

Economic Benchmarking RIN Response - Basis of Preparation (Audited Information)

29 APRIL 2014 – FINAL

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1. Introduction

On 19 December 2013, the Australian Energy Regulator issued TransGrid with a *Regulatory Information Notice Under Division 4 of Part 3 of the National Electricity (New South Wales) Law* (the 'Economic Benchmarking RIN'), requiring the business to prepare and submit certain information to support the AER's economic benchmarking activities. This Basis of Preparation document has been prepared to support the submission of the audited information package which is due to be submitted by 30 April 2014. The audited information package is comprised of:

1. The populated worksheets provided as Appendix A to the RIN;
2. The Basis of Preparation for each variable covered in the RIN worksheets;
3. Confidentiality Claims on any information included in the RIN worksheets;
4. Final Audit Report;
5. Statutory declaration of the form included in Appendix C to the Economic Benchmarking RIN

2. Compliance with the Economic Benchmarking RIN Requirements

The Economic Benchmarking RIN outlines the requirements for the Basis of Preparation as follows:

- a) *demonstrate how the information provided is consistent with the requirements of this Notice;*
- b) *explain the source from which TransGrid obtained the information provided*
- c) *explain the methodology TransGrid applied to provide the required information, including any assumptions TransGrid made;*
- d) *explain, in circumstances where TransGrid cannot provide input for a Variable using Actual Information and therefore must provide input using Estimated Information:*
 - 1) *why an estimate was required, including why it was not possible for TransGrid to use Actual Financial Information or Actual Non-financial Information (as the case may be, depending on the variable.*
 - 2) *the basis for the estimate, including the approach used, assumptions made and reasons why the estimate is TransGrid's best estimate, given the information sought in this Notice.*

To promote a common approach across the business to addressing the requirements of the Economic Benchmarking RIN, TransGrid has gathered information from across the business using a template prepared to respond to each of the AER's requirements. This is outlined in the table below.

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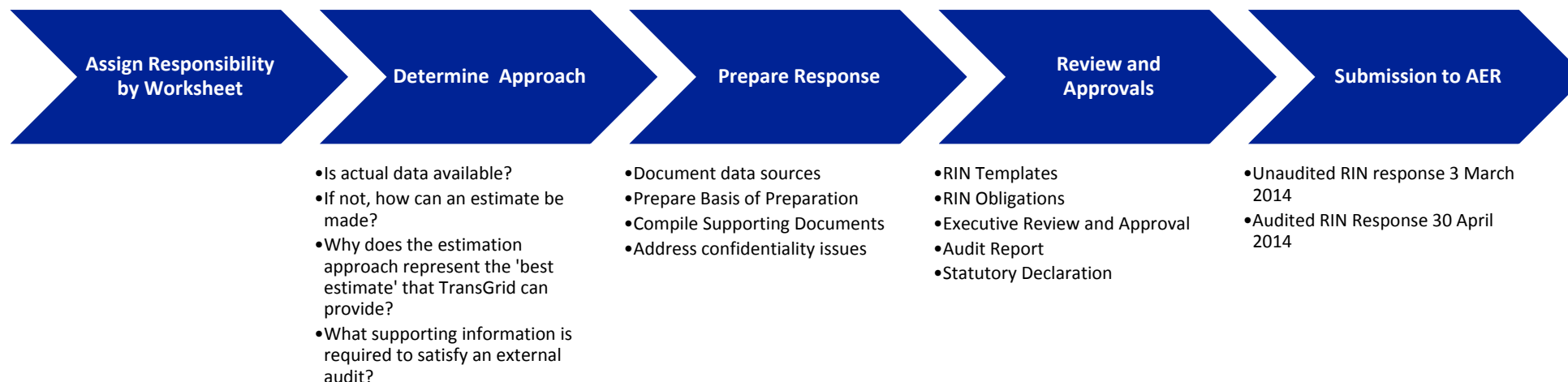
<i>Data variable & TransGrid's interpretation</i>		<i>Data sources, locations and 'owners'</i>	<i>Estimation or actual information, calculations and assumptions</i>		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ¹ ?	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
'Variable_Code' & 'Variable' from worksheet	<i>If AER definition is not clear, document TransGrid interpretation and its rationale</i> Responds to RIN requirement a)	<i>Specify source systems, reports, forms, other RIN variables etc</i> Responds to RIN Requirement b)	Yes/No <i>If estimate is used for this variable, document:</i> <i>Why an estimate was required, including why it was not possible to use Actual Financial Information or Actual Non-Financial Information</i> <i>Estimate basis, including the approach used, assumptions made and reasons why the estimate is TransGrid's best estimate</i> Responds to RIN Requirement d)	<i>Clear description of approach steps / methodology</i> Responds to RIN Requirement c)	<i>Clearly describe any assumptions used and the rationale for each</i> Responds to RIN Requirement c)

¹ 'Information presented in response to the Notice whose presentation is not Materially dependent on information recorded in the NSP's historical accounting records or other records used in the normal course of business, and whose presentation for the purposes of the Notice is contingent on judgments and assumptions for which there are valid alternatives, which could lead to a Materially different presentation in the response to the Notice.', **page 34, "Economic benchmarking RIN For transmission network service providers, Instructions and Definitions"**.

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3. Preparation Process

TransGrid's high level process for preparing its response to the Economic Benchmarking RIN is outlined below.



3.1 Document Control

The RIN, Worksheets, Basis of Preparation and Supporting Documents are located on TransGrid's file servers. These documents will be retained to support the preparation of the annual information required in future years.

3.2 Governance

The information was prepared by the responsible personnel within TransGrid and reviewed by their Group Manager prior to the consolidation into TransGrid's draft submission package. The draft submission package has been audited by KPMG, reviewed by the Executive General Manager/Network Planning and Performance and endorsed for submission to the AER, along with Final Audit Report and Signed Statutory Declaration required by the RIN.

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4. Principles of Preparation

TransGrid's response to the Economic Benchmarking RIN has been prepared in accordance with the AER's document *Economic benchmarking RIN for transmission network service providers, Instructions and Definitions, TransGrid (ABN 19 622 755 774)*, provided as Appendix B to the Economic Benchmarking RIN.

In accordance with the AER's instructions TransGrid has provided actual information using 'records used in the normal course of business' wherever this is possible. In cases where TransGrid has been unable to provide actual information, the variables have been estimated as follows:

- In the first instance, where actual information exists, but the presentation is contingent of a judgement or assumption, TransGrid has used actual information to prepare the variable and stated the judgment or assumption that has been made.
- Where actual information exists, but the information is incomplete over the historical period covered by the Economic Benchmarking RIN, TransGrid has used the actual information as far as practicable and stated the methodology used to estimate the remaining data.
- Where no actual information is recorded for the variable in the normal course of business, TransGrid has stated the methodology that it has used to estimate the variable required by the AER, including the assumptions made and the data sources used.

By following these principles of preparation, TransGrid considers that where estimates have been provided, these represent the best estimate available for each variable, noting that considerable uncertainty remains with respect to the AER's specific purpose(s) for the information.

To provide the AER with an additional indicator of the quality of the estimates that have been provided, TransGrid has implemented a colour coding system for the Economic Benchmarking RIN that has been agreed across the industry. This is outlined below:

Colour Code	Availability of data from NSP's primary system	Additional work around/estimation techniques	Likelihood to pass an audit	Management comfort that information are fit for purpose
Green	Available and verifiable	Simple – no additional work or minor work around (e.g. source data from a secondary system)	Likely	Comfortable
Yellow	Available but with some gaps	Moderate – estimate based on statistically significant sample size	Possible but unlikely	Comfortable
Orange	Little or no data available	Complex – estimate based on formula, standard parameters or other source	Not likely	Not comfortable
Red	Little or no data available	Impossible – rough estimate (e.g. rule of thumb from experience) or not possible	Not likely	Not comfortable
Black	Not applicable to relevant NSP	Not applicable to relevant NSP	Not applicable to relevant NSP	Not applicable to relevant NSP

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5. Information Sources

Due to the combination of financial and non-financial data requested by the AER, including a number of variables that are not routinely reported, TransGrid has drawn data from a number of information sources that are used across its business. In most cases it has been necessary to undertake additional analysis to derive the specific variables that are required from the AER templates. For audit purposes, detailed supporting documents have been given a reference in the following format RINB-[worksheet No.]-[sequence No.] to simplify referencing in the detailed basis of preparation tables.

The key systems that have been relied on are summarised in the table below, and are referred to, in the detailed basis of preparation tables in section 7

Information Source	Brief Description	Supports (Variables)
AEMO	Information requested by TransGrid from AEMO	Worksheet 7 – Quality of Service: TQS0120
AEMO Price and Demand Data Files	AEMO Price and Demand Data Files are publicly available historical records of National Electricity Market spot price and demand for each trading interval.	Worksheet 6 – Physical Assets: TPA0301 to TPA0308, TPA0401 to TPA0408,
AEMO Settlement Statements	AEMO issued statements for intraregional and interregional settlement residues.	Worksheet 2 – Revenue: TREV0110,TREV0205
AER Current Period Determination	The AER's final determination for the 2009/10 to 2013/14. Outlining the Efficiency Carry Forward revenue from the prior regulatory control period	Worksheet 2 – Revenue: TREV0303
AER Roll Forward Model	TransGrid's populated Roll Forward Models provided to the AER	Worksheet 4 – Assets (RAB): All
AER STPIS Letters	Annual letters from the AER confirming the revenue attributable to the Service Target Performance Incentive Scheme	Worksheet 2 – Revenue: TREV0301
AER Service Standards Compliance Reports/Submissions	Service Standards information reported annually to the AER	Worksheet 7 – Quality of Service: TQS0116 to TQS0117, TQS02
Bureau of Meteorology	List and location of weather stations in NSW	Worksheet 8 – Operating Environment: TEF03
Bush Fire Prone Lands	Spatial data set sourced from NSW Rural Fire Service	Worksheet 8 – Operating Environment: TEF0108
Climate Zone Map	Spatial data set sourced from the Australian Bureau of Meteorology	Worksheet 8 – Operating Environment: TEF0105
Ellipse	TransGrid's corporate asset management database	Worksheet 6 – Physical Assets: TPA0501 to TPA0506,TPA06
Invoices Received	Contractor invoices received for vegetation management works have been used to estimate the variables requested in Worksheet 8	Worksheet 8 – Operating Environment: TEF0101
LAN	TransGrid's corporate IT network	Various (Document Locations)
LiDAR	Light Detection and Ranging data sourced from aerial surveys that is used to measure vegetation clearances from TransGrid's transmission line assets.	Worksheet 8 – Operating Environment: TEF0104
Opslog	The business application used to store operator logs	Worksheet 7 – Quality of Service: TQS0121
QAPR	Quarterly Asset Performance Report, an internal report on outages that is generated each quarter from the THEOS System	Worksheet 7 – Quality of Service: TQS0121
Spot Height Data (25m)	Topographical information sourced from NSW Land and Property Information.	Worksheet 8 – Operating Environment: TEF0105

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Information Source	Brief Description	Supports (Variables)
System Operating Diagrams	High Voltage Operating Diagrams detail in plan view, single line format, the high voltage equipment, operational nomenclature and electrical connections for substations, switching stations and power station switchyards	Worksheet 6 – Physical Assets: TPA0501 to TPA0506, TPA06
TAMIS	NSW Transmission System and TransGrid Asset Management Information System (TAMIS) is the Geographical Information System (GIS) used by TransGrid to manage its spatial asset data.	Worksheet 6 – Physical Assets: TPA0101 to TPA0108, TPA0201 to TPA0208, Worksheet 8 – Operating Environment: TEF0106, TEF0201, TEF0204, TEF03001 to TEF03628
THEOS	TransGrid's outage recording/reporting system	Worksheet 7 – Quality of Service: TQS0101 to TQS0119, TQS 0121
TransGrid Regulatory Accounts	TransGrid's audited regulatory accounts, as provided to the AER	Worksheet 3 – Opex: All
TransGrid Electrical Data Book	A central record of electrical asset data regarding TransGrid's network that is published on the TransGrid Intranet.	Worksheet 6 – Physical Assets: TPA0101 to TPA0108, TPA0201 to TPA0208, Worksheet 8 – Operating Environment: TEF0201, TEF 0204
TransGrid Operating Manuals	Operating Manuals for TransGrid's assets outlining ratings for assets in each region of TransGrid's network.	Worksheet 6 – Physical Assets: TPA0301 to TPA0308, TPA0401 to TPA0408,
TRIM	TransGrid's corporate document management system	Various (Document Locations)
TUOS System	Transmission Use of System (TUOS) charges are TransGrid's primary source of revenue. The TUOS System is the billing system that underpins TransGrid's invoicing and records the information from the various metering installations deployed across TransGrid's network.	Worksheet 2 – Revenue: TREV0101 to TREV0110, TREV0201 to TREV0204 Worksheet 5 – Operational Data: TOPED0101 to TOPED0105, TOPED01, TOPCP0101 to TOPCP0208, TOPSD0101, TOPSD0104, TOPSD0301 to TOPSD0308 Worksheet 7 – Quality of Service: TQS03 Worksheet 8 – Operating Environment: TEF0202, TEF0203
The Wire	TransGrid's Intranet	Various (Document Locations)
TransGrid Manuals & Policies	Used for the operation and maintenance of TransGrids assets, these outline equipment information, standard practices and maintenance requirements.	Worksheet 6 – Physical Assets: TPA0501 Worksheet 8 – Operating Environment: TEF0102, TEF0104, TEF 0106

6. Confidentiality Claims

TransGrid has identified one issue where measures need to be taken to protect confidential information. This is summarised below:

Variable(s) affected	Issue	TransGrid Resolution
TOPED0102	Individual customers receiving supply at 330kV and 220kV can be identified if disaggregation is provided by voltage level.	In accordance with the AER's preparation guidelines, these figures have been aggregated into the variable TOPED0102 for the Public Version of the templates.

7. Detailed Basis of Preparation

The following sections outline the Basis for Preparation for each line item in the TransGrid Economic Benchmarking RIN.

7.1 Worksheet 1 - Contents

Worksheet 1 does not contain any information inputs.

7.2 Worksheet 2 - Revenue

Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ² ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TREV0101 From Fixed Customer (Exit Point) Charges	Connection Exit charges for distributors & direct connect customers based on fixed daily rate	From invoices generated by the Pricing team on the monthly basis using a core business TUOS billing system. Revenue from these invoices are summarised in the TUOS Data spreadsheets to facilitate internal financial reporting.	No	Prices for all customer connection points are calculated annually as per the AER approved Pricing Methodology. Approved (prices) by the Executive General Manager/Network Planning & Performance are published on TransGrid's website by 15 May. These (prices) are entered into the TUOS billing system and invoices for all customers are generated each month using the TUOS billing system.	-
TREV0102 From Variable Customer (Exit Point) Charges	This type of charge is not applicable for TransGrid, all exit charges are on fixed basis above	-	No	-	-
TREV0103 From Fixed Generator (Entry Point) Charges	Connection Entry charges for generators based on fixed daily rate	As per TREV0101	No	As per TREV0101	-
TREV0104 From Variable Generator (Entry Point) Charges	As per TREV0102	-	No	-	-
TREV0105 From Fixed Energy Usage Charges (Charge per day basis)	Charges applied for customer D	As per TREV0101	No	As per TREV0101	-
TREV0106 From Variable Energy Usage charges (Charge per kWh basis)	Energy based (per kWh rate) usage charges from loads customers.	As per TREV0101	No	As per TREV0101	-
TREV0107 From Energy based Common Service and General Charges	Energy based (per kWh rate) Common Service and Non-locational TUOS (previously called General Charges) from all loads customers.	As per TREV0101	No	As per TREV0101	-
TREV0108 From Fixed Demand based Usage Charges	Revenue from charges based on a nominated/agreed demand basis	As per TREV0101	No	As per TREV0101	-

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Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ² ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TREV0109 From Variable Demand based Usage Charges	Demand based (per kW rate) usage charges from all loads customers.	As per TREV0101	No	As per TREV0101	-
TREV0110 Revenue from other Sources	Intra-regional residues and Inter-regional Settlement residues auction proceeds, net financial transfers per TREV0201, STPIS revenue per TREV0302, net security deposit from a Direct customer & net adjustments of network support pass through amounts and TUOS under/over collections	From AEMO settlement statements, issued TUOS invoices, AER STPIS letters, TUOS revenue reconciliations	No	Intra-regional residues and Inter-regional Settlement residues auction proceeds, net financial transfers per TREV0201, STPIS revenue per TREV0302, net security deposit from a Direct customer & net adjustments of network support pass through amounts and TUOS under/over collections	-
TREV0201 From Other connected transmission networks	Net of financial transfers to & from Ausgrid, Essential Energy and Directlink	As per TREV0101	No	As per TREV0101	-
TREV0202 From Distribution networks	Total amount charged to ActewAGL, Ausgrid, Essential Energy, Endeavour Energy less financial transfers in TREV0201 excluding Directlink transfers	As per TREV0101	No	As per TREV0101	-
TREV0203 From Directly connected end-users		As per TREV0101	No	As per TREV0101	-
TREV0204 From Generators	Total connection Entry charges for generators	As per TREV0101	No	As per TREV0101	-
TREV0205 Other revenue	As per TREV0110 less financial transfers per TREV0201	As per TREV0110	No	As per TREV0110 less financial transfers per TREV0201	-
TREV0301 EBSS	AER Approved EBSS revenue	Current regulatory determination	No	-	-
TREV0302 STPIS	AER Approved STPIS revenue	Approval letter from AER	No	-	-
TREV0303 Other	Any additional AER approved revenue for 'other' incentive schemes	-	No	-	-
TREV03 Total revenue of incentive schemes	Total of TREV0302, TREV0302 and TREV0303.	-	No	TREV0302 + TREV0302 + TREV0303.	-

Approved By (Group Manager): Warren Barat, Manager Customer Access & Planning

7.3 Worksheet 3 - Opex

Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ³ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TOPEX0101A Maintenance - Lines To TOPEX0113A Other Opex	As per Instruction and Definition provided	2010 to 2013 - Regulatory Accounts '2012-13 Historical Opex by Expenditure Category sheets' 2006 to 2009 - Regulatory Accounts '2008-09 Historical Opex by Expenditure Category sheets'	No	Prepared in accordance with the requirements of the audited regulatory accounts.	Figures should reconcile to the Regulatory accounts, with minor rounding difference resulting from using figures in \$M with 2 decimal pts. Other Opex includes Self Insurance and Network Support costs
TOPEX02 Long Services Leave	Heading row	-	-	-	-
TOPEX0201 The carrying amount at the beginning of the period To TOPEX0212 The carrying amount at the end of the period	As per Instruction and Definition provided	Statutory Accounts Employees' Accrued Benefits Provision with further details for "Long Service Leave" from Financial Accounting group	Yes	Prepared in accordance with the requirements of the AER's Electricity transmission network service providers Information guidelines (September 2007)	Each component of the total Statutory Accounts Provision (i.e. opening balance, closing balance and movements) was allocated between Opex and Capex based on the level of actual labour oncosts recognised in the Statutory Accounts. The Opex amounts were then allocated to the Transmission Service types based on the proportional level of actual labour oncosts recognised in the Statutory Accounts against each Transmission Service Type. This provided the basis for the Prescribed Opex Provision. The Capex amounts were allocated to the respective Transmission Service Types based on the proportion of capital expenditure incurred on the individual Transmission Service Types. This provided the basis for the Prescribed Capex Provision.
TOPEX03 Annual Leave	Heading row	-	-	-	-
TOPEX0301 The carrying amount at the beginning of the period To TOPEX0312 The carrying amount at the end of the period	As per Instruction and Definition provided	Statutory Accounts Employees' Accrued Benefits Provision with further details for "Annual Leave" from Financial Accounting group	Yes	As per TOPEX0201	As per TOPEX0201
TOPEX04 Workers' Compensation	Heading row	-	-	-	-
TOPEX0401 The carrying amount at the beginning of the period To	As per Instruction and Definition provided	Statutory Accounts – Net of Insurance Provision less Insurance Recovery Asset with further details from Financial Accounting group	Yes	As per TOPEX0201	As per TOPEX0201

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Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ³ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TOPEX0412 The carrying amount at the end of the period					
TOPEX05 Defined Benefits Scheme Superannuation	Heading row	-	-	-	-
TOPEX0501 The carrying amount at the beginning of the period To TOPEX0502 The carrying amount at the end of the period	As per Instruction and Definition provided	Statutory Accounts - Superannuation Provision	Yes	As per TOPEX0201	Figures derived from the Statutory Accounts – Superannuation Provision

Note to TOPEX02 to TOPEX05

Entities that operate in Australia are required to comply with general accounting conventions which include Australian Accounting Standards. Australian Accounting Standard AASB137 Provisions, Contingent Liabilities and Contingent Assets provides guidance on Provisions. The following are definitions from AASB 137:

- A liability is a present obligation of the entity arising from past events, the settlement of which is expected to result in an outflow from the entity of resources embodying economic benefits.
- A provision is a liability of uncertain timing or amount.

The concept of the provision is that it is a liability which is to be recognised in the Statement of Financial Position, formerly referred to as the balance sheet. The Statement of Financial Position does split liabilities and therefore provisions into current (expected to be incurred within 12 months of the reporting date) and Non Current (expected to be incurred in 12 months or longer of the reporting date). The concept of splitting a provision into operating and capital is inconsistent with AASB137.

For the purposes of the Economic Benchmarking RIN TransGrid had originally reported operating expenditure for employee entitlements based on cash costs paid, as it regards this expenditure as being the actual employee entitlement costs incurred by the organisation. However, for the purposes of complying with the Economic Benchmarking RIN, TransGrid has undertaken a split of the provision into operating and capital components.

Approved By (Group Manager): David van Beek, A/Manager Corporate & Management Accounting

7.4 Worksheet 4 - Assets (RAB)

Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ⁴ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TRAB0101 Opening Value To TRAB0107 Closing value for asset value	As per Instruction and Definition provided (Page 19 to 23)	Electricity Transmission Network Service Provider Roll Forward Model (RFM)	No, actual information	Prepared in accordance with the requirements of the AER Determination. This is the sum of all the "Asset Category" below. "As Commissioned" RAB used.	-
Overhead Transmission Assets TRAB0201 Opening Value To TRAB0207 Closing value for asset value	As per Instruction and Definition provided (Page 36)	Electricity Transmission Network Service Provider Roll Forward Model (RFM)	No, actual information	Prepared in accordance with the requirements of the AER Determination. "As Commissioned" RAB used. In the RFM, the categories that are noted as "Transmission Lines"	In the RFM, there are two categories in 2009-14 relating to TL and Cables: Trans Lines & Cables – Aug Trans Lines & Cables – Rep As "as commissioned" RAB is used, there is no cables commissioned as far in 2009-14, hence all values under TL& Cable are attributed to TL
Underground Transmission Assets TRAB0301 Opening Value To TRAB0307 Closing value for asset value	As per Instruction and Definition provided	Electricity Transmission Network Service Provider Roll Forward Model (RFM)	No, actual information	Prepared in accordance with the requirements of the AER Determination. "As Commissioned" RAB used In the RFM, the categories that are noted as "Underground Cables"	-
Transmission Switchyards, Substations TRAB0401 Opening Value To TRAB0407 Closing value for asset value Underground Transmission Assets	As per Instruction and Definition provided	Electricity Transmission Network Service Provider Roll Forward Model (RFM)	No, actual information	Prepared in accordance with the requirements of the AER Determination. "As Commissioned" RAB used In the RFM, the categories that are noted as "Substations including Buildings", "Substations – Augmentation". Substation – Replacement"	-
Easements TRAB0501 Opening Value To TRAB0507 Closing value for asset value Underground Transmission Assets	As per Instruction and Definition provided	Electricity Transmission Network Service Provider Roll Forward Model (RFM)	No, actual information	Prepared in accordance with the requirements of the AER Determination. "As Commissioned" RAB used In the RFM, the categories that are noted as "Land and Easements"	-
Other Assets with Long Lives TRAB0601 Opening Value To	As per Instruction and Definition provided	Electricity Transmission Network Service Provider Roll Forward Model (RFM)	No, actual information	Prepared in accordance with the requirements of the AER Determination. "As Commissioned" RAB used	-

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Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition"? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TRAB0607 Closing value for asset value Underground Transmission Assets				In the RFM, the categories that are noted as "SCADA and Communications", "SMHEA Assets", "Secondary Systems – Augmentation", "Secondary Systems – Replacement", "Communications – Augmentation", "Communications – Replacement", "Equity Raising Costs"	
Other Assets with Short Lives TRAB0701 Opening Value To TRAB0707 Closing value for asset value Underground Transmission Assets	As per Instruction and Definition provided	Electricity Transmission Network Service Provider Roll Forward Model (RFM)	No, actual information	Prepared in accordance with the requirements of the AER Determination. "As Commissioned" RAB used In the RFM, the categories that are noted as "Non-network Assets", "Business IT", "Support the Business – Minor Plant", "Motor Vehicles & Mobile Plant"	-
Total Disaggregated RAB asset values TRAB0801 Overhead transmission assets (wires and towers/poles etc) To TRAB0806 Other assets with short lives (please specify)	As per Instruction and Definition provided	Electricity Transmission Network Service Provider Roll Forward Model (RFM)	No, actual information	This is calculated as the average of the opening and closing RAB values for the Regulatory Year for each RAB Asset Category as per Page 22 of the Instruction.	-
Asset Lives – estimated service life of new assets TRAB0901 Overhead transmission assets To TRAB0905 Other assets with short lives	As per Instruction and Definition provided	Electricity Transmission Network Service Provider Roll Forward Model (RFM)	No, actual information	Calculation for Weighted Average Asset lives for each asset category, in accordance with Page 22 of the Instruction. Calculation Sheet attached.	-
Asset Lives – estimated residual service life TRAB1001 Overhead transmission assets To TRAB1005 Other assets with short lives	As per Instruction and Definition provided	Electricity Transmission Network Service Provider Roll Forward Model (RFM)	No, actual information	This is calculated using Opening Asset Value divided by depreciation for the year.	As depreciation is already weighted averaged, the residual service life is considered weighted averaged.

Approved By (Group Manager): David van Beek, A/Manager Corporate & Management Accounting

7.5 Worksheet 5 - Operational Data

Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ⁵ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TOPED0101 Energy Grouping by Downstream Connection Type: To other connected transmission networks	Energy supplied to transmission networks in adjacent NEM regions (ie flows related to interconnectors). In accordance with the first paragraph of the AER's instructions (5.1 Instructions on page 24) only exports have been considered (as these are flows being delivered by TransGrid's network) Flows to other transmission networks has been taken to be flows to adjacent NEM Regions. Flows to other transmission networks within the NSW region of the NEM (to networks owned by DNSPs) have been included in "Flows to Distribution Networks"	TransGrid's TUOS billing system	Yes The data are materially dependent on whether this category includes the parts of DNSPs' networks which serve a transmission function and are designated as transmission assets for pricing purposes. Actual information has been used, excluding DNSP assets that serve a transmission function from the calculation.	Data have been obtained from revenue or statistical 15 minute metering registrations. For each of the categories, those 15 minute data have been summated to obtain figures for each regulatory (financial) year Energy calculations involve spreadsheets which sum the 15 minute registrations for the relevant period(s) and make any adjustments to achieve the appropriate units of measurement (for example, dividing by 1,000 to convert from kWh to MWh) Energy flow to other TNSPs was found by summing up interconnector exports from Transgrid's network. These are at Jindera-Wodonga, Buronga Red Cliffs, and Murray – Dederang to Victoria and QNI to Queensland.	DNSP transmission assets are not included in this calculation. Rounded to nearest whole number
TOPED0102 Energy Grouping by Downstream Connection Type: To distribution networks	Energy supplied to the distribution networks has been taken to be the energy supplied to the distributors in NSW and the ACT, even though parts of Ausgrid's and Essential Energy's networks are considered to serve a transmission function	TransGrid's TUOS billing system	Yes As per TOPED0101	As per TOPED0101 This was calculated as follows; Native BSP loads minus embedded generation plus embedded generation that feed into Transgrid network. Industrials such as Tomago and Broken Hill mines are also included in this category in the Public Version, in accordance with the AER's Instructions.	As per TOPED0101
TOPED0103 to TOPED0105 Energy Grouping by Downstream Connection Type: To directly connected end-users	Energy supplied to customers directly connected via dedicated connections owned by third parties such as a DNSP. (excluding customers whose identity could be deduced from the voltage of supply – Reported in TOPED0102) Aggregated data for customers supplied at 132 kV has been provided. Those aggregated energy usage data cover Visy Gadara, Norske Skog, Cadia mine and North Parkes mine.	TransGrid's TUOS billing system	Yes The data are materially dependent on whether this category includes customers indirectly connected to TransGrid's network via dedicated feeders which are owned by third parties such as DNSPs. Actual information has been used, which includes some industrial customers that are indirectly connected via the	As per TOPED0101 This includes all industrials connected at 132 KV (ANM, Gadara, Cadia and North Parkes Mines)	Includes some industrials connected via dedicated feeders owned by DNSP's

⁵ 'Information presented in response to the Notice whose presentation is not Materially dependent on information recorded in the NSP's historical accounting records or other records used in the normal course of business, and whose presentation for the purposes of the Notice is contingent on judgments and assumptions for which there are valid alternatives, which could lead to a Materially different presentation in the response to the Notice.', page 34, "Economic benchmarking RIN For transmission network service providers, Instructions and Definitions".

Economic Benchmarking RIN Response - Basis of Preparation (Audited Information)



Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ⁶ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
			distribution network.		
TOPED0106 Pumping and Power Station Auxillaries	TransGrid has provided this additional variable (rounded to the nearest 100 GWh) to show the load attributable to Pumping and Power Stantion Auxilaries (refer to TOPED01)	TransGrid's TUOS billing system	Yes	This value is the difference between TOPED01 and the Sum of variables TOPED01 to TOPED05. The total figure may not sum due to rounding.	Pumping and Power Station Auxillary loads are the only residual loads remaining once all other loads have been accounted for.
TOPED01 Total energy transported	TransGrid's network also supplies other loads, such as pumps and power station auxiliaries. These have been included in the totals, but not provided separately, as the template does not make provision for that	TransGrid's TUOS billing system	Yes The data are materially dependent on whether this category is to include other loads such as pumps and power station auxiliaries. Actual information has been used, which includes pumps and power station auxiliaries. Therefore TOPED01 values exceed the sum of the three categories TOPED0101, TOPED0102 and TOPED0103.	The structure of "Table 5.1 Energy delivered" implies that the total energy supplied (TOPED01) is the sum of the three categories TOPED0101, TOPED0102 and TOPED0103. This is not the case for TransGrid's network which also supplies other loads such as pumps and power station auxiliaries. Consequently, the data are materially dependent on whether this category is to include those other loads or not.	The total includes the loads associated with pumps and power station auxiliaries. This is in addition to the energy quantities reported in TOPED0101 to TOPED0105
TOPED0101a To Other connected transmission networks (Imports + Exports)	TransGrid has provided this additional variable to report the value of TOPED0101 calculated on the alternative basis of Imports + Exports	TransGrid's TUOS billing system	Yes	TOPED0101 + Flows from other connected transmission networks	The Total Imports + Exports value has been provided to ensure that this figure is available should it be required.
TOPCP0101 - TOPCP0108 Number of entry points at each transmission voltage level (kV)	This variable is interpreted as each individual point of connection between an electricity producing customer (generator) and the TransGrid network. Interconnectors have been taken to be a generator. Due to missing data in 2006 and 2010, the statistics for these years have had to be interpolated	Based on customer connection data used to compile the annual Electricity Network Performance Report.	Yes Data was not available in a consistent format for 2006 and 2010. These have been estimated based on the preceding/following years	A list ofcustomer connection pointswascompiled from the annual Electricity Network Performance Report. Each connection points was identified as either a 'load' or a 'generator' on the basis of the customer type. The number of 'generator' connection points at each voltage level was summed to provide the number of entry points and the number of 'load' connection points was summed at each voltage level to provide the number of exit points	The connection point numbers in 2006 and 2010 are in accordance with the linear trend in the preceeding/followingyears
TOPCP0201 - TOPCP0208 Number of exit points at each transmission voltage level (kV)	This variable is interpreted as each individual point of connection between the TransGrid network and an electricity consuming customer (load). Where the point of connection is shared by a generator and load (E.g. a teed line), the line has been taken to be a load. Due to missing data in 2006 and 2010, the statistics for these years have had to be interpolated. Refer to Note on TOPCP0201 to	Based on customer connection data used to compile the annual Electricity Network Performance Report.	Yes As per TOPCP0101 - TOPCP0108	As per TOPCP0101 - TOPCP0108	As per TOPCP0101 - TOPCP0108

Economic Benchmarking RIN Response - Basis of Preparation (Audited Information)



Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ⁶ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
	TOPCP0208				
TOPSD0102 Transmission System coincident weather adjusted maximum demand 10% POE	As per AER definition on page 24 of Economic Benchmarking RIN For transmission network service providers.	TransGrid's TUOS billing system	Yes These are based on AEMO's weather and day-type correction models	TransGrid does not produce weather corrected maximum demands for to its transmission system. However, TransGrid has access to AEMO NEFR weather and day-type corrected historical summer and winter maximum demand series for the NSW Region. Based on the relationship between AEMO actual maximum demand series and TransGrid boundary raw actual series, historical weather corrected AEMO maximum demand series have been adjusted to compute an approximate weather and day type corrected corrected historical series for TransGrid's coincident maximum demand.	Assumed that the weather and day-type corrected historical series derived from AEMO weather and day-type correction models can be used to approximate weather and day-type corrected actuls for TransGrid's boundary. Reported to three significant figures
TOPSD0103 Transmission System coincident weather adjusted maximum demand 50% POE	As per AER definition on page 24 of Economic Benchmarking RIN For transmission network service providers.	TransGrid's TUOS billing system	Yes These are based on AEMO's weather and day-type correction models	TransGrid does not produce weather corrected maximum demands for to its transmission system. However, TransGrid has access to AEMO NEFR weather and day-type corrected historical summer and winter maximum demand series for the NSW Region. Based on the relationship between AEMO actual maximum demand series and TransGrid boundary raw actual series, historical weather corrected AEMO maximum demand series have been adjusted to compute an approximate weather and day type corrected corrected historical series for TransGrid's coincident maximum demand.	Assumed that the weather and day-type corrected historical series derived from AEMO weather and day-type correction models can be used to approximate weather and day-type corrected actuls for TransGrid's boundary. Reported to three significant figures
TOPSD0104 Transmission System non-coincident summated maximum demand	As per AER definition page 24.	TransGrid's TUOS billing system	Yes The data are materially dependent on whether this category is to include loads other than those in categories TOPED0101, TOPED0102 and TOPED0103 (e.g. pumps and power station auxiliaries)	Using template: 'Loads supplied from TG's network' S:\NPD\NPI\Bulk Supply Point Load Data\AER RINs	Reported to three significant figures
TOPSD0105 Transmission System non-coincident weather adjusted summated maximum demand 10% POE	-	-	Will Not Be Provided (In accordance with AER Guidelines)	As per TOPSD102	-
TOPSD0106 Transmission System non-coincident weather adjusted summated maximum demand 50% POE	-	-	Will Not Be Provided (In accordance with AER Guidelines)	As per TOPSD102	-
TOPSD0201 Transmission System coincident maximum	As per AER definition page 24.	Variables: TOPSD0101	Yes The data are materially dependent on	Divide Transmission System Coincident Maximum Demand (TOPSD0101) by Average Overall Network Power Factor Conversion	Accuracy is limited by the uncertainty inherent in the calculation of the average power factor.

Economic Benchmarking RIN Response - Basis of Preparation (Audited Information)



Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ⁶ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
demand		TOPSD0301	how the data in MW are "translated" to data in MVA	between MVA and MW (TOPSD0301).	
TOPSD0202 Transmission System coincident weather adjusted maximum demand 10% POE	-	- Variables: TOPSD0102 TOPSD0301	Yes The data are materially dependent on how the data in MW are "translated" to data in MVA Refer to note below	Divide Transmission System Coincident Maximum Demand 10%POE(TOPSD0102) by Average Overall Network Power Factor Conversion between MVA and MW (TOPSD0301	Accuracy is limited by the uncertainty inherent in the calculation of the average power factor.
TOPSD0203 Transmission System coincident weather adjusted maximum demand 50% POE	-	- Variables: TOPSD0103 TOPSD0301	Yes The data are materially dependent on how the data in MW are "translated" to data in MVA	Divide Transmission System Coincident Maximum Demand 50% POE (TOPSD0103) by Average Overall Network Power Factor Conversion between MVA and MW (TOPSD0301	Accuracy is limited by the uncertainty inherent in the calculation of the average power factor.
TOPSD0204 Transmission System non-coincident summated maximum demand	As per AER definition page 24.	Variables: TOPSD0104 TOPSD0301	Yes The data are materially dependent on how the data in MW are "translated" to data in MVA	Divide Transmission System non-coincident weather summated maximum demand (TOPSD0104) by Average Overall Network Power Factor Conversion between MVA and MW TOPSD0301.	Accuracy is limited by the uncertainty inherent in the calculation of the average power factor.
TOPSD0205 Transmission System non-coincident weather adjusted summated maximum demand 10% POE	-	-	Will Not Be Provided (In accordance with AER Guidelines)	As per TOPSD102	-
TOPSD0206 Transmission System non-coincident weather adjusted summated maximum demand 50% POE	-	-	Will Not Be Provided (In accordance with AER Guidelines)	As per TOPSD102	-
TOPSD0301 Average overall network power factor conversion between MVA and MW	As per AER definition on page 24.	TransGrid's TUOS billing system	Yes These data are not particularly meaningful and consequently are not routinely calculated. The values are dependent on the method used to estimate them.	TransGrid does not collect data to derive network wide power factors. However, there is data collected for reactive loading at some (but not all) bulk supply points. This data has been used to develop a broad approximation of system wide power factors. Refer to 'Note to TOPSD0301 to TOPSD0308'	Refer to 'Note to TOPSD0301 to TOPSD0308'
TOPSD0302 Average power factor conversion for 500 kV lines	As TOPSD0301	TransGrid's TUOS billing system	Yes As Per TOPSD301	As Per TOPSD301	As TOPSD0301
TOPSD0303 Average power factor conversion for 330 kV lines	As TOPSD0301	TransGrid's TUOS billing system	Yes As Per TOPSD301	As Per TOPSD301	As TOPSD0301

Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ⁶ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TOPSD0304 Average power factor conversion for 275 kV lines	As TOPSD0301	TransGrid's TUOS billing system	Yes As Per TOPSD301	As Per TOPSD301	As TOPSD0301
TOPSD0305 Average power factor conversion for 220 kV lines	As TOPSD0301	TransGrid's TUOS billing system	Yes As Per TOPSD301	As Per TOPSD301	As TOPSD0301
TOPSD0306 Average power factor conversion for 132 kV lines	As TOPSD0301	TransGrid's TUOS billing system	Yes As Per TOPSD301	As Per TOPSD301	As TOPSD0301
TOPSD0307 Average power factor conversion for 66 kV lines	As TOPSD0301	TransGrid's TUOS billing system	Yes As Per TOPSD301	As Per TOPSD301	As TOPSD0301 TransGrid no longer has any 66kV lines.
TOPSD0308 Average power factor conversion for 33 kV lines	As TOPSD0301	TransGrid's TUOS billing system	Yes TransGrid does NOT have any 33kV lines, but there is no provision to black out cells of this colour.	As Per TOPSD301	TransGrid does not have any 33kV lines but is required to provide meaningful entries for this variable. Therefore the system average has been included.
TOPSD0308 Average power factor conversion for 33 kV lines	As TOPSD0301	TransGrid's TUOS billing system	Yes TransGrid does NOT have any 33kV lines, but there is no provision to black out cells of this colour.	As Per TOPSD301	TransGrid does not have any 33kV lines but is required to provide meaningful entries for this variable. Therefore the system average has been included.

Note to TOPSD0301 to TOPSD0308 & TOPSD0201

The nature of transmission systems is that they are “better” at transmitting real power (MW) than reactive power (MVar)⁶. Consequently, reactive power needs are met on a more local basis, rather than a network wide basis. This involves the installation of reactive plant (such as shunt capacitors, shunt reactors, statcoms and static VAr compensators) at strategic locations, as well as utilisation of the reactive generation/absorption capability of generators. In some circumstances reactive plant may be installed in “downstream” networks, rather than at bulk supply points, if there is also a need to manage reactive power loadings within those networks.

As network wide reactive loads and their derivative network wide power factors, are not particularly meaningful, TransGrid does not collect data to derive them. However, TransGrid does have reactive loading data for some (but not all) bulk supply points. Those data have been used to develop a broad approximation of system wide power factors. This has been done by:

- Deriving the real and reactive power loads for individual bulk supply points where data are available and usable⁷ at the time of the summer and winter maximum demand for that bulk supply point; and
- Summating those individual bulk supply point maximum demands to derive undiversified (non-coincident) total summer and winter maximum demands and the associated power factors.

The reported quantities are the power factor for the season in which the maximum real power demand was the highest. As they are only very broad estimates, the figures are given to two only significant figures (to avoid a false sense of precision).

⁶

This stems from the fact that the reactance of transmission lines and transformers is typically several (to many) times greater than their resistance. This leads to the voltage drops associated with reactive power flows through those network elements being commensurately higher than those associated with real power flows. Consequently, it is much more difficult to meet reactive power needs from “remote” locations than is the case for real power needs. This leads to reactive power needs being met on a “more local” basis.

⁷

At some locations the meters measure the real and reactive power flows on the customers lines supplied from the bulk supply point. In these cases, calculations are straight forward. At other locations, the meters measure the real and reactive power flows in the transformers at the bulk supply point. In these cases the reactive power flows are affected by any reactive plant connected to the low voltage busbar. Where reactive plant is also installed within the customer's networks, it is sometimes not possible to identify, and adjust for, the impact of TransGrid's reactive plant. Where this is the case, the particular bulk supply points have been excluded from the calculations.

The summer and winter maximum real and corresponding reactive power loads at the individual bulk supply points are derived from revenue⁸ and in some cases statistical metering data. Generally, the statistical metering uses the same class of metering instruments (current transformers, voltage transformers and meters) as the revenue metering at that site.

Summer has been taken to be late November to early March and winter May to August. Generally, winter maximum demands are more likely to occur in July and August than in May or June. Consequently, the power factors reported correspond to either the winter in which the regulatory (financial) year commences or the following summer, whichever has the higher real power maximum demand.

TransGrid's bulk supply points provide supply at a number of voltages (between 11 kV and 330 kV) with supply from most being at 66 kV or below. Also, those supplies are at what can be considered to be the "edges" of TransGrid's network. Thus power factor data at bulk supply points do not necessarily provide any meaningful information about the power factors of flows on transmission lines, operating at particular voltages, within TransGrid's network. Consequently, the power factors for the categories of transmission lines have been taken to be the same as those (broadly) estimated for the overall network. As TransGrid does not have any 66 kV or 33 kV lines, there are no applicable entries for those lines in Table 5.3.3. However, as there is no provision for those cells to be blacked out (they are not shaded orange or blue) figures have been provided even though they do not apply.

Note to TOPCP0201 to TOPCP0208

In preparing the Economic Benchmarking RIN Response, some discrepancies in the historical classification of connection points in the Energy Network Providers Report were identified which were corrected for the preparation of the Economic Benchmarking RIN. These related to some connection points had been counted inconsistently as individual points rather than a single connection point to a customer busbar, and also some circuits between TransGrid busbars had been inadvertently counted. The magnitude of these discrepancies ranged from -3 to 10 exit points between the Economic Benchmarking RIN figures and the historical ENPR figures between 2010 and 2013. We note that this equates to a variance of between 0.2% and 2.2% in any year.

For the avoidance of any doubt, TransGrid notes that the definition of a connection point in the NER is ambiguous, which contributes to an inconsistency of application. Connection point data used by TransGrid for pricing purposes is different to that used for RIN reporting. As a result, the historical discrepancy in reporting of connection points on the basis of the physical network configuration has no impact on TransGrid's pricing

Approved By (Group Manager): Mal Coble, Manager Network Support & Consultations (All variables except TOPCP0101 - TOPCP0108 & TOPCP0201 - TOPCP0208 and Audit Ammendments to TOPSD0102-TOPSD0103, TOPSD0202-TOPSD0203, TOPED0106 and TOPED0101a)

Approved By EGM Network Planning & Performance: Stephen Clark (Audit Ammendments to TOPSD0102-TOPSD0103, TOPSD0202-TOPSD0203, TOPED0106 and TOPED0101a)

Approved By (Group Manager): Steve Jones, Manager Asset Performance (TOPCP0101 - TOPCP0108 & TOPCP0201 - TOPCP0208)

⁸ The accuracy requirements for revenue metering installations are specified in the National Electricity Rules.

7.6 Worksheet 6 - Physical Assets

Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ⁹ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TPA0101 to TPA0108 Overhead network length of circuit at each voltage	Overhead line total length operating at each voltage. Lines are reported at their operating voltage, although they may be constructed suitable for operation at a higher voltage. TransGrid has not operated Transmission Line assets at 275kV, 33kV or lower than 33kV between 2005/06 and 2012/13	Electrical Data Book NSW Transmission System and TransGrid Asset Management Information System (TAMIS)	No	All line information relevant to TransGrid was downloaded from Electrical Data Books and put into Excel. This was used to determine the date on which all lines were energised. This file was used for all voltage classes. Available Line data was sourced from TransGrid's Asset Management Information System (TAMIS) and compared to Electrical data Books.	No assumptions were made in calculations as the asset is static
TPA0201 to TPA0208 Underground cable circuit length at each voltage	Underground cable circuit length at each voltage. TransGrid has not operated Underground Cable assets at 500kV, 275kV, 220 kV, 66kV, 33kV or lower than 33kV between 2005/06 and 2012/13	Electrical Data Book NSW Transmission System and TransGrid Asset Management Information System (TAMIS)	No	All line information relevant to TransGrid was downloaded from Electrical Data Books and put into Excel. This was used to determine the date on which all lines were energised. This file was used for all voltage classes. Available Line data was sourced from TransGrid's Asset Management Information System (TAMIS) and compared to Electrical data Books.	No assumptions were made in calculations as the asset is static
TPA0301 to TPA0308 Estimated overhead network weighted average MVA capacity by voltage class	This variable is interpreted as the sum of all {peak transmission circuit capacity * relevant circuit lengths} for all circuits at each voltage level , divided by the total circuit length for that voltage level TransGrid has not operated Transmission Line assets at 275kV, 33kV or lower than 33kV between 2005/06 and 2012/13	Uses other calculated value: TPA0101 to TPA0108 TransGrid Operating Manuals: OM304 Ratings of Main Grid Circuits - OM305 Ratings of Subsystem Circuits In Northern Region - OM 306 - Ratings Of Subsystem Circuits In Central Region - OM307 - Ratings of Subsystem Circuits In Southern Region AEMO Price and Demand data files	No	AEMO NSW price/demand data (30 minute) was used to determine the time of maximum demand for each FY. Line ratings vary on time of year and time of day, this AEMO data was used to determine which rating to use. The version of OM304, OM305, OM306 or OM307 that was current at the time of maximum demand was obtained. The "Normal MVA" ratings applicable for the time of maximum demand for each line were entered into a spreadsheet. The spreadsheet multiplied the rating with the length of the line (obtained as part of the TPA0101 to TPA0108 calculation) to give a MVA.km value. The sum of the MVA.km values was then divided by the determined kilometres for the voltage class in TPA0101 to TPA0108	Constrained values are included where applicable. E.g. A line rating may be constrained by terminal equipment (such as CT's, wavetraps, etc). In this case the constrained value will be entered, not the line rating Where the ratings are dependant on the loadflow direction, the most likely direction will be shown. This is based on: - Load will be going away from Generator sites - Load is assumed to flow from the higher voltage site, or site closest to the higher voltage network. Where a new line is commissioned or altered after the maximum demand event occurs, the rating shown will be the appropriate season's rating at the end of the financial year. This is so the numbers line up with the annual reports.
TPA0401 to TPA0408 Estimated underground network weighted average MVA capacity by voltage class	This variable is interpreted as the sum of all {peak transmission circuit capacity * relevant circuit lengths} for all underground circuits at each voltage level, divided by the total underground circuit lengths at that	TransGrid Operating Manual OM304 Ratings of Main Grid Circuits TransGrid Data book AEMO Price and Demand data files (from public	No	AEMO NSW price/demand data (30 minute) was used to determine the time of maximum demand for each FY. This file was used for all voltage classes. The version of OM304 that was current at the	It is assumed that the AER require Cyclic rating for underground cables. The only 132kV cables classified as a circuit (CB at each end) at Wallerawang on the Transformers. The cable rating was assumed equal to the Transformer.

⁹ 'Information presented in response to the Notice whose presentation is not Materially dependent on information recorded in the NSP's historical accounting records or other records used in the normal course of business, and whose presentation for the purposes of the Notice is contingent on judgments and assumptions for which there are valid alternatives, which could lead to a Materially different presentation in the response to the Notice.', **page 34, "Economic benchmarking RIN For transmission network service providers, Instructions and Definitions"**.

Economic Benchmarking RIN Response - Basis of Preparation (Audited Information)



Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ⁹ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
	voltage level TransGrid has not operated Underground Cable assets at 500kV, 275kV, 220kV, 66kV, 33kV or lower than 33kV between 2005/06 and 2012/13	website)		time of maximum demand was obtained. The normal cyclic rating was multiplied by the length of the circuit to give an MVA.km value. The sum of the MVA.km values was then divided by the determined kilometres for the voltage class TPA0202 to TPA208 to determine a weighted average MVA. The only 132kV cables classified as a circuit (CB at each end) are at Wallerawang on the Transformers. The cable rating was assumed equal to the Transformer	
TPA0501 Transmission substations (eg 500 kV to 330 kV)	These were taken to be the sum of nameplate capacities of transformers with a primary winding voltage rating of 220 kV and above. This was based on the assumption that the transformers are used in a transmission substation that supplies a subtransmission network.	Ellipse: Equipment Register Tracing Data Nameplate Data System operating diagrams and amendments GM AS S1 009 and amendments – In-Service and Spare Power Transformers and Reactors Equipment Manuals	No.	1. Create valid list A valid list of transformers current at January 2014 was compiled. Non current records were filtered from the equipment register data and reviewed to remove a small number of errors. Spares were separately identified by using 'ACTIVE_FLG' 2. Process capacity values and crosscheck Nameplate ratings for each transformer was processed to a simple list form and this was then linked to the equipment register on equipment identifier and ratings reviewed and possible errors checked using operating diagram amendments. 3. Trace each year's data Tracing data was used to identify transformers in service for each financial year in the required range using the January 2014 information as the base. System spares were cross checked using amendments of GM AS S1 009.	When relocations were known to have happened. it was assumed that transformers were moved at the end of a financial year and for a replacement, no overlap was shown. Spare transformers temporarily connected to facilitate project staging were considered as remaining as spares. The quoted year is assumed to be the second year of a financial year period – eg: 2006 = 2005/2006. A frequency injection transformer located at Forbes (Asset ID: COSFB24K) was omitted. Its only function is for the injection of the DNSP ripple control into the network.
TPA0502 Terminal points to DNSP systems	Transformers with a primary voltage rating of 132 kV were assumed to fall into this category unless they were used for direct customer supply (see below). In the TransGrid network these transformers are generally installed in rural substations used to supply a DNSP distribution level network.	As for TPA0501	No	As for TPA0501	As for TPA0501
TPA0503 Transformer capacity for directly connected end-users owned by the TNSP	Transformers used to supply direct customers exclusively. Owned by TransGrid. One transformer (Equipment reference SWSGAD1A2) was identified that falls into this category.	As for TPA0501 Information from Customer Access files and Connection Agreements	No	As for TPA0501 Used to identify direct customer connected transformers	As for TPA0501

Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ⁹ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TPA0504 Transformer capacity for directly connected end-users owned by the end-user	Transformers used to supply direct customers exclusively. Owned by the customer	As for TPA0501 Information from Customer Access files and Connection Agreements	No	As for TPA0501 Used to identify direct customer connected transformers. Operating diagrams were also used to obtain transformer ratings.	As for TPA0501
TPA0505 Interconnector capacity	These were taken to be transformers used to directly connect interstate. None were identified.	As for TPA0501	No	As for TPA0501	As for TPA0501
TPA0506 Dedicated SVC transformers	SVC transformers are provided to connect SVCs to the network. They do not fit into the other provided categories	As for TPA0501	No	As for TPA0501	As for TPA0501
TPA06 Cold Spare capacity	Transformers that are not connected to the network and are used as spares to cover against possible failure.	As for TPA0501	No	As for TPA0501	As for TPA0501

Approved By (Group Manager): Steve Jones, Manager Asset Performance

7.7 Worksheet 7 - Quality of Services

Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ¹⁰ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TQS0101 Line outage rate - fault	TQS0102 / TQS0103	RIN variables TQS0102 and TQS0103	No.	Number of Line Fault Outages (TQS0102) in the year divided by the Number of Defined Lines (TQS0103)	-
TQS0102 Number of line fault outages	This variable is interpreted as the total number of instantaneous outages (fault outages as defined by the AER) on circuits owned by TransGrid at 66kV and above. This measure has excluded outages (as defined in V4 of the AER STPIS) removed from the count.	2009-2013 data: Based on data extracted from the organisations outage recording/reporting system (THEOS) on transmission lines and underground cables. 2006-2008 data: Based on data extracted from a database containing historical outage entries (TOS) on transmission lines and underground cables.	No.	The values for this variable were obtained by: 1. Extracting the data from the original data sources (THEOS and TOS, for 2009-2013 and 2006-2008 data respectively). 2. Filtering the data to only outages that meet the definition of the V4 of the AER STPIS. 3. Summing the number of fault outages.	-
TQS0103 Number of defined lines	This variable is interpreted as the total number (three phase equivalent) of circuits owned by TransGrid at 66kV and above. This measure is an average number over twelve months in a calendar year for the 2009-2013 years (because this was the definition used to calculate performance parameters for past STPIS submissions). For 2006-2008 years, this is the total number of lines at year end, because monthly data is unavailable for these years. A non tee'd line (i.e. one connecting between exactly two substations) contributes one count to this parameter. A tee'd line (i.e. one connecting between multiple substations) contributes the following count to this parameter: {No. of line segments connecting from bus to bus} + {No. of line segments connecting from a tee-point to a bus} where: a) There is no overlap between line segments connecting between bus to bus, and tee point to bus; and b) Any line segment connecting from bus to bus shall not be broken down into multiple line segments connecting from tee point to bus. This is the definition of the number of defined lines which has been used in past	2009-2013 data: Based on data used for the 2009-2013 AER STPIS submissions (stored in the THEOS PC Stats database) 2006-2008 data: Based on data provided by relevant asset managers. This data was also used to compile publicly available reports (Network Management Plan and Annual Report)	No.	For 2009-2013 data, this is calculated as the average of the number of lines across the months of any given year (including both overhead transmission lines and underground cables). For 2006-2008 data, the data was reviewed to obtain a consistent definition with the 2009-2013 data.	-

¹⁰ 'Information presented in response to the Notice whose presentation is not Materially dependent on information recorded in the NSP's historical accounting records or other records used in the normal course of business, and whose presentation for the purposes of the Notice is contingent on judgments and assumptions for which there are valid alternatives, which could lead to a Materially different presentation in the response to the Notice.', page 34, "Economic benchmarking RIN For transmission network service providers, Instructions and Definitions".

Economic Benchmarking RIN Response - Basis of Preparation (Audited Information)



Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ¹⁰ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
	STPIS submissions.				
TQS0104 Transformer outage rate - fault	TQS0105 / TQS0106	RIN variables TQS0105 and TQS0106	No.	Number of Transformer Fault Outages (TQS0105) in the year divided by the Number of Defined Transformers (TQS0106)	-
TQS0105 Number of transformer fault outages	This variable is interpreted as the total number of instantaneous outages (fault outages as defined by the AER) on transformers owned by TransGrid with a primary side voltage of 66kV and above. This measure has excluded outages (as defined in V4 of the AER STPIS) removed from the count.	2009-2013 data: Based on data extracted from the organisations outage recording/reporting system (THEOS) on transformers. 2006-2008 data: Based on data extracted from a database containing historical outage entries (TOS) on transformers..	No.	The values for this variable were obtained by: 1. Extracting the data from the original data sources (THEOS and TOS, for 2009-2013 and 2006-2008 data respectively). 2. Filtering the data to only outages that meet the definition of the V4 of the AER STPIS. 3. Summing the number of fault outages.	-
TQS0106 Number of defined transformers	This variable is interpreted as the total number (three phase equivalent) of transformers owned by TransGrid with a primary side voltage of 66kV and above. This measure is an average number over twelve months in a calendar year for the 2009-2013 years (because this was the definition used to calculate performance parameters for past STPIS submissions). For 2006-2008 years, this is the total number of transformers at year end, because monthly data is unavailable for these years.	2009-2013 data: Based on data used for the in 2009-2013 AER STPIS submissions (stored in the THEOS PC Stats database) 2006-2008 data: Based on data provided by relevant asset managers. This data was also used to compile publicly available reports (Network Management Plan and Annual Report)	No.	For 2009-2013 data, this is calculated as the average of the number of transformers across the months of any given year. For 2006-2008 data, the data was reviewed to obtain a consistent definition with the 2009-2013 data.	-
TQS0107 Reactive plant outage rate - fault	TQS0108 / TQS0109	RIN variables TQS0108 and TQS0109	No.	Number of Reactive Plant Fault Outages (TQS0108) in the year divided by the Number of Defined Reactive Plant (TQS0109)	-
TQS0108 Number of reactive plant fault outages	This variable is interpreted as the total number of instantaneous outages (fault outages as defined by the AER) on reactors and capacitors at 66kV and above, and static var compensators (svc) at all voltages, owned by TransGrid. This measure has excluded outages (as defined in V4 of the AER STPIS) removed from the count.	2009-2013 data: Based on data extracted from the organisations outage recording/reporting system (THEOS) on reactive plant. 2006-2008 data: Based on data extracted from a database containing historical outage entries (TOS) on reactive plant.	No.	1. Extracting the data from the original data sources (THEOS and TOS, for 2009-2013 and 2006-2008 data respectively). 2. Filtering the data to only outages that meet the definition of the V4 of the AER STPIS. 3. Summing the number of fault outages.	-
TQS0109 Number of defined reactive plant	This variable is interpreted as the total number (three phase equivalent) of reactors and capacitors at 66kV and above, and static var compensators (svc) at all voltages, owned by TransGrid. This measure is an average number over twelve months in a calendar year for the 2009-2013 years (because this was the definition	2009-2013 data: Based on data used for the 2009-2013 AER STPIS submissions (stored in the THEOS PC Stats Database) 2006-2008 data: Based on data provided by relevant asset	No.	For 2009-2013 data, this is calculated as the average of the number of reactive plant items across the months of any given year. For 2006-2008 data, the data was reviewed to obtain a consistent definition with the 2009-2013	-

Economic Benchmarking RIN Response - Basis of Preparation (Audited Information)



Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ¹⁰ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
	used to calculate performance parameters for past STPIS submissions). For 2006-2008 years, this is the total number of reactive plant at year end, because monthly data is unavailable for these years..	managers. This data was also used to compile publicly available reports (Network Management Plan and Annual Report)		data.	
TQS0110 Line outage rate – forced outage	TQS0111 / TQS0103	RIN variables TQS0111 and TQS0103	Yes. Historically there has been no requirement to measure outages with less than 24 hours notice. There has only been a requirement to measure outages with less than 1 hours notice. Also, TransGrid has measured outages with less than 96 hours notice. Therefore in the absence of better data, this measure is an estimate based on these two classes of outages.	Number of Line Forced Outages (TQS0111) in the year divided by the Number of Defined Lines (TQS0103)	Typically very few Short Notice outages (less than 96 hours notice) have greater than 24 hours notice. Therefore it has been assumed for this parameter that less than 24 hours notice has been given for all Short Notice outages.
TQS0111 Number of line forced outages	This variable is interpreted as the total number of outages that are not instantaneous, however less than 24 hours notice is given to the customer and/or AEMO (forced outages as defined by the AER) on circuits owned by TransGrid at 66kV and above. This measure has excluded outages (as defined in V4 of the AER STPIS) removed from the count.	2009-2013 data: Based on data extracted from the organisations outage recording/reporting system (THEOS) on transmission lines and underground cables. 2006-2008 data: Based on data extracted from a database containing historical outage entries (TOS) on transmission lines and underground cables.	Yes. Historically there has been no requirement to measure outages with less than 24 hours notice. There has only been a requirement to measure outages with less than 1 hours notice. Also, TransGrid has measured outages with less than 96 hours notice. Therefore in the absence of better data, this measure is an estimate based on these two classes of outages.	The values for this variable were obtained by: 1. Extracting the data from the original data sources (THEOS and TOS, for 2009-2013 and 2006-2008 data respectively). 2. Filtering the data to only outages that meet the definition of the V4 of the AER STPIS. 3. Summing the number of forced outages. The data is based on outages with less than 1 hour (Emergency) and 96 hours notice (Short Notice).	Typically very few Short Notice outages (less than 96 hours notice) have greater than 24 hours notice. Therefore it has been assumed for this parameter that less than 24 hours notice has been given for all Short Notice outages.
TQS0112 Transformer outage rate – forced outage	TQS0113 / TQS0106	RIN variables TQS0113 and TQS0106	Yes. Historically there has been no requirement to measure outages with less than 24 hours notice. There has only been a requirement to measure outages with less than 1 hours notice. Also, TransGrid has measured outages with less than 96 hours notice. Therefore in the absence of better data, this measure is an estimate based on these two classes of outages.	Number of Transformer Forced Outages (TQS0113) in the year divided by the Number of Defined Transformers (TQS0106)	Typically very few Short Notice outages (less than 96 hours notice) have greater than 24 hours notice. Therefore it has been assumed for this parameter that less than 24 hours notice has been given for all Short Notice outages.
TQS0113 Number of transformer forced outages	This variable is interpreted as the total number of outages that are not instantaneous, however less than 24 hours notice is given to the customer and/or AEMO (forced outages as defined by the AER) on transformers owned by TransGrid with a primary side voltage of 66kV and above. This measure has excluded outages (as defined in V4 of the AER STPIS) removed from the count.	2009-2013 data: Based on data extracted from the organisations outage recording/reporting system (THEOS) on transformers. 2006-2008 data: Based on data extracted from a database containing historical outage entries (TOS) on transformers..	Yes. Historically there has been no requirement to measure outages with less than 24 hours notice. There has only been a requirement to measure outages with less than 1 hours notice. Also, TransGrid has measured outages with less than 96 hours notice. Therefore in the absence of better data, this measure is an estimate based on these two classes of outages.	The values for this variable were obtained by: 1. Extracting the data from the original data sources (THEOS and TOS, for 2009-2013 and 2006-2008 data respectively). 2. Filtering the data to only outages that meet the definition of the V4 of the AER STPIS. 3. Summing the number of forced outages. The data is based on outages with less than 1 hour (Emergency) and 96 hours notice (Short Notice).	Typically very few Short Notice outages (less than 96 hours notice) have greater than 24 hours notice. Therefore it has been assumed for this parameter that less than 24 hours notice has been given for all Short Notice outages.

Economic Benchmarking RIN Response - Basis of Preparation (Audited Information)



Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ¹⁰ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TQS0114 Reactive plant outage rate – forced outage	TQS0115 / TQS0109	RIN variables TQS0115 and TQS0109	Yes. Historically there has been no requirement to measure outages with less than 24 hours notice. There has only been a requirement to measure outages with less than 1 hours notice. Also, TransGrid has measured outages with less than 96 hours notice. Therefore in the absence of better data, this measure is an estimate based on these two classes of outages.	Number of Reactive Plant Forced Outages (TQS0115) in the year divided by the Number of Defined Reactive Plant (TQS0109)	Typically very few Short Notice outages (less than 96 hours notice) have greater than 24 hours notice. Therefore it has been assumed for this parameter that less than 24 hours notice has been given for all Short Notice outages.
TQS0115 Number of reactive plant forced outages	This variable is interpreted as the total number of outages that are not instantaneous, however less than 24 hours notice is given to the customer and/or AEMO (forced outages as defined by the AER) on reactors and capacitors at 66kV and above, and static var compensators (svc) at all voltages, owned by TransGrid. This measure has excluded outages (as defined in V4 of the AER STPIS) removed from the count.	2009-2013 data: Based on data extracted from the organisations outage recording/reporting system (THEOS) on reactive plant. 2006-2008 data: Based on data extracted from a database containing historical outage entries (TOS) on reactive plant.	Yes. Historically there has been no requirement to measure outages with less than 24 hours notice. There has only been a requirement to measure outages with less than 1 hours notice. Also, TransGrid has measured outages with less than 96 hours notice. Therefore in the absence of better data, this measure is an estimate based on these two classes of outages.	The values for this variable were obtained by: 1. Extracting the data from the original data sources (THEOS and TOS, for 2009-2013 and 2006-2008 data respectively). 2. Filtering the data to only outages that meet the definition of the V4 of the AER STPIS. 3. Summing the number of forced outages. The data is based on outages with less than 1 hour (Emergency) and 96 hours notice (Short Notice).	Typically very few Short Notice outages (less than 96 hours notice) have greater than 24 hours notice. Therefore it has been assumed for this parameter that less than 24 hours notice has been given for all Short Notice outages.
TQS0116 Number of events greater than 0.05 system minutes per annum	This is taken to be the number of unplanned outages in a given year entailing a loss of supply of greater than 0.05 system minutes, subtracting any applicable exclusions as defined by the AER STPIS V4. For 2013, this is the number of such events submitted by TransGrid to the AER (yet to be assessed by the AER), and for 2009-2012 it is the number of such events approved by the AER following their assessment of the submission from TransGrid. For 2006-2008 it is the number of such events recorded by TransGrid.	For 2009-2012 data, AER Service Standards Compliance Reports from their website: www.aer.gov.au . For the 2013 data, the submission email sent to the AER from TransGrid on 24/01/2014.	No, this variable was determined from the sources mentioned in the relevant columns. It is considered actual data.	The values for this variable (i.e. the count of the relevant number of events) are recorded directly in AER data source from which they're retrieved.	Accuracy of the record data sources maintained by TransGrid and AER. Data values from both sources agree.
TQS0117 Number of events greater than 0.25 system minutes per annum	This is taken to be the number of unplanned outages in a given year entailing a loss of supply of greater than 0.25 system minutes, subtracting any applicable exclusions as defined by the AER STPIS V4. For 2013, this is the number of such events submitted by TransGrid to the AER (yet to be assessed by the AER), and for 2009-2012 it is the number of such events approved by the AER following their assessment of the submission from TransGrid. For 2006-2008 it is the number of such events recorded by TransGrid (these match the historical figures used to set values in TransGrid's 2009	For 2010-2012 data, AER Service Standards Compliance Reports from their website: www.aer.gov.au . For the 2013 data, the submission email sent to the AER from TransGrid on 24/01/2014.	No, this variable was determined from the sources mentioned in the relevant columns. It is considered actual data.	The values for this variable (i.e. the count of the relevant number of events) are recorded directly in AER data source from which they're retrieved.	Accuracy of the record data sources maintained by TransGrid and AER. Data values from both sources agree for years 2010-2012. In the first half of 2009, a different STPIS performance measure was used and recorded by the AER (events >0.4 system minutes), hence for that year (and earlier) we rely exclusively on TransGrid's data source.

Economic Benchmarking RIN Response - Basis of Preparation (Audited Information)



Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ¹⁰ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
	revenue proposal).				
TQS0118 Average Outage Duration (minutes)	This is taken to be the average duration in minutes of all unplanned outages in a given year involving a loss of supply, which are not excluded (as defined by the AER STPIS V4).	The "ENS Lost Load" table within the THEOS PC Stats.mdb database stored on TransGrid's shared drive (with secure access for only Network Performance staff).	No, this variable was determined from the sources mentioned in the relevant columns. It is considered actual data.	The value was calculated by averaging all the loss of supply duration values across all non-excluded unplanned outages that resulted in a loss of supply.	Alignment of the record data source maintained by TransGrid with the AER definition.
TQS0119 Failure of protection system	Number of events in a given year where the protection system does not operate for a fault or operates where there is no fault. This interpretation of 'protection system failure' covers both scenarios where the failure is induced by defective equipment forming part of the system, or human error causing the mal-operation of the protection system.	Past QAPR (Quarterly Asset Performance Reviews) reports, which are generated from data in the THEOS PC Stats.mdb database. Opslog - the business application used to store operator logs. THEOS - the business application used to store outage data.	Yes, this variable is considered an estimate because while it is based on actual data, there are a proportionally small number of instances where it isn't possible to determine with reasonable confidence as to whether an outage is due to a protection failure or not (due to lack of information in the records), so these were assumed not to be protection failures, justified by the fact that the vast majority of unplanned outages are not due to protection failures.	This value was calculated by going through all unplanned outages in the "QAPR Comment on Outage" table from THEOS PC Stats and classifying each individual outage according to whether or not it is due to the failure of a protection system. The total number of unplanned outages classified as due to protection system failures are then added up for any given year. In classifying these outages, data from the Past QAPR reports, Opslog and THEOS were sometimes used.	Alignment of the record data source maintained by TransGrid with the AER definition. Where insufficient records/information was kept to determine with reasonable confidence whether or not a given outage was a protection failure, it was assumed not to be a protection failure (justified by the fact that the vast majority of unplanned outages are not protection failures). A 'protection system' is defined as any equipment, cabling, hardware on a protection panel, and also all protection cabling and hardware connecting to that panel, up until where the said cabling terminates into a device that forms part of HV plant (e.g. CT/VT, Bucholz relay etc.). If the fault or failure is in that device that forms part of the HV plant (e.g. VT fuses/terminals), that is not deemed to be a protection failure.
TQS0120 Material failure of SCADA system	The number of TransGrid SCADA outage events advised by AEMO to TransGrid in any given year.	An email from AEMO received on 07/02/2013.	No, this variable was determined from the sources mentioned in the relevant columns. It is considered actual data.	This value was calculated by counting all occurrences of SCADA outages reported from AEMO to TransGrid, for a given year.	Accuracy of data from AEMO.
TQS0121 Incorrect operational isolation of primary or secondary equipment.	Number of events in a given year where the primary or secondary equipment is not properly isolated during scheduled or emergency maintenance. Incorrect isolation is defined as any accidental or deliberate action by a staff member that results in an unplanned outage. No data is available to indicate the occurrence of incorrect isolation action which did not lead to outages.	Past QAPR (Quarterly Asset Performance Reviews) reports, which are generated from data in the THEOS PC Stats.mdb database. Opslog - the business application used to store operator logs. THEOS - the business application used to store outage data.	Yes, this variable is considered an estimate because while it is based on actual data, because no records were kept on incorrect isolation actions that did not lead to outages. These were therefore taken to be zero, due to the absence of data concerning this.	This value was calculated by going through all unplanned outages in the "QAPR Comment on Outage" table from THEOS PC Stats and classifying each individual outage according to whether or not it is due to an incorrect isolation. The total number of unplanned outages classified as due to incorrect isolations is then counted up for any given year. In classifying these outages, data from the Past QAPR reports, Opslog and THEOS were sometimes used.	Accuracy of the record data source maintained by TransGrid. Where insufficient records/information was kept to determine whether or not a given outage was an incorrect isolation with reasonable confidence, it was assumed not to be an incorrect isolation (justified by the fact that the vast majority of unplanned outages are not incorrect isolations). No data is available to indicate the occurrence of incorrect isolation actions which did not lead to outages, hence these were not included in the values provided.
TQS02 Market Impact Parameter	The number of binding constraint dispatch periods with a marginal cost of constraint >\$10/MWh due to TransGrid outages that are not excluded (according to the AER STPIS V4) TransGrid notes that v4 of the STPIS requires the market impact parameter to be calculated and reported to the AER on a calendar year basis.	For 2006-2007, 2009 (2 nd half) & 2010-2012 data, AER Final Decision – TNSP Service Target Performance Incentive Scheme V4 Final Decision (Dec 2012) document. For 2009 (2 nd half) & 2010-2012 data (secondary source), AER Service Standards Compliance Reports from their website: www.aer.gov.au . For the 2013 data, the submission email sent to	No, this variable was determined from the sources mentioned in the relevant columns. It is considered actual data.	The values for this variable (i.e. the count of the relevant number of events) are recorded directly in AER data source from which they're retrieved. With regards to the All Constraints spreadsheet, the value was calculated by counting all such MIC penalties for the 1 st half of 2009, which was subsequently added to the MIC penalty count for the 2 nd half of 2009 retrieved from the AER data source. Similarly, the 2008 value was obtained	Accuracy of the record data sources maintained by AER and TransGrid (for 2009 1 st half data).

Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ¹⁰ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
		the AER from TransGrid on 24/01/2014. For 2009 (1 st half) & 2008 data, TransGrid's constraint records.		from a simple count in the All Constraints spreadsheet. It was verified that in the years 2009-2013, the penalty count according to MITC V4 is the same as under the V2 rules, hence no adjustment to the data provided in submissions for that year were required. This is because no 3 rd party planned outages with customers occurred during these years (allowable exclusions under V2 but not V4)	
TQS03 System Losses	As per AER definition on page 30.	TransGrid's TUOS billing system Variable: TOPED0101	Yes Values dependent on how Energy Out is calculated in variable TOPED0101.	Using : Energy Out (' energy out of TG network v02 ') values from TOPED0101 and Energy In (' Energy into TG monthly summary ') values calculated in the same manner. Applying equation provided by the AER.	As per TOPED0101 TransGrid Notes that 2005/06 and 2006/07 figures are higher than expected due to Interconnector flows. Refer to Note on TQS03

Note on TQS03

TransGrid has observed a discrepancy in the values of the percentage losses in 2005/06 and 2006/-7 due to interconnector energy flows out of TransGrid's Network being lower for 2005 compared to other years. The main interconnector observed to cause this being the Murray-Dederang interconnector which indicates greater inflows than out flows when compared to other years. Whilst we consider that the information provided is accurate, we are investigating the source of the apparent discrepancy in data for the years 2005 and 2006.

Approved By (Group Manager): Steve Jones, Manager Asset Performance (All variables except TQS03)

Approved By (Group Manager): Mal Coble, Manager Network Support & Consultations (TQS03)

7.8 Worksheet 8 - Operating Environment

Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ¹¹ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TEF0101 Total number of vegetation maintenance spans	Where the contractor has claimed and been paid for maintenance work in a span it is counted as a maintenance span If the spans are covered in a 'drive through' inspection and maintenance, then these are counted as a maintenance span Where the TransGrid line inspector has trimmed/removed a couple of trees as part of the inspection and not recorded them, it is not a maintenance span	The data is sourced from the invoices received for vegetation maintenance.	Yes TransGrid has not directly collected the total number of spans maintained in 2012-13. The data is calculated from invoices where the vegetation maintenance contractors have claimed against contract rates for work carried out on each span. Generally this is very accurate to collate the number of spans worked on, however some work was carried out in Northern Region on a lump sum basis due to the cancelling of the main vegetation maintenance contractor during 2012-13 and ongoing works requiring small orders from local tree maintenance contractors.	A count of spans where payment has been claimed by the contractors	Where TransGrid staff have trimmed a tree or trees during a line inspection, this information has not been recorded, so these spans are not counted as maintenance spans.
TEF0102 Average vegetation maintenance span cycle	The straight average of the vegetation maintenance period for each transmission line for the appropriate year. No weighting for line length is required.	The Easement Maintenance Strategy GM AS L5 002 documentation for 2009. For 2010 to 2013, the Transmission Line Maintenance Policy GM AS L1 001 contains the maintenance frequency tables for Northern and Southern Region. Central region still use the excel file used for 2009.	Yes. Some lines or line sections are not specifically listed in the GM AS L5 002 or GM AS L1 001 documents due to recent rearrangements and policy documents not being updated. These sections will not make a significant material change to the overall average figures, and an estimated maintenance frequency was used based upon knowledge of the vegetation situations and other lines in the areas. Where lines cross regional maintenance boundaries, there may be a variation in the designated vegetation maintenance frequency as the general topography of the line changes. The frequency chosen for these lines was the frequency for the longer line section. The impact of these few lines on the overall average is minimal.	The vegetation maintenance cycle in years was listed for each circuit, then the average was taken. All lines were included in all years, not just those with Vegetation Maintenance Spans. Line length was not taken into account, a 'simple' average was taken, as per the instructions: " The average vegetation Maintenance Span Cycle can be calculated based on a simple average of all the Maintenance Span Cycles"	Where lines cross regional boundaries, the maintenance frequency for the region with the longer portion of the line was chosen.

¹¹ 'Information presented in response to the Notice whose presentation is not Materially dependent on information recorded in the NSP's historical accounting records or other records used in the normal course of business, and whose presentation for the purposes of the Notice is contingent on judgments and assumptions for which there are valid alternatives, which could lead to a Materially different presentation in the response to the Notice.', page 34, "Economic benchmarking RIN For transmission network service providers, Instructions and Definitions".

Economic Benchmarking RIN Response - Basis of Preparation (Audited Information)



Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ¹¹ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TEF0103 Average number of trees per vegetation maintenance span	Average number of trees per maintenance span is the number of trees maintained in that span, as trees not maintained are not counted.	The number of trees can generally be calculated using the contractor invoices, as the tree cutting rates are based upon hectare rates and hourly rates	Yes. The contractor invoices are based upon contract rates by either hectare or hourly rates. Work amounts for hectare rate work are agreed with the contractor before work based upon vegetation densities in an agreed format. These vegetation densities are used to determine a coverage percentage and an estimate of a number of trees to be maintained based upon canopy size. Hourly rate work has been estimated to be able to maintain certain numbers of trees per hour using the various types of maintenance	Hourly rate total hours are converted to trees using a trees per hour figure for the various maintenance activities. Hectare rate total hectares maintained are converted to trees by a vegetation coverage density percentage multiplied by a number of trees per hectare at 100% coverage based on crown size suitable for the type of maintenance.	Detailed assumptions for vegetation crown densities, vegetation crown sizes and hourly progress are documented in note to TEF0103
TEF0104 Average number of defects per vegetation maintenance span	A defect tree is a tree that is identified as being within the clearance requirements of GM AS L1 005 – "Maintenance of Easements and Access Tracks" at the time of maintenance work A defect tree is counted if the identified tree was in a span where maintenance was carried out in the applicable year	A cursory review of LiDAR results from 2012/13 year which identified only the worst tree closer than the requirements of GM AS L1 005 at maximum operating temperature. Generally most spans do not have defect trees. General knowledge of vegetation maintenance requirements	Yes. As the LiDAR data for 2012/3 does not cover the whole of the Vegetation Maintenance Spans and results provided only note the worst tree in each span, there was no data to identify the number of defect trees to any certainty. An assumption was made that in a maintenance span there is a maximum of three actual defect trees, and then only a maximum of one in five maintenance spans would have any defect trees. As a result, a value between 0.4-0.6 is considered a maximum. Defect vegetation is in contravention to the requirements of GM AS L1 005 where maintenance work is expected to take into account regrowth prior to the next maintenance cycle such that vegetation never encroaches on safe clearances to conductors.	It is expected that there would be a maximum of one maintenance span in five that would have defect vegetation, and then only two or three trees, so a rate of 0.4 – 0.6 defects per vegetation maintenance span is considered reasonable.	There will be some maintenance spans where there is a stand of trees which have all grown within the clearance requirements, and there will be many spans where there are no defect trees.
TEF0105 – Tropical Proportion Number of spans – result: 2617 spans	-	Climate zone map http://www.bom.gov.au/jsp/ncc/climate_averages/climate-classifications/index.jsp TAMIS (GIS system)	No	Climate zone digital map utilised to run query in GIS (TAMIS) based on spans within class "Warm Humid Summer"	-
TEF0106 Standard vehicle access	An area with no Standard Vehicle Access would not be accessible by a two wheel drive vehicle Value provided is length of network which is accessible by 2WD vehicle	Ellipse report on electronically recorded mains inspections carried out from 2009 to 2014. TAMIS report on electronically recorded mains inspections carried out from 2001 to 2010. TAMIS structure report	Yes Approximately 75% of structures have current electronically recorded mains inspections stored in Ellipse or TAMIS. Results relating to the recorded inspections have been	A report has been produced from Ellipse, listing the inspection results. The latest result available from 2009 - 2014 per structure has been chosen. A report has been produced from TAMIS using the 'Mains Inspection' data set,	Access regarded as 'OK' or 'Yes' in the mains inspection has been allocated as 2WD accessible. Many structures west of the Great Dividing Range are either on rolling paddocks or very flat land, so should be accessible by 2WD vehicles in normal conditions.

Economic Benchmarking RIN Response - Basis of Preparation (Audited Information)



Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ¹¹ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
			extrapolated to the remainder of the Network. The mains inspections have a question to answer in regard to vehicle access, however, this was never intended to indicate whether there is 2WD access to structures. Responses to this question have indicated '4WD', 'Blocked', 'Fenced', 'In Crop', 'OK' or 'Yes'. Where the access is listed as 'OK' or 'Yes', these have assumed to be 2WD accessible. Line inspectors may have indicated that access was OK where they were able to access in their 4WD vehicle, but a 2WD vehicle may not have been suitable.	listing the inspection results. The 'Current' inspection result has been filtered out from the overall list. A report from TAMIS of all the structures has been retrieved. This report has been filtered to remove structures that have no geometry, filtering out those that do not belong to TransGrid. The structure listing has not been verified against other structure counts. The structure listing is then populated with the latest inspection results from Ellipse and TAMIS. The preference is to take the Ellipse result, as this is more recent. A percentage of the available results that are 'OK' or 'Yes' is multiplied by the network line length for each year (2009 – 2013) and rounded to the nearest 100km. The same percentage is used for each year, as the figure is considered reasonable.	Many structures east of the Great Dividing Range are in areas that are generally accessible by 2WD vehicles. Refer to note to TEF0106
TEF0107 – Altitude Length of line (km) above elevation 600 metres – Result 3772 km	-	25m grid spot height data http://www.lpi.nsw.gov.au/mapping_and_imagery/spatial_data/topographic_data	No	The structure location referenced against spot heights within 30m to determine if elevation above 600m. If the structure was above then attached spans included for length calc	-
TEF0108 – Bushfire Risk Number of spans – result 16307 spans	AER classification is "high". RFS classification is either Category 1 or buffer	Bush Fire Prone Lands (BFPL) http://www.rfs.nsw.gov.au/dsp_content.cfm?cat_id=1052	No	Digital map of BFPL used to run query against spans in either Category 1 or buffer lands	RFS web site documents all category 1 and buffer lands as bush fire prone lands
TEF0201 Route line length	The length of line routes. Where a line is a double circuit line, that section of the route is only counted once.	Electrical Data Book NSW Transmission System and TransGrid Asset Management Information System (TAMIS)	No	All line information relevant to TransGrid was downloaded from Electrical Data Books and put into Excel. This was used to determine the date on which all lines were energised. This file was used for all voltage classes. Available Line data was sourced from TransGrid's Asset Management Information System (TAMIS) and compared to Electrical data Books.	No assumptions were made in calculations as the asset is static
TEF0202 Variability of Dispatch	AER definition refers to non-thermal generators. Thermal generators have been taken to be generators using steam turbines. Using this definition, non-thermal generators are wind turbines, hydro generators and open cycle gas turbines.	TransGrid's TUOS billing system	Yes Data is materially dependent on how the data in MW is "translated" to data in MVA.	Uses data calculated for Energy In as part of calculations for TQS03. This is total Energy Input into TransGrid network. Percentage is taken of 'non-thermal' generation to total Energy Input.	In calculating this measure only generators which are connected to TransGrid's network have been considered. The definition refers to non-thermal generators. Thermal generators have been taken to be generators using steam turbines. Using that definition, the non-thermal generators are wind turbines, hydro generators and open cycle gas turbines. Embedded generators have been included in the calculations.

Data variable & TransGrid's interpretation		Data sources, locations and 'owners'	Estimation or actual information, calculations and assumptions		
Variable reference & AER description	TransGrid's interpretation of data variable	Data sources	Is this variable 'Estimated Information' as per AER definition ¹¹ ? (Y/N)	How the values for this variable are calculated	Assumptions made to allow calculation / estimation of the variable
TEF0203 Concentrated Load Distance	AER definition refers to individual nodes with 30% capacity of generation/load. For a transmission network the size of TransGrid's, it would not be prudent to configure the network such that there is 30% or more of generation/load at risk for a major event at a single location. To satisfy criteria of 30% or more generation/load, groups of nodes are considered, allowing a concentrated load distance to be derived.	Data from that used to calculate TEF0201	Yes As nodes within each group are separate, using groups of nodes does not automatically give a single figure for the concentrated load distance.	The definition of this parameter mentions nodes which have at least 30% of generation capacity or load connected to them. For a transmission network transporting the magnitude of load that TransGrid's network does, it would not be prudent to configure it in a way which places 30% or more of generation or load at risk for a major event at a single location. Consequently, no individual nodes within TransGrid's network meet the criteria. However, if groups of nodes in relatively close geographical proximity are considered, rather than single nodes, it is possible to derive a concentrated load distance. In this case the most widely separated groups of nodes are those in the Snowy Mountains area (generation connected at Murray, Upper Tumut and Lower Tumut) and in the Sydney basin (loads connected at Beaconsfield West, Ingleburn, Liverpool, Macarthur, Regentville, Sydney East, Sydney North, Sydney South, Sydney West and Vineyard).	Groups of nodes in close geographical location are considered to be 30% of generation or load. The most widely separated groups are those in the Snowy Mountains area and in the Sydney basin. The average of the route line lengths between the closest nodes in the two areas and the two nodes furthest apart.
TEF0204 Total number of spans		Electrical Data Book NSW Transmission System and TransGrid Asset Management Information System (TAMIS)	No	Line information from Electrical Data Books was used to determine the date on which all lines were energised. Available Line data was sourced from TransGrid's Asset Management Information System (TAMIS).	No assumptions were made in calculations as the asset is static
TEF03001 to TEF03628 Weather Stations	All weather stations in NSW are listed	Bureau of Meteorology: http://www.bom.gov.au/climate/data/stations/ TransGrid's GIS system TAMIS for locations relative to infrastructure	No	Weather stations in NSW were loaded by their data types, then consolidated to a single list. A review of the last date of information available from the weather station and its proximity to the nearest transmission line structure were reviewed to establish whether the station was considered material. Suburb and postcode information were retrieved for the station location. The list was sorted on weather station ID numbers	If a weather station's available data was prior to 2013 or if it was more than 50km from a transmission line it was considered not material to the network.

Note to TEF0103

For hectare rates, the following vegetation crown densities apply:

- Scattered is <5% coverage, use 3% (not used in contracts in place in 2012-3)

- Light is 5-15% coverage, use 10%
- Medium is 15-25% coverage, use 20%
- Heavy (or high) is >25% coverage, use 60% as an average
- Slashing is taken to be 40% coverage as slashing can only be used where trunks are less than 75mm thick at the cutting level.

Vegetation crown sizes are estimated as the following:

- Hectare Hand Clearing – 2 m2 crown – 5000 trees/hectare @100% coverage
- Hectare Mulching – 2 m2 crown – 5000 trees/hectare @100% coverage
- Hectare Slashing or Spraying – 1 m2 crown – 10,000 trees/hectare @100% coverage

For hourly rates, the following progress is estimated:

- Hand clearing – 20 trees per hour
- 'Drive Through' – 10 trees per hour - Where a contractor goes with the inspector and trees are removed at the time
- Spraying – 15 trees per hour, or 30 trees per hour with a spray truck
- Slashing – 1,000 trees per hour
- Pruning by climbing – 1 tree per hour
- Pruning by EWP – 2 trees per hour
- Tritter/Excavator – 150 trees per hour
- Small Mulcher – 250 trees per hour
- Medium Mulcher – 450 trees per hour
- Large Mulcher – 450 trees per hour

Note to TEF0106

TransGrid does not specify that access is required to two wheel drive vehicles, and it is generally expected that access will be using a diesel 4WD vehicle, to minimise risk of fire from hot petrol vehicle exhausts and ensure that personnel are able to safely access all structures.

We note that the AER's definition suggests that access to structures by 2WD vehicles is on an opportunistic basis where "made roads, gravel roads and open paddocks" allow, TransGrid transmission lines are not specifically designed to accommodate this standard vehicle access. In particular, whilst 2WD access via paddocks and some gravel roads may be available in dry weather, safe access is frequently compromised during periods of wet weather. Similarly field staff require a vehicle that can access all types of sites, as adjacent structures on the same line will frequently have different access requirements. Therefore all field staff are provided with a 4WD vehicle.

Whilst TransGrid considers that this estimate has been prepared on the basis of the best information available that is recorded in the normal course of business, we note that that the provision of 4WD vehicles to field staff who prepare maintenance records means that the proportion of the network that is accessible by standard vehicles is likely to be overstated.

Approved By (Group Manager): Steve Jones, Manager Asset Performance (All variables except TEF0202 & TEF0203)

Approved By (Group Manager): Mal Coble, Manager Network Support & Consultations (TEF0202 & TEF0203 excluding Audit Ammendments to TEF0203)

Approved By EGM Network Planning & Performance: Stephen Clark (Audit Ammendments to TEF0203)