintenance, asset renewal and network augmentation budgets and also the efficiency and effectiveness with which all three budgets have been managed.