



TransGrid

# NSW electricity network performance report

2009/10



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## Introduction

This Electricity 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 2008.

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

## 1. Profile

TransGrid is Australia's largest transmission company with its network comprising some 12,609 kilometres of high voltage transmission line and underground cables, as well as 91 substations and switching stations, worth over \$4.2 billion.

TransGrid is responsible for planning and developing the New South Wales transmission system to deliver the requirements of customers within the state and to facilitate operation of the National Electricity Market.

TransGrid's system operates at voltage levels of 500, 330, 220 and 132kV. TransGrid's substations and power station switchyards 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 a number of key challenges including the management of a multi-billion dollar capital works program for 2009-2014 aimed at meeting the ever-increasing demand for electricity and securing the nation's energy future.

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 201 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**

<b>Network Operator Statistics</b>		
	<b>At End 2008/09</b>	<b>At End 2009/10</b>
Customer Numbers (Total)	13	13
Maximum Demand (Aggregated System MW) <sup>1</sup>	14,368	14,051
Energy Received to Year End (GWh) <sup>1</sup>	73,216	72,814
System Loss Factor (%) <sup>2</sup>	3.6%	3.1%
High Voltage Overhead (km) <sup>3</sup>	12,445	12,609
High Voltage Underground (km) <sup>3</sup>	47	47
Substation (Number)	85	91
Structures (Number) <sup>4</sup>	36,543	36,483
Poles (Number) <sup>5</sup>	39,394	38,480
Employees (Full Time Equivalent Number)	995	1017
Contractors (Full Time Equivalent Number)	479	287

- Notes:
1. Maximum demand is the highest coincident summated demand supplied by the network. In previous reports only scheduled demand and energy was reported. With increased semi and non-scheduled generation in NSW, and in accordance with guidelines from AEMO, TransGrid is now reporting Native Energy and Demand (both historical and forecast) series in its Annual Planning Report and in this report. This in turn is applied by AEMO in developing its Electricity Statement of Opportunities (ESOO) and National Transmission Network Development Plan (NTNDP).
  2. The System Loss Factor is the difference between electricity received by the network and electricity delivered to customers divided by electricity received by the network (allowing for embedded generation), expressed as a percentage.
  3. Distances for overhead and underground lines are circuit km.
  4. The number of structures includes both lattice towers and structures comprised of one or more poles.
  5. Pole numbers are total number of individual poles, whether forming a single or multi pole structure.

**Figure 1.1 – Network Map**



## 2. Network Management

### 2.1 Overview

TransGrid's vision is to be recognised as a world class electricity transmission company. It is committed to providing a safe working environment and ensuring the reliability of its electricity transmission network. TransGrid's success in managing its assets is reflected in its transmission system reliability of over 99.999%, making it a leading performer among Transmission Network Service Providers.

TransGrid's asset management and maintenance strategies are driven by its Network Management Plan 2009-2014 Revision 1. In accordance with the Electricity Supply (Safety and Network Management) Regulation 2008 the Plan comprises chapters detailing Network Safety and Reliability, the Public Electrical Safety Awareness Plan, Customer Safety Installation Plan and Bush Fire Risk Management Plan.

This Plan provides a basis for ongoing analysis within TransGrid and for continual improvement of the transmission system while also providing an authoritative vehicle for dissemination of information to TransGrid's customers, stakeholders and employees.

TransGrid has also published a 30 Year Asset Management Plan covering the period from 2009 to 2039. The 30 Year and Five Year Plans quantify TransGrid's medium and long term strategies for asset management and are used to determine 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.

### 2.2 Independent Appraisal Process

This report has been subject to an independent appraisal carried out in accordance with Attachment C of the Industry & Investment NSW Report Outline.

### 2.3 Network Complaints

There were 20 complaints registered during 2009/10.

Nine complaints were associated with the establishment of Wollar switching station and Wollar-Wellington 330kV transmission line. The complaints related to construction activity including noise, dust caused by truck activity, detrimental effects to farming activities, access arrangements such as gates being left open and compensation. Complaints have been managed and resolved by TransGrid local staff managing the project.

Seven complaints were associated with the Dumaresq - Lismore 330kV transmission line project. Complaints generally related to the loss of lifestyle, reduced property values, aesthetic impacts, potential health impacts and tourism impacts that may exist if the proposed line is built. These complaints are being addressed as part of the ongoing community consultation for the project.

Two complaints were associated with communication tower upgrades, one relating to the visual amenity of a new tower and one relating to dust caused by truck activity.

Two complaints were associated with environmental and security matters at Sydney East substation. These related to the use of chemicals for vegetation management rather than cutting of grass, and dumping of bottles by the general public in areas around the substation.

All of these complaints have been addressed. The issues raised with respect to the Dumaresq – Lismore project will be dealt with as part of the continuing consultation program for the project.

## Complaint Performance Data

**Table 2.1 – Complaints Received Regarding Network Issues**

<b>Complaints Received Regarding Network Issues</b>					
<b>Years</b>	<b>2005/06</b>	<b>2006/07</b>	<b>2007/08</b>	<b>2008/09</b>	<b>2009/10</b>
<b>Complaints Total</b>	21	9	27	92	20
<b>Complaints Regarding Vegetation Management</b>	3	2	4	1	1

A complaint means a written or verbal expression of dissatisfaction about an action, a proposed action, or a failure to act by a network operator, its employees or contractors. This includes failure by network operators to observe their published or agreed practices or procedures. Enquiries have not been included.



## 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 the National Electricity Market. In this role it:

- provides jurisdictional information to the Australian Energy Market Operator (AEMO) for input to the Electricity Statement of Opportunities (ESOO) and National Transmission Network Development Plan (NTNDP);
- carries out an Annual Planning Review during which it:
  - prepares an Annual Planning Report (APR) for NSW;
  - holds a public forum that considers the APR and related transmission planning matters;
  - reports to the Minister for Energy on matters arising from the Annual Planning Review; and
  - reports to the Minister for Energy on matters arising from the ESOO and NTNDP.

Secondly, it is registered with AEMO as a Transmission Network Service Provider (TNSP) in the NSW region of the National Electricity Market (NEM). The National Electricity Rules (NER) require TransGrid, as a TNSP, to:

- analyse the future operation of its transmission network to determine the extent of any future network constraints;
- conduct annual planning reviews with DNSPs to determine the extent of any emerging constraints at points of connection between the TNSP's network and the DNSPs' networks;
- carry out joint planning with DNSPs to determine options for the relief of constraints that can be considered by Registered Participants and interested parties;
- coordinate a consultative process for consideration and economic analysis of the options in accordance with the Australian Energy Regulator's (AER's) regulatory test, if required;
- on the basis of the consultative process and economic analysis determine the recommended option for network augmentation if required;
- 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 by June 30 of each year.

The NER require the Annual Planning Report to include:

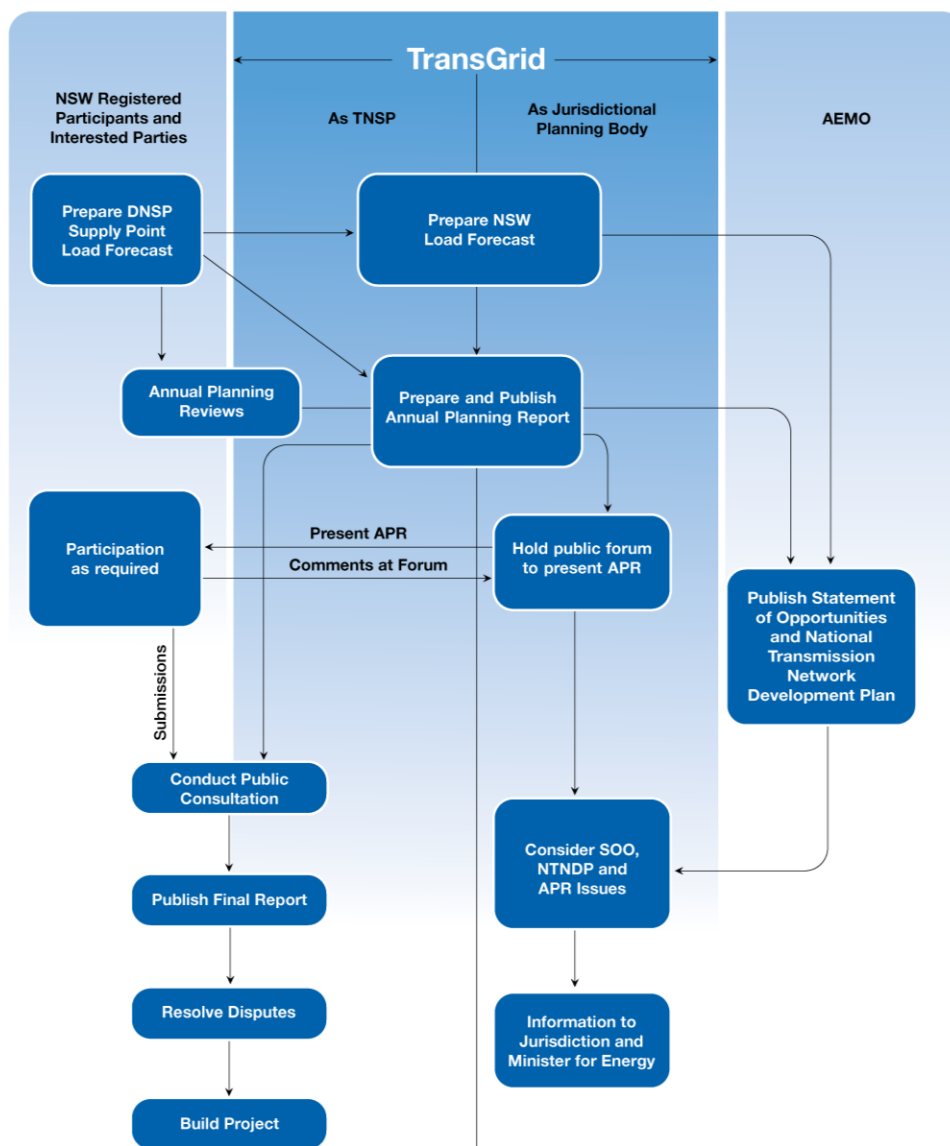
- results of annual planning reviews with DNSPs during the present year;
- load forecasts submitted by DNSPs;
- planning proposals for future connection points;
- forecast and quantification of constraints over 1, 3 and 5 years;

- plans and dates to issue a request for proposal for a non-network alternative;
- summary information for proposed augmentations;
- summary information for proposed replacement transmission network assets; and
- consultation reports on proposed new small transmission network assets.

These obligations are described more fully in Chapter 5.6 of the NER and the AER's regulatory test.

Figure 2.1 illustrates the main tasks and interrelationship of TransGrid's dual roles.

**Figure 2.1 – TransGrid's Planning Roles**



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 Section 4.1 of this document).

## 3.2 System Design Criteria (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 in the NEM, TransGrid is obliged to meet the requirements of Schedule 5.1 of the NER. 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 Registered 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 NER 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.

In addition to adherence to NER and regulatory requirements, TransGrid’s transmission planning approach has been developed taking into account the historical performance of the components of the NSW system, the sensitivity of loads to supply interruption and state-of-the-art asset maintenance procedures. It has also been recognised that there is a need for an orderly development of the system taking into account the long-term requirements of the system to meet future load and generation developments.

TransGrid consults with NEM Registered 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 (DNSPs) in NSW. TransGrid must ensure that the system is adequately planned to enable their licence requirements to be met.

In meeting these obligations TransGrid's approach to network planning is socially and economically based and is consistent with both the NER and the regulatory test. It includes consideration of non-network options such as demand side response and DM and/or embedded generation, as an integral part of the planning process. Joint planning with DNSPs, directly supplied industrial customers, generators and interstate TNSPs is carried out to ensure that the most economic options, whether network options or non-network options, consistent with customer and community requirements are identified and implemented.

TransGrid has traditionally planned the network to achieve supply at least community cost, without being constrained by State borders or ownership considerations. Prior to commencement of the NEM transmission augmentations were subjected to a cost-benefit assessment according to NSW State Treasury guidelines. A similar approach is applied in the NEM where the AER's regulatory test (Regulatory Investment Test for Transmission or RIT-T from 1 August 2010) is applied to meet the requirements of Chapter 5 of the NER.

In addition to meeting requirements imposed by the NER, 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 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 AEMO'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 major directly connected 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 major directly connected 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 of Sydney).
- The main transmission network, which is operated by AEMO, should have sufficient capacity to accommodate AEMO'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 AEMO'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.

In 2005 mandatory licence conditions were introduced on DNSPs which set out certain reliability standards for sub-transmission and distribution networks. The licence conditions specify "n-1, 1 minute" reliability standards for sub-transmission lines and zone substations supplying loads greater than or equal to specified minimums, eg 15 MVA in urban and non-urban areas. These requirements

imply a consequential obligation on TransGrid to provide a commensurate level of reliability in its network supplying NSW DNSPs.

Accordingly, Country Energy has requested TransGrid to provide a commensurate reliability standard at connection points to its network, i.e. “n-1, 1 minute” reliability where Country Energy’s maximum demand is greater than or equal to 15 MVA.

The jurisdictional requirements and other obligations described above also require the following to be observed in planning:

- At all times when the system is either in its normal state with all elements in service or following a credible contingency:
  - Electrical and thermal ratings of equipment will not be exceeded; and
  - Stable control of the interconnected system will be maintained, with system voltages maintained within acceptable levels.
- A quality of electricity supply at least to NER 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 at reducing system energy losses where economic.

A further planning consideration is the provision of sufficient capability in the transmission network to allow components to be maintained in accordance with TransGrid’s asset management strategies.

### 3.3 Demand Management

#### 3.3.1 Consideration of Non-Network Options by TransGrid

The Annual Planning Report provides advance information to the market on the nature and location of emerging network constraints. This is intended to encourage interested parties to formulate and propose feasible non-network options including Demand Management (DM), Demand Side Response (DSR) and local or embedded generation options, to relieve the emerging network constraints. The advantages that non-network options offer in relieving transmission network constraints are that they may:

- reduce, defer or eliminate the need for new transmission or distribution investment; and/or
- reduce, defer or eliminate the costs and environmental impacts of construction and operation of fossil fuel based power stations.

TransGrid considers DM, local/embedded generation and bundled options on an equal footing with network options when planning its network augmentations and applying the AER's regulatory test.

For any option to be considered during the evaluation and analysis process, it must be feasible and capable of being implemented in time to relieve the emerging constraint.

For an option to be recommended for implementation after evaluation and analysis, it must satisfy the regulatory test. It must also have a proponent who is committed to implement the option and to accept the associated risks, responsibilities and accountabilities.

It is expected that DM and local generation options would emerge from joint planning with DNSPs, from the market or from interested parties.

TransGrid's joint planning with NSW DNSPs provides a mechanism to identify opportunities for DM and local/embedded generation options. The NSW DNSPs follow a similar process to TransGrid in preparing planning reports for their networks, thereby providing another useful source of information for proponents of DM and local generation options.

### **Demand Management or Demand Side Response**

DM or DSR options may include, but are not limited to, combinations of the following:

- Reduction in electricity demand at points of end-use through:
  - 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 at points of end-use through:
  - tariff incentives;
  - load interruption and reduction incentives;
  - arrangements to transfer load from peak to off-peak times;
  - energy storage systems;
  - standby generators; and
  - power factor correction equipment.

### **Embedded or Local Generation**

Embedded or local generation options may include generation or cogeneration facilities located on the load side of a transmission constraint. Alternative energy sources may include, but are not limited to:

- bagasse;
- biomass;
- gas (e.g. natural gas or LPG);

- hydro;
- solar; and
- wind.

### **Promotion of DM and Local Generation Alternatives by TransGrid**

TransGrid actively promotes DM and local generation alternatives through:

- identifying opportunities for DM and local generation options through joint planning with the DNSPs and engaging expert external consultants where warranted;
- informing the market of constraints via the Annual Planning Report and consultations for alleviating individual constraints;
- participation in initiatives and reviews that include consideration of DM and its relationship to the development of electricity networks; and
- joint sponsorship of research projects involving DM and embedded generation.

### **3.3.2 Recent Non-Network Projects**

#### **Western 500 kV Conversion Non-Network Project**

TransGrid undertook to acquire 350 MW (effective capacity) of network support services for the Newcastle – Sydney – Wollongong area from non-network sources. Following a competitive tendering process three proponents were selected to form a portfolio consisting of a large industrial load, a demand management aggregator and an embedded generator.

TransGrid contracted 350 MW of network support from this portfolio to ensure that it met its planning and reliability obligations during summer 2008/09 while allowing for deferral of the Western 500 kV conversion project by one year to 2009/10.

The AER approved the pass-through of network support payments made to the service providers. At the conclusion of the support period (March 2009) TransGrid adjusted its 2009/10 TUOS payments returning in excess of \$14 Million in unused funding for network support to its customers.

It was the largest ever acquisition of network support from non-network sources in the NEM to defer a major capital works program while maintaining the reliability of supply to customers.

### **3.3.3 Future DM and other Non-Network Projects**

DM projects and initiatives that TransGrid is likely to implement in the next five years include:

- Network support to cover operational risk management measures for the Sydney Inner Metropolitan load area at times of peak demand [summer of 2012/13]; and
- Projects with the NSW DNSPs to cooperate on demand management innovation for which TransGrid has signed agreements. Joint projects include initiatives to reduce peak demand and some research and development projects.

Other non-network projects that are likely to be implemented are:

- Provision of reactive power for main system network support which may come from non-network sources;
- Provision of network support, possibly from non-network sources, to improve the power transfer capability between the Snowy Mountains and Yass/Canberra. This may include implementation of a special system protection scheme; and
- Provision of Network Support and Control Ancillary Service (NSCAS). The AEMC is currently consulting on the future framework in this regard which may require TNSPs to procure and deliver reactive power capability for main system security and reliability. Part of the NSCAS may come from non-network sources.

### **3.3.4 Price Signals and Financial Incentives to Encourage DM and Local Generation**

TransGrid is a provider of bulk transmission network services and is best placed to implement 'bulk' DM options. For example, it is the customers connected at the transmission voltage levels and electricity distribution businesses that are exposed to and respond to transmission pricing structures. These pricing structures reflect the requirements of the National Electricity Rules and the associated Transmission Pricing Methodology approved by the AER.

Among these structures, the monthly maximum demand charge is designed to encourage demand side response at the time of maximum demand on the transmission network.

In addition, TransGrid can and does provide financial incentives via direct payments under network support contracts with wholesale suppliers of demand reductions such as larger end users or embedded generators or DM aggregators. Contractual payments to smaller suppliers of DM are now proving practical for TransGrid with the advent of DM aggregators. Significantly, the regulatory incentive framework is evolving to provide improved commercial incentives for TransGrid to engage in these activities.

The full impact of transmission pricing structures, as well as distribution sector DM activities, is not always obvious at TransGrid's 'bulk' connection points with electricity DNSPs. This is because this level of demand response is 'embedded' in the aggregated actual demand at these connection points. The forecast demand at these connection points, provided by the electricity DNSPs for transmission planning purposes, also includes anticipated demand response within each DNSP's franchise area.



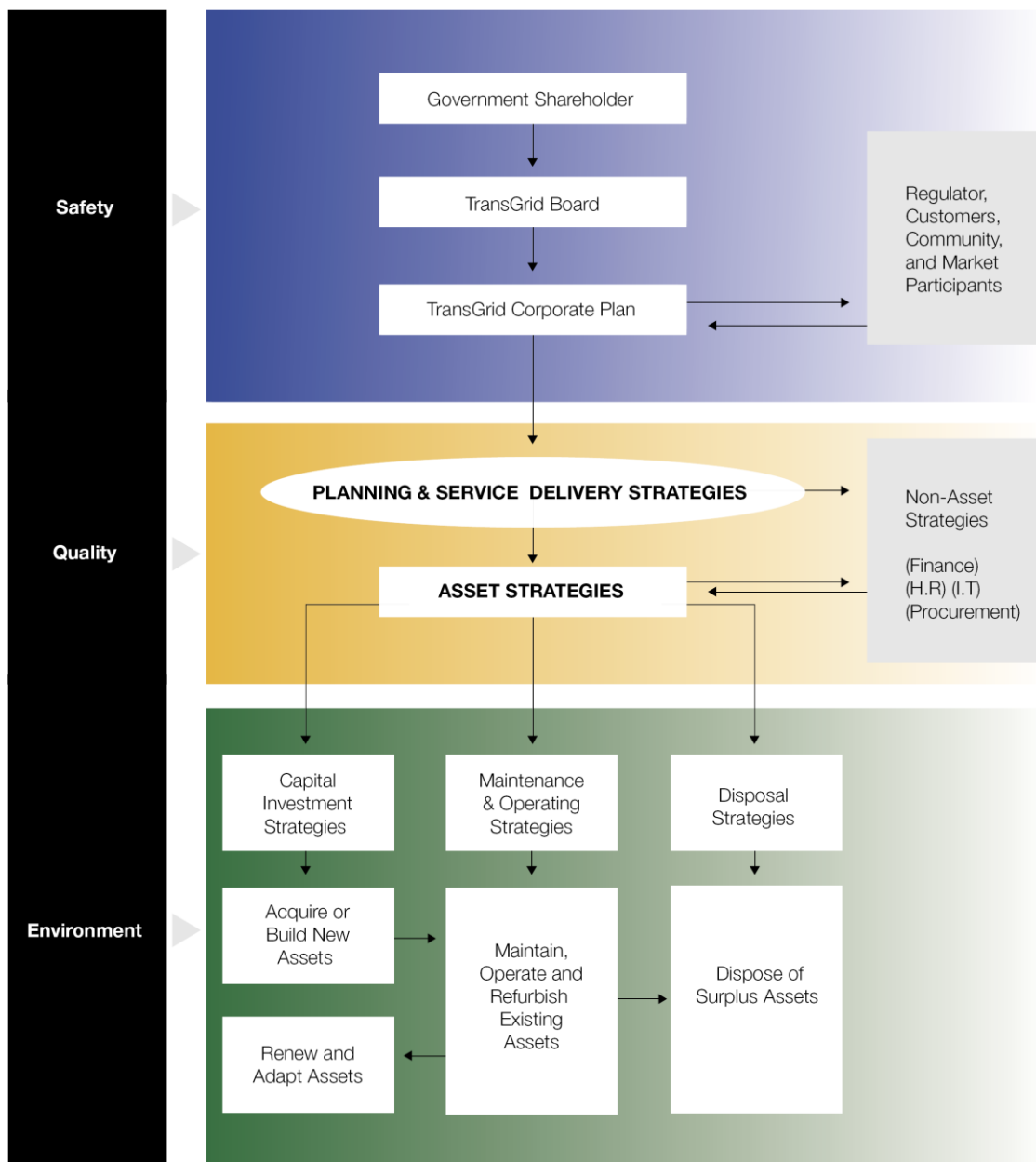
## 4. Asset Management

### 4.1 Overview

TransGrid is constantly striving to optimise its asset management performance as a means of achieving its corporate vision “to be recognised as a world-class electricity transmission company” and meeting its customers’ expectations of system reliability and quality of supply. This involves the development and ongoing review of Asset Management Policies and Strategies for the construction, maintenance, refurbishment, replacement/renewal 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 2006. TransGrid’s model is shown in Figure 4.1.

**Figure 4.1 – Trans Grid’s Asset Management Model**



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 determined by the AER in the form of Reliability and Availability while also meeting its corporate and community commitments to safety and the environment.

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

- The review of maintenance policies and asset management strategies using a risk management approach, 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 consistent 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 in September 2009, November 2009, February 2010 and May 2010.
- Technical Performance Assessments are carried out 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/Newcastle (August 2009), Central Region/Metropolitan (November 2009) and Southern Region/Wagga (March 2010).
- TransGrid's maintenance performance in the Australasian and International sphere is monitored through its regular participation in benchmarking studies. ITOMS (International Transmission Operations & Maintenance Study) is a biennial study organised by a steering committee representing twenty nine transmission organisations from Australasia, Europe, United Kingdom, United States, South America and the Middle East, 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. The most recent study TransGrid has participated in is the ITOMS 2009 study for analysis of performance during the year 2008-2009, for which practices were discussed amongst TNSPs in April 2010. TransGrid performed well in the benchmark, as the least cost transmission organisation worldwide while maintaining above average service levels.
- TransGrid's Reliability Steering Committee provides Executive oversight of all matters affecting network and system performance. The committee convenes on a quarterly basis and reviews the previous quarter's network performance in liaison with the Quarterly Asset Performance Review Working Group and System Planning and Performance Review Working Group with an overall aim of improving network reliability.

These and other asset management strategies which meet the TAM model are described in detail in Chapter 1 of TransGrid's Network Management Plan 2009-2014 Revision 1, as follows: Planning and Service Delivery (Section 3) and Asset Strategies (Section 4), including Asset Maintenance and Operating Strategies (Section 4.1), Specific Asset Profiles and Strategies (Section 4.2) and Asset Disposal Strategies (Section 4.3).

## 4.2 Technical Service Standards

TransGrid's main service standards of customer focussed network performance are those of reliability and availability. In the incentive scheme administered by the AER, average unplanned outage restoration time and market impact of transmission constraints are also reported.

### 4.2.1 Reliability

A customer's perception of a network provider's reliability performance is based on how often the customer loses supply due to a temporary failure of network plant. The less often or less severe any such losses, the better the perceived performance. The industry defines this reliability in 'system minutes'. Simply put, any loss of supply event can be described as the number of minutes that the total network would have to be down at the network's annual maximum demand to equate to the amount of energy (MWh) that was not supplied. For example, in 2009/10, one (1) system minute would have equated to 234.2 MWh.

TransGrid is subject to two reliability incentive parameters under the AER's Service Target Performance Incentive Scheme (STPIS). The parameters are a count of the number of events for which loss of supply is greater than 0.05 system minutes, and the number for which loss of supply is greater than 0.25 system minutes.

### 4.2.2 Availability

TransGrid's connected customers perceive the network's availability as its readiness to effectively transfer energy from the generators to the DNSPs. It is a measure of the total time all transmission assets were in service compared to the theoretical ideal of all assets being in service for 100% of the time.

Availability is impacted by the duration of planned outages for scheduled maintenance and capital construction or replacement programs as well as unscheduled outages from plant failures. Higher values of transmission availability may be achieved by minimisation of planned maintenance (through optimisation of maintenance policy) and more effective co-ordination of all planned outages, as well as improved maintenance practices to achieve fewer plant failures.

### 4.2.3 Average Outage Restoration Time

The average outage restoration time measures the time taken to return equipment to service after an unplanned (forced or emergency) outage. It is calculated by summing the durations of unplanned outages longer than one minute, and dividing by the number of those outages.

### 4.2.4 Market Impact of Transmission Congestion

Since July 2009 TransGrid has participated in the AER's new Market Impact of Transmission Congestion (MITC) parameter, which measures the impact of transmission network outages on market

price. It provides an incentive to TransGrid to minimise transmission constraints, which inhibit the least cost generation from being dispatched resulting in higher generation costs and higher electricity prices. The intent of the parameter is for TNSPs to reduce the impact of their outages on market price through outage scheduling, work practices and other methods.

The MITC parameter counts the number of 5 minute dispatch intervals in which constraints due to planned or unplanned outages on TransGrid's transmission system cause more than a \$10/MWh increase to the spot price. The MITC scheme provides a bonus if the count of these dispatch intervals is less than the performance level determined by the AER. There is presently no penalty applied if the number of constrained dispatch intervals exceed the target.

## 4.2.5 Quality of Supply

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

- power frequency voltage;
- voltage fluctuations;
- voltage waveform distortion;
- voltage unbalance; and
- fault clearance times.

## 4.3 Transmission Performance

### 4.3.1 Reliability

For the 2009/10 year TransGrid experienced 17 Energy Not Supplied outages totalling 1.28 system minutes. When converted to a percentage of energy delivered, this equates to a reliability exceeding 99.999%. There were four incidents with ENS greater than 0.05 system minutes and one incident with ENS greater than 0.25 system minutes, compared to AER targets of four and one respectively.

### 4.3.2 Availability

For the 2009/10 year TransGrid achieved availabilities of:

- Transmission Line Availability – 98.17% compared to AER target of 99.26%;
- Transformer Availability – 98.60% compared to AER target of 98.61%; and
- Reactive Plant Availability – 96.35% compared to AER target of 99.12%.

These represent the availability of transmission lines, transformers and reactive plant as reportable to the AER. The below target value for transmission line availability is due mainly to the longer than planned outage for the reconstruction of the 990 Yass to Wagga 132kV transmission line. The below target value for reactive plant availability is largely due to some plant reaching its end of life, for which there is a replacement project scheduled.

### 4.3.3 Market Impact of Transmission Congestion

In 2009/10 TransGrid recorded 1773 dispatch intervals under this parameter. This is an improvement of 38% against the target of 2857 dispatch intervals, which was TransGrid's average performance in the 2004-2007 period and used by the AER to set the target.

### 4.3.4 Connection Point Performance

Of TransGrid's fourteen connected customers, nine did not experience any unplanned outages causing loss of supply or interruption to generation. Three distribution customers, Country Energy, EnergyAustralia and Integral Energy, experienced loss of supply from unplanned outages. Two generator customers, Macquarie Generation and Snowy Hydro, experienced interruptions to generation.

## Transmission Reliability Performance Data

**Table 4.1 – Transmission Asset Availability (%) Trend**

Transmission Asset Availability (%) Trend						
		Years				
	Objective	2005/06	2006/07	2007/08	2008/09	2009/10
Transmission Lines	99.26	99.47	99.44	98.55	98.44	98.17
Transformers	98.61	98.98	98.16	97.69	98.42	98.60
Reactive Plant	99.12	99.43	99.96	98.97	98.96	96.35

Note: 1. A measure of the circuit availability compared to the total availability if no outages had occurred.  
2. Outages will generally occur for maintenance purposes and thus 100 per cent is inherently unachievable.

**Table 4.2 – Network Reliability Trend (Off Supply Event Numbers)**

Network Reliability Trend (Off Supply Event Numbers)						
		Years				
	Objective	2005/06	2006/07	2007/08	2008/09	2009/10
No. > 0.05 system minutes	4	3	1	3	3	4
No. > 0.25 system minutes	1	0	1	0	0	1

**Table 4.3 – Outage (Un-Planned) Average Duration (Minutes) Trend**

Outage (Un-Planned) Average Duration (Minutes) Trend					
	Years				
Objective	2005/06	2006/07	2007/08	2008/09	2009/10
824	973	613	843	862	607

**Table 4.4 – Connection Point Interruptions (Unplanned) Current Year**

<b>Connection Point Interruptions (Unplanned) Current Year</b>		
<b>Connection Point</b>	<b>Interruption Number</b>	<b>Interruption Duration Total (Minutes)</b>
Griffith – 33kV 79C Darlington Point Feeder	1	164
Broken Hill – 22kV No.3 South Feeder	1	156
Broken Hill – 22kV No.4 Railway Town Feeder	1	156
Broken Hill – 22kV No.5 Talc St 2 Feeder	1	156
Broken Hill – 22kV No.6 Talc St 1 Feeder	1	156
Broken Hill – 22kV No.7 West Feeder	1	156
Broken Hill – 22kV No.8 Cockburn Feeder	1	156
Broken Hill – 220kV X4 Line	1	265
Beryl – 66kV 852 Dunedoo Feeder	1	4
Coleambally – 132kV No.1 Transformer	1	82
Coleambally – 132kV No.2 Transformer	1	82
Kempsey – 66kV 864 Telegraph Point Feeder	1	80
Kempsey – 66kV 0865 New ee Creek Feeder	1	80
Deniliquin – 66kV 821 Finley Feeder	1	4
Deniliquin – 66kV 822 Moulamein Feeder	2	64
Deniliquin – 66kV 845 Deniliquin Feeder	1	4
Deniliquin – 66kV 844 Barham Feeder	1	4
Deniliquin – 66kV No.6 Moama Feeder	1	4
Finley – 66kV 84A Jerilderie Feeder	2	226
Finley – 66kV 84B Finley Feeder	2	226
Balranald – 22kV No.1 Balranald Feeder	3	325
Balranald – 22kV No.2 Moulamein Feeder	2	245
Coffs Harbour – 66kV 703 Nana Glen Feeder	1	14
Coffs Harbour – 66kV 711 North Coffs Feeder	1	12
Koolkhan – 66kV 0825 Koolkhan PS Feeder	2	32
Koolkhan – 66kV 0826 Grafton Feeder	1	27
Koolkhan – 66kV 0896 Maclean Feeder	1	27
Sydney North – 132kV 250 Berowra Line	1	58
Wallerawang 132 – 66kV 940 Warrimoo tee North Katoomba Feeder	1	72
Guthega – No.1 Generator	2	113
Guthega – No.2 Generator	2	113
Bayswater – No.1 Generator	1	251
Bayswater – No.2 Generator	1	147
Bayswater – No.3 Generator	1	211
Bayswater – No.4 Generator	1	359

- Note:
1. This table provides a listing of customer connection points off supply events.
  2. The list does not include load shed following failure of the Bayswater current transformer on 2 July 2009, as this was shed by underfrequency relays in DNSPs' networks and at Tomago Aluminium rather than interruption to a connection point.
  3. Events included in this list may have been excluded from the data shown in Table 4.2. See Attachment A of the Industry & Investment NSW Report Outline for exclusion criteria.



**Table 4.5 – Connection Point Numbers End Current Year**

<b>Connection Point Numbers End Current Year</b>	
<b>Number of Connection Points (Total Number)</b>	427

## 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, our contractors, visitors and the public. Our strategies are aimed at continually improving our performance and maintaining a major focus on risk management.

Our Health & Safety Management System is certified to Australian Standard AS/NZS 4801 and TransGrid also holds a self insurer licence for workers compensation.

TransGrid's Health & Safety Management System is overseen by the Executive Occupational Health and Safety (OHS) Committee which is chaired by the Managing Director and includes the General Manager or senior management representative from each business unit. In addition, a number of strategies during the year have been developed, implemented and monitored to ensure the system is effective and provides for continuous improvement. These include:

- Safety Improvement Program;
- Corporate Health and Safety Plan;
- Safety Communications Steering Committee;
- Quarterly Health and Safety Themes;
- Annual Safety Day – First Aid, Fire Fighting and Risk Assessment competitions;
- Schedule of compliance audits and inspections;
- TransNet (intranet) – maintain relevant OHS information accessible to all employees; and
- Membership and participation in various industry committees, working groups and Field Days.

In the 2010/11 year the above strategies will continue with a focus on:

- health & safety behaviours;
- electrical safety;
- contractor safety;
- Wellbeing and health;
- travelling safety; and
- fatigue.

#### **Executive Occupational Health and Safety Committee**

The Executive Occupational Health and Safety Committee is responsible for:

- (i) The establishment and continuous improvement of occupational health and safety systems, practices and procedures;
- (ii) Develop, monitor, review and, where necessary, amend corporate health and safety objectives and performance measures;
- (iii) The effective implementation of occupational health and safety risk management strategies;



- (iv) Monitor Industry trends and co-ordinate participation in industry committees and working groups;
- (v) Promote initiatives for the improvement of employee health and safety;
- (vi) Facilitate the open sharing of health and safety information;
- (vii) Review incident investigations, recommendations and statistics;
- (viii) Review occupational health and safety audits and monitor progress on action plans;
- (ix) Regularly communicate and meet with workplace management and local Occupational Health and Safety committees.
- (x) Consider recommendations submitted by sub-committees and local Occupational Health and Safety committees.

### **Corporate Health and Safety Plan**

This Plan sets out TransGrid's objectives, targets and key strategies for the year and is the basis for the development of business unit Health and Safety Action Plans. Progress reports on each business unit's Action Plan are reviewed by the Executive OHS Committee on a quarterly basis.

A Corporate Health and Safety Plan 2010 – 2011 has been developed, communicated and cascaded through the business where Business Units develop their own unique health and safety plan and measures based on the corporate plan and the local health and safety risks. Progress on the implementation of the Corporate and Business Unit Health and Safety Plans are reported to the Executive OHS Committee quarterly.

### **Safety Communications Steering Committee**

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.

The Safety Communications Steering Committee (comprising the General Manager/Business Services, Manager/Health and Safety, OHS Advisor and the seven elected OHS Committee Chairpersons) assists with the review of policy and procedures through consultation with local OHS committees. The Safety Communications Steering Committee also develops initiatives to promote health and safety to maintain a high level of awareness amongst staff and is responsible for developing and promoting the Quarterly Health and Safety Themes.

### **Wellbeing**

The TransGrid "Wellbeing" Program was launched in March 2010 and its vision is "to promote living a healthy, happy and productive life by making personal choices that contribute to a healthy and balanced lifestyle". The Program consolidates under one banner TransGrid's existing "people related" services available to our employees. These services and initiatives are being reviewed and as appropriate, added to in the future.

"Wellbeing" provides principles, policies and programs to support employees in the following areas:

- Physical Wellbeing - Maintaining healthy and energetic bodies by making informed choices about exercise, diet and general fitness.
- Emotional Wellbeing - The peace of mind, confidence, and self-respect that we achieve by coming to terms with the full range of emotions.

- Social Wellbeing - Recognising the value and contribution of the relationships with family, colleagues and the community.
- Financial Wellbeing - A sense of comfort and security that results from informed financial decisions that help us achieve our life goals.

### **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. The 2009 winners approached a challenging transformer overhaul project with significant manual handling and lifting activities. Recognising the health and safety risks the winners developed alternative work methods to those recommended by the manufacturer/supplier which not only removed much of the safety risk, but produced a lower cost result.

### **Annual Safety Day**

TransGrid's annual Safety Day includes Risk Assessment, First Aid and Fire Fighting competitions for teams representing all areas of TransGrid. This was held in Wagga in September 2009. In its 52nd year the Safety Day included events in vital emergency response, fire fighting and risk assessment. The participation rate on the day was high with participants responding to various injuries and scenarios.

TransGrid's Safety Day helps to reinforce TransGrid's emphasis on safety as the number one priority. The day helps to hone safety skills which positively influence a sustained safety culture in the workplace.

### **Schedule of Compliance Audits and Inspections**

Compliance audits and inspections conducted to 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, OHS audits on contractors and team leader audits of pre-work risk assessments. Over the past year a program of contractor health and safety audits have been introduced on all major projects. Non conformances identified in the audits are reported and actions are tracked.

OHS Audit reports provided by internal and external auditors reflect a strong OHS commitment, understanding and performance across TransGrid.

In October 2009 a Workcover audit for self insurance was undertaken, with a successful result for TransGrid.

### **TransNet (TransGrid's Intranet)**

TransNet plays an important role in TransGrid's communication strategy. All policies, procedures, manuals and forms are available to all employees electronically via TransNet. This system also provides other OHS information, including:

- Corporate Health and Safety Plan – objectives, targets and key strategies;
- Wellbeing programme.
- OHS Risk Management Database – including TransGrid's Hazard Register, Risk Management Plan, Work Activity and Workplace Risk Assessments, Work Method Statements, OHS Forms;

- Incident Notification System – all hazards, near misses and OHS incidents are notified electronically which facilitates immediate notification to relevant personnel;
- Issues Management System – records all issues requiring action, timeframes for completion and actions implemented;
- Approved Safety Equipment lists – details the Personal Protective Equipment that has been approved for use within TransGrid;
- Listings of First Aid Attendants, Injury Management Co-ordinators, OHS Committees (members, meeting dates, minutes);
- OHS Statistics;
- OHS Incident Management procedure; and
- Health and Safety Notice Board – includes Safety Alerts, Safety Bulletins and general notices, links to external OHS websites.

### Participation in Industry Committees

TransGrid takes an active role in a number of industry committees and working groups such as Energy Networks Association's Health, Safety and Environment Committee, WorkCover Industry Reference Group and the Industry & Investment NSW Industry Safety Steering Committee. Participation ensures 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.

## 5.2 Serious Electricity Network Accidents (Public)

There were no Serious Electricity Network Accidents involving the public in 2009/10. Initiatives are addressed in more detail under the Public Electrical Safety Awareness plan report.

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

Serious Electricity Network Accidents (Public)Trend					
Category	Previous Years				Current Year
	2005/06	2006/07	2007/08	2008/09	2009/10
Non-Fatal	0	0	0	0	0
Fatal	0	0	0	0	0

Note: Table 5.1 includes Serious Electricity Accidents, which are accidents where electricity was involved in the injuries.

## 5.3 Actionable Electricity Network Safety Incidents (Public)

There were no Actionable Safety Incidents involving the public in 2009/10.

**Table 5.2 – Actionable Safety Incidents (Public) on the Electricity Network Summary Trend**

Actionable Safety Incidents (Public) on the Electricity Network Summary Trend					
Category of Incident	Previous Years				Current Year
Year	2005/06	2006/07	2007/08	2008/09	2009/10
<b>Total</b>	0	1	0	1	0

## 5.4 Serious Electricity Network Accidents (Network Worker)

There was one Serious Electricity Network Accident involving a TransGrid employee. The employee was working at the rear of a secondary systems panel while another employee was performing testing at the front of the panel. When a test voltage was injected at the front of the panel, the employee at the rear of the panel inadvertently came in contact with the test voltage. The employee attended hospital and had suffered no serious injury. The cause was a misjudged proximity to equipment while test voltages were applied, and work methods were revised so that staff are not working behind panels while testing is in progress.

There was one Serious Electricity Network Accident involving a TransGrid contractor. A linesman received an electric shock whilst installing jumpers at a tension structure during construction of a new transmission line. The electric shock occurred due to induction from an adjacent in-service transmission line. Safe work practices require the application of portable earths on either side of the structure being worked on, however one set of portable earths was some distance away from the work location and the failure to follow safe work practices was the cause of this incident. The linesman attended hospital and had suffered no serious injury.

**Table 5.3 – Serious Accidents (Network Worker) on the Electricity Network Trend**

<b>Serious Accidents (Network Worker and Accredited Service Provider) on the Electricity Network Trend</b>										
	Previous Years								Current Year	
	2005/06		2006/07		2007/08		2008/09		2009/10	
	NF	F	NF	F	NF	F	NF	F	NF	F
Network Operator Employees	1	0	0	0	0	0	1	0	1	0
Network Operator Contractors	1	1	0	0	0	0	0	0	1	0

NF: Non Fatal      F: Fatal

Note: Table 5.3 includes accidents where electricity was involved in the injuries.

## 5.5 Actionable Electricity Network Safety Incidents (Network Workers)

There were no Actionable Safety Incidents involving network workers in 2009/10.

**Table 5.4 – Actionable Safety Incidents (Network Workers) on the Electricity Network Summary Trend**

<b>Actionable Safety Incidents (Network Workers) on the Electricity Network Summary Trend</b>					
Category of Incident	Previous Years				Current Year
Year	2005/06	2006/07	2007/08	2008/09	2009/10
<b>Total</b>	1	0	1	0	0

## 6. Bush Fire Risk Management

### 6.1 Bush Fire Risk Management Plan

TransGrid's Bush Fire Risk Management Plan is published as Chapter 4 of the Network Management Plan 2009-14 Revision 1. A previous revision of the plan was subject to external audit and found to comply with the requirements of the then in force Electricity Supply (Safety and Network Management) Regulation 2002. Some minor improvements to the plan recommended in the audit report were included in the subsequent revision and carry through to the current plan.

### 6.2 Bush Fire Risk Management Performance

In 2009/10 there was one occurrence where a localised fire was initiated by TransGrid assets:

A small grass fire was initiated by a fallen transmission line conductor due to failure of a line fitting on the 01 Upper Tumut - Canberra 330kV transmission line. This fire self extinguished and was limited to the immediate area of the transmission line easement.

The following table summarises the performance outcomes, and compares these to the previous year's performance:

**Table 6.1 – Bush Fire Risk Management Performance Indicators**

Indicator	2008/09		2009/10	
	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	1	Nil	1

In 2009/10 there were three occurrences where localised fires were initiated by TransGrid activities:

- Spot fires were started by a contractor working on the Wollar - Wellington 330kV transmission line project. A controlled burn off of stacked timber within the easement was being undertaken when weather conditions changed. The fire was extinguished with the assistance of the Rural Fire Service.
- A fire was initiated by a contractor working on the 96G Kempsey to Port Macquarie line project. Sparks from an angle grinder being used on the pole foundation reinforcing cage resulted in an approximately 15 hectare area of paddock and bush being burnt out. The fire was extinguished with the assistance of the Rural Fire Service.
- An elevated work platform being operated by a contractor working on the Wollar to Wellington 330kV transmission line project came into contact with a Country Energy 22kV line resulting in the shorting out of two phases and causing a small grass fire. The fire was extinguished by contractor staff with the assistance of the Rural Fire Service.

## 6.3 Audits

Technical Performance Assessments (TPAs) are undertaken annually in each of TransGrid's three Regions to audit maintenance and inspection compliance to TransGrid's policies. In 2009/10 TPAs were undertaken in Northern Region (Newcastle Area), Central Region (Metropolitan Area) and Southern Region (Wagga Area). No bush fire risk non-compliance issues were identified by these TPAs.

## 6.4 Preventative Programs

TransGrid's preventative program is centred on its routine easement maintenance. Inspection of transmission line hardware and accessories provides further confidence in the reliability of the system to not pose a bushfire ignition risk, and to remain safe during any bushfire occurrence in the area.

## 6.5 Proactive Programs

TransGrid provides corresponding representation to Bush Fire Management Committees as detailed in Attachment 2 of the TransGrid procedure GD AS G2 006 – Administration of the Network Management Plan. When required, the meetings are attended by a regional representative providing advice on matters such as the impact proposed hazard reduction burns will have on TransGrid lines and recommendations are made on how to protect these assets prior to the commencement of a burn.

TransGrid has also provided advice to the relevant Bush Fire Management Committees that TransGrid easements can be maintained, particularly in National Park & Wildlife Service and State Forest managed estates, in a manner such that they can be utilised as Strategic Fire Advantage Zones (SFAZ). Some easements are now being managed in cooperation with these agencies to provide these zones.

TransGrid's Public Electrical Safety Awareness (PESA) plan, which is Chapter 3 of the Network Management Plan 2009-14 Revision 1, provides a strategy for the communication of the fire hazards associated with overhead power lines and vegetation and other electrical safety initiatives.

## 6.6 Aerial Laser Surveys

TransGrid is in the midst of a project to conduct Aerial Laser Surveys (ALS) of transmission lines for the purpose of obtaining accurate and up to date electronic data of these assets. It is only with the advent of this technology that it has been possible to accurately measure the as built profiles of such lines. All lines have been surveyed, with data processing continuing with an expected completion date of November 2010 for the availability of all line models.

Results received to date from these surveys have identified spans on a number of transmission lines in NSW that have clearances to ground below those specified in the relevant Guideline, if they were operated at their maximum operating temperatures. The possible consequences of low clearances can include:

- flashovers to the ground tripping the line;
- flashovers to vegetation that can start a bushfire; and
- flashovers to vehicles or people under the line.

A risk management approach has been undertaken to manage these assets in the time until final designs are prepared and works can be carried out efficiently. This risk management approach has considered historical loading on the lines and combined this with statistical conductor temperature monitoring to assess the locations where operation at maximum expected temperatures may infringe on specified clearances. At no locations do these reduced clearances increase the risk of bushfire ignition.

It is not considered appropriate to either turn off or de-rate the lines. Such action would place significant constraints on the operation of the NSW network. The performance of all TransGrid's lines over the past 40 or more years would indicate that there is minimal risk in leaving these lines in service with their current ratings, providing all reasonable action is taken to mitigate the risk. Actions TransGrid is taking to mitigate the risks have included raising conductors using alternative insulator arrangements, adjustment of conductor tensions and localised ground profiling in private property. To date, TransGrid has rehabilitated eight transmission lines. In terms of managing safety under any sections identified as having reduced clearances at expected maximum temperatures, treatments include signage and access barriers depending on the extent of the reduced clearances. TransGrid continues to maintain interim treatments on six transmission lines pending permanent rehabilitation. It is expected that processing of the ALS data will identify further lines that will require signage and/or access barriers and these will be implemented during 2010-11.

Private property owners, National Parks and Wildlife Service, Snowy Hydro Limited and AEMO are being consulted in relation to the operating issues and risk mitigation strategies.

## 7. Public Electrical Safety Awareness

TransGrid's Public Electrical Safety Awareness Plan (PESAP) is based on a risk assessment of public safety issues with regard to TransGrid's assets. The PESAP is made available to all employees on TransGrid's Intranet "TransNet" and to the public via TransGrid's external website, as Chapter 3 of the Network Management Plan 2009-2014 Revision 1.

The 2009/10 Action Plan for the implementation of the PESAP continued with the three specific focus areas from previous Plans: Relationship Management, Site Specific Issues and Community Interaction. Specific highlights for this year included:

- A targeted mailout of the TransGrid easement brochure to easement affected property owners throughout the more populated Central Region. This resulted in improved communications regarding issues relating to safe practices within easements;
- Information relating to hazards of fire and smoke around transmission lines was provided to farmers with crops that are likely to be burned at the end of their crop cycle;
- All substation sites previously identified with elevated risk factors for security have had new fencing and other security measures installed. This has resulted in no sites remaining with elevated risk exposure factors;
- The list of Transmission lines with elevated risk factors for public safety due to location or history of activity has been reviewed, with no additional sites have been identified; and
- Continuing progress to meet the timeframes required by NSW Maritime on the risk assessment of crossings of navigable waterways,

The implementation of strategies is regularly reviewed by a working group of representatives from each Region and a report is provided to the Executive OHS Committee each year for review.

In addition to regular inspections by field staff, random audits are conducted on all TransGrid substations at least once every two years by the OHS Advisors to monitor safety conformance and identify any public safety issues. Identified issues are managed via reports to the relevant managers of the sites and recorded in the Issues Management System as appropriate.



## 8. Power Line Crossings of Navigable Waterways

TransGrid has been reviewing its existing waterway crossings for compliance with the NSW Maritime “Crossings of NSW Navigable Waterways: Electricity Industry Code”. This review has included:

- Negotiating with Waterways NSW to re-classify the navigability of a majority of the waterways presently classified as navigable in the vicinity of the crossing. Many of these crossings are presently not navigable in any vessel that would cause issues with clearance to the overhead power line. Once this negotiation is complete, it is expected the number of crossings listed below will reduce.
- Of the crossings remaining, risk assessments are being prepared relating the height of the crossing to likely vessels, and reviewing the requirements for signage to address any risks these crossings pose to maritime traffic.

**Table 8.1 – Power Line Crossings of Navigable Waterways Summary**

	Existing (Number)	New (Number)	Incidents (Number)	Crossings Reconstructed (Number)	Crossings Identified as Requiring Conversion to Submarine Crossings (Number)
Overhead Crossings	236	0	0	0	0
Submarine Crossings	0	0	0	0	0