**2003-2004**

**NEW SOUTH WALES**

# Electricity Network

# Performance Report

# TransGrid

**October 2004**

## INTRODUCTION

This Network Performance Report has been prepared by TransGrid to fulfil the requirements of the Electricity Network Operator reporting regime and the Electricity Supply (Safety and Network Management) Regulation 2002. The enactment of Electricity Supply (Safety and Network Management) Regulation 2002 has superseded the Electricity Supply (Safety Plans) Regulation 1997.

Clause 7(5) of the Regulation specifically excludes the requirement for TransGrid to lodge a Customer Installation Safety Plan.

This report has been independently appraised in accordance with the requirements of the DEUS Report Outline. The Appraisal Report confirmed that this Report is complete and that the data presented can be relied upon by the Department for carrying out performance analysis.

# 1. PROFILE

TransGrid is the owner, operator and manager of the high voltage transmission capability between generators, distributors and directly connected end users in New South Wales as well as interconnections with Queensland and Victoria. The system is a major part of one of the most extensive systems in the world comprising of 81 substations and power station switchyards and over 12,400 kilometres of transmission lines.

The system operates at voltage levels of 500, 330, 220 and 132kV. The substations are located on land owned by TransGrid and the transmission lines of steel tower, concrete or wood pole construction are generally constructed on easements acquired across private or public land.

TransGrid has staff strategically based at locations throughout NSW in order to meet the day to day operation and maintenance requirements as well as being able to provide emergency response. The main administrative office is located at the corner of Park and Elizabeth Street Sydney. Field staff are co-ordinated from major depots located at the Metropolitan Centre in Western Sydney and at Newcastle, Tamworth, Orange, Wagga Wagga and Yass.

**Table 1.1 Network Operator Statistics**

| | Number at 30-6-03 | Number at 30-6-04 |
|---|---|---|
| Customer Numbers at Year End (Total) | 13 | 14 |
| Energy Delivered to Year End GWh | 69,427 | 71,571 |
| System Loss Factor (%) | 3.0% | 3.0% |
| Transmission System (km) | 12,420 | 12,446 |
| High Voltage Overhead (km) | 12,400 | 12,426 |
| High Voltage Underground (km) | 20 | 20 |
| HV Structures and Poles | 38,400 | 38,527 |
| Substations (Number) | 81 | 81 |
| Employees (Full Time Equivalent Number) | 964 | 974 |
| Network Contractors (Full time equivalent numbers) | 22 | 89 |

Notes: Distances for overhead and underground lines are circuit km.


TransGrid Network System
Bull Creek
Dumaresq
Lismore
Tenterfield
Moree
Kookfhan
Inverell
Glen Innes
Narrabri
Armidale
Coffs Harbour
Nambucca
Gunnedah
Tamworth 132
Tamworth 330
Kempsey
Port Macquarie
Broken Hill
Muswellbrook
Taree
Beryl
Wellington
Liddell
Bayswater
Stroud
Mudgee
Parkes
Molong
Mt Piper 132
Forbes
Orange
Mt Piper 330
Panorama
Wallerawang
Cowra
Buronga
Griffith
Balranald
Darlington Point
Yanco
Murrumburrah
Avon
Dapto
Marulan
Yass
Kangaroo Valley
Coleambally
Waggs 132
Wagga 330
Tumut
Canberra
Queanbeyan
Gadara
Deniliquin
Finley
Lower Tumut
Jindera
ANM
Upper Tumut
Albury
Hume
Murray
Cooma
Snowy Adit
Guthega
Munyang
Liddell
Bayswater
Tomago
Newcastle
Waratah
Eraring
Vales Point
Munmorah
Tuggerah
Vineyard
Sydney North
Sydney East
Regentville
Sydney West
Kemps Creek
Beaconsfield West
Liverpool
Wallerawang
Sydney South
Ingleburn
Yass
Avon
Dapto
Transmission System Voltages
500kV Transmission Line
330kV Transmission Line
220kV Transmission Line
132kV Transmission Line
66kV Transmission Line
330kV Underground Cable
500kV Substation
330kV Substation
220kV Substation
132kV Substation
Supply Authority Exchange Point
Interstate Exchange Point

# 2. NETWORK MANAGEMENT

## 2.1 Overview

TransGrid's mission is to be Australia's leading manager of network assets. It is committed to providing a safe working environment and ensuring the reliability of its electricity transmission network.

TransGrid published its updated (5 year) Network Management Plan 2001-2006 in May 2002. This Plan provides a focus for ongoing analysis within TransGrid aimed at continually improving the management of the transmission system while also providing an authoritative vehicle for dissemination of information to TransGrid's managers, employees, customers and stakeholders.

TransGrid also produced its 30 year Plan in July 2000, covering the period from 2001 to 2030. The 30 Year and 5 Year Plans quantify TransGrid's medium and long term strategies for asset management and provide expenditure budget forecasts.

Ongoing management strategies aimed at the achievement of TransGrid's mission are the maintenance and development of Asset Maintenance Policies and Strategies in the framework of an accredited Quality Documentation system, a system of Quarterly Asset Performance Reviews, regular Technical Performance Assessments and audits, and extensive benchmarking studies.

In accordance with the Electricity Supply (Safety and Network Management ) Regulation 2002, TransGrid prepared and lodged a Public Electrical Safety Awareness Plan on 30th June 2003 and lodged its Network Management Plan and Bush Fire Risk Management Plan on 29th August 2003.

Subsequently, independent audits of the Network Management and Bush Fire Risk Management Plans were conducted and Audit Reports were lodged on 31st October 2003.

## 2.2 Network Complaints

TransGrid has an established process of contacting all property owners before entering their property to perform any type of work in maintaining transmission lines, easements and access tracks and to fully explain the nature of work to be done, so that all property owners' concerns may be addressed prior to commencement. During the year, each of TransGrid's Regions receives a number of calls from property owners relating to this work. Most of these calls are enquiries about activities about to take place and are satisfied by information supplied by TransGrid's officers. However, some required further discussion with property owners to clarify the situation and sometimes to provide rectifying actions. In its three Regions for 2003/2004, only eight notable verbal or written expressions of dissatisfaction were received. These are shown as complaints relating to vegetation and access track management, and complaints relating to disturbance of livestock from aerial activity in Table 2.1

In addition, TransGrid received four complaints arising from transformer or insulator noise and interference. Three complaints which related to each of Yass 330kV substation, 330kV line No.1 and 330kV line No.32 have been resolved, while the proposed solution to the complaint regarding Vales Point 330kV switching station is subject to a future review. These are shown in Table 2.2 under 'Noise and Interference'.

Also, there was one (1) complaint regarding perceived difficulty in access to transmission loading data to be used by an EMF consultant. After discussion, this matter was mutually and satisfactorily resolved. This is shown in Table 2.1 as complaint relating to request for network information.

Also, claims were made as a consequence of interrupted supply which were caused by TransGrid. During the year, there were a total of 121 claims as a result of four (4) incidents. Seven (7) of these claims, from two (2) incidents, are still under consideration. The remaining 114 claims were accepted. These are shown in Table 2.2 under 'Reliability' and Note 3 for the Table.

The above easement maintenance complaints, noise and interference complaints, information request and supply claims are summarized in the following tables.

## Performance Data

| Table 2.1 - Network Complaints: Total Received 2003/2004 | |
|---|---|
| Total Complaints Received | 134 |
| Distribution Customer Numbers (Averaged over the year) | N/A |
| Complaints Received per 1,000 Distribution Customers (averaged over the year) | N/A |
| Vegetation Management Program: % of Network where Clearing Carried Out[1] | 16.4% |
| Number of Complaints in Relation to Vegetation and access track Management Activities | 6 |
| Number of Complaints in Relation to disturbance of livestock from aerial activity | 2 |
| Number of Complaints in Relation to requests for network information | 1 |

Note: 1. This value relates to easements with vegetation management requirements. Scheduled easement maintenance was 100% complete and mainly on spans with dense vegetation.

| Table 2.2 - Network Complaint Investigations Completed 2003/2004 | | | | |
|---|---|---|---|---|
| **Category** | **Nature of Complaint** | **Total Number** | **% Valid[1]** | **% of Sub-Total** |
| Voltage | Sustained over voltage | | | |
| | Sustained under voltage | | | |
| | Voltage fluctuations | | | |
| | Voltage dips | | | |
| | Switching transients | | | |
| | N-E voltage difference | | | |
| | Ground fault voltage | | | |
| | Voltage unbalance | | | |
| | Mains signalling voltages (Outside defined range) | | | |
| | HV injection (HV/LV Intermix) | | | |
| | Notching | | | |
| | **SUB TOTAL (Supply Voltage Complaints)** | | | |
| | | | | |
| Current | Direct current | | | |
| | Harmonic content | | | |
| | Inter Harmonics | | | |
| | **SUB TOTAL (Supply Current Complaints)** | | | |
| | | | | |
| Other Quality | Mains signalling reliability | | | |
| | Noise & Interference | 4 | 100% | 100% |
| | Level of supply capacity | | | |
| | Supply frequency | | | |
| | Level of EMF | | | |
| | **SUB TOTAL (Other Quality of Supply Complaints)** | 4 | 100% | |
| | | | | |
| | **SUB TOTAL (All Quality of Supply Complaints)** | 4 | 100% | |
| | | | | |
| Reliability | No. of supply failures (No. of claims) | 114 | 100% | |
| | Duration of supply failures | | | |
| | No. of <1 min. interruptions | | | |
| | **SUB TOTAL (Reliability of Supply)** | 114 | 100% | |
| | | | | |
| Safety | Overhead line safety | | | |
| | Underground safety | | | |
| | Electrical station safety | | | |
| | Service line safety | | | |
| | **SUB TOTAL (Network Safety)** | | | |
| | | | | |
| | **TOTAL** | 118 | 100% | N/A |

Note 1: A complaint is valid where non-compliance with published service and network standards occurs.

Note 2: Table 2.2 does not include the 9 vegetation, aerial patrol and data request related activities complaints in Table 2.1.
Note 3: Table 2.2 (Reliability) does not include 7 claims not resolved by date of Report.

# 3. NETWORK PLANNING

## 3.1 Overview

TransGrid is responsible for the planning and development of transmission networks in New South Wales in two interrelated roles.

Firstly it has been nominated by the NSW Minister for Energy to be the Jurisdictional Planning Body (JPB) for NSW. In this role it:

- Represents the NSW Jurisdiction on NEMMCO's Inter-regional Planning Committee (IRPC);
- Provides jurisdictional information to the IRPC to enable it to assist NEMMCO in producing its annual Statement of Opportunities (SOO) and Annual National Transmission Statement (ANTS); and
- Carries out an Annual Planning Review, prepares an Annual Planning Report (APR) for NSW and reports to the Minister on matters arising from the Annual Planning Review, the SOO and ANTS.

Secondly it is registered with NEMMCO as a Transmission Network Service Provider (TNSP) in the NSW region of the National Electricity Market (NEM). As a TNSP the National Electricity Code (the Code) requires TransGrid to:

- Analyse the future operation of its transmission network to determine the extent of any future network constraints;
- Conduct annual planning reviews with Distributors to determine the extent of any emerging constraints at points of connection between the TNSP's network and the Distributor's network and determine options for the relief of constraints;
- Coordinate a consultative process for consideration and economic analysis of network augmentation options in accordance with the ACCC's Regulatory Test and determine the recommended option. TransGrid treats non-network options, including demand management (DM) options, on an equal footing with network options. Consideration of DM options is fully integrated onto TransGrid's network planning processes. They are examined in joint planning with distributors and, if appropriate, are vigorously pursued to delay or modify the extent of network augmentations;
- After resolution of any disputes concerning the recommended option arrange for its implementation in a timely manner; and
- Prepare and publish an Annual Planning Report for NSW by June 30 of each year.

The Code requires the Annual Planning Report to include:

- Load forecasts;
- Results of annual planning reviews with Distributors;
- Planning proposals for future connection points;
- Forecast of constraints over 1, 3 and 5 years;
- Summary information for proposed augmentations; and
- Consultation reports on proposed new small network assets (NSNA).

These obligations are described more fully in Chapter 5.6 of the Code and the ACCC's Regulatory Test.

In 2004, in accordance with a directive from the Ministerial Council on Energy, the Annual Planning Report's structure was aligned with the structure of the ANTS and Annual Planning Reports in other NEM Jurisdictions. Thus in addition to the above the APR contains a Summary of Relevant Major National Flow Path Developments.

To meet these obligations, TransGrid incorporates appropriate elements of the New South Wales Government's Total Asset Management (TAM) System regarding inter-agency plans and strategic planning (refer to Sections 3.3 and 3.5 of this report), service delivery strategy (refer to Section 3.2 of this report) and assessment and Decision Tools (refer to Section 3.4 – Demand Management – of this report.)

## 3.2 Reliability Planning Standards

Under NSW legislation TransGrid has responsibilities that include planning for future NSW transmission needs, including interconnection with other networks.

In addition, as a TNSP TransGrid is obliged to meet the requirements of Schedule 5.1 of the Code. In particular, TransGrid is obliged to meet the requirements of clause S 5.1.2.1:

> *"Network Service Providers* must plan, design, maintain and operate their *transmission networks …* to allow the transfer of power from *generating units* to *Customers* with all *facilities* or equipment associated with the *power system* in service and may be required by a *Code Participant* under a *connection agreement* to continue to allow the transfer of power with certain facilities or *plant* associated with the *power system* out of service, whether or not accompanied by the occurrence of certain faults (called "*credible contingency events*").

The Code also sets out the required processes for developing networks as well as minimum performance requirements of the network in a range of areas including:

- A definition of the minimum level of credible contingency events to be considered;
- The power transfer capability during the most critical single element outage. This can range from zero in the case of a single element supply to a portion of the normal power transfer capability;
- Frequency variations;
- Magnitude of power frequency voltages;
- Voltage fluctuations;
- Voltage harmonics;
- Voltage unbalance;
- Voltage stability;
- Synchronous stability;
- Damping of power system oscillations;
- Fault clearance times;
- The need for two independent high speed protection systems;
- Automatic reclosure of overhead transmission lines; and
- Rating of transmission lines and equipment.

TransGrid consults with Code Participants and interested parties during the planning process and in determining proposals for network augmentations.

TransGrid's planning obligations are also interlinked with the licence obligations placed on Distribution Network Service Providers (DNSP) in NSW. TransGrid must ensure that the system is adequately planned to enable their licence requirements to be met.

In addition to meeting requirements imposed by the Code, environmental legislation and other statutory instruments, TransGrid is expected by the NSW jurisdiction to plan and develop its transmission network on an "n-1" basis. That is, unless specifically agreed otherwise by TransGrid and the affected distribution network owner or major directly connected end-use customer, there will be no inadvertent loss of load (other than load which is interruptible or dispatchable) following an outage of a single circuit (a line or a cable) or transformer, during periods of forecast high load.

In fulfilling this obligation, TransGrid must recognise specific customer requirements as well as NEMMCO's role as system operator for the NEM. To accommodate this, the standard "n-1" approach can be modified in the following circumstances:

- Where agreed between TransGrid and a distribution network owner or directly connected high voltage end-use customer, agreed levels of supply interruption can be accepted for particular single outages, before augmentation of the network is undertaken (for example radial supplies).
- Where requested by a distribution network owner or directly connected high voltage end-use customer and agreed with TransGrid there will be no inadvertent loss of load (other than load which is interruptible or dispatchable) following an outage of a section of busbar or coincident outages of agreed combinations of two circuits, two transformers or a circuit and a transformer (for example supply to the inner metropolitan/CBD area).
- The main transmission network, which is operated by NEMMCO, should have sufficient capacity to accommodate NEMMCO's operating practices without inadvertent loss of load (other than load which is interruptible or dispatchable) or uneconomic constraints on the energy market. At present NEMMCO's operational practices include the re-dispatch of generation and ancillary services following a first contingency, such that within 30 minutes the system will again be "secure" in anticipation of the next critical credible contingency.

These jurisdictional requirements and other obligations require the following to be observed in planning:

- At all times:
  - Electrical and thermal ratings of equipment will not be exceeded;
  - Stable control of system voltage will be maintained, with system voltages maintained within acceptable levels; and
  - Synchronous stability of the interconnected power system will be maintained.
- A quality of electricity supply at least to Code requirements is to be provided;
- A standard of connection to individual customers determined by Connection Agreements is to be provided;
- As far as possible, connection of a customer is to have no adverse effect on other connected customers;
- Environmental constraints are to be satisfied;
- Acceptable safety standards are to be maintained; and
- The power system in NSW is to be developed at the lowest cost possible whilst meeting the constraints imposed by the above factors.

Consistent with a responsible approach to the environment, it is also aimed to reduce system energy losses where economic.

A further consideration is the provision of sufficient capability in the system to allow components to be maintained in accordance with TransGrid's asset management strategies.

## 3.3 Levels of Network Planning

The network planning process is undertaken at three levels:

1. Connection Planning

Connection planning is concerned with the local network directly related to the connection of loads and generators. Connection planning typically includes connection enquiries and the formulation of draft connection agreements leading to a preliminary review of the capability of connections. Further discussions are held with specific customers where there is a need for augmentation or for provision of new connection points.

2. Network Planning within the New South Wales Region

The main 500 kV, 330 kV and 220 kV transmission system is developed in response to the overall load growth and generation requirements and may be influenced by interstate interconnection power transfers. Development includes negotiation with affected NSW and interstate parties.

The assessment of the adequacy of 132 kV systems requires joint planning with DNSPs. This ensures that development proposals are optimal with respect to both TransGrid and DNSP requirements leading to the lowest possible cost of transmission to the end customer. This is particularly important where the DNSP's network operates in parallel with the Transmission network, forming a meshed system.

3. Inter-regional Planning

The development of interconnectors between regions, and of augmentations within regions that have a material effect on inter-regional power transfer capability are coordinated, under the National Electricity Code, by the Inter-regional Planning Committee convened by NEMMCO. Network Service Providers may also apply to NEMMCO for interconnection works to be classified as regulated.

The IRPC conducts an annual planning review of inter-regional networks, and assists NEMMCO in preparing the annual SOO and ANTS. The ANTS identifies actual and potential constraints on major national transmission flow paths that may be addressed by transmission augmentations, generation developments or demand management developments. A timetable for addressing inter-regional constraints follows from this work.

## 3.4 Demand Management

TransGrid treats non-network options, including demand management (DM) options, on an equal footing with network options. Thus consideration of DM options is fully integrated onto TransGrid's network planning processes.

DM options are implemented by third parties who have the relevant expertise and resources. Thus, for a demand management option to be implemented to meet a network constraint it must, in addition to passing the ACCC's Regulatory Test, have a proponent who is committed to implement the option and to accept the associated risks, responsibilities and accountabilities.

At this point in time it is expected that DM options will emerge either from joint planning with distributors, Electricity Market participants or other interested parties. Reasonable DM options may include, but are not limited to, combinations of the following:

- Reduction in electrical energy consumption through increases, at points of end-use, of:
  - Improved energy efficiency devices and systems;
  - Thermal insulation;
  - Renewable energy sources such as solar; and
  - Alternative reticulated energy sources such as natural gas.
- Reduction in peak electricity consumption through increases, at points of end-use, of:
  - Tariff incentives;
  - Load interruption and reduction incentives;
  - Energy storage systems;
  - Standby generators; and
  - Power factor correction equipment.

TransGrid actively promotes DM options through:

- Identifying opportunities for DM options through joint planning with the Distributors and engaging expert external consultants.
- Informing the market of constraints via its Annual Planning Report and consultations for alleviating individual constraints.

- Participating in the review of the Demand Management Code of Practice for Electricity Distributors in NSW.
- Participation in initiatives and reviews by the department of Energy, Utilities and Sustainability and IPART that include consideration of demand management and its relationship to the development of electricity networks.
- TransGrid is a joint sponsor of the first public installation of Pacific Power's Crystalline Silicon on Glass photovoltaic system located at the Powerhouse Museum in Sydney.

TransGrid's joint planning with the NSW distributors provides a mechanism to identify opportunities for DM options. NSW distributors follow a similar process to TransGrid in preparing planning reports for their networks, thereby providing another useful source of information for proponents of DM options. They also follow a Demand Management Code of practice that details the steps to be followed in considering and implementing DM options in distribution planning.

An example of the outcomes of these activities is as follows.

As part of the authorisation for the Sydney CBD and inner suburbs project, TransGrid, Energy Australia and the Department of Infrastructure Planning and Natural Resources (DIPNR) initiated in November 2002 a Demand Management project to identify and investigate the potential for reducing the demand for electricity in the inner metropolitan Sydney region, and ultimately lead to developing a Demand Management strategy that may assist in deferring or avoiding network expansion in the mentioned load area. The project covers investigations and identification of feasible demand management and local generation opportunities. TransGrid and Energy Australia are supporting the project by committing a total of $10 million towards implementation by contributing $1 million per year each over a five-year period.

A number of activities stemming from this project are in progress and some are complete. Those fully or significantly completed include:

- Opportunities for demand reduction in the St George and Sutherland area of Sydney (141 sites with peak demand greater than 200MVA to be assessed).

  Outcome: Identification and quantification of the amount and indicative cost of actual demand reduction opportunities including power factor correction, interruptibility, energy efficiency, cogeneration and energy management.

- Assessment of opportunities to reduce demand for electricity through power factor correction in the inner metropolitan Sydney region.

  Outcome: Following the detailed analysis of billing data for 2,233 sites in the Sydney load area, identified the technical, commercial and practical amount of potential power factor correction to reduce peak demand on the supply network in the inner Sydney region.

- PV (photo-voltaic) system output monitoring on two sites in Sydney (Kogarah and Homebush Bay).

  Outcome: Partial data collected and under analysis to confirm practical performance and reliability of available demand reduction opportunities for PV technology.

It is expected to place in the public domain during the 2004/2005 financial year several Innovation Projects covering different topics for a number of areas in Sydney.

## 3.5 2003/2004 Results and Outcomes

### 3.5.1 Planning Processes

**Joint Planning Meetings with Distributors**

TransGrid held joint planning meetings with all five distributors during the year to 30th June 2004.

**Annual Planning Review**

An Annual Planning Review for 2004 has been carried out. It included:

- An update of TransGrid's load forecast that takes account of winter 2003 peak loads.
- Provision of load forecast data for inclusion in NEMMCO's 2004 Statement of Opportunities and Annual National Transmission Statement that was published on 30th July 2004.
- Publication of an Annual Planning Report for 2004 on 30th June 2004.
- A public forum for the Annual Planning Report was held on 11th August 2004.

**Interconnectors**

NEMMCO applied the regulatory test and determined that SNI passed the regulatory test in December 2001. This decision was appealed before the National Electricity Tribunal, which rejected the appeal in October 2002. The Tribunal's decision was appealed in the Supreme Court of Victoria in November 2002. Hearings were completed in June 2003 with a decision handed down on 24th July 2003 upholding the appeal. On 7th August 2003, TransGrid lodged an appeal against the decision in the Court of Appeal in the Supreme Court of Victoria.

TransGrid is monitoring the ongoing changes and network developments in the NEM and will seek legal advice as to whether or not to continue with the appeal process.

TransGrid, in conjunction with Powerlink Queensland, carried out a major review of possible upgrade options for the Queensland – NSW interconnector, which was completed early in 2004. The review concluded that high capacity upgrades were unlikely to pass the regulatory test in its current form but that a low capacity upgrade may pass the test.

TransGrid, in conjunction with VENCorp in Victoria, analysed a number of options for upgrading the NSW – Victoria interconnection. It was concluded that options to increase the capacity of the interconnection by up to 180 MW were unlikely to pass the current regulatory test.

**Load Forecast Summary**

TransGrid's load forecast for NSW in aggregate is based on econometric modelling. The forecast is supported by data for individual customer connection points, based on forecasts provided by the Distributors.

The 2004 median NSW load forecast predicts that energy sent out will increase by an average 2.2% pa to 2014. Winter maximum demand is predicted to grow by an average 280 MW pa and summer maximum demand by 420 MW pa over the same period.

These results are depicted in the following charts, which also show the variation in the forecasts for different scenarios of economic growth.

**Figure 3.1: NSW Energy Sent Out**

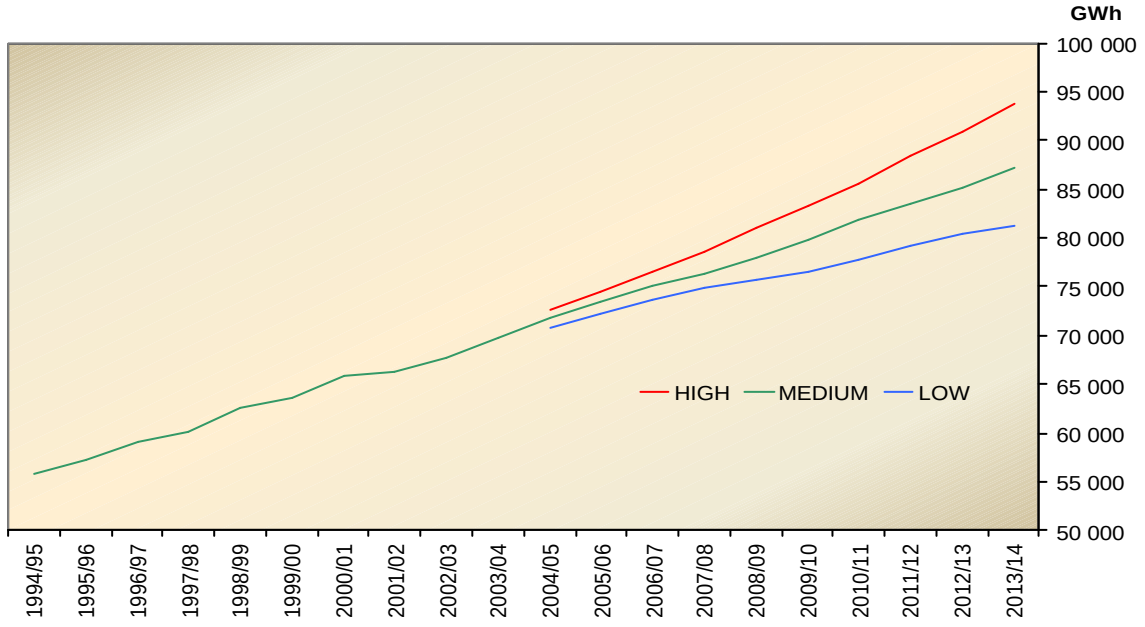


**Figure 3.2: NSW Winter Peak Demand 50% PoE**

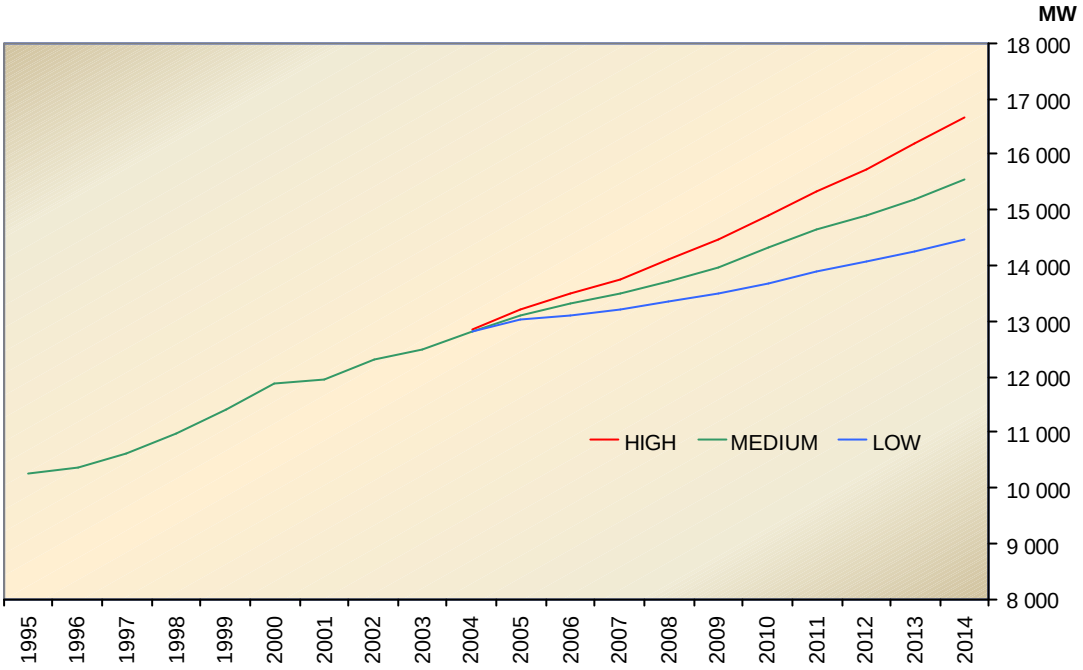
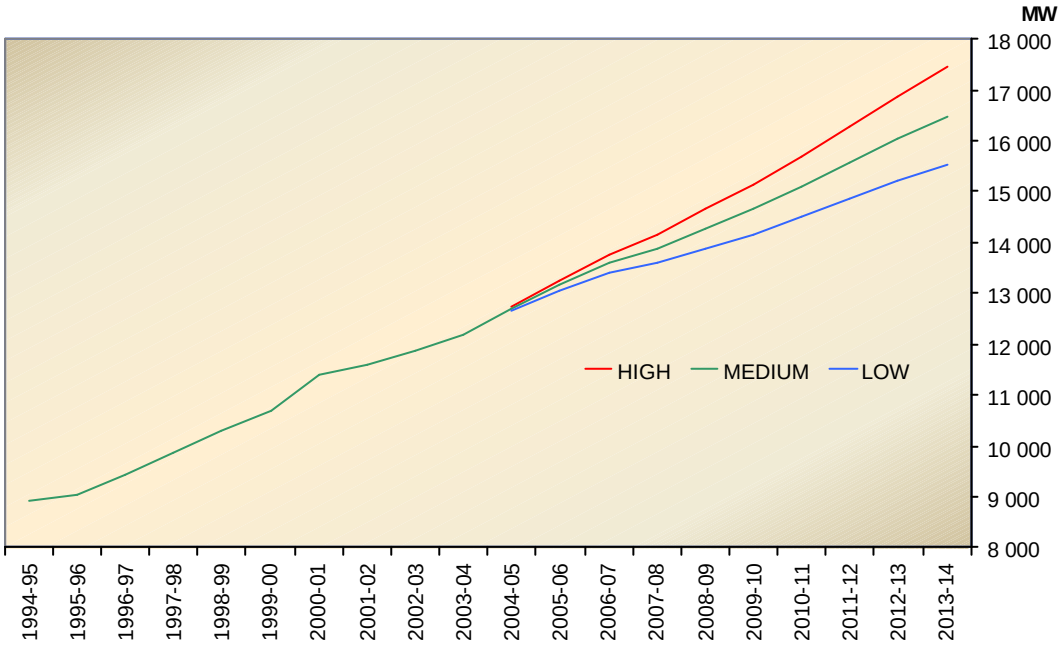



**Figure 3.3: NSW Summer Peak Demand 50% PoE**



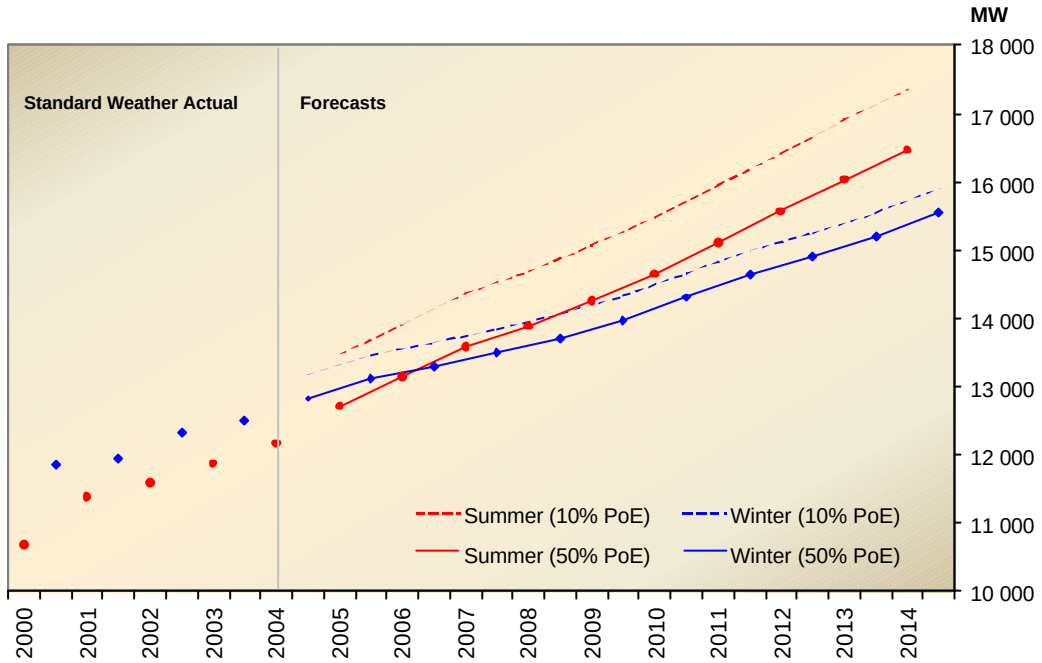

(Note: PoE = Probability of Exceedence)

Prior to 2003 in NSW, summer peak demand had never exceeded the previous winter peak demand. However, in the summer of 2002-03, fuelled by extreme temperatures, peak demand of 12,456 MW exceeded the preceding winter peak for the first time. An average winter during 2003, however, still produced a new record demand of 12,476 MW which was not surpassed in summer 2003-04. The

stronger trend growth of summer peak demand relative to winter, has led to widespread expectation that NSW will soon become summer peaking.

Figure 3.4 shows that based on the latest forecast, a NSW summer peak is likely to be the predominant pattern by the end of the decade under the medium economic growth scenario. In the interim, the prevailing weather conditions during the winter and summer months will greatly influence when the actual peak occurs.

**Figure 3.4: NSW Summer and Winter Peak Demand Compared**



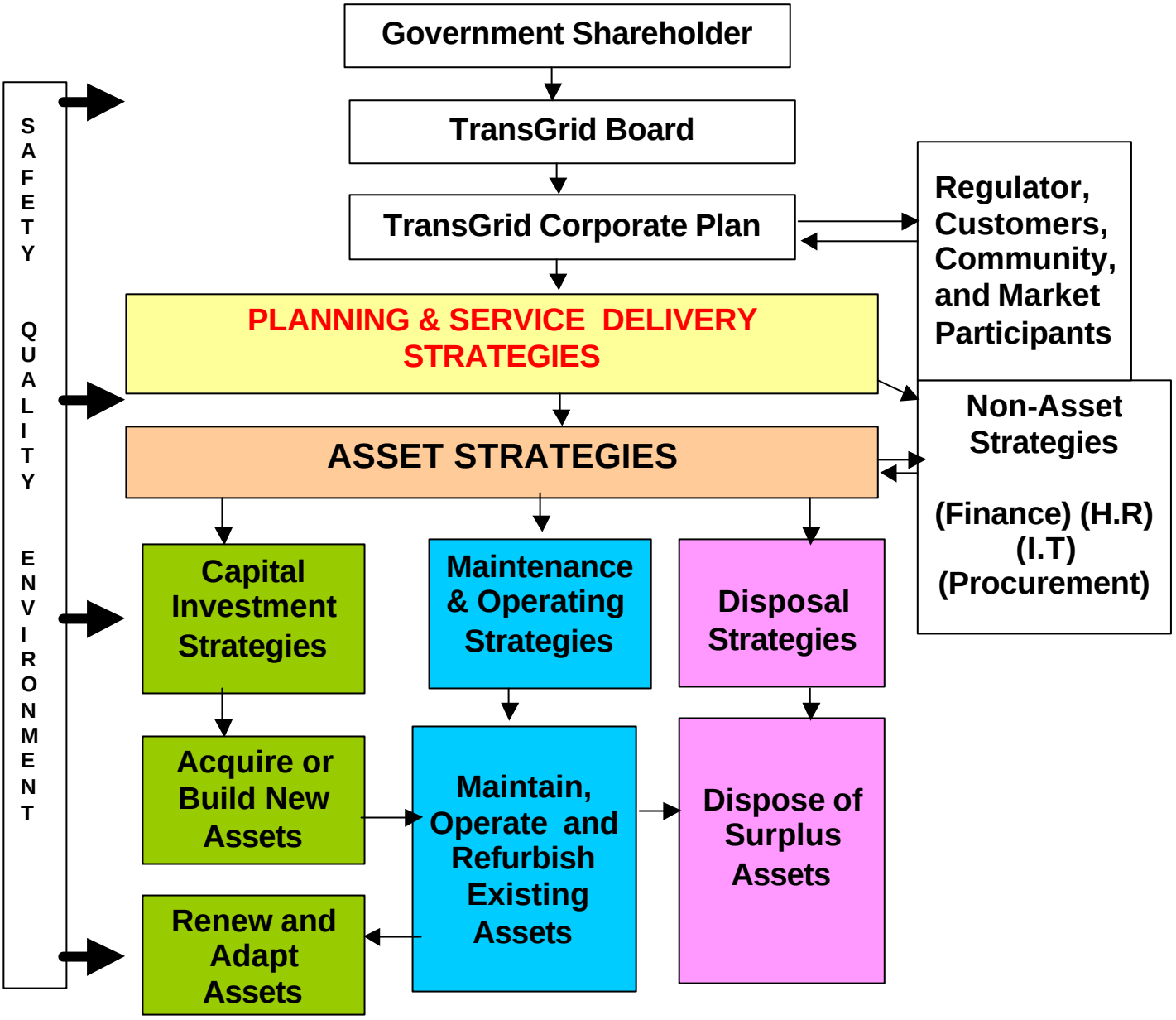

Forecast demands are those that are those that are expected to occur at the 10th and 50th percentiles of the probability distribution of temperature, labelled 10% PoE (Probability of Exceedence) and 50% PoE respectively.

# 4. ASSET MANAGEMENT

## 4.1 Overview

TransGrid is constantly striving to optimise its asset management performance as a means of achieving its corporate mission "To be Australia's leading manager of network assets" and meeting its customers' expectations of system reliability and quality of supply. This involves the development, maintenance and ongoing review of Asset Management Policies and Strategies for the capital investment, maintenance, operation, refurbishment, replacement and disposal of the full range of network assets.

To accomplish this mission, TransGrid has developed an Asset Management model that is based on the New South Wales Government's Total Asset Management (TAM) Model as promulgated in 2001. TransGrid's model is shown in the figure below.




As a service delivery utility, TransGrid's approach is to apply the various elements of the TAM model, including strategies for Planning & Service Delivery, Assets, Capital Investment, Asset Maintenance and Asset Disposal, as well as the recommended implementation Plans for HR, IT, Procurement and the legislative, community and stakeholder forms of direction. In addition, TransGrid strives to meet its

service delivery obligations as seen by its external Regulator in the form of Reliability and Availability while also meeting its corporate and community commitments to safety, the environment and quality.

To support this objective, TransGrid has initiated or maintained a number of strategies during the year.

- The review of maintenance policies to implement the outcomes of Risk Management principles, identifying the criticality, reliability, risks and exposures associated with particular courses of action.

- Achievement of a consistently high standard of asset maintenance is facilitated by TransGrid's continued certification to ISO 9001 of its Quality Documentation system. Despite the large geographical distances between Regions and their assets, there is confidence in the effective application of identical policies across the network.

- Quarterly Asset Performance Reviews are conducted by maintenance, operating, asset management and design staff to specifically review the performance of the network assets during the previous three months. This involves the detailed analysis of all forced and emergency outages during the period, as well as a review of the long term availability and reliability trends to determine any issues requiring further investigation. Review meetings were held on August 2003, November 2003, February 2004 and May 2004.

- Technical Performance Assessments are carried out bi-annually on each Region to audit the technical standard and completeness of the maintenance performance. Independent internal auditors with specialist knowledge of the maintenance functions for different asset types conduct these assessments. A formal report detailing observations and business risks is prepared, with a follow-up process to ensure that any issues identified are effectively addressed. During the year, assessments were conducted at Northern Region (July 2003), Central Region (December 2003) and Southern Region (March 2004.)

- TransGrid's maintenance performance in the Australasian and International sphere is monitored through its regular participation in a number of benchmarking studies. ITOMS (International Transmission Operations & Maintenance Study) is organised by a steering committee representing twenty six transmission organisations from Australasia, Europe, United Kingdom and United States and managed by the consulting group UMS. It compares at a detailed level the comparative costs of individual maintenance functions and their associated outage service levels. The results of these studies continue to provide insights into other best performer organisations' work practices. This information is fed back into TransGrid's reviews of its own practices and policies, completing the self-improvement cycle of asset management. During the year, TransGrid participated in the ITOMS2003 study for analysis of performance during the year 2002/2003.

These and other asset management strategies which meet the TAM model are described in detail in TransGrid's Network Management Plan, contained in the document Network Management Plan 2001 – 2006 as follows: Planning and Service Delivery (Section 3.), Asset Strategies (Section 4.), including Capital Investment Strategies (Section 4.1), Asset Maintenance and Operating Strategies (Section 4.2) and Asset Disposal Strategies (Section 4.4).

## 4.2 Technical Service Standards

TransGrid's prime service standards of customer focussed network performance are those of Reliability and Availability.

### 4.2.1 Reliability

Reliability is a measure of the service level of the transmission network as perceived by the customer. It relates to the amount of Energy Not Supplied resulting from a temporary failure of a component of the network. The measure used to describe Reliability is System Minutes. This is the equivalent of how many minutes the total Network, while delivering the annual maximum MW demand, would have to be out of service to equate to the amount of Energy Not Supplied during the year.

TransGrid has established a Reliability target of between 0.5 and 2.0 System Minutes per annum, with a 3 year rolling average target of 1.3 system minutes.

### 4.2.2 Availability

Availability is a measure of the network's transmission circuits preparedness to transmit energy to and from customers. It relates to the total duration of transmission circuit outages compared to the total possible hours available for all circuits. It indicates the effectiveness of strategies to minimise the number and duration of planned maintenance outages and the success of maintenance policies in reducing unplanned circuit outages.

Availability is measured as a percentage of the ideal (but unrealistic) no outages situation. TransGrid has established a target of between 99.0% and 99.2% over the year.

### 4.2.3 Connection Point Performance

In addition to Reliability and Availability, TransGrid measures its network performance at the individual customer Connection Point level. TransGrid's total connection points are spread across 14 connected customers, 10 being Distributor/Direct customers, and 4 Generator customers. The numbers of connection points per customer range from as few as 1 to as many as 182. The measures reported are the Connection Point Unplanned Interruption (with loss of supply) frequency, duration and restoration time, for each individual customer and an average across the network for the Distributor/Direct customers.

Historically, TransGrid has not recorded details of planned outages that result in unsupplied energy. Contributing to this has been the difficulty in judging what constitutes loss of supply. In many instances, due to forward planning, the customer is able to arrange alternative sources of supply by switching in back-feed circuits or use of alternative local generation. Subsequently, the customer was not without supply.

In many other cases, the TransGrid planned outage is coordinated with a customers scheduled major maintenance involving a shut down of all plant. Often, the outage planned by TransGrid is coordinated with a distributor to allow them to perform outstanding maintenance work, both benefiting from the outage.

### 4.2.4 Quality of Supply

TransGrid addresses its obligations to quality of supply in a manner as set out in Section 3.2 (Reliability Planning Standards) of this report and as required by Schedules S5.1a and S5.1 of the National Electricity Code covering, inter-alia:

- Frequency and Frequency Variations
- System stability
- Power frequency voltage
- Voltage fluctuations
- Voltage waveform distortion
- Voltage unbalance
- Protection systems and fault clearance times

## 4.3 Actionable Asset Incidents – SENI-2 Scheme

A summary of Actionable Asset Incident reports is provided in Table 4.1, with the incident date, brief description, location, network element affected and any action proposed or undertaken if necessary to prevent re-occurrence.

**Table 4.1 Actionable Asset Incident Summary**

| Date | Description | Location | Network Element Affected and proposed preventative action |
|---|---|---|---|
| 21/7/03 | A section of 132kV busbar tripped while busbar protection links were being isolated prior to circuit breaker maintenance. There was a loss of supply of 0.17 system minutes. | Sydney West 330/132kV Substation | Busbar differential protection had operated. However, no further action is required to prevent re-occurence. |
| 14/9/03 | During protection maintenance work at Liddell Sw/S, No.83 330kV line was inadvertently tripped while No.84 line was out of service. With the Queensland interconnection then only retained via the 132kV network, the maloperation of a 132kV contingency system to maintain supply to Port Macquarie resulted in the loss of load at Port Macquarie. There was a loss of supply of 0.235 system minutes. | Liddell 330kV switching station | 132kV lines 964 and 96G tripped losing supply to Port Macquarie 132kV busbar.<br>Contingency operational procedures have been amended. This will permit the system to separate either side of Port Macquarie substation dependant on network configuration and system loading. |
| 25/10/03 | During severe thunderstorms, lightning caused insulator flashovers on 132kV lines 976 and 977 Canberra – Queanbeyan, causing them to trip, reclose, trip and lock-out. As a result, there was a loss of supply at Queanbeyan of 0.255 system minutes. | 132kV lines between Queanbeyan and Canberra. | 132kV lines 976 and 977 were affected, No systemic action was required. |
| 29/12/03 | During strong winds, wind-blown debris caused the trip of the 220kV busbar leading to outages of the X2 Buronga – Broken Hill 220kV line and both Broken Hill and Balranald 220kV substations. There was a loss of supply of 0.196 system minutes. | Buronga 220kV Switching station | 220kV busbar at Buronga switching station was impacted by wind-blown debris. Outages at other locations was a direct result of this busbar outage. No systemic action is available nor required as the incidence of these types of faults is very low for 220kV and 330kV equipment. |
| 30/6/04 | The white phase bushing of the 3x single phase No.1 transformer exploded, damaging the adjoining red phase bushing and also causing the No.2 transfomer to trip. No direct supply interruption occurred, although the Kurri Hydro smelter potlines tripped via their own control systems. Two potlines were initially restored at full loads but were requested to reduce load to allow the third potline to be restored. A subsequent request by TransGrid resulted in the shedding of one of the potlines. A resulting loss of load from Newcastle substation was 1.23 system minutes. | Newcastle 330/132kV substation | The damaged white phase of Transformer No.1 has been replaced and the transformer returned to service. No.2 transformer was undamaged and returned to service two hours after tripping.<br>No further preventative action is required. |

### 4.4 Transmission Performance Data

2003/2004 performance for Reliability and Availability experienced no significant impact from the inclusion of the Snowy Hydro transmission assets which were transferred to TransGrid in June 2002. There were no reliability impacting outages involving the ex-Snowy Hydro assets. Though there were a small number of planned and forced outages on the ex-Snowy Hydro assets, their overall impact on TransGrid's availability measure was not significant.

#### 4.4.1 Reliability

For the year 2003/2004, TransGrid experienced 10 Energy not Supplied outages totalling 2.22 system minutes. 5 of these 10 outages, with loss of supply greater than 0.1 system minutes, are included in Table 4.1. While the total is above the annual upper target of 2.0 system minutes established by ACCC, it includes the impact of one non-typical event with the catastrophic failure of one transformer and temporary tripping of its adjoining transformer. Without this one event, the annual total would have been 0.94 system minutes. When converted to a percentage of energy delivered, 2.22 system minutes equates to a reliability of 99.9994% .

#### 4.4.2 Availability

For the year 2003/2004, TransGrid achieved an availability of 99.65 %. This represents the availability of TransGrid's transmission lines at all voltages from 132kV up to 500kV.

#### 4.4.3 Connection Point Performance

Of TransGrid's 14 connected customers, 9 did not experience any unplanned outages causing loss of supply or interruption to generation. Five (5) distribution customers experienced loss of supply from unplanned outages. These were ACTEWAGL, Australian Inland, Country Energy, EnergyAustralia and Integral Energy :-

**Table 4.11 – Network Reliability Trend**

| Network Reliability | Objective | 99/00 | 00/01 | 01/02 | 02/03 | 03/04 |
|---|---|---|---|---|---|---|
| System minutes | 0.5 – 2.0 | 4.23 | 0.67 | 0.44 | 4.40 | 2.22 |

**Table 4.12 – Circuit Availability Trend**

| Circuit Availability | Objective | 99/00 | 00/01 | 01/02 | 02/03 | 03/04 |
|---|---|---|---|---|---|---|
| Percent | 99.0 – 99.2 | 99.31 | 99.55 | 99.63 | 99.64 | 99.65 |

**Note:** This objective was set by ACCC in 1999, based on TransGrid's relevant historical performance. For 2004/2005 onwards, the objective will be set at 99.5%. This is a higher target due to TransGrid's higher performance achievement since the original target was set in 1999.

**Table 4.13 – Connection Point Interruptions – Average 2003/2004**

| | Objective | 03/04 averaged across network |
|---|---|---|
| Connection point interruption frequency | Note 1 | 0.10 |
| Connection point interruption duration (minutes) | Note 1 | 6.68 |
| Restoration time (minutes) | Note 1 | 65.97 |

**Note 1**: Objectives were not set for 2003/04 as the network has relatively few incidents but of a statistically diverse character, making average connection point performance difficult to predict.
**Note 2**: Indicator values in Table 4.13 are calculated only for Distributor/Direct Customers.

| Table 4.14 – Connection Point Interruptions (Unplanned) 2003/2004 | | |
|---|---|---|
| **Connection Point** | **No. of Unplanned Interruptions 03/04** | **Total Duration of Interruptions 03/04 (min)** |
| **ACTEWAGL** | | |
| Queanbeyan 132/66 kV S/S – 66kV Fdr 844 Fyshwick | 1 | 97 |
| Queanbeyan 132/66 kV S/S – 66kV Fdr 845 Fyshwick | 1 | 97 |
| | | |
| **Australian Inland** | | |
| Balranald 220/22kV S/S - 22kV Fdr N0.2 Moulamein | 1 | 74 |
| Broken Hill 220/22kV S/S - 220kV Fdr X4 Broken Hill Mines | 1 | 25 |
| Broken Hill 220/22kV S/S - 22kV Fdr No. 3 South | 1 | 25 |
| Broken Hill 220/22kV S/S - 22kV Fdr No. 4 Railway | 1 | 25 |
| Broken Hill 220/22kV S/S - 22kV Fdr No. 5 Talc St No.2 | 2 | 76 |
| Broken Hill 220/22kV S/S - 22kV Fdr No. 6 Talc St No.1 | 1 | 25 |
| Broken Hill 220/22kV S/S - 22kV Fdr No. 7 West | 2 | 76 |
| Broken Hill 220/22kV S/S - 22kV Fdr No. 8 Cockburn | 2 | 76 |
| | | |
| **Country Energy** | | |
| Cowra 132/66kV S/S – 66kV Fdr 863 Canowindra | 1 | 78 |
| Molong 132/66kV S/S - 66kV Transformer no.3 | 1 | 120 |
| Nambucca 132/66kV S/S – 66kV Fdr 752 Newee Creek | 1 | 11 |
| Port Macquarie 132/33kV S/S – 33kV Fdr 712 Rocks ferry | 1 | 72 |
| Port Macquarie 132/33kV S/S – 33kV Fdr 711 Laurieton tee Pumps | 1 | 72 |
| Port Macquarie 132/33kV S/S – 33kV Fdr 710 Owen St | 1 | 72 |
| Port Macquarie 132/33kV S/S – 33kV Fdr 708 Owen St tee Boronia St | 1 | 72 |
| Port Macquarie 132/33kV S/S – 33kV Fdr 707 Boronia st No.2 | 1 | 72 |
| Port Macquarie 132/33kV S/S – 33kV Fdr 703 Boronia St No.1 | 1 | 72 |
| Port Macquarie 132/33kV S/S – 33kV Fdr 702 Rocks Ferry | 1 | 72 |
| Queanbeyan 132/66kV S/S – 66kV Fdr 82K/1 Bungendore | 1 | 97 |
| Queanbeyan 132/66kV S/S – 66kV Fdr 82A Lorn Rd | 1 | 97 |
| Queanbeyan 132/66kV S/S – 66kV Fdr S826 Captains Flat | 1 | 97 |
| Queanbeyan 132/66kV S/S – 66kV Fdr 82B High St | 1 | 97 |
| Queanbeyan 132/66kV S/S – 66kV Fdr 82F No.11 Transformer | 1 | 97 |
| Queanbeyan 132/66kV S/S – 66kV Fdr 82M No.12 Transformer | 1 | 97 |
| Wallerawang 132/66kV S/S – 132kV Fdr 92C Oberon | 1 | 6 |
| | | |
| **EnergyAustralia** | | |
| Newcastle 330/132kV S/S – 132kV Fdr 96B Capral (Hydro) | 1 | 120 |
| Newcastle 330/132kV S/S – 132kV Fdr 96W Capral (Hydro) | 1 | 120 |
| | | |
| **Integral Energy** | | |
| Sydney West 330/132kV S/S – 132kV Fdr 237 BHP Mini Mill | 1 | 40 |
| | | |

Note: As explained in 4.2.3, this Table 4.14 lists only Unplanned interruptions.

| Table 4.15 – Averaged Individual Customer Connection Point Performance 2003/2004 | |
|---|---|
| | **03/04 Averaged Across Customer** |
| **Customer: ACTEWAGL** | |
| Connection point interruption frequency | **0.4** |
| Connection point interruption duration (mins) | **38.8** |
| Restoration time (mins) | **97.0** |
| **Customer: ANM** | |
| Connection point interruption frequency | **0** |
| Connection point interruption duration (mins) | **0** |
| Restoration time (mins) | **0** |
| **Customer: Australian Inland** | |
| Connection point interruption frequency | **1.0** |
| Connection point interruption duration (mins) | **36.5** |
| Restoration time (mins) | **36.5** |
| **Customer: BHP (Rod)** | |
| Connection point interruption frequency | **0** |
| Connection point interruption duration (mins) | **0** |
| Restoration time (mins) | **0** |
| **Customer: Country Energy** | |
| Connection point interruption frequency | **0.09** |
| Connection point interruption duration (mins) | **7.15** |
| Restoration time (mins) | **76.53** |
| **Customer: EnergyAustralia** | |
| Connection point interruption frequency | **0.03** |
| Connection point interruption duration (mins) | **3.64** |
| Restoration time (mins) | **120.0** |
| **Customer: Integral Energy** | |
| Connection point interruption frequency | **0.02** |
| Connection point interruption duration (mins) | **0.8** |
| Restoration time (mins) | **40.0** |
| **Customer: SRA** | |
| Connection point interruption frequency | **0** |
| Connection point interruption duration (mins) | **0** |
| Restoration time (mins) | **0** |
| **Customer: Tomago Aluminium** | |
| Connection point interruption frequency | **0** |
| Connection point interruption duration (mins) | **0** |
| Restoration time (mins) | **0** |

| | |
|---|---|
| **Customer: VISY** | |
| Connection point interruption frequency | **0** |
| Connection point interruption duration (mins) | **0** |
| Restoration time (mins) | **0** |
| **Customer: Delta (Generation)** | |
| Connection point interruption frequency | **0** |
| Connection point interruption duration (mins) | **0** |
| Restoration time (mins) | **0** |
| **Customer: Macquarie (Generation)** | |
| Connection point interruption frequency | **0** |
| Connection point interruption duration (mins) | **0** |
| Restoration time (mins) | **0** |
| **Customer: Eraring (Generation)** | |
| Connection point interruption frequency | **0** |
| Connection point interruption duration (mins) | **0** |
| Restoration time (mins) | **0** |
| **Snowy Hydro Authority** | |
| Connection point interruption frequency | **0** |
| Connection point interruption duration (mins) | **0** |
| Restoration time (mins) | **0** |

**Note**: The connection point performance values reported for Generator customers do not include interruptions to auxiliary supply connection points.

**Table 4.16 - Connection Points Not Performing to Objective 2003/2004**

| Connection Point | Commentary |
|---|---|
| | See Notes |

**Notes**: Objectives were not set for 2003/2004 as the transmission network has relatively few incidents and as such a measure from any individual connection point is difficult to predict.

# 5. NETWORK SAFETY

## 5.1 Overview

TransGrid's goal is zero injuries, occupational illnesses and incidents. Our first priority is the health and safety of our people, and our contractors, visitors and the public. Our strategies are aimed at continually improving our performance and maintaining a major focus on risk management. These include:

- Executive OHS Committee (and sub-committees)
- Annual Executive and senior management OHS Workshop
- Corporate Risk Management Database
- Schedule of compliance audits and inspections
- Safety Communications Steering Committee
- Quarterly Health and Safety Themes
- Chairman's Safety Award
- Annual Safety Day – First Aid, Fire Fighting and Risk Assessment competitions
- Presentations to TransGrid Board of every LTI by respective injured employee and their manager
- Participation in industry committees and working groups

Executive OHS Committee (and sub-committees)

The Executive Occupational Health and Safety Committee has responsibility for over-seeing the development of corporate occupational health and safety policy and procedures and the promotion and monitoring of health and safety performance within TransGrid. This includes the establishment of a number of subcommittees to address specific areas of TransGrid's activities who report to the Executive OHS Committee on a quarterly basis. These committees include:

- ≈ Safety Rules
- ≈ High Voltage Safe Working Practices
- ≈ Fire Protection
- ≈ Electric & Magnetic Fields
- ≈ Clothing
- ≈ Safety Communications Steering

Annual Executive and Senior Management OHS Workshop

The Executive OHS Committee and other Senior Managers of TransGrid hold an anuual workshop to review OHS objectives and strategies and determine the focus for the coming year. Three key objectives provided the foundation for the 2003 – 2004 business unit Health and Safety Plans which were to:

1. Develop and implement effective Risk Management in all workplaces and work activities.
2. Reinforce and promote consultative mechanisms to improve health and safety communications.
3. Strengthen our procedures to clarify responsibilities and detail specific deployment strategies to facilitate their implementation.

Corporate Risk Management Database

An OHS Risk Management Database has been established for the collection of risk assessments and Work Method Statements and to ensure availability to all staff as required.

Schedule of Compliance Audits and Inspections

A system of compliance audits and inspections ensure that procedures are implemented in accordance with legislative and organisational requirements. These include OHS system audits, random, unannounced safety compliance inspections, site conformance inspections, contractor audits and team leader audits of pre work risk assessments.

Communication is an integral component of our health and safety system aimed at ensuring that everyone is aware of their responsibilities and role in the implementation of our strategies. OHS Audit reports provided by internal and external auditors reflect a strong OHS commitment, understanding and performance across TransGrid.

Safety Communications Steering Committee

The Safety Communications Steering Committee assists with the review of policy and procedures through consultation with local committees and other relevant parties, and develops initiatives to promote health and safety to maintain a high level of awareness amongst staff.

Quarterly Health and Safety Themes

The specific initiatives for 2003-2004 included a focus on Driver Safety, Diabetes Awareness, Spring Cleaning (housekeeping and lifestyle), Sun Sense, Water Safety, Nutrition and Warming Up for Work. Implementation strategies include presentations from guest speakers, health assessments, information kits, displays and demonstrations.

Chairman's Safety Award

The annual Chairman's Safety Award recognises an individual or team who has made a significant contribution to safety in TransGrid throughout the year.

Annual Safety Day

TransGrid also holds an annual Safety Day with Risk Assessment, First Aid and Fire Fighting competitions for teams representing all areas of TransGrid. In addition to these internal competitions, TransGrid also participates in the Electricity Supply Industry Field Days and the annual NSW Power Industry Safety Day.

Presentations to TransGrid Board

Employees who sustain a lost time injury are invited to attend a Board meeting to discuss the incident. The employee's manager provides details of the injury and the corrective actions implemented to prevent a recurrence.

Participation in Industry Committees

TransGrid takes an active role in a number of industry committees and working groups (such as ESAA NENS and OHS Network, Workcover IRG, DEUS ISSC, etc.) to ensure that trends and expectations of legislators, industry and the community are understood and managed effectively. Compliance to these requirements was demonstrated by nil infringements or prosecutions and the renewal of TransGrid's workers compensation self insurer licence for another three year period to 30 April 2007.

## 5.2 Electrical Network- Accidents and Incidents Involving the Public

**Table 5.1 – Serious Electrical & Electricity Network Accidents (Public) Trend**

| | 99/00 | 00/01 | 01/02 | 02/03 | 03/04 |
|---|---|---|---|---|---|
| Serious Electrical Accidents | 0 | 0 | 0 | 0 | 0 |
| Serious Electricity Network Accidents | 0 | 0 | 0 | 0 | 0 |

**Table 5.2 – Serious Electrical Accident (Public) Numbers**
**Classified by Network Element 2003-2004 - Nil applicable for TransGrid**

**Table 5.3 – Serious Electrical Accident (Public) Numbers**
**Classified by Equipment Items Involved in Overhead Line Contact 2003-2004 – Nil applicable for TransGrid**

**Table 5.4 – Serious Electrical Accident (Public) Numbers**
**Classified by Cause 2003-2004 – Nil applicable for TransGrid**

**Table 5.4 – Serious Electrical Accident (Public) Numbers**
**Classified by Cause 2003-2004 - Nil applicable to TransGrid**

**Table 5.5 – Serious Electricity Network Accident (Public) Numbers 2003-2004 – Nil applicable to TransGrid**

**Table 5.6 – Actionable Safety Incidents (Public) Numbers**
**Classified by Network Element 2003-2004 – Nil applicable to TransGrid**

**Table 5.7 – Actionable Safety Incidents (Public) Numbers**
**Classified by Equipment Items in Overhead Line Contact 2003-2004 - Nil applicable to TransGrid**

**Table 5.8 – Actionable Safety Incidents (Public) Numbers**
**Classified by Cause 2003-2004 - Nil applicable to TransGrid**

## 5.3 Electrical Network- Accidents and Incidents Involving Network Workers

**Table 5.9 – Network Workers Serious Electrical & Electricity Network Accident Numbers Trend**

| | 99/00 | | 00/01 | | 01/02 | | 02/03 | | 03/04 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SEA | SENA | SEA | SENA | SEA | SENA | SEA | SENA | SEA | SENA |
| Employees | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** |
| Network Operator Contractors | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 0 |
| Accredited Service Providers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 5.10 – Serious Electrical Accidents (Network Workers) Numbers**
**Classified by Network Element 2003-2004 – Nil applicable for TransGrid**

**Table 5.11 – Serious Electrical Accidents (Network Workers) Number**
**Classified by Cause 2003-2004 – Nil applicable for TransGrid**

**Table 5.12 – Serious Electricity Network Accident (Network Worker) Numbers 03/04**

| Description | Fatal | Non-Fatal | Preventative Actions Taken or Planned |
|---|---|---|---|
| One SENA was reported for 2003 – 2004. This involved an employee from TransGrid's Southern Region who lost two days from work as a result of the incident. He was clipping in an OPGW (Optical Fibre Ground Wire) when the stringing sheave securing the pin jammed. When he was using a screwdriver as a lever to turn the securing pin, the sheave dropped suddenly jamming his hand between the sheave and the pole. | | 1 | The two issues identified during the investigation have now been addressed by:<br>(a) The inclusion in both the Work Activity Risk Assessment and the Work Method Statement of the hazard presented by stringing sheaves that are in the horizontal, or nearly horizontal, positions, and<br>(b) The securing of a horizontal, or nearly horizontal, sheave as a suitable control measure to reduce the level of risk. |
| **Total** | | **1** | |

## Actionable Safety Incidents (Network Workers)

Although no Actionable Safety Incidents were reported during 2003 – 2004, TransGrid takes a proactive approach to any safety issues or near miss incidents. All incidents are required to be reported and investigated.
Safety Alerts are issued for any relevant industry or internal safety incidents. A Health and Safety Notice Board is maintained on the intranet and staff are notified on a monthly basis of any additions posted during the previous month.

**Table 5.13 - Actionable Safety Incidents (Network Workers) Numbers Classified by Network Element 2003-2004 – Nil applicable for TransGrid -**

**Table 5.14 - Actionable Safety Incidents (Network Workers) Numbers Classified by Cause 2003-2004 – Nil applicable for TransGrid**

## Lost Time Injuries

Though there has been an increase in both LTIs and Average Time Lost Rates from 2002-2003, there is a continuing downward trend over the past five years. The major contributing factors include manual handling injuries and slips and falls. An increased emphasis has been placed on these areas and the importance of thorough risk assessments prior to undertaking any work.

All incidents are required to be reported (whether lost time or not) and thoroughly investigated by the team leader in conjunction with the injured employee (whenever possible). The investigation is to identify the root causes and develop corrective actions. Investigations of all LTIs are reviewed by the Executive OHS Committee at its quarterly meetings and by the Board on a monthly basis.

A statistical trend analysis was undertaken to determine any specific areas requiring attention. With the exception of manual handling, there were no definitive trends highlighted. Initiatives that promote a positive safety culture within TransGrid are continuing with a focus on the three key areas identified:

i) risk management,

ii) safety communications and consultation, and

iii) training and awareness programs.

**Table 5.15 - Lost Time Injuries 2003/2004**

| Measure | Employees | Network Contractors |
|---|---|---|
| Number of Workers (full-time equivalent) | 974 | 89 |
| Number of Lost Time Injuries | 7 | 3 |
| Number of Days Lost | 130 | 101 |
| Lost Time Injury Frequency Rate (LTIFR) | 3.6 | 16.9 |
| Average Time Lost (ATL) | 18.6 | 33.7 |

**Table 5.16 - LTIFR Trend**

| | 99/00 | 00/01 | 01/02 | 02/03 | 03/04 |
|---|---|---|---|---|---|
| Employees | 8.3 | 6.3 | 4.7 | 2.1 | 3.6 |
| Electrical Network Contractors | N/A | N/A | 4.7 | 0 | 16.9 |

Note: Whilst TransGrid's LTIFR has increased from 2002-03, the 5 year trend is continuing downwards. However, three LTIs were reported by contractors working on the upgrade of the Tuggerah-Sterland transmission line. No other lost time injuries were reported for any work on the network.

| Table 5.17 - ATL Trend | | | | | |
|---|---|---|---|---|---|
| | **99/00** | **00/01** | **01/02** | **02/03** | **03/04** |
| Employees | 6.9 | 10.9 | 9.7 | 7.3 | 18.6 |
| Electrical Network Contractors | N/A | N/A | 16 | 0 | 33.7 |

Note: The increase in TransGrid's ATL rate is mainly due to two back injuries and a fractured ankle (total of 98 days for the three incidents).
The high ATL rate for contractors was due to a fractured leg and amputated finger which resulted in 31 days and 65 days away from work respectively. The third incident involved a painful elbow with 5 days lost time.

# 6. Customer Installations

- **Not applicable to TransGrid.**

# 7. BUSH FIRE RISK MANAGEMENT

### 7.1 Bush Fire Risk Management Plan

TransGrid's Bush Fire Risk Management Plan (Revision 2) is published on TransGrid's website. The plan was subject to an external audit and found to comply with the requirements of the Electricity Supply (Safety and Network Management) Regulation 2002 in relation to TransGrid's transmission network assets. The audit report is discussed below.

### 7.2 Bush Fire Risk Management Performance

#### 7.2.1 Performance Indicators

TransGrid's network performed very well during the 2003-2004 reporting period, no bushfires were ignited by any of the high voltage assets. The following table summarises the performance outcomes, and compares these to the previous years performance:

| Indicator | 2002-2003 Performance | | 2003-2004 Performance | |
|---|---|---|---|---|
| | Target | Actual | Target | Actual |
| Network Assets Inspected in Bush Fire Prone Areas | 100 % | 100 % | 100 % | 100 % |
| Outstanding Network Risk Defects in Bush Fire Prone Areas | Nil | Nil | Nil | Nil |
| Fires where it appears ignition may have been caused by network assets | Nil | One (*) | Nil | Nil (**) |

(*) A single incident occurred on 17th November 2002 that although technically not an ignition of a bush fire did cause a crop fire. The incident was the failure of an insulator on transmission line number 99M, a 132kV line between Yass and Murrumburrah. This resulted in a dropped conductor, the resultant arcing igniting the fire. The insulators were 1982 vintage porcelain discs of Chinese origin and only a small number existed on TransGrid's Network. The insulators were tested, found to be in substandard condition and have subsequently been replaced. This type of insulator no longer exists on TransGrid's network.

(**) A single incident occurred on 6th February 2004 that did not result in an ignition of a bush fire, or fire of any kind, however it was a line trip due to flashover to a tree and therefore had the potential to ignite a fire. The tree responsible was identified for maintenance. However, it grew faster than anticipated due to local environmental conditions. This caused the No. 02 transmission line between Yass and Upper Tumut Switching Station to trip and lock out. The protection operated correctly extinguishing the arc and isolating the line. Process improvements have been implemented locally that will ensure an incident of this kind will not be repeated, and TransGrid wide improvements in easement management are currently being developed.

#### 7.2.2 Performance Reviews

Formal reviews are carried out for all major incidents involving Network assets. These reviews are conducted under terms of reference set by the relevant General Manager or the Executive.

TransGrid has carried out reviews of the major bush fire emergencies that have impacted the NSW network in the last decade. These reports are:

- "Review of System Operation and Performance during the N.S.W. Bush Fire Emergency January 1994".
- "Review of Network Performance During Bush Fires in December 2001 – January 2003.
- "Investigation into the Impact of Bush Fires on TransGrid's Network" 4th-6th December 2002.

These reports covered:

- An assessment of system plant and performance
- A review of operating practices, emergency response procedures, and design and maintenance standards; and
- The identification of strategies with respect to easement or site management to enhance reliability of the network in future or similar bush fires.

Generally the reports concluded that the network exhibited excellent performance during these emergencies. A number of improvements have been implemented as a result of these reviews, which will further enhance network reliability.

**7.3 Audit Report - Bush Fire Risk Management Plan**

The Bush Fire Risk Management Plan (Revision 2) was audited as requested by the Director-General of the Ministry of Energy & Utilities (now known as DEUS – Department of Energy, Utilities & Sustainability) by Denhine Holdings Pty Ltd and was found to comply with the Regulation in relation to TransGrid's transmission network assets (Audit Certificate issued on 28th October 2003).

A number of improvement suggestions were raised in the report for consideration. These included:

- Tower warning signs in the name applicable at the time of construction (e.g. The Electricity Commission of NSW). A strategy has been established to progressively update these signs in the name of TransGrid.
- Telephone listings for TransGrid, and cross-referencing to the name ECNSW. Updated listings have been arranged.
- Inspection classification of a line (TL 19) that TransGrid maintains under contract for Delta Electricity. This line has been included in TransGrid's standard GM ASA L7 001 -Transmission Line Inspection Classifications.
- Reference to the Australian Inland franchise area is now included in TransGrid's Public Electrical Safety Awareness plan.
- Recommendations from the interim report "Investigation into the Impact of Bush Fires on TransGrid's Network" 4th-6th December 2002. The report did not identify any further recommendations not covered by previous reports, however the investigating committee implemented some improvements to the protection schemes for 76 (Wallerawang – Sydney South) and 77 (Wallerawang to Ingleburn) lines.

The report also raised the matter of the interpretation of the terms 'private lines' and 'private overhead electricity lines' in the Regulation for clarification and direction by the Ministry of Energy and Utilities.

**7.4 Proactive Programs**

TransGrid provides representation to Bush Fire Management Committees as detailed in Attachment 1 of the Bush Fire Risk Management Plan. All major BFM committees have been attended. At these meetings TransGrid has been providing advice that proposed hazard reduction burns will be reviewed where they may impact our lines and recommendations made to protect assets prior to commencement of burn.

Transgrid has also initiated a process with the NSW Rural Fire Service to utilise TransGrid transmission line easements and access more effectively for bushfire management. A meeting was held with NSW RFS on 16th February to discuss this initiative including Asset Protection and Strategic Protection zone vegetation management options for high voltage transmission lines. As a result of this meeting, TransGrid will participate in the production of RFS Bush Fire Management plans by supplying data from its GIS system. Production of these plans is expected to commence in late 2004.

# 8. PUBLIC ELECTRICAL SAFETY AWARENESS CAMPAIGN REPORT

TransGrid's Public Electrical Safety Awareness Plan is based on a risk assessment of public safety issues. This risk assessment identified eight strategic areas for attention in the Plan:

1. Unauthorised access to substations
2. Unauthorised climbing of transmission towers
3. High machinery and extendable plant operating under transmission lines
4. Excavators and earth moving machinery in vicinity of high voltage cables
5. Kite flying and model planes in proximity to transmission lines
6. Fires under or in proximity to transmission lines
7. Crop dusting and aerial surveillance activities
8. Navigable waters under transmission lines

**2003 – 2004 Plan**

TransGrid formed a partnership with Country Energy for 2003 – 2004 to implement joint initiatives for public electrical safety awareness. This included representation at Field Days, printing of stickers and videos with joint logos and specific training with Emergency services. In addition to this, TransGrid developed and implemented other specific initiatives to address priority issues identified in the Risk Assessment. These included:

1. Identification of substations and transmission lines assessed as having an increased public safety exposure based on established criteria and the Network Security Standard;
2. Identification of specific target groups within the vicinity of areas identified in 1 above which included:
    - i) Schools in the Taree / Kempsey areas
    - ii) Residents adjoining identified substations
    - iii) Local Community in proximity to identified substations and transmission lines
    - iv) Property Developers / Local Councils
    - v) Crop farmers
3. Implementation of initiatives for identified target groups:
    - i) Contact made with schools in proximity to 1 above to discuss current issues and possible options for an awareness program.
    - ii) Advertisement placed in local newspapers in Kempsey, Taree and Sydney South areas to raise awareness of electrical safety particularly in relation to maintaining clearances re trees, kites, model planes, plant and machinery, fires and characteristics of arcing.
    - iii) New brochures relating to public safety issues have been drafted and are currently being reviewed prior to publication.
    - iv) Letter issued to local councils advising of requirements for approval of Development Applications when TransGrid easements are involved.
    - v) Identification of public areas where there is a possibility of kite and model plane flying. These sites are being inspected for suitable signage and subsequent consultation with relevant managers of those areas for the installation of the new and/or replacement signage as appropriate.
    - vi) Participation in 'Dial Before You Dig' program.
    - vii) Community consultation on new construction projects with provision of advice and information.
    - viii) Copy of the Plan is posted on TransGrid's website.
4. Liaison with property owners on activities that are permitted on easements, activities that are controlled and/or not permitted. Brochures addressing these issues distributed to land owners during patrols and on request.

5. Information provided to communities regarding projects being undertaken during 2003 –2004 including:
   i) Tuggerah – Sterland 330kV TL
   ii) Molong – Manildra 132kV TL
   iii) Wollar – Wellington TL
   iv) Yass 330kV substation rebuild
6. Liaison with Emergency Services groups (Police, Fire Brigade, Rural Fire Service and State Emergency Service). These are being addressed in accordance with "critical" ranking identified in the Network Security Plan. Locations completed in 2003 – 2004 include:
   i) Tamworth
   ii) Armidale
   iii) Sydney South
   iv) Beaconsfield
   v) Sydney West
   vi) Haymarket
   vii) Canberra
   viii) Wagga

**2004 – 2007 Plan**

The TransGrid Public Electrical Safety Awareness Plan was revised to cover a three year period from 2004 – 2007. An internal Action Plan is currently being developed to address issues identified as Priority 1 which are to commence and/or be completed during 2004 – 2005.