Basis of Preparation

Response to Economic Benchmarking RIN dated 18 December 2013

Audited Information 28 April 2014

Contents

Purpose

The RIN requires Ausgrid to prepare a Basis of Preparation. By this, the AER means that for every variable in the Templates, Ausgrid must explain the basis upon which we prepared information to populate the input cells. The Basis of Preparation must be a separate document (or documents) that Ausgrid submits with its completed Templates. The AER will publish Ausgrid's Basis of Preparation along with the Templates.

This document is Ausgrid's Basis of Preparation in relation to Unaudited Data required to be submitted to the AER by 3 March 2014.

A revised Basis of Preparation will be prepared in relation to the Audited Information required to be submitted on 30 April 2014.

AER's instructions

The AER requires the Basis of Preparation to follow a logical structure that enables auditors, assurance practitioners and the AER to clearly understand how Ausgrid has complied with the requirements of the Notice.

To do this, the AER recommended that Ausgrid structures its Basis of Preparation with a separate section to match each of the worksheets titled '2. Revenue' to '8. Operating environment' in the Templates.

The AER noted that Ausgrid may consider structuring these sections with subheadings for each subject matter table in each worksheet. For example, for the worksheet '5. Operational data', Ausgrid would explain its Basis of Preparation for the Variables under the heading '5.1 Energy delivery', '5.2 Customer numbers' and '5.3 System demand'. Ausgrid's Basis of Preparation has followed this recommended structure.

Ausgrid must include in its Basis of Preparation, any other information Ausgrid prepares in accordance with the requirements of the Notice (including this document). For example, if Ausgrid chooses to disaggregate its RAB using its own approach in addition to the AER's standard approach, Ausgrid must explain this in its Basis of Preparation.

The AER has set out what must be in the Basis is preparation. This is set out in Table 1 below:

1	Demonstrate how the information provided is consistent with the requirements of the Notice
2	Explain the source from which Ausgrid obtained the information provided
3	Explain the methodology Ausgrid applied to provide the required information, including any assumptions Ausgrid made
4	In circumstances where Ausgrid cannot provide input for a Variable using Actual Information, and therefore must use an estimate, explain: (i) why an estimate was required, including why it was not possible for Ausgrid to use Actual Information; (ii) the basis for the estimate, including the approach used, assumptions made and reasons why the estimate is Ausgrid's best estimate, given the information sought in the Notice.
5	For Variables that contain Financial Information (Actual or Estimated) the relevant Basis of Preparation must explain if accounting policies adopted by Ausgrid have Materially changed during any of the Regulatory Years covered by the Notice: (i) the nature of the change; and (ii) the impact of the change on the information provided in response to the Notice. Ausgrid may provide additional detail beyond the minimum requirements if Ausgrid considers it may assist a user to gain an understanding of the information presented in the Templates. In relation to providing an audit opinion, or making an attestation report on the Templates presented by Ausgrid, an auditor or assurance practitioner shall provide an opinion or attest by reference to Ausgrid's Basis of Preparation.

Structure of this document

The document is structured as follows:

- We outline our general approach to developing our response to the RIN. We identify key systems used to provide data, note issues relating to data quality, and make comments on the reliability of the data for economic benchmarking purposes.

- We set out our response to worksheets 2 to 8, in accordance with the AER's instructions. We note that Worksheet 1 requires no input material.

Ausgrid Basis of Preparation

General approach

In this section, we identify our general approach to collecting and preparing information.

Ausgrid reiterates a key concern that the AER may use information which is of a poor quality to make regulatory determinations. While Ausgrid has provided its best estimate of the data where no actual information is available, Ausgrid is concerned about the underlying quality and robustness of the data, and therefore considers that such information should not be used in benchmarking analysis conducted by the AER.

1.1   Systems used to provide data

Where data has been sourced directly from Ausgrid's financial and other information systems this system has been identified. Similarly where estimated data is based on data sourced from Ausgrid's systems those systems are identified.

1.2   Data quality issues

In previous consultations on the RIN, we have raised significant concerns with providing historical data in the form required by the AER. In this document Ausgrid outlines its concerns in relation to the detailed templates.

1.3   Approaching our obligations under the NEL

Our view of the NEL is that a DNSP is only obligated to "provide" information that is available, that is, data which has been historically collected in our systems. In cases, where that information cannot be provided in the form required by the AER from our systems, we would have a reasonable excuse under section 28(5) of the NEL to not comply with that element of the notice. We have strong doubts that a RIN can require a business to" prepare" information by way of estimate that cannot be reasonably derived from information currently held in its systems.

Our understanding of the term 'prepare' relates to a power the AER has to compel a DNSP to collect information in the form required by the AER for future periods (for example, by developing new systems) rather than to manipulate historical data in potentially inaccurate ways. We suggest that the AER should give more careful consideration to whether it has appropriately informed itself of the distinction under section 28D of the NEL between the ability of a RIN to require existing information to be provided and the ability to require information to be prepared, maintained and kept on a going forward basis.

Despite this Ausgrid has prepared and included estimated data to the best of its ability and these estimates have been submitted for audit and review as required by the RIN.

1.4   Recognition by AER that 'best estimates' are not robust

The AER has acknowledged that if we are compelled to provide best estimates then there is potential for the data to lack robustness.

1.5   Process used to determine if information is actual or estimated

Where Actual Information is not able to be derived from Ausgrid's financial and information systems, then information has been estimated on the basis which Ausgrid considers provides the best available estimate. In circumstances where the AER has recommended an approached for estimating, that approach has been followed as far as practicable and reasons for variations have been identified and explained.

1.6   Reliability of applying data to economic benchmarking

We consider that the application of economic benchmarking to guide regulatory decision making would result in regulatory error, leading to outcomes that are detrimental to the long term interests of customers. Our view is based on the following reasons:

- As noted in the sections on data quality, there is recognition by the AER that data quality from best estimates will not be of a robust quality, and may not pass audit and reviews. This document identifies where material has been developed from best estimates but this should not imply that Ausgrid in any way supports the data being used for the purposes of economic benchmarking. We note in this respect that models such as TFP are based on the interaction of multi-variables. If a data series is inaccurate, it can significantly alter the findings of the model and lead to misleading conclusions.

- We are not convinced that economic benchmarking tools such as Total Factor Productivity (TFP) can be used to infer relative efficiency of DNSPs over time. We consider that the models cannot adequately

normalise for differences between DNSPs, and do not provide meaningful assessment of the apparent differences in productivity levels. For example, TFP will show that a firm that replaces ageing assets has declining levels of capital productivity, as the model would show higher prices for capital while maintaining existing service levels. In our view this would be driven by the age of the asset base which is likely to vary between DNSPs.

- We consider that economic benchmarking models such as TFP do not provide the AER with guidance on how to target its review of expenditure forecasts, as the information provided is at too high a level to identify potential areas of efficiency. The models and data collected will not provide any guidance on the underlying drivers of apparent productivity, and therefore does not provide useful analysis on which areas to review in a DNSP's capex and opex forecasts.

1.7   Ausgrid's preparation costs

The costs incurred by Ausgrid in terms of staffing resources to complete the RIN to the unaudited stage were considerable. Further considerable costs were incurred in having the information audited by two separate auditors for the financial and non-financial information; and in building or modifying systems to capture the information going forward, Ausgrid (and other DNSPs) will incur costs which are not otherwise required for Ausgrid's operational activities.

As foreshadowed in Ausgrid's unaudited Basis of Preparation document, an assessment has been made of the direct costs and resourcing implications of completing the Economic Benchmarking RIN. The direct cost of the external service providers required for auditing & reviewing of the financial and non-financial information respectively, amounted to approximately $140,000. Further, Ausgrid's own resources required supplementation given the workload burden imposed by the coincident timing of the Economic RIN and the RIN associated with Ausgrid's regulatory reset submission. To cope with the timelines additional resources were engaged to assist with this work. Ausgrid staff were withdrawn from normal business for an extensive period not only to provide the required information for the two RINs but also to participate in the audit processes and to prepare responses to the AER's many "clarification" questions following submission of Ausgrid's unaudited response on 31 March 2014. Ausgrid has estimated these latter costs of preparation to be in excess of $500,000 leading to an overall cost burden of some $650,000. Given that similar costs are likely to be incurred across the NEM, Ausgrid considers that further consideration should be given to the structure and extent of future RINs in the context of the National Electricity Objective and the intrusive impact on normal business activities of a DNSP to comply with these Notices.

As a general comment on costs, we are also concerned with the number of RINs, and the far-reaching level of information requested within each RIN. Our understanding of the AER's intentions on future annual reporting is that DNSPs will be required to submit three RINs each year; the completion and submission of an annual benchmarking RIN, the completion and submission of the current annual RIN and the possible completion and submission of the category analysis RIN. We submit that not only does this place significant regulatory burden on DNSPs, it also seems to be a costly duplication of effort and information which would contribute to the ongoing costs for customers.

1.8   Process issues

The Economic Benchmarking RIN provided for a very compressed period of two months between submission of the unaudited and audited information. During this period Ausgrid received emails from AER staff on almost 50 issues in relation to the unaudited responses. Some of these issues requested changes and additions to the RIN templates. We note that AER's requests came at a point in the process where the auditors were reviewing, and in some cases had reviewed our responses.

The AER's request for changes to our response was not contemplated in the Notice issued to us, and meant that we were not afforded a proper opportunity to comply with the timelines of the Notice. The auditors had to revisit material leading to increased costs, confusion as to the status of particular information at any given time, and increased the likelihood of administrative errors in providing our final response to the AER. This impacted significantly on the auditing process as opinion already expressed on information which is subsequently changed, is potentially invalidated without revisiting it. Ausgrid strongly recommends that the two-stage process of submitting unaudited as well as audited information be dispensed with going forward.

Worksheet 2 – Revenue

2.1 Revenue grouping by chargeable quantity

Compliance with requirements of the notice

The information reported in Table 2.1 is consistent with the requirements of the Notice, AER's RIN Benchmarking Explanatory Statement and Instructions and Definitions Manual. In particular, the Revenue reported in Table 2.1;

- has been reported in accordance with the definition of Standard Control Services and Alternative Control Services as defined in the National Electricity Rules (NER) Chapter 11 appendix 1.6.2.3B.

- has been reported in accordance with the Regulatory Accounting Statements as per the Annual Reporting Requirements.

- reconciles to Direct Control Services revenues reported in the Regulatory Accounting Statements.

- has been grouped into chargeable quantity categories in accordance with the definitions provided in the RIN Economic Benchmarking Instructions and Definitions Manual.

In addition, in accordance with the instructions provided Total Revenue by Chargeable Quantities reported in Table 2.1 equals the Total Revenue by Customer Class reported in Table 2.2. Also Revenue from Unmetered Supplies reported in Table 2.1 agrees to Unmetered Supplies reported in Table 2.2.

Source of information

Table 2.1 Revenue Grouping by chargeable Quantities - Variables DREV101 to DREV0113 has been sourced from SAP Financials, SAP Business Warehouse (BW) Network Tariff Reports and Regulatory Accounting Statements.

Methodology and Assumptions

Revenue reported in Table 2.1 is as per the definition of Standard Control Services and Alternative Control Services as defined in the National Electricity Rules (NER) Chapter 11 appendix 1.6.2.3B.

Standard Control Services - Distribution service that is provided by a NSW Distribution Network Service Provider and that was determined by IPART to be prescribed distribution services (for the purposes of the regulatory control period 2004-2009) is deemed (for the purposes of the regulatory control period 2009-2014) to be classified as Direct control service and further classified as a standard control service.

Alternative Control Services - Distribution service that is provided by a NSW Distribution Network Service Provider and that was determined by IPART to be an excluded distribution service (for the purposes of the regulatory control period 2004-2009) is deemed (for the purposes of the regulatory control period 2009-2014) to be classified as Direct control service and further classified as alternative control service.

Total Revenue reported in Table 2.1 for each of the financial years 2005-06 to 2012-13 agrees to the Direct Control Services Revenue reported in the Regulatory accounts as at the 30th June for each year. The revenue includes both Billed and Accrued data.

BW Network Tariff report collates billed and accrued revenue by Network Tariff and Tariff component. This has been used to enable the completion of Table 2.1 Variables DREV0101 to DREV0109.

The Variables DREV0101 to DREV0109 categorises Distribution Use of System Revenue into tariff component charges.

Each Ausgrid Network tariff is comprised of more than one component except for unmetered loads which has only a single component.

DREV0101	This represents the Network Access Charge (NAC) of the Ausgrid Network Tariff. This is a fixed (c/day) applied to each energised connection point at which energy or demand is recorded.

DREV0102	This represents Non Time of Use charge (c/kWh) applied to the total energy determined from an energy only meter. Step pricing structures applies to selected Non ToU energy charges.
DREV0103	Revenue from customer consumption of electricity during peak period.
DREV0104	Revenue from customer consumption of electricity during shoulder period
DREV0105	Revenue from customer consumption of electricity during off peak period
DREV0106	Controlled Load is applicable to electricity which is separately metered and controlled. It is used for operating storage water heaters, thermal storage space heaters, and other approved fixed wired appliances. Control Load Tariffs are secondary tariffs and can only be applied at installations with selected Primary Tariffs.
DREV0107	Unmetered Supplies are metering installations that do not have a physical meter attached to the installation.
DREV0108	For the Financial periods 2005-06 to 2012-13 Contracted Maximum Demand Charges was not a component of the Ausgrid Network Tariff
DREV0109	This variant includes charges calculated on maximum demand that is either reset on a monthly basis or ratcheted.

Variables DRE0110 to DREV0113 categorises the remaining standard control revenues and Alternative Control Revenue.

Standard Control

DREV0110	There were no Metering services as per the AER requirements for the Financial periods 0506 to 1213 for Ausgrid.
DREV0111	This definition for Connection Services as per AER requirements is consistent with the definition under the NECF. The NECF definition was effective as from 1 July 2013. Therefore monopoly Services and Miscellaneous Services has been categorised in the Variant DREV0113 for the completion of these templates for the Financial periods 2005-06 to 2012-13.
DREV0113	Miscellaneous services as identified in appendix G of Final Decision NSW Determination of the regulatory control period 2009-2014
	Monopoly services as identified in appendix G of Final Decision NSW Determination of the regulatory control period 2009-2014
	Emergency Recoverable Works as identified in appendix G of Final Decision NSW Determination of the regulatory control period 2009-2014
	Ausgrid Prescribed Transmission Standard Control Services Revenue

Alternative Control Revenue

DREV0112	The construction and maintenance of Public Lighting Infrastructure
	Customer specific services

Use of estimated information

There is no estimated information for Revenue groupings by chargeable Quantities

Material accounting policy changes

There has been no material accounting changes during the financial periods 2005-06 to 20012-13 that has had an impact on Revenue reported in Table 2.1

2.2   Revenue grouping by customer type of class

Compliance with requirements of the notice

The information reported in Table 2.2 is consistent with the requirements of the Notice, AER's RIN Benchmarking Explanatory Statement and Instructions and Definitions Manual. In particular, the Revenue reported in Table 2.2;

- has been reported in accordance with the definition of Standard Control Services and Alternative Control Services as defined in the National Electricity Rules (NER) Chapter 11 appendix 1.6.2.3B.
- has been reported in accordance with the Regulatory Accounting Statements as per the Annual Reporting Requirements.
- reconciles to Direct Control Services revenues reported in the Regulatory Accounting Statements.
- has been grouped into chargeable quantity categories in accordance with the definitions provided in the RIN Economic Benchmarking Instructions and Definitions Manual.

In addition, in accordance with the instructions provided Total Revenue by Chargeable Quantities reported in Table 2.1 equals the Total Revenue by Customer Class reported in Table 2.2. Also Revenue from Unmetered Supplies reported in Table 2.1 agrees to Unmetered Supplies reported in Table 2.2.

Source of information

Table 2.2 Revenue groupings by customer type or class - Variables DREV0201 to DREV0206 has been sourced from SAP Financials, SAP Business Warehouse (BW) Network Tariff Reports and Regulatory Accounting Statements.

Methodology and Assumptions

Revenue reported in Table 2.2 is as per the definition of Standard Control Services and Alternative Control Services as defined in the National Electricity Rules (NER) Chapter 11 appendix 1.6.2.3B.

Standard Control Services - Distribution service that is provided by a NSW Distribution Network Service Provider and that was determined by the IPART to be prescribed distribution services (for the purposes of the regulatory control period 2004-2009) is deemed (for the purposes of the regulatory control period 2009-2014) to be classified as Direct control service and further classified as a standard control service.

Alternative Control Services - Distribution service that is provided by a NSW Distribution Network Service Provider and that was determined by the IPART to be an excluded distribution service (for the purposes of the regulatory control period 2004-2009) is deemed (for the purposes of the regulatory control period 2009-2014) to be classified as Direct control service and further classified as alternative control service.

Total Revenue reported in Table 2.2 for each of the financial years 2005-06 to 2012-13 agrees to the Direct Control Services Revenue reported in the Regulatory accounts as at the 30th June for each year. The revenue includes both Billed and Accrued data.

BW Network Tariff report collates billed and accrued revenue by Network Tariff and Tariff component. This has been used to enable to completion of Table 2.2 Variables DREV0201 to DREV0205.

The Variables DREV0201 to DREV0205 categorises Distribution Use of System by Customer class

Each Ausgrid Network tariff is comprised of more than one component except for unmetered loads which has only a single component.

DREV0201	Residential Tariffs are assigned to premises where electricity use is principally for private domestic purposes. For Ausgrid this includes (but not limited to) Residential tariffs such as EA010 Residential Inclining Block, EA025 Residential ToU and Controlled Loads 1 & 2.
DREV0202	Revenue from Non Residential Customers not on demand includes (but not limited to) Small Business Tariffs such as EA50 Small Business Inclining Block and EA225 Small Business ToU. A small number of Cost Reflective Network Price (CRNP's) Customers are also populated in this category.
DREV0203	Revenue from Non Residential Low Voltage Demand Tariff Customers is assigned to those customers where the usage is from 40MWh up to 750MWh per annum. This includes (but not limited to) the following Tariffs EA302 LV 40-160MWh Tariff, EA305 LV 160-750MWh Tariff and EA310 >750MWh.
DREV0204	Revenue from Non Residential High Voltage Demand Tariff Customers includes EA370 and EA380 HV Connection Network Tariffs, EA390 Sub-transmission Connection Network Tariff and the majority of CRNP Tariffs.
DREV0205	Unmetered Supplies are metering installations that do not have a physical meter attached to the installation. These include Network Tariffs EA401 Public Lighting, EA402 Constant Unmetered and EA403 EnergyLight.

Variables DRE0206 categorises other standard control revenue and Alternative Control Revenue

Standard Control

DREV0206	Revenue from Other Customers include Miscellaneous services, Monopoly Services and Emergency Recoverable Works
	Ausgrid Prescribed Transmission Standard Control Services Revenue

Alternative Control Revenue

DREV0206	The construction and maintenance of Public Lighting Infrastructure
	Customer specific services

Use of estimated information

There is no estimated information for Revenue groupings by Customer Type or Class

Material accounting policy changes

There has been no material accounting changes during the financial periods 2005-06 to 20012-13 that has had an impact on Revenue reported in Table 2.2

2.3   Revenue (penalties) allowed (deducted) through incentive schemes

Compliance with requirements of the notice

The information reported in Table 2.3 is consistent with the requirements of the Notice, AER's RIN Benchmarking Explanatory Statement and Instructions and Definitions Manual.

Source of information

Final Decision NSW Determination 2009-10 to 2013-14 28 April 2009 and IPART 2004 determination

Demand management incentive schemes for the ACT and NSW 2009 distribution determinations

The final D-factor Submission Reports submitted by EnergyAustralia/Ausgrid to IPART/AER over the requested reporting period.

The independent audit reports prepared for the D-Factor Submission in each year.

Letters from the Regulator confirming the D-Factor revenue adjustment factor for each year

Letter from the Regulator confirming the service standard Factor and financial incentive adjustment.

Methodology and Assumptions

Revenue reported in Table 2.3 has been populated as follows:

Variant DREV0301 - Efficiency Benefit Sharing Scheme (EBSS). The EBSS was not implemented under the 2004-2009 IPART determination nor 2009-2014 Regulatory Control Period.

Variant DREV0302 - Service Target Performance Incentive Scheme (STPIS). This represents the Service Standard Factor (S-Factor) to apply to EnergyAustralia's maximum allowed revenue. The S-Factor incentive amount reported for each year was taken from copies of Letters from ACC/AER confirming the financial incentive adjustment to apply for the financial year.

Variant DREV0302 - This variant has been populated by estimates for Demand management incentive schemes (DMIS). They include Demand Management innovation allowance (DMIA) Scheme which applied from the regulatory control periods 2009 to 2014and D-Factor scheme developed originally applied by IPART in its 2004 determination.

The DMIA amount reported for the financial years 2009-10 to 2011-12 was taken from the Demand management incentive schemes for the ACT and NSW 2009 distribution determinations – the allowance allowed for EnergyAustralia/Ausgrid was $1M per annum for the control period 2009-2014.

The D-Factor incentive amount reported for each year was taken from copies of the final D-Factor Reports submitted to the regulator. Where possible, the D-Factor incentive adjustment factor has also been confirmed by referring to the letter of confirmation provided by the regulator in each year.

Use of estimated information

Table 2.3 Revenue (penalties) allowed (deducted) through incentive schemes has been completed as estimated information rather than actual financial information.

The basis for completing Table 2.3 as estimated information was Ausgrid's' inability to readily populate the data requested / required directly from our General Ledger (i.e. accounting) system. Additionally, it should be noted, as outlined above under Methodology & Assumptions, a number of external third party sources (i.e. AER, IPART etc.) to which the estimated amounts are underpinned, and to include third party correspondence confirming these amounts, provide for the basis for which this data has been provided.

For these reasons the estimate provided is considered to be the best estimate of the information required by the RIN.

Material accounting policy changes

There has been no material accounting changes during the financial periods 2005-06 to 20012-13 that has had an impact on Revenue reported in Table 2.3

Worksheet 3 – Opex

3.1 Opex categories

Compliance with requirements of the notice

Information reported in Table 3.1 is in accordance with the annual audited Statutory and Regulatory financial statements as well as Ausgrid's Cost Allocation Methodology (CAM). Ausgrid prepares Standard Control Services Annual Regulatory Statements for the AER which comply with Australian Accounting Standards and the Regulatory Information Requirements Guidelines for the NSW Electricity Distributors. These are independently audited and reviewed each year before reporting separately to the AER. The Regulatory Financial Statements include Standard Control Services (Distribution) and Standard Control Services (Transmission).

Ausgrid has reported Opex line items in a manner that is consistent with the Regulatory Accounting Statements. Total Opex is equal to that reported in the Regulatory Accounting Statements.

In 2011 there was a material change in the Annual Reporting Requirements from the AER. As a result, Ausgrid has completed Table 3.1.1 according to the categories reported in the current Annual Regulatory Requirements. Ausgrid has 'backcast' the FY2006 to FY2010 numbers by using these categories.

In FY2010, Ausgrid implemented an integrated asset management system. The integrated asset management system has resulted in generic costs being allocated to more direct categories. This has made it difficult for Ausgrid to backcast on the same basis as the FY2013 year. Management has made assessments in the previous years to align the cost categories.

The opex reported in table 3.1.1 is not consistent with the Opex reported in Table 3.1.2 for the FY2006 to FY2013 financial years at a regulatory category level, but does reconcile to the total historical Opex as disclosed in the Regulatory Accounting Statements.

Table 3.1.2 has been prepared for all Regulatory years in accordance with the IPART Accounting Separation Code and the ACCC Requirement Guidelines and aligns to IPART and ACCC Regulatory Accounting Statements from FY2006 to FY2010. Ausgrid has prepared FY2011 - FY2013 information based on these categories. The integrated asset management system implemented in FY2010 resulted in generic costs being allocated to more direct categories. This has resulted in the change of costs categories and management has made assessments in the outer years to prepare the FY2010 – FY2013 information for this Table.

Ausgrid allocates costs to each line of business on either a direct attribution basis or by the application of allocators. A comprehensive review of the allocations between Network and External businesses occurs each year. Compliance is in line with the CAM and the Network Regulatory Policy Directions Paper. The current CAM is on Ausgrid's Website.

Source of information

Financial data included in template 3.1 is sourced from SAP and TM1 (Ausgrid's financial accounting and reporting systems), and they have been verified against Statutory Accounts and Regulatory financial statements.

Ausgrid also has in place accounting treatment policies (Statement of Accounting Treatments or SATs), Policies & Procedures, standard reporting, accounting and reporting systems, a centralised finance function and qualified staff who are able to manage the requirements.

Total Opex reported in Tables 3.1.1 & 3.1.2 aligns with the Regulatory Accounts in total from FY2006 to FY2013. Opex categories reported in Table 3.1.1 align with annual Regulatory Reporting Requirements and annual Regulatory Accounts from FY2011.

Methodology and Assumptions

Table 3.1.1 - Current opex categories and cost allocations

Opex reported in Table 3.1.1 has been prepared for all Regulatory years in accordance with Ausgrid's CAM and aligns to the Annual Reporting Requirements used in the FY2013 financial year.

In FY2010, Ausgrid implement an integrated asset management system. The integrated asset management system has resulted in generic costs being allocated to more direct categories. This has made it difficult for Ausgrid to backcast on the same basis as the FY2013 year. Management has made assessments in the previous years to align the cost categories. Ausgrid found minor differences in the accounting system for

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previous years and has adjusted the Corporate Finance function costs to align to the Regulatory Accounting Statements.

Ausgrid recognises any year end adjustments in the Corporate Finance Function. The below table represents the costs of the Corporate Finance Function with these year end impacts excluded:

	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12	FY 13
Corporate Finance Function	(3.6)	(28.0)	83.0	25.3	57.8	26.0	36.5	(16.8)
Year End Adjustments								
Less Total YE Adjustments - relating cc8510	(16.5)	(42.5)	66.0	(0.6)	35.2	(0.3)	12.0	(43.0)
Underlying Corporate OPEX (excluding YE Adjustments)	12.9	14.5	17.0	25.9	22.6	26.3	24.4	26.2

Alternative Control Services Opex Summary categories are equal to that reported in the Regulatory Accounting Statements. As the categories were not disclosed in detail, the financials align to the Statement of Financial Performance and/or the financial data extracted from SAP and TM1 (Ausgrid's financial accounting and reporting systems).

Ausgrid has reported no financial numbers for Network Operating costs reported in the FY2011 RIN for Alternative Control Services in alignment with the Regulatory Accounting Statements.

Table 3.1.2 - Historical opex categories and cost allocations

Opex reported in Table 3.1.2 has been prepared for all Regulatory years in accordance with the IPART Accounting Separation Code and the ACCC Requirement Guidelines and aligns to IPART and ACCC Regulatory Accounting Statements from FY2006 to FY2010.

Ausgrid has prepared FY2011 - FY2013 information based on the most recent annual RIN requirements. Ausgrid has added additional rows to table 3.1.2 to report Opex data for FY2011 – FY2013 to align with the most recent RIN reporting requirements.

Use of estimated information

All financial data reported in Tables 3.1.1 & 3.1.2 are actuals and can be verified in SAP.

Material accounting policy changes

No accounting policy changes during the period FY2006 to FY2013 have had a material impact on operating expenditure.

3.2   Opex consistency

Compliance with requirements of the notice

Information reported in Table 3.2.1 is in accordance with the Ausgrid's Cost Allocation Methodology & Table 3.2.2 is in accordance with the IPART Accounting Separation Code and the ACCC Requirement Guidelines.

Source of information

Financial data included in Tables 3.2.1 & 3.2.2 is sourced from SAP and TM1 (Ausgrid's financial accounting and reporting systems).

Methodology and Assumptions

Table 3.2.1 Opex consistency - current cost allocation approach

Ausgrid has prepared the information in Table 3.2.1 for disclosure purposes as Ausgrid is not required to complete this table as there has been no material change in Ausgrid's Cost Allocation Methodology over the time

periods. Opex reported in Table 3.2.1 has been prepared for all Regulatory years in accordance with Ausgrid's Cost Allocation Methodology and aligns to the Annual Reporting Requirements for 2012/13 financial year.

Ausgrid has determined "Opex for network services" as the aggregate of opex for the year less the opex for metering and connection services.

There are no numbers for "Opex for amounts payable for easement levy or similar direct charges on DNSP" as Ausgrid capitalises these amounts.

There are no numbers for "Opex for transmission connection point planning" as Ausgrid's costs are capitalised as a part of the planning of our transmission network with discussions with Transgrid.

Table 3.2.2 Opex consistency - historical cost allocation approaches

Opex reported in Table 3.2.2 has been prepared for all Regulatory years in accordance with the IPART Accounting Separation Code and the ACCC Requirement Guidelines and aligns to IPART and ACCC Regulatory Accounting Statements from FY2006 to FY2010. For FY2011 to FY2013 Opex has been prepared according to Ausgrid's Cost Allocation Methodology and aligns to the Annual Reporting Requirements for FY2011 to FY2013 financial years.

Ausgrid has determined "Opex for network services" as the aggregate of opex for the year less the opex for metering and connection services.

There are no numbers for "Opex for amounts payable for easement levy or similar direct charges on DNSP" as Ausgrid capitalises these amounts.

There are no numbers for "Opex for transmission connection point planning" as Ausgrid's costs are capitalised as a part of the planning of our transmission network with discussions with Transgrid.

Use of estimated information

All financial data reported in Table 3.2.1 & 3.2. are actuals and can be verified in SAP.

Material accounting policy changes

No accounting policy changes during the period FY2006 to FY2013 have had a material impact on operating expenditure.

3.3   Provisions

Compliance with requirements of the notice

Information reported is in accordance with the Regulatory Accounting statements as well as Ausgrid's Cost Allocation Methodology. Ausgrid prepares Standard Control Services Annual Regulatory Statements for AER which comply with Australian Accounting Standards and the Regulatory Information Requirements Guidelines for the NSW Electricity Distributors. These are independently audited and reviewed each year before reporting separately to the AER. The Regulatory Accounting Statements include Standard Control Services (Distribution) and Standard Control Services (Transmission).

The financial information provided is for each grouping of provisions identified as follows:
- Employee Benefits
- Restructuring costs
- Insurance
- Dividends
- Other

Other provisions consist of Asbestos Remediation, Polychlorinated Biphenyls (PCB) disposal costs for end of life equipment provision, legal provision, and asset decommissioning. Each individual provision has been specified by name and the variable codes for the line items have been separately identified as required.

Ausgrid has included an extra component in the provisions table to reflect the movement in the provisions which do not impact opex nor capex (i.e. dividend and employee benefits affecting equity, decommissioning affect asset values).

Source of information

Information provided is based on:

- Audited Regulatory Accounting statements;

- Historical accounting records;

- TM1 and SAP (Ausgrid's financial accounting and reporting systems) and

- External actuarial reports.

Methodology and Assumptions

Ausgrid applied the IPART Accounting Separation Code and the ACCC Requirement Guidelines and its Cost Allocation Methodology in providing the required information for FY2006 - FY2010.

Financial information on provisions reconciles to the reported closing balances for provisions in the Regulatory Accounting Statements for each Regulatory Year. In circumstances where a provision closing balance is compiled from actual and estimated numbers, the carrying amount at the end of the period is reflected in the actual and consolidated sheet.

Ausgrid has provided more complete information for benchmarking purposes in the tables below. The tables shown below provide additional information relating to movements (i.e. oncosts and payments) made from each employee provision for FY2006 – FY2010. This information has been extracted from the accounting system. The Historical Regulatory Accounts do not show this information and it has not been included in the templates as this information was not included in the regulatory accounts submitted.

		Standard control services						
		2006	2007	2008	2009	2010	2011	2012
GL 210500 to 210530 accounts								
Opex component								
The carrying amount at the beginning of the period	$'000	-	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	0.00
Increases to the provision	$'000	88,783.66	109,562.83	124,312.59	131,564.35	163,605.79	159,417.86	135,151.10
Amounts used (that is, incurred and charged against the provision) during the period	$'000	(85,875.73)	(107,590.35)	(123,968.15)	(129,052.48)	(162,634.78)	(153,477.40)	(133,439.70)
Unused amounts reversed during the period	$'000	(2,907.93)	(1,972.47)	(344.44)	(2,511.87)	(971.00)	(5,940.46)	(1,711.40)
The increase during the period in the discounted amount arising from the passage of time and the effect of any change in the discount rate.	$'000	-	-	-	-	-	-	-
The carrying amount at the end of the period	$'000	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**0.00**	**0.00**

		Alternative control services						
		2006	2007	2008	2009	2010	2011	2012
GL 210500 to 210530 accounts		GL 210500 to 210530 accounts						
Opex component								
The carrying amount at the beginning of the period	$'000	-	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	0.00
Increases to the provision	$'000	2,630.63	2,914.61	3,551.79	4,401.20	3,881.23	4,934.82	4,065.46
Amounts used (that is, incurred and charged against the provision) during the period	$'000	(2,544.47)	(2,862.14)	(3,541.95)	(4,317.17)	(3,858.19)	(4,750.93)	(4,013.98)
Unused amounts reversed during the period	$'000	(86.16)	(52.47)	(9.84)	(84.03)	(23.04)	(183.89)	(51.48)
The increase during the period in the discounted amount arising from the passage of time and the effect of any change in the discount rate.	$'000	-	-	-	-	-	-	-
The carrying amount at the end of the period	$'000	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**0.00**	**0.00**

The disclosure of the discount rate may have impacted the values reported Regulatory Accounting Statements for each Regulatory Year in the categories of "increases to the provision" or "unused amount reversed during the period". The discount rate impact was estimated and was not sourced from the accounting system.

The discount rate assumptions applied to the provisions are outlined below:

- Defined Benefits Superannuation (in Employee Benefits Provisions)

    The defined benefits superannuation position has been assessed by an actuary each year. The impact and value of this assessment is recognised by Ausgrid. The actuary did not provide Ausgrid any information on the impact of discount rates unless specifically requested. The discount rate impact is known for the years ended 30 June 2012 and 2013 and has been shown as actual. For FY2006 to FY2011, the discount rate impact is not known. The "increase during the period in the discounted amount arising from the passage of time and the effect of any change in the discount rate" for FY2006 to FY2009 has been estimated by Ausgrid as the year end adjustment. The discount rate for FY2010 and FY 2011 has been estimated by Ausgrid as the net impact of actuarial gains and losses as the "discounted rate impact".

- Long Service Leave, Supplementary Superannuation and Severance allowance, and Preserved Sick leave (in Employee Benefits Provisions)

    The position of these provisions has been assessed by an actuary each year. The impact and value of this assessment is recognised by Ausgrid. The actuary only provided information as at 31 December of each financial year. Therefore Ausgrid has rolled forward this discount rate impact to calculate an estimated 30 June discount rate effect.

- Workers' Compensation Insurance

    The position of this provision has been assessed by an actuary each year. The impact and value of this assessment is recognised by Ausgrid. The actuary did not provide any information on the impact of discount rates. The "increase during the period in the discounted amount arising from the passage of

time and the effect of any change in the discount rate" for FY2006 to FY2013 has been estimated by Ausgrid using the actuarial numbers of "effect of change in economic assumptions" over the "sum of changes across the period". This actuarial information used by the actuary is based on data extraction dates which are not exact balance sheet dates.

- PCB and Site Remediation provisions (in Other Provisions)

  For the Regulated distribution business, the Other Provision is related to site remediation, removal and disposal of equipment and decommissioning of assets to meet the legal and constructive obligation of Ausgrid. The discount rate applied to the above provisions was based on market yield on Commonwealth government 10 year bond rate as at 30 June for the relevant year.

Ausgrid has added an extra component in the provisions table to reflect the movement in the provisions which do not impact opex nor capex. The provisions for dividend do not impact opex nor capex. The actuarial gains and losses for defined benefits superannuation provision are reflected in an equity account and therefore the whole impact of the provision is not affecting opex or capex. The provision for decommissioning was created by increasing the asset value. Capex is not recognised until incurred, therefore there are components of this provision which are not recognised as capex nor opex.

Use of estimated information

Ausgrid has used estimated information for "The increase during the period in the discounted amount arising from the passage of time and the effect of any change in the discount rate" where actual information was not available. Information provided is categorised as estimates as they are not readily available from either Ausgrid's annual financial statements, TM1 or SAP. Furthermore, actuaries have not specifically provided Ausgrid this information. This is the best estimate available as the methodologies used are based on information relevant and available to each provision.

Ausgrid has outlined above under Methodology and Assumptions the basis for the estimates.

Material accounting policy changes

Ausgrid undertook material changes in accounting policies relating to the adoption of International Financial Reporting Standards (IFRSs). Ausgrid applied the Australian Equivalents to International Financial Reporting Standards (AEIFRS) from the reporting period beginning 1 July 2005. Some impacts arose because AEIFRS requirements were different from Australian Generally Accepted Accounting Principles (AGAAP) requirements. This affected the opening balances in 2006 and was reflected in the IPART and ACCC regulatory accounts for FY2006.

3.4 Opex for high voltage customers

Compliance with requirements of the notice

The information reported in Table 3.4 is consistent with the requirements of the Notice, AER's RIN Benchmarking Explanatory Statement and Instructions and Definitions Manual.

Source of information

High Voltage customer numbers and loads are sourced from Ausgrid's Metering Systems being Meter Data Agency Databased (MDA) and Maintenance Costs are sourced from SAP ECC (Data was obtained from Current Regulatory Proposal).

Methodology and Assumptions

The process adopted was as follows;

1. Identify HV Customers and their current loads.
   HV Customers and their loads were identified from our metering systems.

2. Allocate HV customers' to substation types on the basis of capacity characteristics of substation types. HV loads were then allocated to various substation types on the basis of the following substation capacities;

DC's	< 2MVA
Chambers & Large DC's	2-5 MVA
Zones	≥ 10 MVA

3. Calculate Ausgrid' average maintenance cost by substation type.
Ausgrid's average maintenance costs by substation type were calculated by dividing total maintenance costs for the year by the number of commissioned substations. Maintenance costs prior to 2010 were assumed to be equivalent to 2010 costs in real terms.

4. Derive estimated maintenance costs
Maintenance costs were then estimated by multiplying the average internal maintenance costs by the number of HV substations.

Use of estimated information

Ausgrid has used estimated information for Table 3.4 Opex for High Voltage Customers.

Since this is a cost is incurred by customers, Ausgrid has no actual information on these costs. As a result, it is necessary to estimate this cost on the basis of best available information. This is the best estimate available as the methodology used is based on information relevant and available.

These estimates are significantly limited in their application. Ausgrid has not been able to evaluate the age, condition or state of these assets. Ausgrid's actual maintenance costs, if Ausgrid owned these assets, may significantly vary from these estimates.

Material accounting policy changes

There have not been any material changes in accounting policies.

Worksheet 4 – RAB

4.1 RAB values

Compliance with requirements of the notice

The RAB worksheet required Regulatory Asset Base data into aggregated categories of capital inputs: namely overhead lines, underground cables, transformers and other capital. Furthermore, a split between Network Services, Standard Control Services and Alternative Control Services as per the definitions in Chapter 9 of the Economic Benchmarking Instructions was required.

This overarching requirement has been met with information provided in all three templates: the Worksheet 4 Actual Information template, Worksheet 4 Estimated Information template, and the Worksheet 4 Consolidated Information template.

Additionally, compliance with the RIN also involved the requirements detailed in Table 1, which also details the actions Ausgrid completed to meet these requirements.

Table 1 Compliance with the RIN

Compliance Requirement	Ausgrid's Compliance
All cells filled where highlighted yellow in the templates	Ausgrid has provided information in all yellow highlighted cells.
RAB values reported in accordance to the Standard Approach (section 4.1.1) detailed in the Instructions provided by the AER.	Ausgrid has complied with the Standard Approach provided in Chapter 4 of the Instructions. Assets have been directly attributed to the AER's economic benchmarking RAB Asset classes where appropriate, and have applied the more detailed allocation approach where direct attribution was not possible. Details are provided in following sections of this Basis of Preparation document.
RAB Standard Control Services values reported in accordance with the Financial Reporting Framework in Box 7 of section 4.1 of the Instructions provided by the AER.	Ausgrid provided Standard Control Services in the templates using information in Ausgrid's Roll Forward Models. These in turn reconcile to amounts reported in Annual Reporting Requirements (where actual data was provided in the templates).
The provision of a Basis of Preparation to accompany the filled worksheets (this document); in particular detailing the allocation methodology used (see 'Methodology and Assumptions' below).	Ausgrid has complied with this requirement through the provision of this Basis of Preparation document.
Substation land to be included in the 'substation asset' category	Ausgrid has complied with this requirement by allocating all substation land to the 'substation asset' category.
Reporting of Alternative Control Services where the AER has approved a RAB or RAB equivalent for the services, or alternatively the reporting of '0' in the absence of any approved RAB.	Ausgrid has complied with this requirement with the provision of Public Lighting RAB information.
All financial information rounded to the nearest dollar, and Non-Financial Information reported to 3 significant figures	Ausgrid has complied with this requirement. Please see each RAB Template.

Details of the steps Ausgrid has taken to comply with this RIN are detailed in sections below.

Moreover, as detailed in the instructions, Table 4.1 must reconcile to Table 4.2. This requirement has been met.

Source of information

Information for Table 4.1 RAB Values has been sourced from the Roll Forward Model (RFM). These provide the Opening Asset RAB values to the Post Tax Revenue Model (PTRM) for the regulatory period being forecast, and therefore are based on actual expenditure information which is reconcilable to Annual Regulatory Accounts.

Four main RFMs have been used as source data for Table 4.1:

1. EnergyAustralia Distribution RFM for 2009-14 Determination: this includes distribution RAB data between FY2005 and FY2009. This will be referred to as the 'Distribution RFM 0409'.

2. EnergyAustralia Transmission RFM for 2009-14 Determination: this includes transmission RAB data between FY2005 and FY2009. This will be referred to as the 'Transmission RFM 0409'.

3. Ausgrid Distribution RFM for 2014-19 Transitional Proposal: this includes distribution RAB data between FY2010 and FY2014 (FY2014 partially forecast). This will be referred to as the 'Distribution RFM 0914'.

4. Ausgrid Transmission RFM for 2014-19 Transitional Proposal: this includes distribution RAB data between FY2010 and FY2014 (FY2014 partially forecast). This will be referred to as the 'Transmission RFM 0914'.

For Standard Control Services, Ausgrid sourced the RAB values from the Distribution RFM 0409 and the Transmission RFM 0409 for the financial years 2006 to 2008 and the Distribution RFM 0914 and the Transmission RFM 0914 for the financial years 2009 to 2013. The RAB value data was extracted from the 'Input' sheet, the 'Actual RAB Roll Forward' sheet and the 'Total Actual RAB Roll Forward' sheet from each RFM.

For Alternative Control Services, the RAB value data was sourced AER's 2010 determination model for pre-2009 public lighting capital charges (referred to in this document as the PL PTRM).[1]

Methodology and Assumptions

The methodology for this section involved the following:

A. Standard Control Services

For each Table 4.1 line item (DRAB0101 to DRAB0107) is the sum of each of the respective rows in table 4.2. For the financial years 2006 to 2008, the Distribution RFM 0409 and the Transmission RFM 0409 line items were aggregated year by year, and for the financial years 2009 to 2013, the Distribution RFM 0914 and the Transmission RFM 0914 line items were aggregated year by year.

Disposal totals were obtained from the 'Input' sheets of each RFM. Closing values were obtained from the 'Total Actual RAB roll forward' sheets. All other line items were obtained from the 'Actual RAB roll forward' sheets.

B. Network Services

Network Services was obtained by removing the Metering Asset RAB components from each Standard Control Service Table 4.1 lines, including direct IT system assets and non-system assets attributable to the Metering Asset RAB as per the Cost Allocation Method (CAM). The proportion of Metering IT system assets relative to total IT system assets was determined using FY2013 actual book value data, with this proportion applied to each year. The non-system assets were segregated using the proportion of direct metering assets to direct non-metering assets, which was also applied to each historical year.

C. Alternative Control Services

Alternative Control Services Table 4.1 has been generated using information from the PL PTRM.

It should be noted that closing value for assets line item (DRAB0107) is the summation of all closing values in Table 4.2 and therefore includes inflation from easements (DRAB0802). Thus it does not reconcile within Table 4.1 (i.e. sum(DRAB0101, DRAB0104, DRAB0105) ≠ DRAB0107).

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[1] Note: The PL PTRM does not include new capital expenditure after 1 July 2009, as public lighting changed to an alternative arrangement outside of the RAB. The PL PTRM has also been adjusted for CPI since last being approved by the AER.

An assumption has been made, applicable to Table 4.1 and Table 4.2, that "Actual Additions (as recognised in the RAB)" includes the impact of disposals, and therefore disposals (e.g. DRAB0106) is excluded from the calculation of the closing RAB line (e.g. DRAB0107).

This is consistent with the RFM models, where the inclusion of actual capex in the "Actual RAB" sheet includes the net capex (i.e. disposals and capital contributions removed), as well as the half year application of WACC as calculated in the "Input" sheet.

Use of estimated information

The Network Services lines in Table 4.1 has been classified as estimated information as a result of the allocation methodology used to extract metering related assets from the Standard Control Services Table 4.1 lines, as described in 'B. Network Services' above. The result is the best estimate as it sums actual data with estimated data from Table 4.2. The estimated data aligns with the Standard Approach allocation process described in the Instructions; that is, delineates based on FY2013 book value proportions.

The Standard Control Services and the Alternative Control Services Table 4.1 columns have been classified as Actual Information as they have been derived from the Roll Forward Models and are reconcilable to the Regulatory Accounts for the relevant years.

Material accounting policy changes

Not applicable.

4.2   Asset value roll forward

Compliance with requirements of the notice

In this section we demonstrate how the information provided is consistent with the requirements of this Notice.

The RAB worksheet required Regulatory Asset Base data into aggregated categories of capital inputs: namely overhead lines, underground cables, transformers and other capital. Furthermore, a split between Network Services, Standard Control Services and Alternative Control Services as per the definitions in Chapter 9 of the Economic Benchmarking Instructions was required.

This overarching requirement has been met with information provided in all three templates: the Worksheet 4 Actual Information template, Worksheet 4 Estimated Information template, and the Worksheet 4 Consolidated Information template.

Additionally, compliance with the RIN also involved the requirements detailed above in Table 1, as well as requirements specific to Table 4.2. These are detailed in Table 2 which also specifies the actions Ausgrid completed to meet these requirements.

Table 2 Compliance with the RIN – Table 4.2

Compliance Requirement	Ausgrid's Compliance
Ausgrid must report RAB Asset Financial Information broken down in accordance with the RAB Assets as per definitions of the categories specified in Chapter 9.	Ausgrid has used the definitions specified in Chapter 9 as required. All assumptions and variations from these definitions are detailed in 'Methodology and Assumptions' below.
Where previously reported, Ausgrid must provide values separately for Easements. Otherwise, this should be included in the remaining categories. Data that includes Easements should be identified.	Easements have been reported separately. Data that contains easements has been identified.
Provision of Actual information where applicable	Ausgrid has attempted to provide as much actual information as possible.

Details of the steps Ausgrid has taken to comply with this RIN are detailed in sections below.

Source of information

The source information for Table 4.2 is the same as for Table 4.1, with the additional inclusion of data from Ausgrid's Fixed Asset Register to create a method to allocate the existing RAB values into the AER's required categories. The Fixed Asset Register has disaggregated replacement cost data between 2009 and 2013, with details of splits between distribution assets and transmission assets.

For 2006 to 2008, the estimation approach is explained below.

The estimated Capital Contribution values (DRAB 13 Estimated Value of Capital Contributions or Contributed Assets) is Actual Information sourced from SAP and TM1 (Ausgrid's Financial and Reporting System).

Ausgrid has relied on the following financial reports for the process of segregating the RAB into the required RIN classes:

- Annual "Assets Under Construction" (AUC) reports to determine the breakup of Ausgrid's "Work in Progress" (WIP) asset category in the RAB. This allowed the WIP to be segregated into the RIN classes

- Annual "Book Value Land by Property Usage" reports to determine the split of Ausgrid's "Land and Easements" RAB class. This was required to meet the AER's requirement to allocate system land to the respective substation RIN category as required.

Methodology and Assumptions

The methodology used for Table 4.2 included a detailed allocation of RAB asset classes to the categories required in the RIN. Direct allocation was utilised where possible in line with the Standard Approach. RAB assets that could not be directly allocated utilised the depreciated replacement cost approach described in the Instructions. As such, this approach produced the best estimate of the information being sought in the RIN within the confines of the Standard Approach.

This overall methodology is detailed as follows:

1) In the 2005 to 2010 RAB, Work in Progress (WIP) was its own asset class to ensure the total capex was added 'as incurred'. The WIP was reallocated across the asset categories in the RAB, which were then allocated into the RIN categories as described in the following steps.

2) For the remaining assets that required allocation across a number of RIN classes, in particular between overhead and underground classifications or zone and distribution substations, these were assigned an allocator based on depreciated replacement costs. The allocators were created as follows:

   a. Ausgrid's Fixed Asset Register (FAR) was used to estimate weightings for 2009 to 2013. The FAR was used to determine the depreciated replacement cost of assets by financial class each year. Assets by financial classes aggregate to form RAB assets for the RFM. This method is in line with the Instructions; part (c) of the *RAB allocation approach* section. The FAR data provided a more accurate basis for estimation of the depreciated replacement cost in comparison to using the physical asset data (Template 6), the unit rate replacement cost and the weighted average asset age as recommended by the AER in part (c).

   Each disaggregated RAB asset was allocated a specific RIN category:

      i. overhead assets less than 33kV

      ii. underground assets less than 33kV

      iii. zone substations

      iv. distribution substations

      v. overhead assets greater than 33kV

      vi. underground assets greater than 33kV

   b. The weightings were applied to the RAB Asset numbers in the RFM. This approach allowed for reconciliation to Table 4.1 as required.

   c. For years 2006 to 2008, the 2009 RAB Asset Weightings were assumed as FAR data for these years was unavailable. This was determined to be a reasonable assumption with the projections in line with latter year weightings.

d. The weightings were applied to each RFM model in order to calculate the RIN category allocations.

3) Assets that could directly allocate to RIN categories were allocated in full.

4) Steps 1 and 2 were repeated for each RFM (distribution and transmission RFMs for both 2004-09 and 2009-14) with consolidated data inserted into the Consolidated spreadsheet Standard Control Service column.

5) In line with Table 4.1, Metering related assets (i.e. direct metering assets, direct IT metering assets and non-system assets allocated to Metering) were segregated from the Standard Control Services data to fill Network Services columns. This was undertaken in accordance with the CAM.

6) Public Lighting data was inserted separately, sourced from the Public Lighting PTRM. This was categorised into the "Other Assets with Long Lives" class.

7) Capital contribution data (DRAB13 Estimated Value of Capital Contributions or Contributed Assets) was obtained from SAP and TM1 (Ausgrid's Financial and Reporting System). The amounts reported for Network Services and Standard Control Services are the same as there were no capital contributions associated with metering services.

8) Metering was separated from the "Metering and Load Control" asset group based on book values as of FY2013. The Load Control assets were allocated to the "Other" Long Life asset class, and also determined to be classified as Network Services assets.

9) As Ausgrid's RAB has system land and easements in a single asset class ("Land and Easements"), zone system land and distribution system land was segregated from easements. This was undertaken using the FAR to initially isolate the easements, and then separate the system land into zone and distribution proportions using book values.

10) As a final step, the consolidated template was separated into actual and estimated information. This was based on direct attribution (step 2 above) or allocation (step 1): it was assumed that all RAB data that could directly be applied to a RIN category was deemed as accurate and therefore actual, whereas allocated RAB was less accurate and therefore estimated.

As the template involved the reproduction of the RAB into unorthodox categories, additional assumptions had to be made in order to provide information in a practical and reasonable manner. Assumptions include the following:

•   "Actual Additions (recognised in the RAB)" is net of disposals, and therefore calculation of the closing RAB for each RIN category does not require the addition of the disposal line items.

•   RAB assets that could not clearly be attributed to a RIN category were assigned to an 'Other' category based on standard life. The majority were "Other Assets with Long Lives" which includes the following:

    o   Communications equipment

    o   Public lighting

    o   Emergency spares

    o   Furniture, fittings, plant and equipment

    o   Motor vehicles

    o   Non system buildings and land

    o   Other non-system assets

    o   Equity Raising Costs (for 2010-2013)

    o   Load control assets

    The "Other Assets with Short Lives" mainly consists of IT related assets.

•   Zone Substations includes ancillary assets, as well as zone buildings and zone land

•   Load Control assets were assumed to be Network Services assets

•   IT system assets and Non-System assets allocated to Metering were determined using the proportions based on FY13 data.

- Assets attributable to overhead categories may include assets associated with underground assets (e.g. underground to overhead connections (UGOHs)). These have not been segregated.

- As previously explained in section 4.1, Network Services differs to Standard Control Services only by metering assets. Other non-Network Services assets could not be segregated by RIN category.

- Easement assets have not been included outside of the easements category.

- Public Lighting was part of Ausgrid (formerly EnergyAustralia's) RAB for 2004-09. This has been reported in the templates. For 2010 to 2013, new public lighting capex was not recorded against the RAB asset category, although the asset continued to be rolled forward as a RAB.

- Disposals have been sourced from the RFM input sheet. Therefore, they do not include any WACC (i.e. half year application of WACC).

- Capital Contributions sourced from SAP and TM1 (Ausgrid's Financial and Reporting System) also do not include any WACC (i.e. half year application of WACC).

Use of estimated information

Ausgrid has treated allocated RAB data as estimated, which is explained in greater detail above.

As per the Instructions, the allocation method was necessary where RAB assets did not fall directly within a single RIN category.

The allocation methodology provided by the AER alters the underlying actual data, and therefore cannot be treated as actual data. As indicated above, the approach produced the best estimate of the information being sought in the RIN within the confines of the Standard Approach.

Notwithstanding the estimated nature of the data in Table 4.2, at an aggregated level this data reconciles to the data in Table 4.1.

Material accounting policy changes

Not applicable.

4.3 Total disaggregated RAB asset values

Compliance with requirements of the notice

The RAB worksheet required Regulatory Asset Base data into aggregated categories of capital inputs: namely overhead lines, underground cables, transformers and other capital. Furthermore, a split between Network Services, Standard Control Services and Alternative Control Services as per the definitions in Chapter 9 of the Economic Benchmarking Instructions was required.

This overarching requirement has been met with information provided through all three templates: the Worksheet 4 Actual Information template, Worksheet 4 Estimated Information template, and the Worksheet 4 Consolidated Information template.

Additionally, compliance with the RIN also involved the requirements detailed above in Table 1 as well as requirements specific to Table 4.3. These are detailed in Table 3 which also specifies the actions Ausgrid completed to meet these requirements.

Table 3 Compliance with the RIN – Table 4.3

Compliance Requirement	Ausgrid's Compliance
Calculation based on the average of opening and closing RAB values.	Ausgrid has averaged the opening and closing RAB values from Table 4.2.
Data must be directly reconcilable to Table 4.2	The data directly reconciles to Table 4.2

Details of the steps Ausgrid has taken to comply with this RIN are detailed in sections below.

Source of information

The source for Table 4.3 is Table 4.2.

Methodology and Assumptions

In this section we explain the methodology Ausgrid applied to provide the required information, including any assumptions Ausgrid made.

Ausgrid has calculated the disaggregated RAB values by averaging the opening and closing values.

Use of estimated information

Ausgrid has used estimated information where allocation has taken place, i.e. table data based on allocated Table 4.2 data has been treated as estimated.

Material accounting policy changes

Not applicable.

4.4   Asset lives

Compliance with requirements of the notice

The RAB worksheet required Regulatory Asset Base data into aggregated categories of capital inputs: namely overhead lines, underground cables, transformers and other capital. Furthermore, a split between Network Services, Standard Control Services and Alternative Control Services as per the definitions in Chapter 9 of the Economic Benchmarking Instructions was required. This overarching requirement has been with information provided in through all three templates: the Worksheet 4 Actual Information template, Worksheet 4 Estimated Information template, and the Worksheet 4 Consolidated Information template.

Additionally, compliance with the RIN also involved the requirements detailed above in Table 1, as well as requirements specific to Table 4.3. These are detailed in Table 4 which also specifies the actions Ausgrid completed to meet these requirements.

Table 4 Compliance with the RIN – Table 4.4

Compliance Requirement	Ausgrid's Compliance
Asset lives must be reported in accordance with definitions in Chapter 9	Ausgrid has used the definitions as per Chapter 9
Weightings must be calculated as specified in the Instructions, in order of preference.	Ausgrid has utilised option 1: based on the asset's share of the RAB for the category and expected lives
Ausgrid must provide actual information where possible, otherwise Ausgrid must provide estimated information.	Ausgrid has utilised a weighting approach and therefore has deemed Table 4.4 data as estimated.

Details of the steps Ausgrid has taken to comply with this RIN are detailed in sections below.

Source of information

The asset lives for each category in each year were derived from the AER final decision RFMs from the 2004-09 and 2009-14 determinations.

Public lighting information for 2004-09 was obtained from the 2009 AER decision with public lighting forecasted in a separate model.

The Ausgrid Fixed Asset Register was also relied upon to derive the dollar value splits from one Ausgrid asset class into RIN categories.

Methodology and Assumptions

The asset lives for each year in the RIN template have been reported in line with the AER's asset input categories for economic benchmarking. RAB assets are separated for the Network Services component of Standard Control Services.

Asset lives values for the RAB have been reported in accordance with the standard approach detailed in the Instructions.

Where RIN categories comprise a number of RAB assets, asset lives for the whole category are calculated by weighting the lives of individual assets within that category, as explained in the Instructions. Weightings were calculated on the basis of the assets share of the RAB for that RIN category, in line with the example provided.

The standard and remaining asset lives for each Ausgrid asset category in each year were derived from the AER approved Transmission and Distribution RFMs from 2004-09 and 2009-14:

1. The first step was to collect the standard lives for each Ausgrid asset category, and apply this as the standard life for each year within that regulatory period. Given that the RFMs were used to collect the standard lives for each Ausgrid asset category, no inconsistencies were found in the standard lives of assets that were reported in the RAB for both periods.

2. The next step was to derive the weighted average standard lives and remaining lives for each Ausgrid regulatory asset class for each year required by the RIN (FY06-FY13).

3. Remaining lives for existing RAB as well as net capex in subsequent years within that period were weighted based on their real depreciated values within the relevant RFM.

4. After the weighted average standard and remaining lives had been collected for each Ausgrid asset category for each year required by the RIN (FY06-FY13), the next step was to allocate them into RIN categories. In some instances, one RIN category consisted of a number of RFM RAB asset classes. The standard and remaining lives for each year in these cases were derived by weighting each life by its asset dollar value for that year, and summing the weighted averages as they apply to each RIN category.

5. In other instances, one RFM RAB asset class was split into a number of RIN categories. These weightings were derived from weighting explained above using the Fixed Asset Register (see methodology in Basis of Preparation Template 4.2). For example, the Ausgrid asset class of 'Sub-transmission lines' was allocated into two RIN categories; "Overhead assets 33kV and above' and 'Underground assets 33kV and above'.

Assumptions:

- The RFM RAB asset classes of 'Substations' and 'Transformers' have been allocated across the RIN categories of "Distribution substations including transformers" and "Zone substations". Given that the AER asset category of Distribution Substations included transformers, Ausgrid considers it is reasonable to assume that the "Zone substations" category should also include its share of transformers.

- Any asset classes that reported a standard or remaining life of "n/a" in the RAB RFM were given no weighting in calculating the weighted average remaining life when allocated to the RIN categories. Therefore, the standard and remaining lives as well as the dollar values for these asset classes were not included in the calculation of the weighted averages for RIN categories.

Use of estimated information

Ausgrid has used estimated information based on the premise that the weighting method has been provided by the AER and cannot be deemed as actual information from Ausgrid.

The Standard Approach set out in the RIN instructions necessitates the data to be estimated. The estimated data is considered to be the best estimate as the method used to derive it is consistent with the RIN instruction and provides an outcome considered to most closely align with that being sought by the RIN.

Worksheet 5 – Operational data

5.1   Energy delivery

Compliance with requirements of the notice

In this section we demonstrate how the information provided is consistent with the requirements of the Notice, specifically section 5.1.

Compliance Requirement	Ausgrid's Compliance
Energy delivered is the amount of electricity transported out of Ausgrid's network in the relevant Regulatory Year (measured in GWh).	Ausgrid has relied on audited electricity transported statistics in populating the 2006 to 2012 cells. While an audit of 2013 statistics has not been required, an identical process as that used in the 2006 to 2012 statistics has been followed.
It must use the energy metering or estimated at the customer charging location rather than the import location from the TNSP	Ausgrid has reported electricity delivered.
Energy delivered must be the actual energy delivered data, unless this is unavailable. Where actual information is not available for the most recent reporting period, energy delivery data for that period may be reported on an accrual basis	Ausgrid has relied on audited electricity transported statistics in populating the 2006 to 2012 cells. While an audit of 2013 statistics has not been required, an identical process as that used in the 2006 to 2012 statistics has been followed.
Peak, shoulder and off-peak periods relate to Ausgrid's own charging period.	The audited 2006 to 2012 and unaudited 2013 electricity transported statistics clearly distinguish between peak, shoulder and off-peak consumption.
For Table 5.1.1 Energy Grouping-delivery by chargeable quantity Ausgrid must report energy delivered in accordance with the category breakdowns as per the definitions provided in Chapter 9 Ausgrid must only report "Energy Delivery where time of use is not a determinant" (DOPED0201) for Energy Delivery that was not charged for peak, shoulder or off-peak periods.	Ausgrid has complied with the definitions. Technically, DOPED0205 (Controlled load) and DOPED0206 (unmetered supplies) fall into the "Energy Delivery where time of use is not a determinant" (DOPED0201) category, but because they have been specifically requested these energy consumptions have been populated in DOPED0205 (Controlled load) and DOPED0206 (unmetered supplies).
For Table 5.1.2 Energy – Received from TNSP and other DNSPs by time of receipt Ausgrid must report energy input into its network as measured at supply points from the TNSP and other DNSP in accordance with the definition provided in chapter 9 Ausgrid must only report energy against "Energy received from TNSP and other DNSP not included in the above categories" (DOPED0304) where it is not possible to allocate the energy received into on-peak, shoulder and off-peak times.	Ausgrid has complied with the definition. The energy reported is that measured at TransGrid bulk supply points and at Ausgrid's boundary with Endeavour Energy. The energy can be completely allocated to peak, shoulder and off-peak periods.

Compliance Requirement	Ausgrid's Compliance
For Table 5.1.3 Energy delivered must be reported in accordance with the category breakdown as per the definitions provided in chapter 9. Ausgrid is required to report energy received from Non-residential Embedded Generation by time of receipt. Ausgrid is required to report back cast energy received from Residential Embedded Generation only if it records data for these variables (DOPED0405–DOPED0408), however Ausgrid is required to provide this data for future Regulatory Years. 'Energy received from Embedded Generation not included in above categories' (DOPED0404 and DOPED0408) includes energy received from Embedded Generation on an accumulation basis and not measured by the time of receipt. Ausgrid must only report energy received in DOPED0404 where it is not possible to allocate the energy received into on-peak, shoulder and off-peak times (DOPED0401–DOPED0403 and DOPED0405–DOPED0407). When completing the templates for Regulatory Years subsequent to the 2013 Regulatory Year, if Ausgrid can provide Actual Information for the Residential Embedded Generation variables (DOPED0405–DOPED0408) it must do so; otherwise Ausgrid must provide Estimated Information.	Ausgrid has complied with the definition. The energy reported is that from embedded generators, including rooftop solar PV exports to the network.
For Table 5.1.4 Ausgrid must report energy delivered in accordance with the category breakdown as per the definitions provided in chapter 9. The category breakdown must be consistent with the customer types reported in table 5.2.1.	Ausgrid notes that the category breakdown in Table 5.1.4 is different to that in Table 5.2.1, the latter of which includes an additional row for "Unmetered customer numbers", which is not present in Table 5.1.4. In Table 5.1.4 Ausgrid has entered unmetered energy deliveries into the "Other customer class energy deliveries" cells.

Source of information

Table 5.1 requests both energy "delivered" and energy "received". Ausgrid relies on separate data sources for both measures.

The energy delivered data in Tables 5.1, 5.1.1 and 5.1.4 is **Actual Information** sourced from SAP via the Business Warehouse which collates customer volume consumption for billing purposes. For the years 2006 to 2012 the SAP Business Warehouse data was summarised into annual Weighted Average Price Cap (WAPC) volume schedules which were fundamental to the setting of regulatory prices under the WAPC form of regulation. The 2006 to 2012 WAPC schedules have been subject to and have passed annual independent audits as part of the annual pricing proposal process. An independent audit of the 2013 volumes has not been required due to the introduction of the revenue cap regulatory regime. However, identical processes have been applied in preparing the 2013 energy delivered data to those used previously to prepare the audited 2006 to 2012 data.

The energy received data in Tables 5.1.2 and 5.1.3 is **Actual Information** sourced from a combination of:

- Ausgrid's Bulk Supply Point (BSP) data processing system, which relies on market-standard metered data to calculate the half-hourly energy flows into the network from TransGrid, other DNSPs and non-residential embedded generators. The BSP system is also the source for Ausgrid's reporting of system-

wide maximum demand, and in this context the BSP system has been subject to and passed various independent audits as part of previous RIN audits; and

- The SAP Business Warehouse which is the source for the requested data on exports to the network from small embedded generators (most notably solar PV exports).

Methodology and Assumptions

Metered data from the SAP Business Warehouse and BSP system has been used in populating Table 5.1.

In Table 5.1.4 the cells in "Other Customer Class Energy Deliveries" are unmetered supply tariffs.

Use of estimated information

No estimation has been required in populating Table 5.1.

5.2   Customer numbers

Compliance with requirements of the notice

In this section we demonstrate how the information provided is consistent with the requirements of the Notice, specifically section 5.2

Compliance Requirement	Ausgrid's Compliance
Distribution customers for a Regulatory Year are the average number of active National Meter Identifiers (NMIs) in Ausgrid's network in that year (except for Unmetered Customer Numbers).	Ausgrid has complied with this definition
Each NMI is counted as a separate customer	Ausgrid has complied with this definition. The total customer count represents the number of distinct accrued installations as at the end of each month. The default parameter for the customer number extraction query includes sites with a status of occupied or vacant.
The average is calculated as the average of the number of NMIs on the first day of the Regulatory Year and on the last day of the Regulatory Year. Both energised and de-energised NMI must be counted. Extinct NMIs must not be counted. Note also email clarification from Andrew Ley of the AER dated 4 Feb 14. The definition of customer numbers excludes "deactivated NMIs. A deactivated NMI is equivalent to a NMI that is "extinct". This is a NMI with a status code "X" in accordance with AEMO's MSATs CATs procedure. The definition includes de-energised NMIs (Status Code D). For the avoidance of doubt, our definition of customer numbers includes NMIs with status codes "A: (Active) and "D" (Not energised). Our definition does not include NMIs with status codes "X" (Extinct) or "G:" (Greenfield site).	
For unmetered customers, the Customer Numbers are the sum of connections (excluding public lighting connections) in Ausgrid's network that do not have a NMI and the energy usage for billing purposes is calculated using an assumed load profile (examples	As stipulated, public lighting customers have been excluded from the customer number statistics both Tables 5.2.1 and 5.2.2.

include bus shelters, security lighting and traffic signals where not metered). Public lighting connections must not be counted as unmetered customers.	
Table 5.2.1 Distribution Customer Numbers by customer type or class Ausgrid must report Customer Numbers in accordance with the categorisation as per the definitions provided in Chapter 9. Ausgrid must report customer against "Other Customer Numbers"(DOPCN0106) only when customers cannot be allocated to the other customer classes (DOPCN0101- DOPCN0105)	Ausgrid has applied the following definitions from Chapter 9 for completion of Table 5.2.1 Residential Customers: Residential customer means a customer who purchases energy principally for personal, household or domestic use at premises. Non-residential customers not on demand tariff: All customers that are not Residential Customers and who do not pay demand-based tariffs. These customers will typically pay a fixed charge and a charge based on energy consumption. (Non residential) Low Voltage demand tariff customers: Non-residential Customers that pay a charge based on either their actual Maximum Demand or a contracted level of demand and who are connected at 240 or 415 volts. These customers may also pay a fixed charge and a charge based on energy consumption in addition to the demand charge. (Non Residential) High voltage demand tariff customers: Non-residential Customers that pay a charge based on either their actual Maximum Demand or a contracted level of demand and who are connected at higher than 415 volts. These customers may also pay a fixed charge and a charge based on energy consumption in addition to the demand charge. Unmetered Customer numbers: Customers for which energy delivered is for uses which are "calculated" rather than "metered". This may include supplies for the purposes of traffic controls, phone of public transport cubicles and other services where consumption is calculated rather than metered As stipulated, public lighting customers have been excluded from the customer count. Ausgrid has not reported any customer numbers against "Other Customer Numbers".
Table 5.2.2 Distribution Customer Numbers by location on the network Ausgrid must report Customer Numbers in accordance with the category definition provided in Chapter 9. The locations are CBD, urban, short rural and long rural	Ausgrid has applied the following definitions from Chapter 9 for completion of Table 5.2.2 Customers on CBD Network Customers on Urban Network Customers on Short Rural Network Customers on Long Rural Network

Source of information

Table 5.2 requests separate breakdowns of customer numbers into customer class categories and into location-based categories. Ausgrid relies on separate data sources for both measures.

The customer class breakdown in Table 5.2.1 is sourced from SAP via the Business Warehouse query "Accrual Tariff Usage - Installation Count". The customer count represents the number of distinct accrued installations as

at the end of each month. The default parameter for this report includes sites with a status of occupied or vacant. The customer count query used to extract the data has been subject to and passed various independent audits as part of previous RIN audits. However, due to the specific definitions used in this notice (in particular the requirements to prepare average customer numbers and to exclude public lighting customers), the numbers in this Notice have not themselves been audited.

The location-based breakdown in Table 5.2.2 is sourced from Ausgrid's Outage Management System (OMS) which contains customer numbers on the location-based breakdown requested by the Notice.

The following provides additional contextual information on the data contained within OMS.

There are applications (directly linked to OMS) and reference tables outside OMS that hold information relevant to performance reporting. Specifically:

- Electrical connectivity details (including where NMIs are attached to the network): source is GIS.

- NMI details: SAP Customer Care System (CCS) & B2B.

- Reporting Reference tables: Feeder categorisation (CBD, urban etc) and annual Tmed threshold values.

The reporting reference tables provide the capability of separating outage events, NMIs affected and NMIs fed by Feeder Category

Methodology and Assumptions

Table 5.2.1

Outputs from SAP via the Business Warehouse query "Accrual Tariff Usage - Installation Count" form the basis for the data in Table 5.2.1.

Table 5.2.2

Once the data is extracted into the reporting environment it is combined with the reference feeder category and NMI status (active vs. inactive) to generate the required performance measures:

A Business Objects report (03_01 Monthly reports – misc Ver 9.0.xls) provides the summarised results for customer numbers by feeder category as required for the tables described.

It is recognised that the feeder category and number of customers may change throughout the year and therefore that data is as at the end the 2012-13 year.

Key assumptions used in method:

- All outage events are correctly recorded in OMS (times, NMIs affected, Trigger, et al)

- All reference tables are accurate (feeder categories)

Use of estimated information

Table 5.2.1

The data provided for years 2008-2012 is Actual Information.

Ausgrid for its own business purposes and for the purpose of this Notice, has necessarily relied on estimates for the 2006 and 2007 values of DOPCN0101 and DOPCN0101. Estimation has been necessary as in these years a number of tariffs were open to a mix of residential and non-residential customers, and the SAP Business Warehouse customer count query at the time did not distinguish between residential and non-residential customers. The SAP Business Warehouse did, however, at the time distinguish between residential and non-residential customers' consumption, including Network Access Charge (NAC) volumes. The estimated share of residential and non-residential customers on the shared tariffs has been assumed to align with the billed NAC volumes and for this reason is considered to produce the best estimate most closely aligned to the data being sought by the RIN.

Table 5.2.2

The data in this table is estimated information. Actual information could not be provided in relation to this table because in the process of extracting data from the OMS reporting environment for use in completing this Notice, it was identified that some historical outage event records contained incorrect customer allocations. This was caused by a recent third party software problem associated with the reporting environment. This meant that the actual customer numbers by location breakdown could not be relied upon as accurate. Consequently Ausgrid has

estimated the values of DOPCN0201 to DOPCN0204. To calculate the feeder category allocation, reports were extracted on 14/1/2014 and percentages were determined using historical customer numbers. The global percentages are expected to have been minimally impacted by the reporting problem and for this reason are considered to produce the best estimate of the customer numbers in the categories being sought by the RIN.

The estimation process for DOPCN0201 to DOPCN0204 was as follows:

1. Use the total customer count value from DOPCN01 (that is, the customer count from the SAP Business Warehouse customer count query).

2. Then, apportion the splits across feeder categories in DOPCN0201 to DOPCN0204 on the basis of the splits obtained on the 14/1/2014 OMS data extract.

5.3   System demand

Compliance with requirements of the notice

All data in Table 5.3.1 to 5.3.4 is provided as actual. All data in relation to weather adjusted maximum demand at 10% POE for 2006 is not available.

All data in Table 5.3.6 to 5.3.7 is provided as actual.

Source of information

Tables 5.3.1 to 5.3.4

Data provided in Table 5.3.1, 5.3.2, 5.3.3, and 5.3.4 is obtained from Ausgrid's Spatial Demand Forecast System.

Table 5.3.5

The following data sources were used for the estimation of Power Factor (PF):

I.   SCADA data

Real and reactive power from zone substations from SCADA data sourced from PI Historian database. For the 2013 Regulatory Year, 33 Zone and Sub Transmission substations provided valid aggregated real and reactive power flow data. Earlier years show less coverage.

II.   SAS data

Real and reactive power from transformers or feeders in zones in the SAS database.

The SAS database holds, among others, metering data from individual transformers and feeders in substations. About 100 sites had data that was viable for calculation of the PF.

III.   Low Voltage (LV) Power Quality (PQ) meter data

Real and reactive power from distribution transformers. There was limited data available for the PF assessment at LV level as only data from PQ surveys (usually covering only one or two weeks) at distribution transformers were deemed to be acceptable for calculating a network wide PF. Fourteen sites were used for FY12 and 6 for FY13.

Data was extracted and analysed for the Regulatory Years (RY) 2008 to 2014 (where the Regulatory Year 2007 covers the Period July 2006 to June 2007 and so forth).

Data for Regulatory Year 2007 was estimated based on subsequent year's data.

Tables 5.3.6 to 5.3.7

The demand supplied data is sourced from SAP via the Business Warehouse which collates customer volume consumption for billing purposes. For the years 2006 to 2012 the data is from the Weighted Average Price Cap (WAPC) volume schedules which were fundamental to the setting of regulatory prices under the WAPC form of regulation. The 2006 to 2012 WAPC schedules have been subject to and have passed annual independent audits as part of the annual price-setting process. An independent audit of the 2013 volumes is not required due to the introduction of the revenue cap regulatory regime. However, identical processes have been applied in preparing the 2013 energy delivered data to those used previously to prepare the audited 2006 to 2012 data.

Table 5.3.6 requests data for customers charged on a MW basis. Over the period covered by this Notice there have been three such tariffs (EA302, EA303 and EA304). Customers on these tariffs generally have Type 5 meters installed.

Table 5.3.7 requests data for customers charged on a MVA basis. Over the period covered by this Notice there have been 49 such tariffs. Customers on these tariffs generally have Type 4 or higher meters installed.

Methodology and Assumptions

<u>Tables 5.3.1 to 5.3.4</u>

Ausgrid performs weather normalisation at 10% & 50% POE using simulation technique at the zone substation level on a yearly basis. Power factors and diversity factors are measured and calculated as close to the system peak as possible to enable conversion between MW and MVA and calculation of coincident system maximum demand. Key assumptions include:

- All load data is obtained from Ausgrid's SCADA system or metering points. All weather data is obtained from Bureau of Meteorology weather stations.

- Maximum demand for the financial year includes period 1st May – 30th June from the previous financial year. Ausgrid's winter season covers period 1st May – 31st August and Ausgrid believes it is impractical to divide the winter season across two financial years.

- Ausgrid interprets "transmission connection point" as any "subtransmission substation", "zone substation", or "High Voltage Customer" connected at 132kV for Table 5.3.2 and 5.3.4.

- Data for High Voltage Customers connected at 132kV is not readily available for years 2006 to 2010. Where data was missing for a HVC, a suitable recorded value close to the missing data year was assumed.

- Redbank 132kV generator has data missing for a number of seasons. Redbank 132kV generator was assumed as 130MW of generation for all years where data was not recorded.

- 10% & 50% POE actual obtained by selecting the corresponding percentile of the maximum demand from 2000 simulated summer & winter seasons.

- Simulation is based on the daily maximum load and average temperature relationship observed for the corresponding season.

<u>Table 5.3.5</u>

Power Factor derivation method:

As specified in the instructions and definitions guide, 10min average PF was calculated from 10min average real (MW = P) and reactive (MVAr = Q) power readings using the following formula:

$$PF = \frac{abs(P)}{\sqrt{P^2 + Q^2}}$$

The total site PF of an individual site for a given Regulatory Year was calculated as the 50th percentile of all available data.

The network wide PF of a voltage level is the average of the PF of all sites where a total site PF value is available for that voltage level.

Although some sites have PQ meters installed that provide PF values in the range of -1 to 1, the above formulae was applied to provide a better measure of the relative amplitude of the reactive power on the network when aggregating PF network wide.

Note: The data has been sourced from various databases some of which are implemented for purposes other than power quality (Revenue metering and the like). Due to the data volume and time constraints, it has not been possible to carry out detailed checking for incorrect or 'bad' data. As stated above, a simple 50th percentile figure has been calculated and used for the report. A more rigorous analysis would consider statistical compliance with the relevant rules and standards.

Note: Power Factor was calculated for all levels of power (i.e. not at system peak) and no correction was made for weather.

DOPSD0301 is set equal to DOPSD0104 divided by DOPSD0204.

Note: In Zone and Sub Transmission Substations, the aggregated Power Factor for the substation was calculated and reported against both the primary and secondary voltage. No adjustment was made for possible impact of the

transformer impedances. Where a substation has two transformation stages, the aggregated data was reported for the end secondary voltage (11kV) only.

Ausgrid maintains a legacy 5kV distribution network out of two Zone Substations (Camperdown and Blackwattle Bay). Camperdown Zone is being converted to 11kV distribution network with planned completion by December 2014. Blackwattle Bay Zone is planned for conversion to an 11kV distribution network in the period 2016-2018. Neither zone records MW so it is not possible to provide Power Factor for the 5kV level. If an estimation of Power Factor for 5kV was required, figures for 11kV would be used as the aggregated load types would be broadly similar.

Tables 5.3.6 to 5.3.7

The volumes which are relevant to Tables 5.3.6 and 5.3.7 are entered in the WAPC volume schedules as the sum of the twelve individually monthly billed kW or kVA (depending on the tariff structure) volumes for each tariff.

For the purposes of completing this Notice, the value entered is the WAPC volume divided by twelve.

Use of estimated information
All data provided as estimated values in this section below is based on the best possible estimates available to Ausgrid at the time of preparation for this economic benchmarking RIN.

Tables 5.3.1 to 5.3.4

Data required in populating Tables 5.3.1 to 5.3.4 is primarily based on actual information, with the following minor exceptions:

- Data for High Voltage Customers connected at 132kV is not readily available for years 2006 to 2010. Where data was missing for a HVC, the most recent available value was reported and this represents the best available estimate.

- Redbank 132kV generator has data missing for a number of seasons. Redbank 132kV generator was estimated to be 130MW of generation for all years where data was not recorded. This is the most recent value available and represents the best estimate for the generator output.

Tables 5.3.5

For table 5.3.5, Ausgrid has used estimated information for the following data points:

Voltage Level	Regulatory Years	Reason
132 kV	2006	Historical data not available
66kV	2006 – 2012	Historical data not available
33kV	2006	Historical data not available
22kV	2006 - 2014	Historical data not available
SWER	2006 - 2014	Historical data not available
11kV	2006	Historical data not available
Low Voltage	2006 - 2012	Historical data not available

The basis for the estimate:

- For 22kV and SWER, a PF value of 0.90 was used as this is the same value used by Ausgrid distribution planning. Based on research done for SWER lines, the value chosen is the best estimate available at the time of preparing the RIN information.

- For 66kV, the data was sourced from two SCADA sites and three revenue metering data sites, so the estimates were based on that limited measurement data. The values used are appropriate given that the loads on the 66kV lines are generally mining sites in the Hunter area with predominantly large 3 phase motors and represent best available estimates for this data.

- For all other voltage levels, estimates were the calculated mean value of years where actual measured data was available. The variation of the measured PF around the mean is low (less than 4% for voltages

where long run data was available), so use of the mean is deemed appropriate and are best estimates based on available data.

Note: For Regulatory Year 2006, limited historical data is stored on Ausgrid databases, but was not able to be retrieved and analysed in time for this report. The mean value of PF for subsequent years where measured data was available was used (with same comments as above about the small variation of measured data around the mean). It is not expected to have a material impact on the overall report.

Tables 5.3.6 to 5.3.7

No estimation has been required in populating Tables 5.3.6 and 5.3.7.

Worksheet 6 – Physical assets

6.1   Network capacities variables

Compliance with requirements of the notice

The information in this section is compliant in that actual values are used where possible, and best estimates are provided where actual data is not available.

Source of information

Tables 6.1.1 and 6.1.2

The data for table 6.1.1 and table 6.1.2 is sourced from Ausgrid's Geographical Information System (GIS) – the repository for spatial asset data. Extracts are run at 6 monthly intervals providing a variety of different summaries of the asset information held within the system. These reports are held in date specific folders within Ausgrid's universal network drive under the folder U:\GIS\IPART. Data for 2007 to 2013 financial years inclusive was sourced from the "Network Age" extracts, with 2006 being sourced from the "Suburb totals" due to the "Network Age" extract not being run prior to 2007. These reports contain lengths of mains by conductor/cable code.

Specifically, the original source files used are:

2006

U:\GIS\IPART\01_07_2006\ODRC_TOTALS_REPORTS_01_07_2006\ODRC_Suburb_Totals_01_07_2006.csv

2007

U:\GIS\IPART\01_07_2007\ODRC__NETWORK_AGE__01_07_2007.csv

2008

U:\GIS\IPART\01_07_2008\reconcilation\ODRC__NETWORK_AGE__01_07_2008.csv

2009

U:\GIS\IPART\01_07_2009\reconcilation\ODRC__NETWORK_AGE__01_07_2009.csv

2010

U:\GIS\IPART\01_07_2010\ODRC__NETWORK_AGE__15_09_201010_18_42.csv

2011

U:\GIS\IPART\01_07_2011\ODRC_SUBURB_REPORTS_01_07_2011\ODRC__NETWORK_AGE_01_07_2011.csv

2012

U:\GIS\IPART\01_07_2012\ODRC_NETWORK_AGE_01_07_2012\ODRC_FINYEAR_2013_NETWORK_AGE_01_07_2012.csv

2013

U:\GIS\IPART\01_07_2013\ODRC_NETWORK_AGE_01_07_2013\ODRC_FINYEAR_2013_NETWORK_AGE_01_07_2013.csv

Tables 6.1.3 and 6.1.4

The data for tables 6.1.3 and 6.1.4 are sourced from different locations depending on voltage, as the data requested is not retained by Ausgrid in the format required. As will be detailed later, only current data was available with prior years being estimated.

Specifically, the original sources are:

Overhead and Underground Low Voltage

Using cable length extracts from GIS held in file:

U:\GIS\IPART\01_01_2014\ODRC_NETWORK_AGE_01_01_2014\ODRC_FINYEAR_2014_NETWORK_AGE_01_01_2014.csv

Additional GIS was used to provide the proportions, by cable code, of direct and duct laid LV cables.

Overhead 11kV, SWER and 22kV, and Underground 11kV and 5kV

The data is sourced from the 'Sincal' modelling tool used by the Distribution Planning section. This data has been stored in MS Access file named "Sincal Extract.mdb", containing tables named 'ea_sincal_heads',' ea_sincal_sects' and 'zone_reference_list'.

Overhead and Underground 33kV, 66kV and 132kV

This data is sourced from 'RIC' the Ratings and Impedance Calculator, which in turn sources its data from GIS and SAP PM (Plant Maintenance).

The ratings information was obtained from the standard report "R03" for feeder ratings, particularly the file U:\RIC\Rating_Reports\R03_FEEDER_Ratings\R03_2014-02-02_Detailed.xls

Length information was obtained from an extract from RIC (originally sourced from GIS). This file has been saved as "prod_feeder_lengths.xls"

Methodology and Assumptions

<u>Tables 6.1.1 and 6.1.2</u>

For data sourced using the "Network Age" files, prior to 2013 the "Length" column contains a value equal to the sum of the route length for the cable code multiplied by the "ODRC Multiplier" value for that particular cable code. As the use of the multiplying factor was discontinued in 2013, the data for previous years has had to be modulated to remove the multiplying factor. This has been done for each of the years 2007 to 2012, with the modified value being stored in the field "ODRC Multiplier Removed Length". The original files have not been modified, only copies of these files made for the RIN response.

For 2006, with the data sourced from the "Suburb Totals" report, the data is available with and without ODRC multiplier factored in, and thus the value without ODCR multiplier is utilised.

Using these source data sets, different filters are applied based on the different voltages required, and the different files. The below table shows the different filters used for the different RIN variables, and the length field summated to acquire the overall total length.

RIN		Data extract file filters			Data used
Variable	Year(s)	Asset Category	Primary Operation Voltage	Level	Length field used
Overhead Low Voltage Distribution	2006	LV line	LV	4	ODRC Multiplier NOT Applied / Total
Overhead 11kV	2006	HV line	11kV	4	ODRC Multiplier NOT Applied / Total
Overhead SWER	2006	HV line	12.7kV	4	ODRC Multiplier NOT Applied / Total
Overhead 22kV	2006	HV line	22kV	4	ODRC Multiplier NOT Applied / Total
Overhead 33kV	2006	HV line	33kV	4	ODRC Multiplier NOT Applied / Total
Overhead 66kV	2006	HV line	66kV	4	ODRC Multiplier NOT Applied / Total
Overhead 132kV	2006	HV line	132kV	4	ODRC Multiplier NOT Applied / Total
Underground Low Voltage Distribution	2006	LV cable	LV	4	ODRC Multiplier NOT Applied / Total
Underground 5kV	2006	HV cable	5kV	4	ODRC Multiplier NOT Applied / Total
Underground 11kV	2006	HV cable	11kV	4	ODRC Multiplier NOT Applied / Total
Underground 22kV	2006	HV cable	22kV	4	ODRC Multiplier NOT Applied / Total
Underground 33kV	2006	HV cable	33kV	4	ODRC Multiplier NOT Applied / Total
Underground 66kV	2006	HV cable	66kV	4	ODRC Multiplier NOT Applied / Total
Underground 132kV	2006	HV cable	132kV	4	ODRC Multiplier NOT Applied / Total
Overhead Low Voltage Distribution	2007-12	LV line	LV	na	ODRC Multiplier Removed Length
Overhead 11kV	2007-12	HV line	11kV	na	ODRC Multiplier Removed Length
Overhead SWER	2007-12	HV line	12.7kV	na	ODRC Multiplier Removed Length
Overhead 22kV	2007-12	HV line	22kV	na	ODRC Multiplier Removed Length
Overhead 33kV	2007-12	HV line	33kV	na	ODRC Multiplier Removed Length
Overhead 66kV	2007-12	HV line	66kV	na	ODRC Multiplier Removed Length
Overhead 132kV	2007-12	HV line	132kV	na	ODRC Multiplier Removed Length
Underground Low Voltage Distribution	2007-12	LV cable	LV	na	ODRC Multiplier Removed Length
Underground 5kV	2007-12	HV cable	5kV	na	ODRC Multiplier Removed Length
Underground 11kV	2007-12	HV cable	11kV	na	ODRC Multiplier Removed Length
Underground 22kV	2007-12	HV cable	22kV	na	ODRC Multiplier Removed Length
Underground 33kV	2007-12	HV cable	33kV	na	ODRC Multiplier Removed Length
Underground 66kV	2007-12	HV cable	66kV	na	ODRC Multiplier Removed Length
Underground 132kV	2007-12	HV cable	132kV	na	ODRC Multiplier Removed Length
Overhead Low Voltage Distribution	2013	LV line	LV	na	Length Total ODRC (kms)
Overhead 11kV	2013	HV line	11kV	na	Length Total ODRC (kms)
Overhead SWER	2013	HV line	12.7kV	na	Length Total ODRC (kms)
Overhead 22kV	2013	HV line	22kV	na	Length Total ODRC (kms)
Overhead 33kV	2013	HV line	33kV	na	Length Total ODRC (kms)
Overhead 66kV	2013	HV line	66kV	na	Length Total ODRC (kms)
Overhead 132kV	2013	HV line	132kV	na	Length Total ODRC (kms)
Underground Low Voltage Distribution	2013	LV cable	LV	na	Length Total ODRC (kms)
Underground 5kV	2013	HV cable	5kV	na	Length Total ODRC (kms)
Underground 11kV	2013	HV cable	11kV	na	Length Total ODRC (kms)
Underground 22kV	2013	HV cable	22kV	na	Length Total ODRC (kms)
Underground 33kV	2013	HV cable	33kV	na	Length Total ODRC (kms)
Underground 66kV	2013	HV cable	66kV	na	Length Total ODRC (kms)
Underground 132kV	2013	HV cable	132kV	na	Length Total ODRC (kms)

Table 6.1.3 and Table 6.1.4 Global Assumptions

All voltages used in MVA calculations are nominal voltages.

All ratings are based on normal summer day ratings.

Unless inherent in rating data supplied, all limitations are thermal. Voltage drop considerations are not contained within the data sets available for use in these calculations

Table 6.1.3

Variable DPA0301 – Overhead low voltage distribution

Due to the absence of a data set with both cable length and rating information, the basic methodology applied is to use the extract that has cable length by cable code and match this with cable ratings data.

Using the GIS "Network Age" report as the original source (specified above), the required data set is selected by applying a filter of "LV line" on field 'Asset Category', and "LV" on 'Primary Operating Voltage'.

Each row of data is then manually given a 'Conductor Material' attribute based on the description of the cable code. Using this field and the 'Cable Size' field, the data is then summarised to give the total laid length by Conductor Material and Cable Size.

The corresponding ratings are then assigned to each of these summarised records, using data sourced from Ausgrid's Network Engineering Guideline - Low Voltage Planning Manual LV Cable Ratings. Where the Material is unknown, these records are ignored. If there is a direct mapping to the data held in the guideline lookup tables,

the corresponding normal summer day rating is used. If there is no direct mapping and the total length installed is greater than 1km, the corresponding ratings are obtained using the rating held in the Sincal data for the same cable code, or estimated using the ratings for the same material.

These values are then used to calculate the weighted average MVA across all cable codes, with the assumption that all conductors are multi-phase and the standard single phase voltage is 240V.

Variable DPA0401 – Underground low voltage distribution

Due to the absence of a data set with both cable length and rating information, the basic methodology applied is to use the extract that has cable length by cable code and match this with cable ratings data. As cable ratings are different for duct laid and direct laid cable, a second data extraction from GIS was used to provide a split by cable code of the proportions that are direct laid and duct laid.

Using the GIS "Network Age" report as the original source (specified above), the required data set is selected by applying a filter of "LV cable" on field 'Asset Category', and "LV" on 'Primary Operating Voltage'. The duct and direct laid percentages are then inserted for each row based on a lookup from the GIS sourced data, and the total length for the row then split into a duct laid length and direct laid length using the given proportions. Each row of data is then manually given an 'Insulation Type' and 'Conductor Material' attribute based on the description of the cable code. Using these two fields and the 'Cable Size' field, the data is then summarised to give the total, direct laid and duct laid lengths by Insulation Type, Conductor Material and Cable Size.

The direct and duct laid ratings are then assigned to each of these summarised records, using data sourced from Ausgrid's Network Engineering Guideline - Low Voltage Planning Manual LV Cable Ratings. Where the Insulation Type or Material is unknown, these records were ignored. If there is a direct mapping to the data held in the guideline lookup tables, the corresponding summer rating for soil thermal resistivity of 1.2 K.m/W is used. If there is no direct mapping and the total length installed is greater than 1km, the corresponding ratings for direct laid and duct laid were calculated, again using the instructions in Ausgrid's Network Engineering Guideline - Low Voltage Planning Manual LV Cable Ratings.

These values are then used to calculate the weighted average MVA across all cable codes, with the assumption that all cables are multi-phase and the standard single phase voltage is 240V.

Variables DPA0302, DPA0303 and DPA0304 - Overhead 11 kV, SWER and 22kV & Variables DPA0402 and DPA0407 Underground 11kV and 5kV

Data has been extracted from the 'Sincal Extract' database for all sections with a length > 0m. The data has been split into 5 different sets for the five different variables. Records were split between Overhead and Underground based on overhead sections having a 'section_lay' = 5, and underground sections having a 'oh_const_code' = 0.

Within the underground data, the 'feeder_volts' field was used to split between 5kV and 11kV.

Within the overhead data, the SWER records were selected using the 'zone_number'/'panel_group' information for the known SWER feeder, and the known cable codes represented on that feeder. The 22kV records were selected using the 'zone_number'/'panel_group' information for the known 22kV feeder, and the known cable codes represented on that feeder. Where the total section lengths for each cable code exceeded the known lengths for that code at that voltage, records were assigned to make up the known length.

In calculating the MVA rating, the normal summer rating was used for underground sections and the normal summer day rating was used for overhead sections. Within the data set there is no information available to indicate whether a section is single phase or multiple phase, as such all calculations are based on multiple phase with the exception of SWER. The additional assumption is that circuit voltage is the nominal voltage, i.e. 5kV, 12.7kV, 11kV or 22kV.

Variables DPA0305, DPA0306, and DPA0307 – Overhead 33kV, 66kV and 132kV & Variables DPA0404, DPA0405 and DPA0406 – Underground 33kV, 66kV and 132kV

Using the R03 report sourced from RIC, the data is filtered selecting RTNG TYPE (Rating Type) = DAY. These data records are then merged with the feeder length data (from file "prod_feeder_lengths.xls") and an overhead and underground length is assigned to each feeder record. Where the feeder summer normal current rating is 0, 1, 99999 or blank the record is marked as to be ignored. (Additionally – for this response - as the data is from a current extract and the data is required for historical years, one record that is for a feeder known to be commissioned in the 2014 year that significantly changed the data for the 66kV underground category is also marked to be ignored). Where the ampere rating is populated, yet the MVA is not, the MVA is calculated using the assumption that all feeders are 3 phase and at nominal voltage. The weighted average MVA is then calculated for

each voltage for overhead and underground, with the assumption that the rating for the 'feeder' is the same for both the overhead and underground portions.

Use of estimated information

Tables 6.1.1 and 6.1.2

No estimates were used in the completion of these tables.

Tables 6.1.3 and 6.1.4

Datasets used in the calculation for circuit capacity for the 2013 regulatory year was not available for historic years. Given the assumptions made in the compilation of this data for the 2013 regulatory year, and the levels of error incurred on the dataset in the application of these assumptions, it is considered a best estimate to assume that the overall weighted average MVA for each variable is relatively constant. As such the years prior to 2013 have been backcast with the same value as calculated for the 2013 regulatory year.

Data for variable DPA0403 has been entered as 0. This is because there is no information on the conductor to calculate an MVA rating, and as the total length of 22kV underground mains is recorded as 10m the data is of little value in benchmarking calculations.

6.2 Transformer capacities variables

Compliance with requirements of the notice

The information in this section is compliant in that actual values are used where possible, and best estimates are provided where actual data is not available.

Source of information

Table 6.2.1

Variable DPA0501 - Distribution transformer capacity owned by utility

The information used for this variable is sourced from data underlying Ausgrid's previous responses to the Energy Supply Association of Australia's (ESAA) Distribution sector benchmarking survey, with the exception of 2009 where the data could not be located. For the years 2010 to 2013 the raw data came from SAP PM, and for years 2006 to 2008 the data came from the legacy system TIS.

Variable DPA0502 - Distribution transformer capacity owned by High Voltage Customers

As transformer capacity owned by HV customers is not stored by Ausgrid, the secondary method of using the summation of individual customer maximum demands has been used. This data is sourced from the Meter Data Warehouse (MDW), using a list of known HV Customer NMIs for each year.

Variable DPA0503 - Cold spare capacity included in DPA0501

Data for this variable has been sourced from SAP MM (Materials Management) for the year 2013. A process change implemented in 2012 has given a more accurate view of the spares holdings of distribution transformers. Prior to 2013 this data was unreliable.

Table 6.2.2

Variables DPA0601, DPA0602 and DPA0603 - Total installed capacity for first step transformation where there are two steps to reach distribution voltage, Total installed capacity for second step transformation where there are two steps to reach distribution voltage & Total zone substation transformer capacity where there is only a single step transformation to reach distribution voltage

The information used for these variables is sourced from data underlying Ausgrid's previous responses to the ESAA's Distribution sector benchmarking survey, with the exception of 2009 where the data could not be located. For the years 2010 to 2013 the raw data came from SAP PM, and for years 2006 to 2008 the data came from the legacy system TIS.

Variable DPA0604 - Total zone substation transformer capacity

Sum of variables DPA0601, DPA0602, DPA0603 and DPA0605

Variable DPA0605 - Cold spare capacity of zone substation transformers included in DPA0604

Data for this variable is not generally extracted, so for this request has had to come from a variety of sources. Information for 2006 and 2007 has come from old spares holdings spreadsheets. 2011 values have come from a spares analysis undertaken in that timeframe. 2012 and 2013 figures have come from SAP PM extractions done for the ESAA's Distribution sector benchmarking survey. 2008 to 2010 figures were required to be estimated as no data for this period could be located.

Methodology and Assumptions

<u>Table 6.2.1</u>

Variable DPA0501 - Distribution transformer capacity owned by utility

Traditional reporting of this information has not included cold spare storage capacity. However, naming of variable DPA0503 indicates that this variable must include cold spare storage capacity. Data is available for all years, except 2009, for the value not including cold spare storage capacity. Thus the data used for this variable is the value not including cold spare storage capacity, plus the value calculated in variable DPA0503.

The value not including cold spare storage capacity has been taken from the Ausgrid response to the ESAA's Distribution sector benchmarking survey for the respective regulatory year, which as stated before comes from extracts via the legacy TIS system for years prior to 2009, and extracts from SAP PM for years 2010 to 2013. The logic used in the compilation of data for years prior to 2009 are unknown, however for the data sourced from SAP PM the process has slightly changed each year as refinements were made.

Specifically, the method for each year is:

2006 to 2008 – figure from ESAA report for 11kV (and below) Transformer capacity (MVA) + figure calculated for variable DPA0503 for the respective year.

2009 – Estimated using the mid point of the figure for 2008 and 2010.

2010 – figures from ESAA report for 11kV (and below) & SWER Transformer capacity (MVA) + figure calculated for variable DPA0503 for the respective year.

2011 – Using data extracted for ESAA report, specifically in file "ESAA 2011 FY - Dist Tx.xlsx". Sum transformer kVA (column '/BIC/ZTXCKVA') with filter on 'Exist' = "Y", and '/BIC/ZOWNER' <> "12733070" (i.e. not privately owned). The 'Exist' field is a flag manually populated to select records that appear to have been in commission at the end of the 2011 financial year. This summated value is then added to the figure calculated for variable DPA0503 for 2011.

2012 – Using data extracted for ESAA report, specifically in file "Working sheet for ESAA stats 2011-12.xlsx". Sum Rated Power Nameplate kVA with filter on 'Include/Exclude' = "Include", and 'Owner' <> "12733070" (i.e. not privately owned). The 'Include/Exclude' field is a flag manually populated to select records that appear to have been in commission at the end of the 2012 financial year. This summated value is then added to the figure calculated for variable DPA0503 for 2012.

2013 – Using data extracted for ESAA report, specifically in file "Zone and Dist Tx with rating for ESAA 2012-13.xlsx". Summate Rated Power Nameplate kVA with filter on 'BPC Asset Category Key' <> "AS_NONE" (to only select transformers within distribution substations) and 'Owner Name' <> "Private" (i.e. not privately owned). The data set has already been restricted to select records that appear to have been in commission at the end of the 2013 financial year. This summated value is then added to the figure calculated for variable DPA0503 for 2013.

Variable DPA0502 - Distribution transformer capacity owned by High Voltage Customers

A list of NMIs representing HV customers has been compiled for each year using network tariff codes for High Voltage (EA350, EA360, EA370, EA380, EA390) and CRNP customers current at the end of each respective regulatory year. These NMIs were then provided to TCA MDA and the "Extended Billing Format (monthly)" query/ extraction was run for these NMIs for each year. The extracted information for each year has been stored in files as follows:

2006 – "T6.2.1_FY06&Summary.xlsx"

2007 – "T6.2.1_FY07.xlsx"

2008 – "T6.2.1_FY08.xlsx"

2009 – "T6.2.1_FY09.xlsx"

2010 – "T6.2.1_FY10.xlsx"

2011 – "T6.2.1_FY11.xlsx"

2012 – "T6.2.1_FY12.xlsx"

2013 – "T6.2.1_FY13.xlsx"

Within each file (representing each year of data), the maximum monthly maximum demand is selected for each meter point in all NMIs. These values are then summated to give a total kVA value for the respective regulatory year. This figure is then converted to a total MVA by dividing through by 1000.

Note that whilst the data for this variable trends upwards over all years from 2006 to 2012 and then drops sharply. This is due in particular to one customer reducing demand by over 200MVA. This should be considered when using this data.

Variable DPA0503 - Cold spare capacity included in DPA0501

As stated before, prior to 2013 this data was unreliable. The method to retrieve the figure for 2013 was to extract all distribution transformers held within SAP MM storage locations. This was done using SAP transaction IQ09 with the selection criteria 'Object Type' = "TX_DIST" and 'Storage Location' <> "". The Rated Power Nameplate (kVA) data was then obtained from SAP BI (Business Intelligence) for these particular transformers and then summed. This data is stored in file "Dist Txs in MM store.xlsx".

The method to obtain the data for years 2006 to 2012 was to assume that the percentage represented by total cold spare capacity across the total commissioned capacity would be relatively constant, so this percentage value calculated for 2013 was then applied to the total commissioned capacity for years 2006 to 2012 to calculate total cold spare capacity.

Table 6.2.2

Variable DPA0601 - Total installed capacity for first step transformation where there are two steps to reach distribution voltage

Data for 2006 to 2009 has had to be estimated as no data exists that directly maps to this variable for these years. For 2010 to 2013 the figures are sourced from data underlying Ausgrid's previous responses to the ESAA's Distribution sector benchmarking survey, with the process to calculate the figure differing from year to year as changes were made to the extraction process.

In detail, the method to calculate the result for 2010 uses the data in file "Zone & Subtran Tx Stats 2010.xls". Placing a filter on column 'EQUITYPE' = "TX_SUBTRAN", and 'Change' <> "X", the summation of the column 'MVA' gives the total capacity required.

For 2011, the method to calculate the result uses the data in file "ESAA 2011 FY - Zone and ST Tx.xlsx". Placing a filter on column 'EQUITYPE' = "TX_SUBTRAN" and 'Exist' = "Y", the summation of the column 'Max MVA' gives the total capacity required.

For 2012, the method to calculate the result uses the data in file "Working sheet for ESAA stats 2011-12.xlsx". Placing a filter on column 'Object Type' = "TX_SUBTRAN" and 'Include/Exclude' = "Include", the summation of the column 'Max Tx Rating' gives the total capacity required.

For 2013, the method to calculate the result uses the data in file "Zone and Dist Tx with rating for ESAA 2012-13.xlsx". Placing a filter on column 'Object Type' = "TX_SUBTRAN", the summation of the column 'Max rating MVA' gives the total capacity required.

Variable DPA0602 - Total installed capacity for second step transformation where there are two steps to reach distribution voltage

For 2006 to 2008 the information for this variable is taken directly from Ausgrid's response to the ESAA's Distribution sector benchmarking survey for the respective year. The data used in these survey responses does not appear to have been retained. Data for 2009 has had to be estimated as no data exists that directly maps to this variable for these years. For 2010 to 2013 the figures are sourced from data underlying Ausgrid's previous responses to the ESAA's Distribution sector benchmarking survey, with the process to calculate the figure differing from year to year as changes were made to the extraction process.

In detail, the method to calculate the result for 2006 was to summate the transformer capacity values for 33kV and 66kV held in spreadsheet "esaa 05-06.xls".

The method to calculate the result for 2007 was to summate the transformer capacity values for 33kV and 66kV held in spreadsheet "06-07 Distribution survey - amended.xls".

For 2008 the method to calculate the result was to summate the transformer capacity values for 33kV and 66kV held in spreadsheet "ESAA distribution sector survey 2008 - EA.xls".

The method to calculate the result for 2010 uses the data in file "Zone & Subtran Tx Stats 2010.xls". Placing a filter on column 'EQUITYPE' = "TX_ZONE", '/BIC/ZVOPRIM' = "33000" or "66000" (for primary voltage of 33kV or 66kV) and 'Change' <> "X", the summation of the column 'MVA' gives the total capacity required.

For 2011, the method to calculate the result uses the data in file "ESAA 2011 FY - Zone and ST Tx.xlsx". Placing a filter on column 'EQUITYPE' = "TX_ZONE", '/BIC/ZOWNER' <> "12733070" (to only select Ausgrid owned assets), '/BIC/ZVOPRIM' = "033000" or "066000" (for primary voltage of 33kV or 66kV) and 'Exist' = "Y", the summation of the column 'Max MVA' gives the total capacity required.

For 2012, the method to calculate the result uses the data in file "Working sheet for ESAA stats 2011-12.xlsx". Placing a filter on column 'Object Type' = "TX_ZONE", 'Operating Voltage' = "33000" or "66000" (for primary voltage of 33kV or 66kV), 'Owner' <> "12733070" (to only select Ausgrid owned assets) and 'Include/Exclude' = "Include", the summation of the column 'Max Tx Rating' gives the total capacity required.

For 2013, the method to calculate the result uses the data in file "Zone and Dist Tx with rating for ESAA 2012-13.xlsx". Placing a filter on column 'Object Type' = "TX_ZONE", 'Operating Voltage' = "33000" or "66000" (for primary voltage of 33kV or 66kV) and 'Owner' <> "12733070" (to only select Ausgrid owned assets), the summation of the column 'Max rating MVA' gives the total capacity required.

Variable DPA0603 - Total zone substation transformer capacity where there is only a single step transformation to reach distribution voltage

Data for 2006 to 2009 has had to be estimated as no data exists that directly maps to this variable for these years. For 2010 to 2013 the figures are sourced from data underlying Ausgrid's previous responses to the ESAA's Distribution sector benchmarking survey, with the process to calculate the figure differing from year to year as changes were made to the extraction process.

The method to calculate the result for 2010 uses the data in file "Zone & Subtran Tx Stats 2010.xls". Placing a filter on column 'EQUITYPE' = "TX_ZONE", '/BIC/ZVOPRIM' = "132000" (for primary voltage of 132kV) and 'Change' <> "X", the summation of the column 'MVA' gives the total capacity required.

For 2011, the method to calculate the result uses the data in file "ESAA 2011 FY - Zone and ST Tx.xlsx". Placing a filter on column 'EQUITYPE' = "TX_ZONE", '/BIC/ZOWNER' <> "12733070" (to only select Ausgrid owned assets), '/BIC/ZVOPRIM' = "132000" (for primary voltage of 132kV) and 'Exist' = "Y", the summation of the column 'Max MVA' gives the total capacity required.

For 2012, the method to calculate the result uses the data in file "Working sheet for ESAA stats 2011-12.xlsx". Placing a filter on column 'Object Type' = "TX_ZONE", 'Operating Voltage' = "132000" (for primary voltage of 132kV), 'Owner' <> "12733070" (to only select Ausgrid owned assets) and 'Include/Exclude' = "Include", the summation of the column 'Max Tx Rating' gives the total capacity required.

For 2013, the method to calculate the result uses the data in file "Zone and Dist Tx with rating for ESAA 2012-13.xlsx". Placing a filter on column 'Object Type' = "TX_ZONE", 'Operating Voltage' = "132000" (for primary voltage of 132kV) and 'Owner' <> "12733070" (to only select Ausgrid owned assets), the summation of the column 'Max rating MVA' gives the total capacity required.

Variable DPA0604 - Total zone substation transformer capacity

As specified, the summation of variables DPA0601, DPA0602, DPA0603 and DPA0605.

Variable DPA0605 - Cold spare capacity of zone substation transformers included in DPA0604

As stated before, data for this variable is not generally held. However, some data was obtained from a variety of sources for most years.

2006 and 2007 data came from old spares holding spreadsheets. The process for compiling the data within the spreadsheets is unsure, most likely manual. The spreadsheets nearest to the end of the respective regulatory year have been used, with the assumption that they are as close as possible to the actual inventory at year end. The files used separated into different sheets based on primary and secondary voltages. The files used for 2006 are: "132-11 kVTxsRev12 060908.xls", "33-11kVTxsRev13.xls", "33-5kVTxsRev10.xls" and "66-11kVTxsRev11 060908.xls". For 2007: "132-11 kVTxsRev13 070424.xls", "33-11kV Txs Rev14 070424.xls", "33-5kV Txs Rev 11 070424.xls" and "66-11kV Txs Rev 12 070424.xls".

2011 data has come from a spreadsheet prepared for spares analysis "tx system spare matrix 5-5-11.xlsx". Again whilst this data is not compiled at the end of the financial year it is assumed to be relatively accurate.

2012 data is sourced from the spreadsheet "Working sheet for ESAA stats 2011-12.xlsx". To select the records appropriate for this variable, filters are applied as follows: 'Owner' <> "12733070" (to only select Ausgrid owned); 'Object Type' = "TX_SUBTRAN" or "TX_ZONE" (zone or subtransmission transformers only); 'Lifecycle Status' = "DCOM", "SPR" or "ESPR" (including spare or decommissioned transformers); 'Include/Exclude' = "Exclude" (this is selected as the records flagged as "Include" are for assets commissioned at the end of the year, thus the ones not commissioned at that date are to be selected for this variable). The maximum MVA rating stored for each transformer is then summated to give a total MVA figure.

2013 data has been taken from the spreadsheet "ESAA stats for DNSP benchmarking.xlsx". Transformers that qualify for this category are flagged with the data 'COLD SPARE?' = "Y". The maximum MVA rating for all ratings is then summated, with an additional filter on 'Owner' <> "12733070" (to remove privately owned assets).

Use of estimated information

Variable DPA0501 - Distribution transformer capacity owned by utility

Data for 2009 was not available. Data for this variable was estimated using the mid-point between data for 2008 and 2010. This is considered to be the best estimation in the absence of exact data.

Also, as the data for variable DPA0501 was calculated using existing data held for commissioned capacity plus the figure for variable DPA0503, where DPA0503 was estimated it stands to reason that this overall figures is also somewhat of an estimation. Given that the proportion DPA0503 represents of the total capacity is less than 4%, and that this estimate in itself can be considered reasonable, then the data for variable DPA0501 can be considered to be an accurate estimation.

Variable DPA0502 - Distribution transformer capacity owned by High Voltage Customers

No estimations have been used for this variable, beyond the option given in the RIN instructions as below:

"If the transformer capacity owned by customers connected at high voltage is not available, report summation of individual Maximum Demands of high voltage customers whenever they occur (i.e. the summation of single annual Maximum Demand for each customer) as a proxy for delivery capacity within the high voltage customers."

Variable DPA0503 - Cold spare capacity included in DPA0501

Data on spare distribution transformers at historical points of time is not available as this data has not been retained.

The method to obtain the data for years 2006 to 2012 was to assume that the percentage represented by total cold spare capacity across the total commissioned capacity would be relatively constant, so this percentage value calculated for 2013 was then applied to the total commissioned capacity for years 2006 to 2012 to calculate total cold spare capacity. This is considered to be the best estimation as generally the inventory of spare transformers would be relatively constant.

Variable DPA0601 - Total installed capacity for first step transformation where there are two steps to reach distribution voltage

Detailed historical records have not been kept that allow transformer capacity for first step transformation to be distinguished from single step transformation prior to 2010. In addition, the structure of the legacy data system that contained these assets means that back-calculating the figures using commissionings and decommissionings within each year is impracticable.

For this reason it is considered that the best estimate in the absence of exact data for years 2006 to 2009 for this variable is obtained by using the trending of the data from 2010 to 2013 and backcasting.

Variable DPA0602 - Total installed capacity for second step transformation where there are two steps to reach distribution voltage

Data for 2009 was not available. Data for this variable was estimated using the mid-point between data for 2008 and 2010. Given that only one year of data was missing, this is considered to be the best estimation in the absence of exact data for 2009.

Variable DPA0603 - Total zone substation transformer capacity where there is only a single step transformation to reach distribution voltage

Detailed historical records have not been kept that allow transformer capacity for first step transformation to be distinguished from single step transformation prior to 2010. In addition, the structure of the legacy data system that contained these assets means that back-calculating the figures using commissionings and decommissionings within each year is impracticable.

The data for years 2006 to 2008 for this variable has been calculated using the total value supplied for 132kV transformer capacity in Ausgrid's response to the ESAA's Distribution sector benchmarking survey for the respective year, minus figure estimated for DPA0601 for the respective year. For 2009 this variable was estimated using the mid-point between data for 2008 and 2010.This is considered to be a reasonable estimation in the absence of exact data.

Variable DPA0605 - Cold spare capacity of zone substation transformers included in DPA0604

Estimates have been used for this variable for the years from 2008 to 2010. It is known that the spares holdings were gradually increased during this period, and as such a linear trend was applied to the data using responses for 2007 and 2011. Overall the trend in figures is accurate, although the individual values for each year may be inaccurate. For these reasons the estimated data is considered to be the best estimation in the absence of exact data for years 2008 to 2010.

6.3   Public lighting

Compliance with requirements of the notice

The information in this section is compliant in that actual values are used where possible, and best estimates are provided where actual data is not available.

Source of information

Data for this section is obtained from SAP PM, extracted via Business Objects using reports built specifically for this request.

Methodology and Assumptions

Variable DPA0701 – Public lighting luminaires

The query used in the extraction of this data from SAP PM contains the following logic:

Object Type = LIGHT; AND

SL Rate = 1 or 2; AND

Creation Error = N; AND

Date First Commissioned <= 'End of Regulatory Year Date'; AND

(Status = Commissioned OR Date Decommissioned > 'End of Regulatory Year Date')

This is to ensure that only valid records for Ausgrid maintained luminaires that were in commission at the end of the respective regulatory year are counted. As this data is back calculated off the current data set, master data attribute changes made affect all historical data. As such it is assumed that the current master data against these assets is to be considered accurate for all historical years.

Variable DPA0702 – Public lighting poles

The query used in the extraction of this data from SAP PM (for regulatory years 2012 and 2013) contains the following logic:

Object Type = POLE; AND

Creation Error = N; AND

Owner = Ausgrid OR Rural Subsidy Scheme OR 'blank'

Asset Group = Distribution Mains Streetlighting

Date First Commissioned <= 'End of Regulatory Year Date'; AND

(Status = Commissioned OR Date Retired > 'End of Regulatory Year Date')

This is to ensure that only valid records for Ausgrid owned poles exclusively used for public lighting in commission at the end of the respective regulatory year are counted. As this data is back calculated off the current data set, master data attribute changes made affect all historical data. As such it is assumed that the current master data against these assets is to be considered accurate for all historical years.

Use of estimated information

DPA0702 – Public lighting poles

Ausgrid made changes to its asset data in March 2012 to identify poles that are solely used for public lighting. As such data for regulatory years prior to 2012 is not available for this variable. It was considered the best estimate to calculate the representative proportion of dedicated public lighting poles against public lighting luminaires for the 2013 regulatory year, and use this percentage against the public lighting luminaire totals for regulatory years 2006 to 2012 inclusive.

Worksheet 7– Quality of services

7.1   Reliability

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice unless specified in the methodology and assumptions.

Source of information

Data used to populate Tables 7.1.1 and 7.1.2 has been taken from outage event records located in Ausgrid's Outage Management System (OMS) and its related reporting environment.

Final outage event records are manually entered into OMS after outage events. Fields within each record are entered both automatically and manually and are subject to quality assurance checks.

Information for interruptions affecting single premises is sourced from Ausgrid's Customer Aided Service System (CASS). For other network events, supply restoration and other information is recorded by System Operators in the Sydney control room on Interruption Report Forms (blue forms), or by System Operators in the Newcastle control room on Line Impedance Data (LID) system reports, and on switching sheets.   This information is reconciled into OMS post event. Following an outage, an Ausgrid officer validates the existing OMS record against the blue form or LID system report and customer call data. If the existing outage event record can be made to accurately reflect interruption details it is completed. Otherwise, the event is recreated in OMS based on switching details such that the record accurately reflects the restoration switching.

OMS outage event records include the following fields:

- Date of event

- Time of interruption

- Time of restoration[2]

- Event trigger

- Number of Customers Interrupted (CI)

- Number of Customer Minutes Interrupted (CMI)

- Feeder ID

- Event Hierarchy

- Exclusion Flag

- Exclusion Reason

OMS automatically calculates CI and CMI by combining the following information:

- Electrical connectivity details from Ausgrid's Graphical Information System (GIS)

- Interruption and restoration steps as recorded by System Operators

- National Metering Identifier (NMI) information from SAP, Customer Care Solution (CCS) and Business to Business (B2B)

The automatic calculation of CI and CMI is based on NMIs and therefore excludes all unmetered supplies. CI and CMI calculations are automatic on the basis of manually entered interruption and switching steps. SAP, CCS and B2B are used to exclude inactive customers (permanently disconnected) from the calculation of CI and CMI.

The reporting environment contains data extracted from OMS that has been cleansed to remove redundant data. Relevant calculations such as SAIDI, SAIFI and MAIFI are also added to records within the reporting environment. The reporting environment facilitates the extraction of information into to a range of Business Objects reports.

A report (*AER RIN 2013 – 14 Sustained Interruption to Supply V1.0*) for each regulatory year from 2008/09 to 2012/13 is generated from the reporting environment on 1/4/2014. Each report contains a list of outage events with the following key attributes:

- Event ID

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[2] There may be multiple restoration times for customer groups within a single outage event due to staged restoration works.

- Reporting date
- Feeder ID
- Feeder Category
- Event Trigger
- Event Hierarchy
- CI
- CMI
- Global SAIDI[3]
- Global SAIFI[2]
- Feeder Category SAIDI[2]
- Feeder Category SAIFI[2]

Separate entries appear in the list if a single event affected multiple feeders. The report contains separate sections for unplanned, planned and excluded outage events. The report does not contain momentary interruptions of duration one minute or less.

Data used to complete Tables 7.1.1 and 7.1.2 for regulatory years 2006 and 2007 has been taken from the OMS reporting environment, however; the data for these years originated from Ausgrid's legacy Network Reliability Data (NRD) system. The NRD system assigned customer numbers to outage events by averaging techniques such as post code averaging. It was previously recognised that the transition from NRD to OMS could result in a step change in reliability performance due to differences in the customer allocation methodology. The reporting environment contains "OMS equivalent data" for 2006 and 2007 that has been scaled to account for differences in customer allocation methodologies between NRD and OMS.

Methodology and Assumptions

Key elements of the methodology:

1. A Business Objects report (*AER RIN 2013 – 14 Sustained Interruption to Supply V1.0*) is extracted from the reporting environment (on 1/4/2014) for all required regulatory years. Each report contains the following key information (Events are classified as "excluded" in accordance with Clause 3.3 of the STPIS which aligns with the definitions in the Instructions and Definitions):

    a. An unplanned event list that details the CI, CMI and whole of network SAIDI / SAIFI contribution for each event

    b. An excluded event list that details the CI, CMI and whole of network SAIDI / SAIFI contribution for each event (The exclusion reason of each event is verified against STPIS clause 3.3 (a))

2. The table below details the calculation of each of the variables in Table 7.1.1 (Inclusive of MEDs):

Variable_Code	Variable	Calculation
DQS0101	Whole of network unplanned SAIDI	For each regulatory year: 1. Calculate the sum of whole of network SAIDI for unplanned events (**a**) 2. Calculate the sum of whole of network SAIDI for excluded events (**b**) 3. Calculate the sum of steps 1 and 2
DQS0102	Whole of network unplanned SAIDI excluding excluded outages	For each regulatory year: 1. Calculate the sum of whole of network SAIDI for unplanned events (**a**)
DQS0103	Whole of network unplanned SAIFI	For each regulatory year: 1. Calculate the sum of whole of network

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[3] Verified to be calculated in accordance with the assumptions below.

Variable_Code	Variable	Calculation
		SAIFI for unplanned events (**a**)
		2. Calculate the sum of whole of network SAIFI for excluded events (**b**)
		3. Calculate the sum of steps 1 and 2
DQS0104	Whole of network unplanned SAIFI excluding excluded outages	For each regulatory year: 1. Calculate the sum of whole of network SAIFI for unplanned events (**a**)

3. Calculate the daily unplanned whole of network SAIDI for each day in regulatory years 2006 – 2013 from **a**.

4. In order to calculate the variables in Table 7.1.2 it is first necessary to calculate the 2013 T_{MED}. The T_{MED} is calculated for 2013 in accordance with Appendix D of the STPIS. Data from step 3 is used in the calculation.

5. Flag all events in **a**. that occur on a day where the daily SAIDI from step 3 is greater than the T_{MED} calculated in step 4 (MED).

6. The table below details the calculation of each of the variables in Table 7.1.2 (Exclusive of MEDs):

Variable_Code	Variable	Calculation
DQS0105	Whole of network unplanned SAIDI	For each regulatory year: 1. Calculate the sum of whole of network SAIDI for unplanned events (**a**) (Excluding events occurring on a day flagged as a MED in step 5) 2. Calculate the sum of whole of network SAIDI for excluded events (**b**) (Excluding events occurring on a day flagged as a MED in step 5) 3. Calculate the sum of steps 1 and 2
DQS0106	Whole of network unplanned SAIDI excluding excluded outages	For each regulatory year: 1. Calculate the sum of whole of network SAIDI for unplanned events (**a**) (Excluding events occurring on a day flagged as a MED in step 5)
DQS0107	Whole of network unplanned SAIFI	For each regulatory year: 1. Calculate the sum of whole of network SAIFI for unplanned events (**a**) (Excluding events occurring on a day flagged as a MED in step 5) 2. Calculate the sum of whole of network SAIFI for excluded events (**b**) (Excluding events occurring on a day flagged as a MED in step 5) 3. Calculate the sum of steps 1 and 2
DQS0108	Whole of network unplanned SAIFI excluding excluded outages	For each regulatory year: 1. Calculate the sum of whole of network SAIFI for unplanned events (**a**) (Excluding events occurring on a day flagged as a MED in step 5)

Key assumptions used in the methodology:

1. All outage event attributes are correctly entered in OMS or NRD.

2. The NMI connectivity details in GIS are correct at the time of outages, or that any errors are managed through manual processes to determine the actual customers affected by an event, or by holding out outage event records in the OUTAGES_NOT_IN_OMS table until GIS updates are received.

3. Ausgrid calculates reliability metrics differently from Appendix A of the STPIS due to technical constraints. Reliability metrics are calculated as follows:

   STPIS Appendix A, Note 1: All reliability metrics are calculated using daily customer counts. Ausgrid has consistently adopted this approach because average customer counts do not result in stable metrics suitable for trend analysis due to the constant adding, removing and reconfiguring of feeders. (Different)

   STPIS Appendix A, Note 2: All unmetered supplies are excluded from the calculation of reliability metrics. (Compliant)

   STPIS Appendix A, Note 3: All active customers are included in the calculation of reliability metrics. All inactive customers are excluded in the calculation of reliability metrics. The following assumptions regarding customer counting have been made:

   Active = Energised + De-energised

   Inactive = Extinct = Deactivated

   De-energised $_{(AER)}$ = Temporary disconnection $_{(AUSGRID)}$

   Inactive $_{(AER)}$ = Permanent disconnection $_{(AUSGRID)}$

   (Compliant)

4. All customers connected to a three phase low voltage supply are interrupted for the entire duration of an event. This approach is adopted because the accurate determination of customers connected to each phase of a low voltage supply is currently not possible.

5. The reliability metrics reported in this worksheet differ from previous metrics provided to the AER for the following reasons:

   - Customer installation faults are no longer classified as excluded events by Ausgrid.

   - Some outage event records have been updated to rectify inaccuracies identified through various forms of reliability analysis within Ausgrid.

   - The 2013 T_{MED} has been applied to all regulatory years in Table 7.1.2 as per the requirements of this notice.

   - In response to various audits, Ausgrid has consistently applied the assumptions listed above in calculating the SAIDI and SAIFI. Earlier data provided to the AER may not be consistent with these assumptions. This is the first opportunity Ausgrid has had to provide corrected data.

Use of estimated information

Ausgrid has used estimated information for Tables 7.1.1 and 7.1.2 for regulatory years 2006 and 2007. This information was required to be estimated to account for a step change in customer allocation methodologies between OMS and Ausgrid's legacy system NRD. The estimation methodology utilised for Tables 7.1.1 and 7.1.2 is deemed to be Ausgrid's best estimate because it is based upon actual outage event records but adjusted appropriately to account for the step change.

An estimate of the number of Customers Interrupted (CI) and Customer Minutes Interrupted (CMI) was made for each outage event record. The estimation involved scaling the NRD CI and CMI outage event attributes based on the relative distribution substation customer counts in the two systems. The associated equations are shown below:

Calculations were performed using an Access database in which the NRD CI and CMI information at a low voltage distributor level was loaded. The distribution substation level scaling was produced by using a translation table imported into Access. This translation table provided the OMS customers as at 30/8/2007 and the corresponding NRD customers as at 30/6/2007 at a distribution substation level. Note that the estimated attributes for these outages are contained in the OMS reporting environment, so identical methodology and assumptions have been applied for all regulatory years to calculate the information for Table 7.1. Note that CI and CMI may not be integers due to the estimation calculations.

7.2 Energy not supplied

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice unless specified in the methodology and assumptions.

Source of information

Data used to complete Table 7.2 for regulatory years from 2010 to 2013 has been taken from outage event records located in Ausgrid's Outage Management System (OMS) and the related reporting extracts and reference tables. See section 7.1 for further information about the OMS system.

All other data separation required for this notice (i.e. reporting category) is determined from the attributes of each OMS outage event record.

In the process of extracting data from the OMS reporting environment for use in completing this notice, it was identified that some historical outage event records contained incorrect customer allocations. This was caused by a recent third party software problem associated with the reporting environment. As Ausgrid does not have an established business process for reporting on the metrics requested in Table 7.2 it was not possible to source actual data as per Table 7.1. Thus for regulatory years 2006 through to 2011, estimates have been provided. The methodology for these estimates is explained below.

Ausgrid installs meters on our network to measure consumption. Each meter is assigned a National Metering Identifier (NMI). For reporting purposes, each NMI is considered as a customer. Ausgrid uses the Business Warehouse Billing Data system to obtain annual consumption data for each NMI by regulatory year measured in kilowatt-hours (kWh). This system also provides the total days connected for each NMI.

Planned outages are entered into DAROS for the Sydney Control Room and LID for the Newcastle Control Room. As LID data was not available for all eight years, estimates were made using DAROS data only.

Methodology and Assumptions

Key elements of the Methodology (Regulatory years 2010 to 2013 for unplanned and 2012 to 2013 for planned):

1. A Business Objects report (*NMI Data Unplanned Outages by Region v0.6 with MEDs.xls*) is extracted from the reporting environment for regulatory years 2010 to 2013 for each of the regions North, Central and South. Each report contains the following key information (Events are classified as "excluded" in accordance with Clause 3.3 of the STPIS – which aligns with the Instructions and Definitions):

    a. Whole of region **unplanned** customer duration by NMI excluding excluded interruptions for the regulatory year (Including MEDs)

    b. Accompanying data for each NMI instance that details the region, event time, outage job number and reporting category (planned, unplanned, momentary, excluded)

2. A Business Objects report (*NMI Data Planned Outages by Region v0.3.xls*) is extracted from the reporting environment for regulatory years 2012 and 2013 for each of the regions North, Central and South. Each report contains the following key information (Events are classified as "excluded" in accordance with Clause 3.3 of the STPIS – which aligns with the Instructions and Definitions):

    a. Whole of region **planned** customer duration by NMI for the regulatory year

    b. Accompanying data for each NMI instance that details the region, event time, outage job number and reporting category (planned, unplanned, momentary, excluded)

3. For any outage event a set of NMIs will be affected. A single NMI can be affected multiple times in any one regulatory year due to unique outage events and as such the Business Objects reports include multiple entries for some NMIs. For each set of planned or unplanned data for each region and regulatory year, the

NMI data is consolidated by summing all the unique outage events and their duration for each NMI. The result is a data set of all NMIs and their total time not supplied for the regulatory year by region.

4. The full set of NMI data for each regulatory year is consolidated into one spreadsheet with the following columns:

   a. NMI

   b. Total outage duration for the year in minutes

   c. Annual measured consumption (kWh)

   d. Days connected

   e. Minutes connected

   f. Energy Not Supplied

This data is provided separately for planned and unplanned data. The planned data is considered accurate only for 2012 and 2013.

5. The table below details the calculation of each of the variables in Table 7.2 –Actual Information:

Variable_Code	Variable	Calculation
DQS0201	Energy not supplied (planned)	For each NMI: 1. Calculate minutes connected per NMI **e.** = **d.** x 24 x 60 2. Calculate Energy not supplied per NMI **f.** = **c.** x. (**b.** / **e.**) 3. Summate column **f.** to calculate the energy not supplied for the year and divide this summation by 1,000,000 to present in GWh
DQS0202	Energy not supplied (unplanned)	For each NMI: 1. Calculate minutes connected per NMI **e.** = **d.** x 24 x 60 2. Calculate Energy not supplied per NMI **f.** = **c.** x. (**b.** / **e.**) 3. Summate column **f.** to calculate the energy not supplied for the year and divide this summation by 1,000,000 to present in GWh

Key elements of the Methodology (Regulatory years 2006 to 2009 for unplanned and 2006 to 2011 for planned):

For these years, estimates were required using the following key variables:

   a. Table 7.1 – Actual/estimated Information variable DQS0102

   b. Table 7.2 – Actual Information variable DQS0201

   c. Table 7.2 – Actual Information variable DQS0202

   d. DAROS data – yearly count of substations affected by planned outages

   e. SAIDI / unplanned GWh not supplied per year

   f. Average SAIDI / unplanned GWh not supplied

   g. Substations affected / planned GWh not supplied per year

   h. Average substations affected / planned GWh not supplied

6. The table below details the calculation of each of the variables in Table 7.2 – Estimated Information:

Variable_Code	Variable	Calculation
DQS0201	Energy not supplied (planned)	For 2012 and 2013: 1. Calculate relationship between substations affected and planned energy not supplied $\mathbf{g.} = \mathbf{d.}/\mathbf{b.}$ 2. Calculate average $\mathbf{h.} = \text{average } (\mathbf{g}.)$ For 2006 to 2011: 3. Calculate energy not supplied as $\mathbf{d.}/\mathbf{h.}$
DQS0202	Energy not supplied (unplanned)	For 2010 to 2013: 1. Calculate relationship between SAIDI and unplanned energy not supplied $\mathbf{e.} = \mathbf{a.}/\mathbf{c.}$ 2. Calculate average $\mathbf{f.} = \text{average } (\mathbf{e}.)$ For 2006 to 2009: 3. Calculate energy not supplied as $\mathbf{a.}/\mathbf{f.}$

Key assumptions used in the methodology:

1. All outage event attributes for 2010 to 2013 are correctly recorded in OMS as at 14/2/2014.

2. The connectivity model in OMS, as received from GIS, is correct, or that any discrepancies are managed through a combination of additional switching in OMS to match the actual configuration, or by holding out the event in the OUTAGES_NOT_IN_OMS table until the updates come through.

3. The duration of the outage for each NMI includes only customers registered as active at the time of the outage.

4. Where the Business Warehouse Billing Data does not have consumption data for a NMI from the OMS system Ausgrid assumes that the customer has not been billed and therefore the energy not supplied is zero.

5. Where the Business Warehouse Billing Data does not have days connected data for a NMI but does have consumption data Ausgrid assumes that the NMI was connected for the full year.

6. That the correlation between SAIDI (DSQ0102) and energy not supplied (unplanned) provides a reasonable basis for extrapolating energy not supplied (unplanned) for regulatory years 2006 to 2009.

7. That the count of substations affected by planned outages, as reported in our DAROS system, provides a reasonable basis for extrapolating energy not supplied (planned) for regulatory years 2006 to 2011.

Use of estimated information

Ausgrid has used estimated information for DQS0201 for regulatory years 2006 to 2011 and DQS0202 for regulatory years 2006 to 2009.

DQS0201

This variable was required to be estimated by Ausgrid because previous to regulatory year 2012, Ausgrid did not enter all planned outage data into the OMS system, therefore making reporting against individual NMIs as required in this section impossible.

The DAROS system is used to enter planned outages. This system provides Ausgrid with a count of the total number of distribution substations interrupted due to a planned outage in the DAROS network area. Ausgrid carried out a high level review of the correlation between the count of substations affected by planned outages

and total planned energy not supplied to our customers. Ausgrid considers this correlation appropriate as the year on year variation was minimal. Ausgrid has used this correlation based on two years of actual data to estimate the preceding six years from 2006 to 2011. This methodology is deemed to be Ausgrid's best estimate because it is based upon historic records of planned outages and an established relationship between the attributes of historic planned outage records and actual energy not supplied for 2012 and 2013.

DQS0202

This variable was required to be estimated by Ausgrid because previous to regulatory year 2010, reliable data for all NMIs in the OMS system is not available.

Unplanned SAIDI data is available due to existing Ausgrid reporting processes. Ausgrid carried out a high level review of the correlation between the SAIDI for unplanned outages including Major Event Days but excluding the exclusions outlined in Chapter 9, i.e. Variable DQS0102 and total unplanned energy not supplied to our customers. Ausgrid considers this correlation appropriate as the year on year variation was minimal. Ausgrid has used this correlation based on four years of actual data to estimate the preceding four years from 2006 to 2009. This methodology is deemed to be Ausgrid's best estimate because it is based upon unplanned SAIDI performance and an established relationship between unplanned SAIDI and actual energy not supplied for 2010 to 2013.

7.3 System losses

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice.

Source of information

The data within this table is calculated based on energy data provided in tables 5.1, 5.1.2 and 5.1.3 of the Notice.

Methodology and Assumptions

Ausgrid use the formula provided in the Economic Benchmarking RIN for distribution network service providers – Instructions and Definitions section 7.3:

Equation 2 Calculation of system losses

$$system\ losses = \frac{electricity\ imported - electricity\ delivered}{electricity\ imported} \times 100$$

Electricity imported is the total electricity inflow into Ausgrid's distribution network (including from Embedded Generation) minus the total electricity outflow into the networks of the adjacent connected distribution network service providers or the transmission network(s).

Electricity delivered is the amount of electricity transported out of Ausgrid's network to its customers as metered (or otherwise calculated) at the customer's connection.

This is a system wide figure not a feeder level figure.

Use of estimated information

The data in this table is based on data from tables 5.1, 5.1.2 and 5.1.3 of the Notice that are actuals.

7.4 Capacity utilisation

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice.

Source of information

There are three key inputs to the capacity utilisation calculation:

1. Non-Coincident Maximum Demand

This value is sourced from RIN table section 5.3.3 - Annual system maximum demand characteristics at the zone substation level - DOPSD0201 - Non-coincident summated raw system annual maximum demand.

2. Zone Throughput Capacity

Ausgrid's SAP based asset management system contains details on substation assets, such as transformers, circuit breakers, current transformers, etc. Along with the lifecycle status and functional location of these assets, they contain stored characteristics which include information relating to the asset thermal rating. This data is used by an Ausgrid IT system known as the Ratings and Impedance Calculator (RIC) to perform ratings calculations based on ratings rules. RIC generates a report known as "R01 – Present Zone and STS Firm Ratings". This report is used as the base data for the zone substation transformer thermal capacity calculation for each year.

The RIC system was introduced three years ago. Prior to 2011 similar reports known as TF45 were available from a mainframe application known as TIS. The substation capacity information used to calculate capacity is sourced from archived R01 and TF45 reports dating back to 2006.

3. Zone Feeder Exit Capacity

Due to historical differences regarding work practices, data systems and data storage across Ausgrid, this data was extracted differently for the Sydney and Hunter areas. This is being addressed by the creation of a common feeder forecasting methodology, business practice/process and storage mechanism.

Sydney Data – the 2006 and 2007 connectivity data was not available, for the subsequent years, network models for each year were created based on archived connectivity data as at the end of December of each calendar year. This connectivity data was used to create SINCAL (load flow and connectivity analysis software package) models of all zone's distribution networks. Data was extracted for the trunk section Summer Day, Summer Night, Winter Day and Winter Night ratings for the distribution network feeders. The lowest of these values was selected as the 11kV capacity.

Hunter Data –The trunk rating is sourced for the Hunter area from well established distribution feeder forecasts which date back to 2006. Data was extracted for the trunk section Summer ratings for the distribution network feeders.

Additionally, zone substation commissioning and decommissioning dates were provided by the distribution planning section.

Methodology and Assumptions

Capacity utilisation (DQS04) is a measure of the capacity of zone substation transformers that is utilised each year.

The overall utilisation is calculated from the sum of non-coincident Maximum Demand at the zone substation level divided by the summation of zone substation capacity.

Individual zone substation capacity is determined by comparing the feeder exit capacity to the zone substation throughput (thermal) capacity and selecting the lower value of the two.

For ease of data collection and in order to avoid splitting summer or winter seasons over two different years an adjusted review period was used. In the case of 2013 for example, the year review period starts on 1 April 2012 and continues through to 31 March 2013. The same dates are implemented for each review year, 2013 back to 2006.

Zone substations are included in the calculations for a particular year if they have been commissioned before or during the yearly review period and have not yet been decommissioned. Decommissioned zones are not removed from calculations in the yearly review period in which the zone was decommissioned but are removed from the following year.

In the event that there was only one of the capacity values (throughput or exit) available for a particular zone for a particular yearly review period then the known value was used as default.

Commissioning dates were available for the full review period, however decommissioning dates were only recorded from 2008. No zone load recordings were found to cease during 2006 or 2007 implying that no zones

were decommissioned during this period (and if any were they would not be included in the system demand calculation).

Specific Data Collection Methodologies:

1. Non-Coincident Maximum Demand

Ausgrid use the formula and methodology provided in the Economic Benchmarking RIN for distribution network service providers – Instructions and Definitions Section 5.3.

2. Zone Throughput Capacity

The Instructions and Definitions state:

"For the purpose of this measure, thermal capacity is the rated continuous load capacity of the zone substation (with forced cooling or other capacity improving factors included if relevant). This must be the lowest of either the transformer capacity or feeder exit capacity of the zone substation. Feeder exit capacity should similarly be the continuous rating."

Ausgrid has assumed through the inclusion of the "capacity improving factors" wording in the above statement that the AER is interested in the normal cyclic rating of the transformer, as opposed to the transformer nameplate rating.

The normal cyclic rating is based on the individual transformer thermal performance from temperature rise tests and the transformers load cycle which will generally not be continuous (constant load), however once the typical load cycle has been allocated to the transformer the normal cyclic rating is available every day of the year, but not every hour of the day.

Ausgrid does not use nameplate ratings for operational or planning purpose. Ausgrid zone transformers have a summer normal rating, summer maintenance rating, summer emergency rating, winter normal rating, winter maintenance rating and a winter emergency rating. These are all cyclic ratings.

As the AER has requested that the capacity be the lowest of either the transformer capacity or the feeder exit capacity, Ausgrid has assumed that the AER is actually interested in the transformer throughput rating which considers the rateable equipment such as a circuit breakers and other equipment that is in series with the transformer and limits its load carrying capability. Ausgrid has therefore capped the transformer ratings to the applicable throughput rating.

3. Zone Feeder Exit Capacity

Sydney Data – the total zone substation distribution feeder exit capacity was based on the summation of the trunk section ratings of the feeders that supply network load connected to a zone substation. Due to the data availability issues and number of zones to check, efforts were focussed on the validation of feeders where the exit capacity was known to be the limitation, rather than the Zone transformer throughputs.

The following was taken into account in providing for the simulation:

- Trunk section limitation was based on the minimum rating to the first tee-off of load on the feeder.
- All feeders were limited to 400A to match switchgear/protection systems.
- Thermal ratings are cyclic ratings based on cable type, load cycle, thermal resistivity, mutual heating, OH construction operating temperature.
- Where possible, as a minimum for 2013 data, if data was missing for individual feeders and the summation was limiting the capacity of the zone substation, this data was sourced manually from the current system diagrams.
- 2006 and 2007 connectivity data was not available so it was not provided.
- Conversion from 11kV amps to MVA used the following formula based on nominal voltages:
  .
- Conversion from 5kV amps to MVA used the following formula based on nominal voltages:
  .
- Where possible, double banked feeders were captured as 2 feeders.
- Feeders that were normally open at the circuit breaker and connected to feeders supplying the network were included.
- Network models for each year were created based on archived connectivity data as at the end of December of each calendar year. It was assumed that the December model snapshot represented that summer's configuration and the previous winter's configuration.

- Ausgrid owned feeders that exited the zone substation were only summated. Feeders that did not exit the zone such as ones supplying only FIU, Aux subs, cap banks, or inter group ties were excluded.
- Where HV customers own the cables connected to our substations, they have been excluded such as Graving Dock, ANSTO, CALTEX etc.
- All city CBD zone substations have complex triplex feeder configurations and as such limited data could be captured from our existing systems in the time frames available.
- Connectivity data was not available for Bankstown Zone Substation. This affects review years 2011, 2012 and 2013 as the substation was commissioned in November 2010.

Hunter Data – the total zone substation distribution feeder exit capacity was based on the summation of the trunk section ratings of the feeders that supply network load connected to a zone substation.

The following was taken into account when running the simulation:

- Feeders are included if they normally supply load or could be used to supply load.
- The trunk ratings of 11kV feeders for the Hunter area are based on the section of feeder that carries 90% or more of the total feeder load.
- The trunk ratings for the Hunter are recorded on a yearly basis in an 11kV feeder forecast which exists to 2004.
- Where ratings were unavailable for a certain year the ratings from the previous year and subsequent year were used.
- Throughout the period many new zones were commissioned, with several commissioned in stages. As a zone is commissioned in stages, the zone exit capacity changes on a regular basis as new 11kV feeders are connected.

Use of estimated information

This information contained in Table 7.4 was required to be estimated by Ausgrid because a large number of input variables were utilised in the calculation methodology. A small number of these variables were required to be estimated due to missing data. Unless specifically mentioned in the methodology, the information provided is actual data. Both throughput and exit capacity data was limited for some regulatory years. If data was missing or deemed erroneous for a particular zone substation listing then the next available annual capacity values were used. This methodology is deemed to be Ausgrid's best estimate because is consistent between all reported regulatory years and is based upon the most accurate available data in the case of missing input variables.

Worksheet 8 – Operating environment factors

8.1   Density factors

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice.

Source of information

Customer Density

Customer numbers were used from Table 5.2. See related basis of preparation section.

Route Line length utilised the Route Line Lengths calculated in DOEF0301. Basis of preparation 8.2 defines the source of this information.

Demand density

Refer Tables 5.3.1 - DOPSD0201 (for demand) and 5.2.1 - DOPCN01 (for total customer numbers).

Energy Density

Energy density information was sourced from Tables 5.1 (for energy) and 5.2 (for customer numbers).

Methodology and Assumptions

Customer Density is a direct calculation from the results of DOEF0301 and Customer numbers in Table 5.2 (Number of customers divided by Route km) therefore all assumptions defined for this data are applicable to Customer Density.

The Demand Density is the total kVA non-coincident demand data (summed at zone substation level) from Table 5.3.1 divided by the total customer numbers from Table 5.2.1 of the benchmarking RIN.

The Energy Density is the energy delivered from Table 5.1 divided by the customer numbers from Table 5.2.1.

Use of estimated information

Customer Density - Customer density is calculated by number of customers divided by route length of network in km.

Customer numbers are actual, as shown in Table 5.2.

Route length of overhead network in km is not available prior to 2010. The route length of network used for calculating Customer Density 2006-2009 is the 2010 overhead route result plus the total underground circuit length for the corresponding year. Because customer density is a direct calculation from the results of DOEF0301 and Customer numbers in Table 5.2, all estimations defined in the related basis of preparation is applicable to Customer density.

For Demand Density no estimates were required.

For Energy Density no estimates were required.

8.2   Terrain factors

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice.

Source of information

DOEF0205 Total Number of Spans was calculated using Ausgrid's Geographical Information System (GIS) data. Ausgrid's GIS data is not represented as spans or singular routes, but represents the network as individual circuits; therefore significant manipulation of the existing data model was required defined in Methodology and Assumptions. GIS data was available for 2010-2013. Historic GIS data prior to 2010 was not available and estimated values were used.

The above data was used as a basis for providing;

- DOEF0204 Total Vegetation Maintenance Spans

- DOEF0202 Urban and CBD Vegetation Maintenance Spans

    o Combined with 2013 reliability feeder classifications applied to 2009-2013.

- DOEF0203 Rural Vegetation Maintenance Spans

    o Combined with 2013 reliability feeder classifications applied to 2009-2013.

- DOEF0201 Rural Proportion

    o Combined with 2013 reliability feeder classifications applied to 2009-2013.

- DOEF0212 Tropical Proportion

    o Combined with Bureau of Meteorology Climate Classification Maps based on standard 30 year climatology (1961 -1990) applied to 2009-2013.

- DOEF0213 Standard Vehicle Access

    o Combined with current (Feb 2014) road corridor data from the Land and Property Information applied to 2009-2013,

    o 2013 Australian Bureau of Statistics land zoning data.

- DOEF0214 Bushfire Risk

    o Combined with Rural Fire Service 2013 Bushfire Prone Land data applied to 2009-2013.

- DOEF0210 Average Number of Defects per Urban and CBD Vegetation Maintenance Span

    o Combined with; 2013 reliability feeder classifications applied to 2009-2013,

    o Ausgrid acquired 2012 and 2013 Light Detection And Ranging (LiDAR) vegetation defect data,

    o Vegetation management contract data for 2009-2011.

- DOEF0211 Average Number of Defects per Rural Vegetation Maintenance Span

    o Combined with; 2013 reliability feeder classifications applied to 2009-2013,

    o Ausgrid acquired 2012 and 2013 LiDAR vegetation defect data,

    o Vegetation management contract data for 2009-2011.

- DOEF0208 Average Number of trees per Urban and CBD Vegetation Maintenance Span

    o Combined with; 2013 reliability feeder classifications applied to 2009-2013,

    o Ausgrid acquired 2012 and 2013 LiDAR vegetation defect data,

    o 2009-2011 data estimated.

- DOEF0209 Average Number of trees per Rural Vegetation Maintenance Span

    o Combined with 2013 reliability feeder classifications applied to 2009-2013 and

    o Ausgrid acquired 2012 and 2013 LiDAR vegetation defect data

    o 2009-2011 data estimated

- DOEF0206 and DOEF0207

    o Was obtained from the Contract Operations group in Ausgrid and is based on the typical network maintenance cycle.

Methodology and Assumptions

Span Calculation and Feeder Classification

Ausgrid assessed the Australian Energy Regulator's (AER)'s recommendation to use number of poles minus one to calculate the number of spans. Further analysis found this methodology to be fundamentally flawed where the overhead network was not linear in nature. For example if the spans created a closed loop the number of spans

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equals the number of poles, however if the spans formed a grid (adjoining loops sharing a span) the number of poles has no relationship on the number of spans.

In Figure 8.2.1 (below) the numbers represent the count of spans, black lines represent actual network span data in an area west of Sydney, and black circles represent poles.

For simplicity poles in-between main vertices and the small line segments teeing off the main line have been ignored. This has no impact on the formula or result.

- Red numbered spans (1-5) – this is a simple loop (common in residential areas which are not densely populated).
    - The span count equals the number of poles. (20% error using pole count minus one)

- Combining the red and blue numbered spans (1-8) – this is the simplest form of a grid (common in residential areas which are not densely populated).
    - The span count equals the number of poles plus one. (33% error using pole count minus one)

- Combining the red, blue, and green numbered spans (1-11) – this is a larger grid (common in residential areas).
    - The span count equals the number of poles plus two. (22% error using pole count minus one)

- Combining red, blue, green, and orange numbered spans (1-21) – this forms a grid consisting of multiple rows and columns (this is the most common span configuration throughout residential, urban, and CBD areas).
    - The span count equals the number of poles plus five. (31% error using pole count minus one)
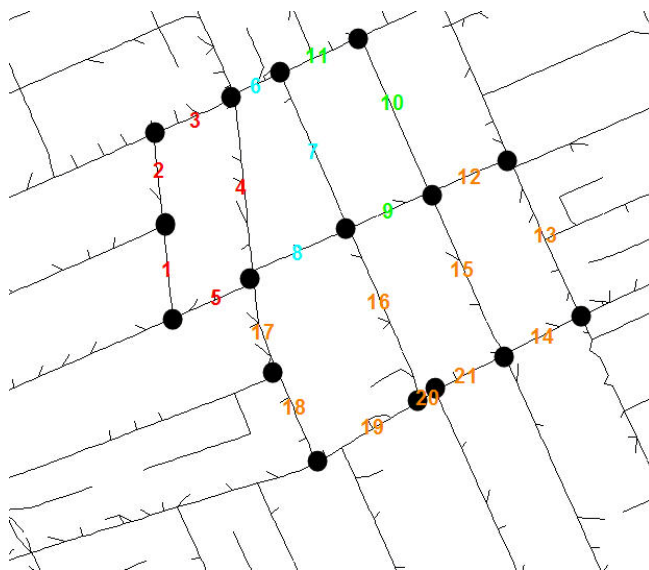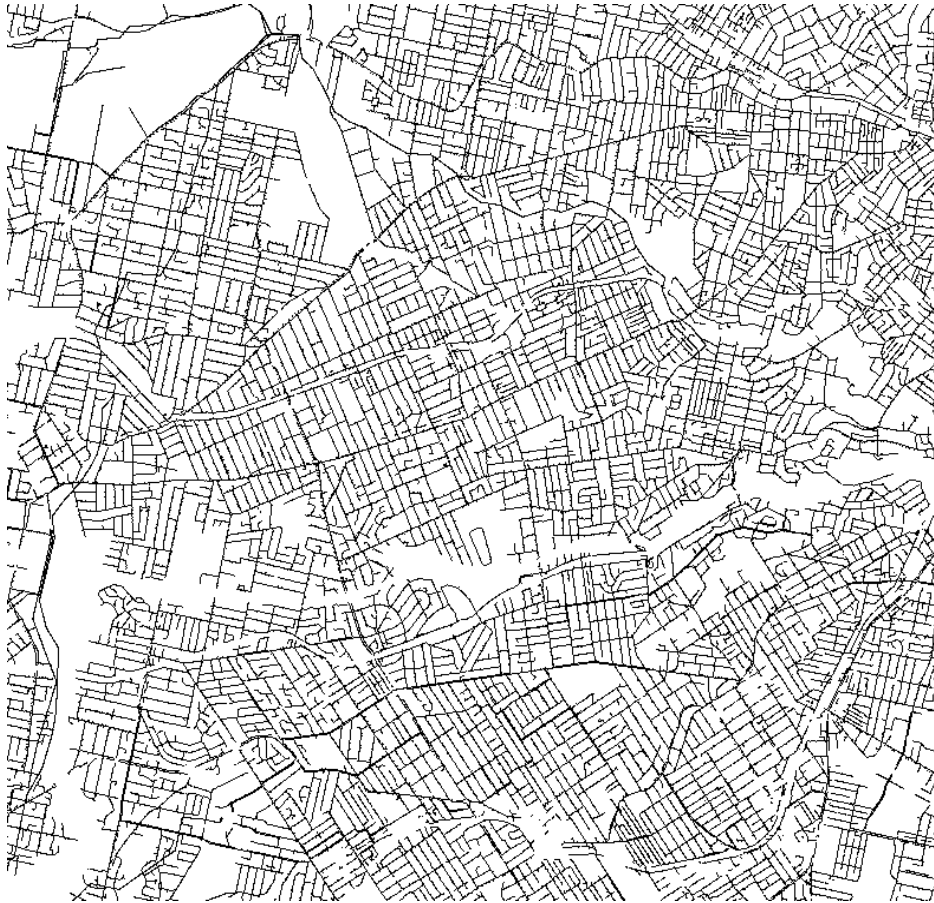

Figure 8.2.1

Figure 8.2.2 - a larger sample area showing that these areas are not insignificant.

Additionally, an overhead service is part of Ausgrid's network, which may or may not be between poles, increasing the error in the AER's pole minus one methodology.

Ausgrid calculated the number of spans for 2013 to be 1,340,583 but only consists of 603,410 poles.

These errors are exacerbated further when calculating the number of spans with bushfire risk. The nature of the Rural Fire Services bushfire prone land dataset results in cases where the span crosses an at risk area, but the poles at either end of the span fall outside. This results in the span not being counted as at risk.

The span connected to Ausgrid's network where it is connected to the point of attachment, or the first span to a private pole is considered part of Ausgrid's network therefore it has been counted as one span. The LiDAR data used to calculate average number of trees and defects did not cover service lines or their related defects. For this reason, services have been excluded in these calculations between 2012 and 2013 for DOEF0208, DOEF0209, DOEF0210, and DOEF0211, otherwise it would result in a lower result.

To calculate the number of spans Ausgrid spatially manipulated the data using the following methodology:

- The circuit data was split into line segments at every pole.

- Where the line segments ran parallel they were snapped together.

- For spans which contained multiple conductors with different feeder classifications (Rural portion, Urban, and CBD), the highest voltage's classification was attributed to the span, with all others removed. If the span represented conductors with different feeder classifications and of the same voltage the following priority was applied to the span;

     1. CBD

     2. Urban

     3. Rural

- Ausgrid does not give Transmission feeders (feeders > 22kV) a feeder classification of CBD, Urban or Rural. A transmission feeder typically supplies multiple HV feeder classifications. As a consequence, spans made up of transmission only feeders are not assigned a CBD, Urban or Rural category. If a span only consisted of transmission it received a classification of transmission, however if there was also a conductor of lesser voltage in the span, transmission voltage was ignored and the classification of the lower voltage was applied.

- The RIN templates only show spans associated with low voltage and high voltage mains. Transmission only spans were not included in the RIN Template. The transmission results are as follows;

Transmission vegetation maintenance spans (number of spans)
2010	17970
2011	18419
2012	18386
2013	18468

Average Number of Trees and Defects (2012 and 2013)

Ausgrid utilised LiDAR acquired data for 2012 and 2013 to calculate vegetation within the vicinity of its network covered by vegetation management activities. The spread or coverage of the LiDAR data and tree identification was up to 8 meters from the network. Trees and vegetation outside of this corridor were ignored and deemed not to be within the vicinity of the network for vegetation management activities.

The source data extent did not fully cover the Ausgrid's network, nor was it an equal sample of construction types, environmental, and demographic variations within its supply area. The LiDAR data acquired in 2012 did not encompass low voltage network and related defects. The coverage area for LiDAR acquisition was increased in 2013 to include low voltage (excluding services) and coverage area was increased. This results in a difference in sample data used between 2012 and 2013 shown in Table 8.2.1.

Sample Data Representation of Total Network

Feeder Classification	2012	2013
Transmission	66%	63%
Rural	34%	94%
Urban/CBD	1%	10%

Table 8.2.1

Ausgrid does not give Transmission feeders (feeders > 22kV) a feeder classification of CBD, Urban or Rural. A transmission feeder typically supplies multiple HV feeder classifications. As a consequence, spans made up of transmission only feeders are not assigned a CBD, Urban or Rural category. If a span only consisted of transmission it received a classification of transmission, however if there was also a conductor of lesser voltage in the span, transmission voltage was ignored and the classification of the lower voltage was applied.

The RIN templates only show spans associated with low voltage and high voltage mains. Transmission only trees and defects were not included in the RIN Template. The transmission results are as follows;

Year	Trees	Defects
2012	0.34	0.04
2013	0.30	0.06

Average Number of Trees and Defects (Prior to 2012)

Historic data was obtained from vegetation management contracts for years prior to the availability of LiDAR data. This historic data did not provide the means to report based on the feeder category (Urban, Rural, CBD). To provide the split, the percentage of spans in each category from the same year was applied to the total. The historic vegetation management data contained spans cleared, and trees trimmed which provides a basis to calculate the defects per span maintained. It does not provide account for spans which did not require clearing but vegetation was in the vicinity of the network. This means that the number of spans used in the calculation is significantly reduced inflating the number of defects per span. This accounts for the notable difference in the defect results from 2009-11 and 2012-13.

Due to the lack of data available related to the average number of trees, for 2009-2011 an average of 2012-13 data was used.

The AER Instructions and Definitions for the economic benchmarking RIN outlined a number of data sources that Ausgrid was required to use to underpin estimates, including using Normalised Difference Vegetation Index (NDVI) grids and maps available from the Bureau of Meteorology, or data from the National Vegetation Information System (NVIS) overlaid with GIS data to calculate the average number of trees per span.

The Bureau of Meteorology provide the following description of the NDVI[4]:

> ”The NDVI is calculated from the red and near-infrared reflectances rRed and rNIR. Its value is always between -1 and +1. Vegetation NDVI in Australia typically ranges from 0.1 up to 0.7, with higher values associated with greater density and greenness of the plant canopy. NDVI decreases as leaves come under water stress, become diseased or die. Bare soil and snow values are close to zero, while water bodies have negative values.”

NVIS is orientated towards native vegetation and NVIS data was partially updated in NSW with 2001-09 data, with extensive areas of 1997 data remaining from the earlier version of NVIS.

Both of these data sources do not contain any spatial or a-spatial data regarding vegetation density or number of trees, they consist of vegetation health and native species data. Additionally, both are represented at a resolution which far exceeds the area covered by vegetation management activities to comply with Ausgrid's vegetation obligations.

Vegetation Maintenance Spans

Vegetation maintenance spans includes the first service span connected to Ausgrid's network in some regions where vegetation clearing on service lines are carried out, it also includes overhead street lighting spans. Due to the source data structure used to calculate the feeder classifications, street lighting data was not able to be assigned a classification and therefore omitted from the feeder category split results in DOEF0202, and DOEF0203, but included in total DOEF0204 and DOEF0205.

Tropical Proportion

Service lines have been excluded.

Standard Vehicle Access

It was assumed that Standard Vehicle Access DOEF0213 is length of spans not accessed by a standard vehicle as defined in the definition.

Standard Vehicle Access is defined by the AER in the RIN Instructions and Definitions (page 50) as;

> "Distribution route Line Length that does not have Standard Vehicle Access. Areas with Standard Vehicle Access are serviced through main roads, gravel roads and open paddocks (including fated and fenced paddocks). An area with no standard Vehicle Access would not be accessible by a two wheel drive vehicle."

Ausgrid does not record information with regard to length of network accessible in relation to vehicular capability or terrain.

The estimated values for Standard Vehicle Access have been calculated as follows: Spans which are not within a 10 meter buffer of a designated road corridor formed or unformed were identified using GIS spatial analytical software. The spans output of this query were then removed if the continuous line segment length was less than 100m, thus removing small segments which in most cases run parallel with the road corridor (assumed to be also accessible via a standard vehicle). Ausgrid was unable to identify open paddocks which are, or are not, accessible via a standard two wheel drive vehicle. In order to provide a best estimate Ausgrid utilised the 2013 Australian Bureau of Statistics data which contained agriculturally zoned land, assumed to largely be open paddocks which would be accessible via a two wheel drive vehicle. Where the spans fell inside the agricultural areas they were removed from the length calculation.

The "mesh block" data from the Australian Bureau of Statistics for the agricultural land "The Mesh Block Category (MB_Category) attribute is a field based on planning/zoning scheme data provided by each state/territory"

(link http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1209.0.55.002Main+Features12006?OpenDocument).

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[4] For more information, see http://www.bom.gov.au/climate/austmaps/about-ndvi-maps.shtml

The network spans deemed not accessible via a standard two wheel drive vehicle were calculated to be 17.6% of the network not within the 10m buffer of the road corridors, therefore this percentage has been applied to each year 2009-2012.

Service lines have been excluded because they are an arbitrary length of 10 meters towards the centre of the supplied land parcel. Actual lengths could extend much further than 10 meters and Ausgrid has no way of determining this length. Using an arbitrary length would compromise the validity of the actual route length calculated.

Bushfire Risk

Includes service lines where they are subject to vegetation management.

Rural proportion

Services line lengths are an arbitrary length of 10m towards the centre of the supplied land parcel, therefore they have been excluded. Results in the table have been provided as per definition "Distribution line route length classified as short rural or long rural in km / total network Line", rather than km as noted in table 8.2.

Underground cables are excluded for calculating the Route length classified as short or long rural in km, and the Total network Line. Therefore the figures reporting the Rural proportion excludes underground network cables.

Average Vegetation Management Cycles

Ausgrid ensures vegetation management activities are executed under a contract arrangement whereby the contractor is required to maintain clearances throughout the term of the contract.

The frequency in which the contractor carries out activities to fulfil their responsibilities is not known by Ausgrid and would vary depending on the vegetation type, area, and contractor.

There is no clause or requirement in the contract to carry out vegetation maintenance activities in a cyclic manner. However, the typical maintenance review cycle is 1 year.

Use of estimated information

Ausgrid has used estimated information prior to 2010 for Table 8.2 - Terrain Factors in calculating spans, route, length, and trees.

Backup GIS data is not available prior to 2010 which is used to calculate spans, route, and length.

- DOEF0201 - Rural Proportion
    - The 2009 figure has been calculated by taking the average of the 3 year consistent growth rate over 2010 – 2013, and subtracting it from the 2010 result.
    - This calculation is representative of the year on year trend because of the limited network changes and reconfiguration options on rural classified feeders and is deemed Ausgrid's best estimate.
- DOEF0202 - Urban and CBD vegetation maintenance spans
    - The 2009 figure equals the same as 2010 result.
- DOEF0203 - Rural vegetation maintenance spans
    - The 2009 figure equals the same as 2010 result.
    - Due to the limited data availability for 2009, network configuration changes, classification changes on feeders, and data capture and cleansing activities, calculating a historic trend is unreliable; therefore providing the same result as 2010 is Ausgrid's best estimate.
- DOEF0204 - Total vegetation maintenance spans
    - The 2009 figure equals the same as 2010 result.
- DOEF0205 - Total number of spans
    - The 2009 figure equals the same as 2010 result.
    - Due to the limited data availability for 2009, data capture and cleansing activities, calculating a historic trend is unreliable; therefore providing the same result as 2010 is Ausgrid's best estimate.
- DOEF0208 - Average number of trees per urban and CBD vegetation maintenance spans

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- o The 2009-2011 results equals the average of 2012-13 data

- DOEF0209 - Average number of trees per rural vegetation maintenance spans

  - o The 2009-2011 results equals the average of 2012-13 data

  - o Due to not having any reliable data for 2009-2011, and the result being an average number of trees per span it is estimated not to significantly change; therefore providing the an average of the results formulated from LiDAR data between 2012-2013 is Ausgrid's best estimate.

- DOEF0212 - Tropical proportion

  - o The 2009 figure equals the same as the 2010 result.

  - o The tropical area of Ausgrid's network is an older area with limited modification to the number of spans between the years 2009-2013. The four year trend on the calculated results reflects this, and is Ausgrid's best estimate.

- DOEF0213 - Standard vehicle access

  - o The figure equals the same as 2010 result.

  - o Non- standard vehicle access spans are primarily in remote areas, where between 2010 and 2013 there is a very slight trend showing that there is a 3km reduction, expected to be a result of expanding development or decommissioning of network. Due to the very slight change, and the average over the four year period, being a 750m variation to the 2010 results, it is Ausgrid's best estimate to report the same value for 2009 as was reported in 2010.

- DOEF0214 - Bushfire risk

  - o The 2009 figure equals the same as 2010 result.

  - o Due to the estimated total number of spans being equal in 2009 and 2010 result it is assumed that the bushfire areas also didn't change between 2009-2010, and therefore it is Ausgrid's best estimate to report the number of spans in bushfire risk areas for 2009 to equal the same as the 2010 results.

For results over 2009-2011 for the following defect calculations, actual data was used how ever the categorisation split was estimated based on percentage of vegetation maintenance spans for each category. This span data used for the calculation was also estimated as mentioned above against DOEF0202, DOEF0203, and DOEF0204. Refer to DOEF0202, DOEF0203, and DOEF0204 explanation above to why Ausgrid's methodology is considered the best estimate.

- DOEF0210 - Average number of defects per urban and CBD vegetation maintenance span

- DOEF0211 - Average number of defects per rural vegetation maintenance span

8.3   Service area factors

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice.

Source of information

DOEF0301 Route Line Length was calculated using Ausgrid's Geographical Information System (GIS) data. Ausgrid's GIS data is not represented as spans or singular routes, but represents the network as individual circuits; therefore significant manipulation of the existing data model was required defined in Methodology and Assumptions. GIS data was available for 2010-2013. Historic GIS data prior to 2010 was not available and estimated values were used.

Methodology and Assumptions

In this section we explain the methodology Ausgrid applied to provide the required information, including any assumptions Ausgrid made.

To calculate the route line length Ausgrid spatially manipulated the data using the following methodology;

- The circuit data was split into line segments at every pole.
- Where the line segments ran parallel they were snapped together.
- For spans which contained multiple conductors duplicates were removed and the length calculated.

Services line lengths are an arbitrary length of 10m towards the centre of the supplied land parcel, therefore they have been excluded.

The definition of Route Line Length (DOEF0301) as defined by the AER to include underground cables has been accommodated.

> "*This email concerns the "Route Line Length" variable (DOEF0301)*
> *We have received a question as to whether Route Line Length captures the length of underground cables. We confirm that the intention of this variable is to capture the length of both underground cables and overhead lines. However we note that the wording of the definition in the economic benchmarking RIN isn't clear regarding this.*
> *We request that you include the route length of underground cables in route line length. This will ensure that this measure is consistent across NSPs and will appropriately account for the route length of all conductors should this be used as a benchmarking metric.*"
> email from the AER titled "EBT RIN – Route Line Length" on 07/04/2014 at 02:50pm,

The original definition of Route Line Length to be "measured as the length of each span between poles and/or towers" is not relevant to underground cables; therefore length for each underground conductor circuit was added to the overhead route line length which was calculated in accordance with the original definition. That is; "each span is considered only once irrespective of how many circuits it contains".

Use of estimated information

Backup GIS data is not available prior to 2010 which is used to calculate spans, route, and length.

DOEF0301 - Route Line length prior to 2010 equals the same as 2010 for the overhead conductors, plus the total actual underground circuit lengths for the corresponding year.

The route overhead line length between 2010-2011 fluctuates slightly due to data cleansing in 2011 but apart from this the change is less than 8km. Therefore it is Ausgrid's best estimate to use the 2010 result for the 2009 reported figure.

8.4   Weather stations

Compliance with requirements of the notice

Of the 573 weather stations within the Ausgrid area, 19 are used to assist in the operation of Ausgrid's network. 2 weather stations outside of Ausgrid's area (067117 Holsworthy control range and 066124 Parramatta North) are used by Ausgrid to assist in the operation of the network.

Of the total 573 weather stations within the Ausgrid area 206 are no longer operational. Two weather stations not currently in operation are paired with a newly commissioned weather station in close proximity to form a complete historical weather data set. There 204 of the 206 weather stations currently not operated by the Bureau of Meteorology (BOM) are not usable by Ausgrid.

The remaining 350 weather stations are unsuitable for use by Ausgrid as these weather stations do not measure the desired climate observation at the appropriate frequency to be used to assist in network operations. For example, the weather station may only exclusively record rainfall, wind, or peak temperature only.

Additionally to BOM weather stations, substations in the Newcastle and Hunter regions can have weather data available for the Hunter Control Room to use and an Ausgrid weather station at Bass Hill is available for the Sydney Control Room.

System Control will also use independent weather reports and data from MetraWeather, WeatherZone and the Bureau of Meteorology to assist in the operation of Ausgrid's Network.

Source of information

A list of Bureau of Meteorology weather stations was obtained from the www.bom.gov.au website.

Methodology and Assumptions

This list of weather stations obtained from the BOM contained Latitude and Longitude coordinates which were then matched to Ausgrid's Geographical Information System to determine the suburb and location of all weather stations within the Ausgrid network area.

It is assumed by Ausgrid that the list of BOM weather stations extracted from the www.bom.gov.au website on 21 January 2014 is complete and position coordinates contained within both the BOM data and Ausgrid's GIS are accurate.

Use of estimated information

Ausgrid has used estimated information for Suburb and Postcodes of weather stations which fall under the jurisdiction of the Sydney Harbour Foreshore Authority

- A number of islands in Sydney Harbour and harbour foreshore locations in Sydney are assigned to the Sydney Harbour Foreshore Authority within Ausgrid's GIS and therefore no suburb or post code could be derived from aligning BOM data with GIS
- The positions of all weather stations within the Sydney Harbour Foreshore Authority local government area were located in GIS. A nearby electrical asset was then queried to determine the nearest suburb where appropriate and a post code derived using http://auspost.com.au/apps/postcode.html

- The relative spatial proximity of the weather station to a nearby electrical asset, considering the weather station requires power and this is very close, is deemed Ausgrid's best estimate in calculating a postcode for the weather stations assigned to the Sydney Harbour Foreshore Authority.