

NEW SOUTH WALES

# Transmission Annual Planning Report 2014

OUTLINE



TransGrid

# Message from the Managing Director

TransGrid is adapting and enhancing its business operations to become more responsive to the changing energy environment so that we can continue to provide safe, reliable and economically efficient transmission services to New South Wales, the Australian Capital Territory and the National Electricity Market.



The electricity industry is in a time of transformation. The last five years have seen a shift towards renewable sources of generation, adoption of energy efficiency initiatives, energy storage technologies becoming more affordable and smarter ways of managing peak demand for electricity. Consequently, the electricity supply chain of the future will look very different to that of the past.

TransGrid is shaping the transmission network of the future, and has committed to adapt to the changing environment by altering the way we plan, build, operate and maintain the network and aligning our business priorities with the changing needs of electricity consumers.

This Transmission Annual Planning Report 2014 (TAPR 2014) provides advance information to market participants, customers, consumers and other interested parties on the nature and location of emerging constraints in TransGrid's transmission network. It also includes information on the status of network augmentation and asset renewal projects as they evolve from need identification to completion. The TAPR 2014 places particular focus on TransGrid's commitment to more effective consumer engagement, non-network options and renewal of assets nearing the end of their serviceable lives.

In recognition of the impact our investment decisions have on transmission costs and ultimately on electricity end users, TransGrid has established a comprehensive consumer engagement program to give consumers a voice in the development of TransGrid's business plans. We have held a number of forums with residential and small business customers, talked with our directly connected customers, carried out consumer surveys and started conversations on our new engagement website – Have Your Say TransGrid. We have worked closely with consumer representatives and large businesses on specific aspects of our business plans and operations.

TransGrid is committed to using non-network options to address network constraints where feasible and cost-effective. This TAPR outlines TransGrid's future demand management initiatives with a key focus on collaboration to improve consumer understanding of demand management, capturing synergies across different industry participants' demand management activities and reducing regulatory barriers to demand management uptake.

To improve understanding of the demand management market, TransGrid proposes research to better understand today's drivers of peak demand, businesses' energy behaviours and demand response capacity. TransGrid also seeks to overcome practical barriers to the application of demand management tools and technologies. To develop the "market" for non-network options, TransGrid intends to procure pre-emptive demand management in the Sydney inner metropolitan area.

A key element of TransGrid's investment plans is judicious renewal of parts of the network that are nearing the end of their serviceable lives. The electricity transmission network in New South Wales was first developed in the 1950s and 1960s, to improve efficiency and reliability above that of individual local or distributed generation systems that existed at that time. To date, TransGrid has mainly undertaken replacement and refurbishment of individual items of equipment to keep existing substations and transmission lines operational at the lowest cost. Now, parts of the network are in need of more comprehensive renewal.

TransGrid's proposed asset renewal program comprises the most economic combination of replacement and refurbishment options for transmission equipment nearing the end of its serviceable life. The program is essential to ensure the safety of staff, contractors and the public and to maintain a reliable electricity supply.

In early 2014, the Australian Energy Regulator (AER) undertook a review of the TAPRs produced by all Transmission Network Services Providers (TNSPs) within the NEM. That review resulted in the AER asking TransGrid to provide additional information in its TAPR.

Some changes have been made to this TAPR to accommodate evolving circumstances and in response to

some of the AER's requests. Prior to making further improvements, TransGrid intends to consult with other stakeholders having an interest in the TAPR.

I believe that consultation is key to TransGrid's future. As a TNSP, our continued role in the electricity supply chain depends on our capacity to be responsive to change. We must consider and take into account the opinions and preferences of our customers, and be ready and willing to adapt to new ways of doing business.

In delivering this TAPR, we invite you to share your views and take part in a robust discussion that will influence the shape of the transmission network of the future. We look forward to your valuable feedback on the TAPR 2014.



**Peter McIntyre**  
**Managing Director**

June 2014

## About TransGrid

**TransGrid is the owner, operator and manager of one of the largest electricity transmission networks in Australia, connecting generators, distributors and major end users in New South Wales (NSW) and the Australian Capital Territory (the ACT).**

With 96 substations and over 12,900 kilometres of transmission lines, our network serves the largest state in Australia's National Electricity Market and facilitates interstate trading of electricity.

TransGrid's primary objective is to meet its customers' reliability expectations at least cost through prudent investment in non-network services, network replacement and augmentation assets, and through efficient asset management and system operation.

# Purpose of TransGrid's NSW TAPR and the TAPR Outline

The purpose of the NSW TAPR is to provide advance information to market participants, customers and interested parties on the nature and location of emerging constraints in TransGrid's transmission network.

It is one of a number of documents that disseminate information for transmission and distribution planning in the NEM. These documents cover the broad areas of supply demand balance in the NEM as well as transmission and distribution network planning. These documents are mandated through a variety of legislative and policy directives including the National Electricity Rules (NER).

The TAPR includes:

- Outcomes of the annual planning review that includes planning analysis of network constraints for the 10 year planning horizon;
- An update of the NSW and ACT load forecasts provided by AEMO and the connected distributors;

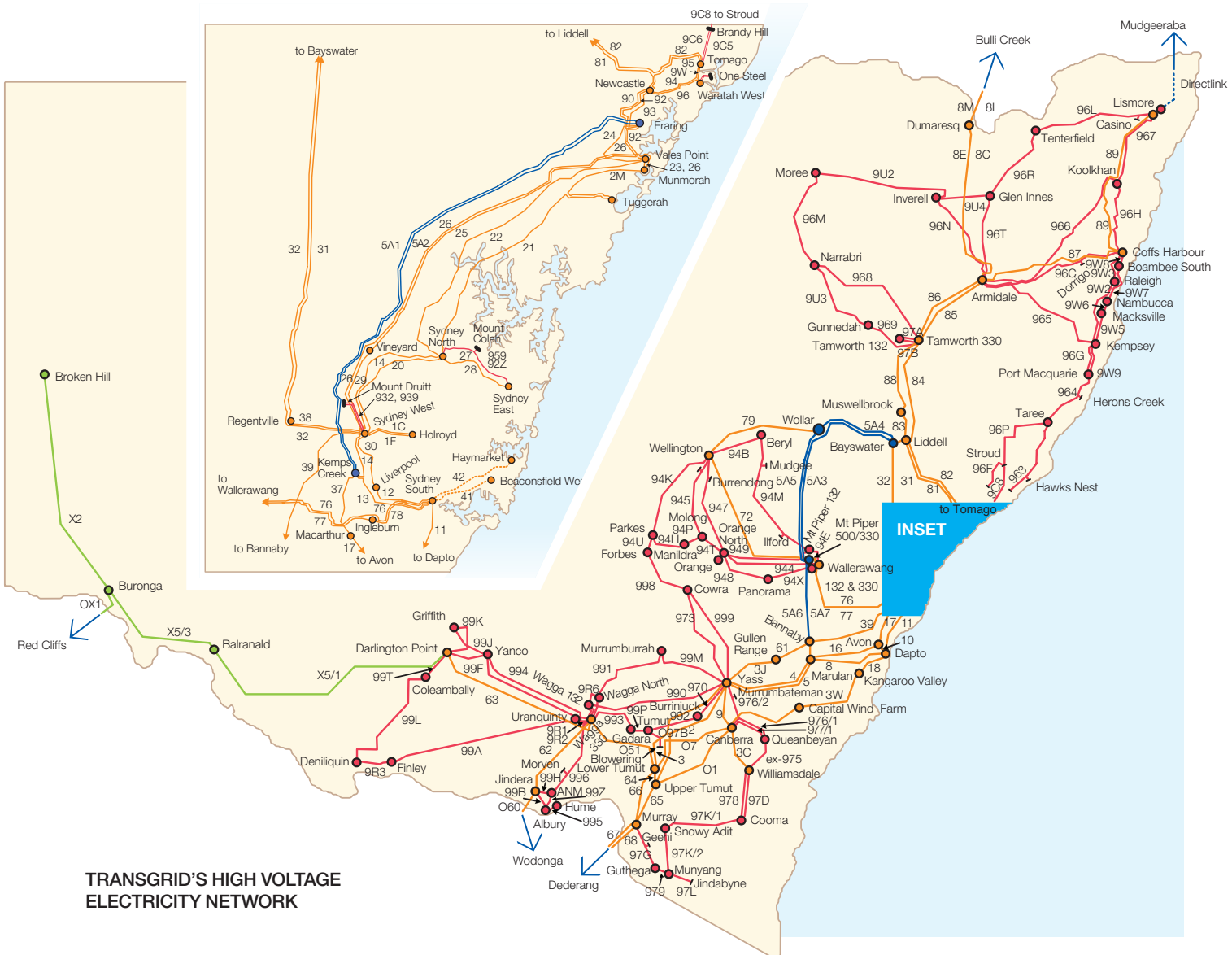
- Completed projects, committed projects and projects having completed the regulatory consultation process;
- Constraints and potential solutions for the one to five year planning horizon;
- Longer term constraints and indicative solutions;
- Network replacement projects; and
- Indications of whether TransGrid is likely to issue a Request for Proposals seeking non-network solutions.

This information also forms an input into the preparation of the National Transmission Network Development Plan (NTNDP) produced by the Australian Energy Market Operator (AEMO). The NTNDP covers the

development of the national transmission system under a range of economic and market development scenarios. Chapter 5 of the TAPR provides an overview of the latest NTNDP and sets out the linkages between it and TransGrid's network development plans.

TransGrid presents the findings of the TAPR at a public forum held in Sydney each year.

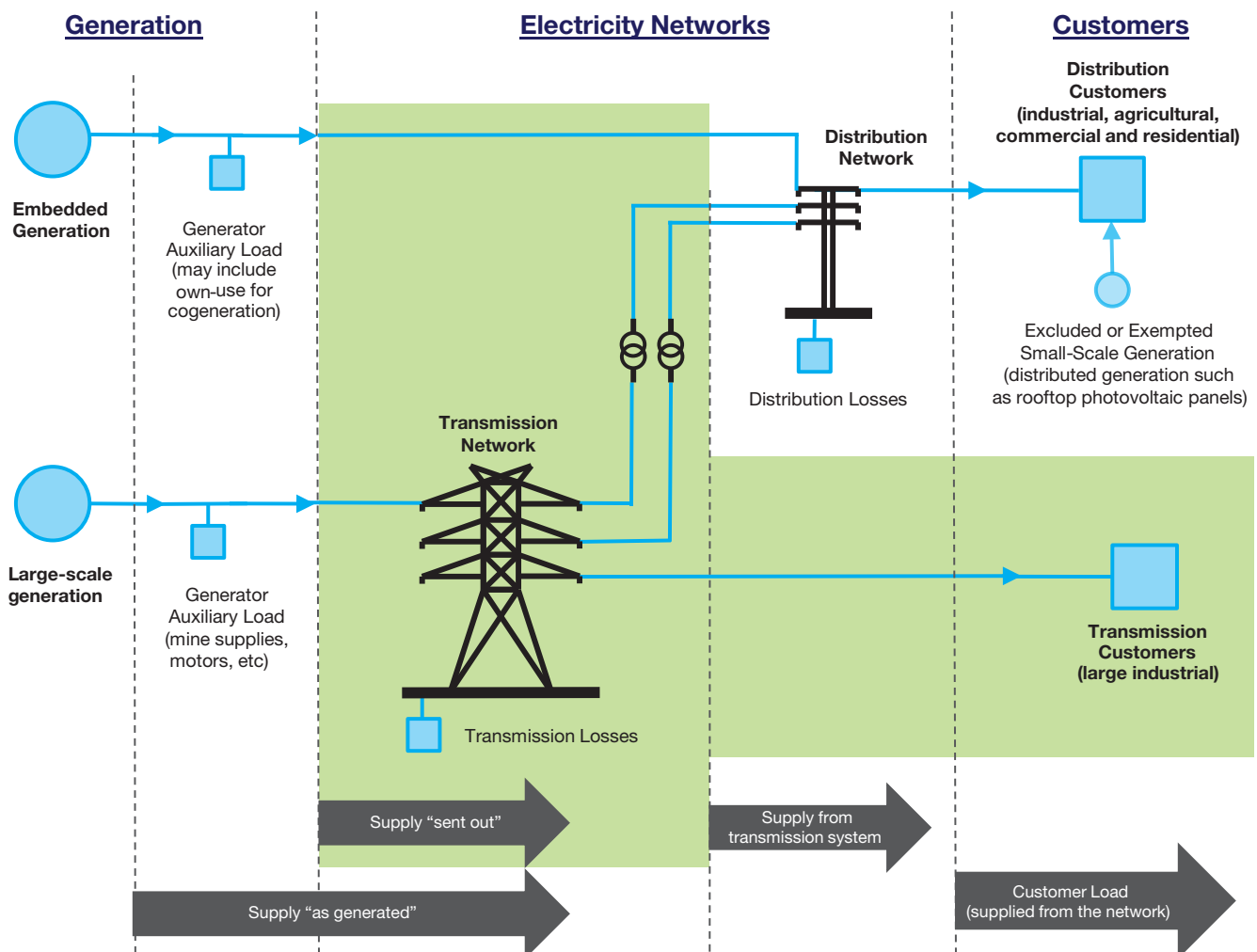
This TAPR Outline document is intended as an introduction to the TAPR 2014 and a guide to its contents and layout.



# The Role TransGrid Plays in the National Electricity Market (NEM)



The green area in the diagram below shows where TransGrid fits in the NEM as a TNSP. The diagram shows the role TransGrid plays in the NEM in connecting and transporting the energy produced by the competitive generation sector of the industry. It shows the separation of the roles played by the transmission and distribution sectors in transporting that energy. It also shows the connection of consumers at both the transmission and distribution level. TransGrid's role is to transport the energy generated; it does not buy or sell that energy. The role of buying and selling energy within the NEM is played by others including Retailers.



Source: Modified version of AEMO diagram in ESOO 2011

# Energy and Demand Forecasts Consumer Engagement

The TAPR 2014 places particular focus on TransGrid's commitment to more effective consumer engagement, non-network options and renewal of assets nearing the end of their serviceable lives



The NSW NEM region energy and demand forecasts for 2014 have been prepared by AEMO and are included in Chapter 3 of the TAPR. We continue to work with AEMO on input parameters and the forecast process. The key economic, price and demographic projections underpinning these forecasts are available from AEMO.

The AEMO energy forecasts show an annual energy growth of 0.4% for the forecast period 2014/15 to 2023/24. AEMO has also forecast the 50% Probability of Exceedance (PoE) summer and winter peak demands to grow at an annual rate of 1.1% for the forecast period. The forecast energy growth rate is lower than the 2013 forecast. The forecast summer and winter demand growth rates are higher than the 2013 forecasts. Both summer and winter peak demand forecasts have a lower starting point than the 2013 forecasts.

## NSW FORECASTS

The following table summarises historical and projected changes in the NSW region energy and 10% PoE maximum demands.

TransGrid also receives bulk supply point forecasts from the connected distribution network owners for the purposes of network planning. The bulk supply point forecasts are included in Appendix 3 of the TAPR. Those forecasts show lower starting points and marginally lower growth rates relative to the 2013 forecast.

## CONSUMER ENGAGEMENT PROGRAM

While TransGrid's key interface has historically been with generators, distribution network service providers and some large directly connected customers, TransGrid understands that energy consumers are interested in its operations in terms of the prices they pay for electricity, their access to electricity when and where they need it and the financial, environmental and community impacts of new infrastructure.

In recognition of the importance of community engagement, TransGrid has redefined the way in which it engages with the community on capital works programs. Conversations with the community will start in the early planning stages, when a need is identified to address a network constraint, and to give consumers a voice in the development of TransGrid's business plans.

TransGrid's new stakeholder engagement process is proactive and transparent. It is based on meaningful, open and honest engagement; focuses on listening to feedback; incorporating and addressing stakeholder views in our business plans; and responding to and acting upon stakeholder feedback.

The integration of TransGrid's consumer engagement program in the Network Investment Process is described in Chapter 2 of the TAPR.

	Actual/estimated 2005/06 to 2013/14	Projected 2014/15 to 2023/24
Energy Sent out	-1.1%	0.4%

	Actual 2005/06 to 2013/14	Projected 10% POE 2014/15 to 2023/24
Summer Peak Demand	-1.2%	1.2%

	Actual 2006 to 2013	Projected 10% POE 2014 to 2023
Winter Peak Demand	-1.6%	1.1%

# Non-Network and Demand Management Options

TransGrid is committed to the continued consideration of non-network options which include demand management, local/embedded generation and bundled demand side response (DSR) on an equal footing with network options when planning its network and applying the AER's Regulatory Investment Test for Transmission (RIT-T).

It is expected that demand management, local generation and bundled demand side response options would emerge from joint planning with Distributors, from the market or from interested parties through consultation processes.

TransGrid's joint planning with NSW Distributors provides a mechanism to identify opportunities for non-network options. The 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 non-network options.

TransGrid's approach to considering non-network options is described in Chapter 4 of the TAPR. The consideration of intention to issue Requests for Proposals for non-network options with respect to identified constraints is described in Chapter 7.

## ASSET REPLACEMENT AND REFURBISHMENT

TransGrid's asset management system has been independently reviewed against the newly released international standard ISO55001. As a result of that review TransGrid is expecting to attain full certification later this year.

Within TransGrid's asset management process the condition and performance of the transmission and associated network assets are effectively monitored, maintained and developed to meet customer and stakeholder expectations.

One of the significant challenges is that works must be undertaken in a manner that ensures services to customers are maintained at acceptable levels.

TransGrid's asset management processes are described in Chapter 2 and Appendix 2 of the TAPR. Chapters 6 and 7 and Appendix 2 include needs arising from assets reaching the end of their serviceable lives.

## NETWORK DEVELOPMENTS

TransGrid undertakes a comprehensive network planning and analysis process to identify the areas of the network where limitations are expected to emerge in the future. These limitations could be addressed with non-network and/or network developments.

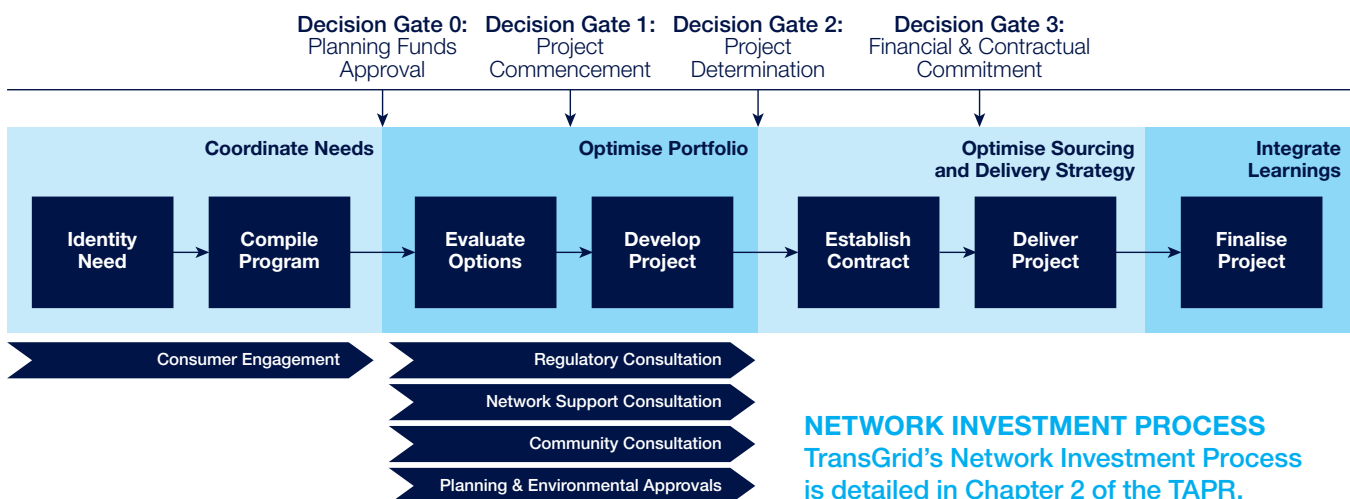
The energy and demand forecasts form a fundamental input to this process in identifying the network investment requirements. Planning and development of the network is undertaken on a cyclical and a needs basis to ensure that transmission service delivery to our customers is cost-effective, environmentally responsible, responsive to changing requirements and meets the jurisdictional, contractual and NER obligations.

The following projects feature in TransGrid's TAPR 2014 (Chapter 6) and fall into three categories: completed, committed and those which have passed the regulatory process. This is not a complete or definitive list and further information is contained in the TAPR 2014.

## Completed Network Developments

The following works have been completed in the year since publication of TransGrid's TAPR 2013:

- Supply to the lower Mid North Coast of NSW – increase in the capacity of the transmission system supplying the lower Mid North Coast by construction of sections of single circuit and double circuit 330 kV transmission line, to initially operate at 132 kV and construction of a new double circuit 132 kV transmission line;
- Tee-connection of Essential Energy's Herons Creek 132/66 kV Substation to TransGrid's 964 Taree – Port Macquarie 132 kV transmission line;
- Installation of power oscillation damping control on the Armidale Static VAR Compensator (SVC) to improve the damping of system oscillations;
- Reconnection of the 132 and 66 kV transmission lines from the old Wallerawang substation to the new Wallerawang 132/66 kV Substation;
- Reinforcement of supply within the Sydney inner metropolitan area, by establishing an additional cable link between Beaconsfield West and Haymarket 330/132 kV Substations;
- Installation of shunt reactors at Murray Switching Station and Yass 330/132 kV Substation as network support and control of ancillary services (NSCAS), which also relieved the constraint on voltage levels in the Canberra – Kangaroo Valley 330 kV system;
- Connection of the first stage (166 MW) of Gullen Range Wind Farm to a new switching station in the 61 Bannaby – Yass 330 kV transmission line;





- Transformer and reactor replacements and capacity upgrades at Armidale, Wallerawang, Sydney East 330/132 kV and Narrabri and Yass 132/66 kV Substations; and
- Replacement of the secondary systems at Tumut 132/66 kV Substation.

### Committed Network Developments

The TAPR 2014 describes projects and options which are proposed to meet present and emerging constraints in the network.

TransGrid has committed to the following network developments:

- Redevelopment of Orange 132/66 kV Substation expected to be completed in April 2017;
- Western Sydney Supply Project – TransGrid and Ausgrid are undertaking works to increase the capacity of the transmission system supplying the Sydney CBD and Inner Metropolitan Area. The major components of the works include 330 kV substations, transmission lines and cables.

Holroyd Substation and the double circuit 330 kV line work was completed in March 2014. Installation of the two 330 kV cables and construction of the Rookwood Road Substation are expected to be completed around September 2014;

- Disconnection of Munmorah Power Station – disconnection of the 330 kV generator connections is expected to be completed by mid to late 2014;
- Upper Tumut Switching Station rehabilitation – most of the rehabilitation works have been completed with the remainder programmed for completion through to January 2015;
- Remediation of 97G Murray – Guthega 132 kV transmission line to restore the line to its original capacity, which is expected to be completed in November 2014;
- Replacement of Cooma 132 kV Substation which is approaching the end of its serviceable life is expected to be completed in November 2015;
- Refurbishment of Yanco 132 kV Substation is expected to be completed in September 2015;

- Upgrading of Lines 61 and 3J, to an operating temperature of 100°C. Expected completion is summer 2014/15;
- Transformer replacements and upgrades at Newcastle, Griffith and Yanco Substations; and
- Capacitor bank replacements and upgrades at Canberra, Yass and Orange Substations.

### Network Developments which have completed the Regulatory Process

Following are some of the proposals which have completed the regulatory process but are not yet committed projects:

- Transposition work on Line 76/77 Wallerawang – Sydney South/Ingleburn double circuit 330 kV line;
- Development of the southern supply to the ACT<sup>1</sup>;
- Sydney West and Williamsdale 132 kV switchbays for distributor requirements;
- Quality of supply monitoring; and
- Replacement of network assets nearing the end of their serviceable lives at a number of locations.

## NETWORK CONSTRAINTS

The regulatory consultation process is underway for the Queensland – NSW Interconnector (QNI) transmission capacity project.

### Constraints expected within five years

The following are some of the constraints described in Chapter 7 of the TAPR 2014 which are expected to emerge within the next five years:

- Supply to the Gunnedah/Narrabri area;
- Condition of Tamworth No 2 Transformer;
- “Powering Sydney’s Future” Supply to the Sydney inner metropolitan area;
- 41 Cable Sydney South – Beaconsfield capacity;
- Strategic land acquisition at Riley Street;
- Supply to the Beryl/Mudgee area;
- Connection of Ausgrid’s new subtransmission substation in the Munmorah/Doyalson area;
- Condition of Munmorah, Vales Point, Canberra, Burrinjuck and Wagga 132/66 kV Substations;
- Condition of 944 Wallerawang – Orange North 132 kV transmission line; and
- Snowy to Sydney Network capacity.

### Constraints expected within five to ten years

These are some of the constraints reported in the TAPR that may emerge sometime between five and ten years from now:

- Tamworth and Armidale 330 kV Switchyards;
- Hunter Valley – Tamworth – Armidale 330 kV system capacity;
- Voltage control in Northern NSW;
- Supply to the Forster/Tuncurry area; and
- Capacity of Marulan – Avon, Marulan – Dapto and Kangaroo Valley – Dapto Lines.

Constraints that are anticipated to emerge sometime beyond ten years from now are detailed in Chapter 7.

1. Given the passage of time the regulatory consultation may need to be revisited.

Copies of the TAPR for 2014 are available from TransGrid:

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