Basis of preparation

> **Response to economic benchmarking RIN dated 18 December 2013**

Version updated as at 28 April 2014

CONTENTS

Purpose

The RIN requires Essential Energy (EE) to prepare a Basis of Preparation. By this, the AER mean that for every variable in the Templates, Essential Energy 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 Essential Energy submits with its completed Templates. The AER will publish Essential Energy's Basis of Preparation along with the Templates.

This document is Essential Energy's Basis of Preparation in relation to the Audited Information required to be submitted to the AER 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 Essential Energy has complied with the requirements of the Notice.

To do this, the AER recommended that Essential Energy 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 Essential Energy may consider structuring these sections with subheadings for each subject matter table in each worksheet. For example, for the worksheet '5. Operational data', Essential Energy 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'. Essential Energy's Basis of Preparation has followed this recommended structure.

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

The AER has set out what must be in the Basis of 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 Essential Energy obtained the information provided
3	Explain the methodology Essential Energy applied to provide the required information, including any assumptions Essential Energy made
4	In circumstances where Essential Energy 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 Essential Energy to use Actual Information; (ii) the basis for the estimate, including the approach used, assumptions made and reasons why the estimate is Essential Energy'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 Essential Energy 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. Essential Energy may provide additional detail beyond the minimum requirements if Essential Energy 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 Essential Energy, an auditor or assurance practitioner shall provide an opinion or attest by reference to Essential Energy'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.

General approach

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

A key concern of Essential Energy is that the AER may use information which is of a poor quality to make regulatory determinations.

Essential Energy has explained the reliability of the information, and set out where caution should be applied by the AER in the application of the data to economic benchmarking models. We note that this issue has been raised with the AER in consultations relating to this notice.

1.1 Systems used to provide data

Where data has been sourced directly from Essential Energy's financial and other information systems, this system has been identified. Similarly where estimated data is based on data sourced from Essential Energy'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. We continue to raise our concerns in relation to the detailed templates for economic benchmarking purposes and have outlined in this Basis of Preparation where caution should be applied by the AER in the application of the data to economic benchmarking models.

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 not to 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, Essential Energy has prepared and included the estimated data using 'best estimates' given the resources and limited time available to complete the detailed templates.

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. Essential Energy has addressed the implications of using best estimates which are not robust in its Basis of Preparation to accompany the final Audited Information.

1.5 Process used to determine if information is actual or estimated

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

Essential Energy have implemented an internal colour coding system to the numbers inputted in the Economic Benchmarking RIN template to illustrate what is deemed to be actual or estimated information. This coding is shown below and has been used in the template with estimated data only to indicate how reliable the data is.

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

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 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 section 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 identified where material has been developed from best estimates and the confidence we have in that data. We note in this respect that models such as Total Factor Productivity (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 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 Essential Energy's preparation costs

The costs incurred by Essential Energy in terms of staffing resources to completing the RIN to the audited stage have been considerable. Further considerable costs will be incurred in building or modifying systems to capture the information going forward which is not otherwise required for Essential Energy's operational activities.

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 on-going costs for customers.

Worksheet 2 – Revenue

2.1 – 2.2 Revenue grouping by chargeable quantity & Revenue grouping by customer type or class

Compliance with requirements of the notice

This section contains data on the revenue allocated to the Regulated Network business as shown in the respective year's regulatory returns as per the requested groupings. The revenue has been determined on an 'as billed' basis.

Source of information

Total revenue amounts have been sourced from the annual regulatory accounts.

The respective financial years' reviewed Weighted Average Price Cap (WAPC) has also been used to prorate the total revenue into the chargeable quantity and customer type line items.

The WAPC is reviewed annually by external parties and reported to the AER (previously IPART). Data for the 2012/13 year has not been audited to date.

Revenue for Connection Services DREV0111 relates to revenue from Miscellaneous and Monopoly Services (MMS) and is sourced from the WAPC for all years except 2012/13. For this year it is sourced from data used to compile the annual regulatory accounts.

Revenue for SLUOS DREV0112 (Alternative Control) is sourced from the annual audited regulatory accounts.

Revenue from other sources DREV0113 relates to Emergency Recoverable Works (ERW) and is sourced from the WAPC for all years except 2012/13. For this year it is sourced from data used to compile the annual regulatory accounts.

Revenue from Other Customers DREV0206 relates to MMS and ERW income and is linked to tables above.

The prorate of Streetlighting revenue for the 2011 to 2013 years is based on the revised units discussed in Operational Data section *5.1 Total Energy Delivered*.

Methodology and Assumptions

Total revenue from SLUOS is taken from the annual regulatory accounts as it is not reported in the WAPC. The WAPC for each respective year was used to prorate the total revenue into individual line items.

The WAPC variable template provides a tab with the Distribution revenue at a Tariff level, which is also split by charge type of Fixed, Non time of Use, Peak, Shoulder and Off Peak by Network demand and capacity charge. This table is also replicated at the same level for Consumption and Demand.

The WAPC template has been created each year by extracting all the invoice data from *Energy/Peace* application for the relevant financial year and aggregating into the network tariff components. The following tables below show how revenue amounts from the annual regulatory accounts have been apportioned using data from the WAPC into the RIN template, for Table 2.1 and Table 2.2.

Table 2.1

Variable Code	**Variable**	**Standard Control Services**	**Alternative Control Services**
DREV0101	Revenue from Fixed Customer Charges	Sum of all Fixed charges for all Tariffs **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	n/a
DREV0102	Revenue from Energy Delivery charges where time of use is not a determinant	Sum of all Non TOU tariffs excluding Controlled load tariffs and street lighting tariffs **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	n/a
DREV0103	Revenue from On–Peak Energy Delivery charges	Sum of all Peak tariffs less the Peak Street lighting component **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	n/a
DREV0104	Revenue from Shoulder period Energy Delivery Charges	Sum of all shoulder tariffs less the shoulder Street lighting component **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	n/a
DREV0105	Revenue from Off–Peak Energy Delivery charges	Sum of all off peak tariffs less the off peak Street lighting component **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	n/a
DREV0106	Revenue from controlled load customer charges	Sum of all Controlled Load Tariffs **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	n/a

DREV0107	Revenue from unmetered supplies	BLNP3AO, BLNN1AO **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook) and relates to Street lighting NUOS**	
DREV0108	Revenue from Contracted Maximum Demand charges	Sum of all capacity charges **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	n/a
DREV0109	Revenue from Measured Maximum Demand charges	Sum of all demand charges **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	n/a
DREV0110	Revenue from metering charges	n/a	n/a
DREV0111	Revenue from connection charges	Revenue from Miscellaneous and Monopoly Fees as reported in WAPC	n/a
DREV0112	Revenue from public lighting charges	n/a	SLUOS charges as reporting in annual regulated accounts
DREV0113	Revenue from other Sources	Emergency Recoverable Works as reported in WAPC	n/a

Table 2.2

Variable Code	**Variable**	**Standard Control Services**	**Alternative Control Services**
DREV0201	Revenue from residential Customers	Sum of all residential tariffs fixed and usage charges includes controlled load **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	n/a
DREV0202	Revenue from non-residential customers not on demand tariffs	Sum of Non domestic tariffs that do not have Demand charges, excludes street lighting tariffs **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	n/a
DREV0203	Revenue from non-	Sum of all LV Demand	n/a

	residential low voltage demand tariff customers	tariffs, fixed, usage and demand charges **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	
DREV0204	Revenue from non-residential high voltage demand tariff customers	Sum of all HV Demand, Sub transmission and Site specific tariffs, fixed, usage and demand charges **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook)**	n/a
DREV0205	Revenue from unmetered supplies	BLNP3AO, BLNN1AO **(Links refer to '3-Tariff Rev' tab within the relevant year's WAPC workbook) and relates to Street lighting NUOS**	n/a
DREV0206	Revenue from Other Customers	Revenue from Miscellaneous and Monopoly fees and Emergency Recoverable Works	n/a

Use of estimated information

As the WAPC for each year was used to prorate the total revenue figures from the annual regulatory accounts into individual line items, the information is considered to be estimated.

Material accounting policy changes

n/a

Reliability of information

The total revenues provided in these tables are considered to be reliable, however the splits into different categories are based on assumptions and estimates and caution should be used when using this for benchmarking or decision making purposes.

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

Compliance with requirements of the notice

Essential Energy has reported the penalties or rewards of incentive schemes in this table.

Revenues reported in table 2.3 reflect the effect on revenues of incentive schemes in the year that the penalty or reward is applied.

Source of information

Data has been sourced from the incentive scheme payments which Essential Energy has received.

Methodology and Assumptions

This table requires data about the payments received by Essential Energy under the EBSS, STPIS, and other schemes. As the EBSS and STPIS schemes are yet to commence for Essential Energy, there is no amount to report. The only incentive scheme applicable to Essential Energy at this time is the DMIS, which provides the company with an allowance of $600,000 annually. As such, no methodology was required to arrive at this amount.

Use of estimated information

As the data provided in this table is factual, it was not necessary to estimate any information.

Material accounting policy changes

n/a

Reliability of information

The data provided in this table is considered to be reliable.

Worksheet 3 – Opex

3.1.1 Current opex categories and cost allocations

Compliance with requirements of the notice

This section contains data on various opex categories allocated to the Regulated Network business.

Source of information

Data has been sourced from previous annual regulatory accounts and budgets.

Methodology and Assumptions

2010 – 2013 data is the same as the figures in table 3.1.2. Prior to this, pole replacement amounts were removed to be in line with current practices.

In 2008/09, the Finance team changed the way overheads were allocated from being based on direct labour to direct spend. As a result, 2006 – 2008 overheads have been backed out to be based on direct spend rather than direct labour. Reallocation was performed on the proportions in the 2008/2009 budget figures.

Use of estimated information

Refer to methodology and assumptions section mentioned above.

Material accounting policy changes

Refer to methodology and assumptions section mentioned above.

Reliability of information

The 2009 – 2013 data was sourced from previous annual regulatory accounts for the respective years and is therefore considered to be reliable. The 2006 to 2008 data is based on assumptions and estimates so caution should be used when using this information for benchmarking or decision making purposes.

3.1.2 Historical opex categories and cost allocations

Compliance with requirements of the notice

This section contains data on various opex categories allocated to the Regulated Network business as shown in the respective year's regulatory returns.

Essential Energy has reported its historical Opex categories in accordance with the Opex activities within the Annual Reporting Requirements that applied in the relevant Regulatory Year.

Source of information

Data has been sourced from previous annual regulatory accounts.

Methodology and Assumptions

The data for all opex categories was sourced from the relevant years' annual regulatory accounts.

The data contained within the Alternative Control Services section of the Other Network Maintenance Costs line was sourced from the Public Lighting opex section of each of the relevant years' annual regulatory accounts.

Note that for Network operating costs, prior to 2011 this was previously called Prescribed Services Operating Costs in the annual regulatory accounts.

Use of estimated information

There has been no use of estimated information in the opex categories mentioned above. Where figures greater than zero have been entered, the numbers are linked back to other data in the EB RIN, which is ultimately sourced from opex figures disclosed in previous annual regulatory accounts.

Material accounting policy changes

Essential Energy has not undertaken any material changes in accounting policies.

Reliability of information

The data used for the compilation of this expenditure was sourced from previous annual regulatory accounts for the respective years and is therefore considered to be reliable.

3.2.1 Opex consistency - current cost allocation approach

Compliance with requirements of the notice

Essential Energy believes there are no material differences in either our cost allocation approach or basis of preparation of the annual regulatory accounts. Therefore this table has not been populated.

3.2.2 Opex consistency - historical cost allocation approaches

All rows except for those relating to Metering and Connection Services

Compliance with requirements of the notice

This section contains data on various opex categories allocated to the Regulated Network business as shown in the respective year's regulatory returns.

Essential Energy has reported, for all Regulatory Years, Opex in accordance with the requirements of the Cost Allocation Approach and the Regulatory Accounting Statements that were in effect for the relevant Regulatory Year.

Source of information

Data has been sourced from other tables in the Economic Benchmarking RIN, namely, Table 3.1.2 Historical opex categories and cost allocations.

Methodology and Assumptions

Opex for Network Services
It was assumed that all of Network Services expenditure was already captured in Table 3.1.2 Historical opex categories and cost allocations. As such, this row is equal to the Total Opex row in that table, less any expenditure captured in the remainder of Table 3.2.2 (including any expenditure contained in the Alternative Control Services section of Table 3.2.2).

Opex for Public Lighting
The data in this row is equal to the data in the Alternative Control Services section of the Other Network Maintenance Costs row in Table 3.1.2 Historical opex categories and cost allocations, which solely comprises public lighting costs.

Opex for amounts payable for easement levy or similar direct charges on DNSP
Essential Energy has no such amounts.

Opex for transmission connection point planning
Essential Energy has no such amounts.

Use of estimated information

There has been no use of estimated information in the opex categories mentioned above. Where figures greater than zero have been entered, the numbers are linked

back to other data in the EB RIN, which is ultimately sourced from opex figures disclosed in previous RINs.

Material accounting policy changes

Essential Energy have not undertaken any material changes in accounting policies around the items reported in table 3.2.2 over the period requested.

Reliability of information

The totals used for the compilation of this expenditure was ultimately sourced from previous RINs for the respective years, and are therefore considered to be reliable. However, the split into the different categories is based on assumptions and estimates so caution should be used when using it for benchmarking or decision making purposes.

3.2.2 Metering and Connection Service expenditure

Compliance with requirements of the notice

This section contains data on metering and connection operating expenditure allocated to the Regulated Network business as shown in the respective year's regulatory returns.

Essential Energy has reported, for all Regulatory Years, Opex in accordance with the requirements of the Cost Allocation Approach and the Regulatory Accounting Statements that were in effect for the relevant Regulatory Year.

Source of information

Data has been sourced from work papers (mainly trial balances) used in preparation of the annual regulatory returns (IPART/AER).

Methodology and Assumptions

The methodologies applied to estimate opex for metering and connection operating expenditure was extracting data from the annual regulatory trial balances at a departmental level or at a project type level.

For metering operating expenditure data was extracted for departments containing "meter" or "M-R" (meter reading). In addition data was extracted for operating expenditure project types not in these departments which contained "meter" or "MTR" and were not related to contestable activities.

For connection operating expenditure data was extracted on departments containing "conn" (connections), and operating project types containing "conn". One project type fitted the criteria, 11535 "New Connections" which appeared to have minimal usage across the period requested. Over the period a range of departments that were

previously utilised (776, 786, 796, 806, 816, 826, 836, and 846) appeared to have been replaced with 3 departments in 2013 (418, 440, and 994).

For data from 2006 and 2007 the approach used to construct the regulatory accounts was Excel based. Operating expenditure (accounts 19999 to 27500) data was extracted from the P&L component of the Excel work file, as well as data on operating expenditure in the Revenue range. Data on the recoverable works expenditure account 11010 was extracted to break out relevant departments. Similar to the approach in 2008 to 2013, data on relevant project types in other departments from a trial balance was extracted for the relevant year. For the trial balance sourced data, a relevant allocation rate was applied to derive the portion relating to the Regulated Network business.

Data was extracted on project type 11105 Non-Routine meter reads which holds costs relating to connection service activities, as well as meter reading related costs. Data based on Process Tracking Jobs (PTJs) analysis was supplied for the years 2009 to 2013 which was used to derive a % rate of connection service related activities in the years 2009 to 2013. For the years 2006 to 2008 an average rate based on the 2009 to 2013 data was used.

Project type 11120 Installation Inspections has also been included. Data was extracted from the various years' trial balances.

Use of estimated information

Essential Energy has used estimated information for the proportion of costs relating to connection service activities that would be included as part of project type 11105 Non-Routine Meter Reading. This is based upon an analysis of PTJs in Energy with volumes multiplied by estimated hours covering the period 2009 to 2013. An average rate based upon the period 2009 to 2013 was used for 2006 to 2008.

Material accounting policy changes

Essential Energy have not undertaken any material changes in accounting policies.

Reliability of information

Most of the data used for the compilation of the metering service and connection service expenditure was sourced from regulatory account work files for the respective years, and is therefore considered reliable. However records are not kept historically for reporting expenditure solely related to metering and connection services. Therefore these amounts are based on assumptions and estimates so caution should be used when using this information for benchmarking or decision making purposes.

3.3 Provisions

Compliance with requirements of the notice

This section contains data on provisions allocated to the Regulated Network business as shown in the respective year's regulatory returns.

Essential Energy has performed the following:

- reported, for all Regulatory Years, financial information on provisions for Standard Control Services in accordance with the requirements of the Cost Allocation Approach and the Regulatory Accounting Statements that were in effect for the relevant Regulatory Year
- reported financial information for each of its individual provisions
- specified the name of the provision and added Variable codes for line items
- reported provisions in accordance with the principles and policies within the Annual Reporting Requirements for each Regulatory Year

Financial information on provisions reconcile to the reported amounts for provisions in the Regulatory Accounting Statements for each Regulatory Year. Immaterial differences in opening and closing values were noted due to the rounding of numbers.

Source of information

Data has been sourced from work papers used in preparation of the statutory financial statements, and work papers used in preparation of the annual regulatory returns (IPART/AER).

Methodology and Assumptions

The sign convention applied is consistent with the year-end regulatory accounts where provision values are expressed as negatives, with provision increases expressed also as negatives.

The methodologies applied to derive provision movements in the years prior to 2013 are consistent with those applied in the 2013 regulatory accounts. These include estimating the Regulated Network share of provision movements where the provision is not wholly related to the Regulated Network business. Prior to 2011 provision movements were not disclosed in the regulatory accounts.

In 2013 data on the defined benefit superannuation liability was included in Provisions in the statutory financial statements and regulatory statements, as opposed to Other Liabilities in previous years, as part of a Network NSW financial statement harmonisation process. Pre 2013 data has been provided on this item to be consistent with 2013.

The 2010 closing provision balances as per the 2010 regulatory accounts were inconsistent with the 2011 opening balance taken up in the AER regulatory accounts.

For the purposes of this return the 2010 balances have been treated as per the 2011 opening balance. A reconciliation is available for this exercise.

The assumption has been applied that a portion of the increase in employee related provisions (employee entitlements & worker's compensation) is apportioned to capital projects via the labour overhead process. No allowance has been made for any indirect form of capital allocation (E.g.: corporate allocation) of the operating expenditure component of these provisions. Another assumption underpinning the analysis is that material increases/ decreases to the Other Provision types have as a general rule been applied against the abnormal gain/loss account range. The abnormal gain/loss accounts have traditionally been excluded from the corporate allocation process and therefore would not give rise to a capital allocation.

Note that in 2010 and previous years, the regulatory accounts did not include a provisions tab. Information gathered for these years is contained within provision movement working papers which ultimately feed back into the regulatory and statutory accounts.

Use of estimated information

- Essential Energy has used estimated information for the regulated network business' share of movements through employee provisions and defined benefit superannuation liability, and the component of provision increases in the employee related provisions directly transferred to capital projects.

- Apportionment of the year end balances was done for the respective pre 2011 regulatory return, but a breakdown of movements was not required.

- An approach consistent with that applied in the 2011 to 2013 regulatory returns was adopted to derive the required movement data. This methodology has been subject to external audit in those years and was deemed appropriate for the prior years.

- The component of labour related provisions estimated to have been directly transferred to capital projects as part of the labour overhead allocation process is based upon an average rate from analysis of 10 years (2004 to 2013) worth of year end performance report Labour schedules.

Material accounting policy changes

Essential Energy have not undertaken any material changes in accounting policies.

Reliability of information

Data used for the initial provision tables has been sourced from work papers that support both the statutory accounts and the regulatory accounts for the respective years. Therefore the information provided in this table is considered to be reliable.

3.4 Opex for high voltage customers

Compliance with requirements of the notice

This section contains data on the opex that would have been incurred by Essential Energy, had it owned the transformer assets owned by its high voltage customers.

Source of information

Information on the number of high voltage customers connected to the Essential Energy network was sourced from an Excel database maintained by Essential Energy's HV Network Connections Group and validated by way of a HV customer report from Essential Energy's customer management system Energy/Peace.

Historical maximum monthly demand was extracted from Essential Energy's metering database 'EDDIS' which in turn supplies data for the network billing function.

HV customer connection dates were sourced from signed Customer Connection Agreements stored in Essential Energy's document database 'Objective' (copies also located in the HV Connection Group shared drive).

Methodology and Assumptions

HV customer data includes maximum kVA per connection customer, and connection dates where these occurred since 2005.

As no data is held on private customer high voltage assets the following assumptions were made to develop an asset base for estimating costs:

1. Customers with a demand over 5,000kVA and/or a connection voltage of 66kV or above have a zone substation to reduce voltages to distribution level, typically 11kV, excluding generators.

2. Customers with a demand less than 5000kVA and connection voltage of less than 66kV have no zone substation to reduce voltages for connection to distribution substations.

3. The number of zone substations as per assumption 1 above is one per connection.

4. The number of distribution substations is one per 500kVA of demand or part thereof.

5. No allowance has been made for overhead or underground circuits or switch gear as there is no basis on which to determine this.

Whilst there is no detail of the asset types, condition or required maintenance a simple estimate of an assumed annual maintenance cost has been developed for the quantities that were derived in the assumptions above. This estimate is of direct costs only, and excludes overhead costs.
Internal costing estimates, covering Labour, Fleet, Materials and Travel costs were used to estimate the costs of sites falling under and over 5MVA. Maintenance and running costs for HV sites over 5 MVA are significantly higher than for those which are under 5 MVA. As this covered only direct costs, overhead costs have been excluded.

Reference was made to a work paper file used in the compilation of the 2013 Financial RIN, which analysed project costs for the 2013 financial year. A vlookup formula was applied to the Max kVA column in the data, to pull the appropriate level of costs against each HV site, for each year. In each year, the costs relating to any sites that had not yet been connected in that year were removed from the total.

The rationale for showing direct costs only, excluding overhead costs is that Essential Energy should only be reflecting the incremental costs to the business.

Use of estimated information

A very high level estimate has been used to prepare the table of costs. This table of costs has been applied to an assumed asset base in circumstances where the quantity, type, age nor condition of the components is known to Essential Energy. The type of equipment used by each HV site was estimated based on maximum demand and the costs associated with each site was estimated based on estimates of Essential Energy's own running costs for such equipment.

Material accounting policy changes

Essential Energy have not undertaken any material changes in accounting policies.

Reliability of information

The data used provided in this table is based on assumptions and estimates so extreme caution should be used when using this information for benchmarking or decision making purposes.

The data used for the compilation of this expenditure is highly unreliable and it is not advised that it can be used for any purpose with any degree of certainty. It should not be used for the purposes of any benchmarking activity. Essential Energy cannot report with any level of accuracy, on the equipment owned by its high voltage customers, or the operating running and maintenance costs of equipment which it does not own or manage.

Worksheet 4 – Assets (RAB)

4.1 Regulatory Asset Base Values – 4.4.2 Asset Lives – estimated residual service life

Compliance with requirements of the notice

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

Essential Energy has:

- Reported its RAB assets in line with the asset input categories for economic benchmarking.
- Separated the Network Services component of Standard Control services to extract Metering Services
- Reported its RAB values in accordance with the standard approach in section 4.1.1 and the assets (RAB) Financial Reporting Framework in box 7 of the Economic Benchmarking RIN for DNSPs Instructions and Definitions document.
- Included Substation land in the Substation categories.
- Reported 0s in the Alternative Control Services RAB tables as the AER has not developed a RAB for these services.
- Reported capital contributions as DRAB13
- No dual function assets
- Reconciled the data between tables 4.1 and 4.2
- Reported an Easements value as this data has been previously recorded
- Used an average of the opening and closing RAB values for each category in completing Table 4.3
- Reported asset lives in accordance with the definitions provided in Chapter 9.
- Calculated asset lives by weighting the lives of individual assets within that category.

Source of information

In this section, we explain the source from which Essential Energy obtained the information provided.

There are four main sources used to obtain the information for the RAB workings

1. Regulatory capex working papers for each regulatory year – these have been used to disaggregate additions for the 2006 to 2013 years. The amounts have been agreed to the regulatory accounts for each year and the relevant Roll Forward Model.
2. AER Roll Forward Models (RFM) for the period 2004-2009 (Final provided from the AER) and 2009-2014 (as lodged with the Transitional proposal)

3. The System assets Fixed Asset Register (FAR) as at 30 June 2013. This contains the asset financial information by asset class as well as the depreciated cost base at that date. It has been used to determine the percentages to disaggregate RAB categories in the RFMs that could not be directly apportioned. It has been assumed that the asset splits in the FAR are consistent with the asset splits in the RAB.
4. *Sheet 7. Asset Installation* from the 2013 RIN. This has been used to determine the average asset ages and standard lives.

Methodology and Assumptions

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

Workbook from which to follow this method is called "RAB sheet – Economic benchmarking for audit.xlsx" and the sheet is called "4. Assets (RAB) – AER method".

Main assumptions are:

- FAR splits at 30 June 2013 are representative of the RAB asset splits for assets requiring disaggregation.
- The 30 June 2013 FAR asset splits are representative of all years between 2006 and 2013.
- Any WIP, equity raising costs, deferred depreciation and RAB adjustments have been treated as Other assets with long lives. Rather than any apportionment, this provided the simplest means of reconciling back to the RFMs.
- Movement of Metering assets from the Meter category does not impact on the estimated service life of new Meter assets or the estimated residual service life of Meter assets.

Scope of services

Standard Control and Alternative Control numbers

NB. All of Essential Energy's RAB is related to Standard Control. There is no Alternative Control RAB. As a result, there are 0s entered for all of the Alternative Control cells.

Approach for deriving Network Services numbers

As specified in section 9 of the AER Economic Benchmarking Instructions and Definitions for Essential Energy, Metering services **do** form part of the Standard Control data, but **have been excluded from the Network Services** numbers. Fee based and quoted services costs are already excluded from Essential Energy's RAB values so no adjustment was required for these costs in establishing the Network Services numbers.

In establishing the adjustment to be made for Metering, the percentages derived in calculating the initial 2013/14 metering RAB for the Transitional Proposal have been assumed to apply historically to all years. This equates to 84% of the previous AER asset category "Customer metering and load control" and 1.7% of total non-system

assets. The Meters, Other long life assets and Other short life asset categories and the associated RAB compilation rows have been reduced by these percentages as follows:

Meters

- All RAB values linked to the RFMs were multiplied by 16% to extract the 84% related to metering.

Other long life assets

- The closing RAB value for 2013 and 2009 was established:
    - FF&E, Land, Buildings and Other non-system assets closing RAB balances per the RFM were multiplied by 98.3%
    - The closing RAB values for Emergency spares, WIP, Deferred depreciation, RAB adjustment and Equity raising costs per the RFM were added to this value
- The components for inflation addition, straight line depreciation, additions and disposals were calculated in the same manner
- The opening RAB value was back calculated and carried back to form the prior year's closing balance

Other short life assets

- The closing RAB value for 2013 and 2009 was established:
    - IT and Motor vehicle closing RAB balances per the RFM were multiplied by 98.3%
    - The closing RAB value for Communications per the RFM were added to this value
- The components for inflation addition, straight line depreciation, additions and disposals were calculated in the same manner
- The opening RAB value was back calculated and carried back to form the prior year's closing balance

Table 4.1 Regulatory asset base values

- This table is a summation of the asset data contained in Table 4.2 Asset value roll forward. Formulas have been entered accordingly.
- In addition, a check section has been entered in rows 136 to 150 to compare the values by line item per the RFMs to the totals derived in this table. There are no reconciling items.

Table 4.2 Asset value roll forward

Some RAB financial information was able to be directly allocated to a group of RAB assets – these classes are summarised below. For these assets, the amounts from the RAB tables in the relevant RFM were used to complete the data tables.

Table 1 RAB categories that have been directly apportioned

OLD RAB category	New RAB category	Assumptions
Customer metering and Load Control	Meters	Assumed load control is part of Meters category
Communications	Other assets with short lives	
Land	Other assets with long lives	
Easements	Easements	
Emergency spares	Other assets with long lives	Assumed to be a long life

OLD RAB category	New RAB category	Assumptions
		asset as standard life is >10 years*
Work in progress	Other assets with long lives	Assumed to be a long life asset as standard life is >10 years* Have not apportioned WIP as is a simpler method and avoids reconciling amounts.
IT systems	Other assets with short lives	
Furniture, fittings, plant & equipment	Other assets with long lives	Assumed to be a long life asset as standard life is >10 years*
Motor vehicles	Other assets with short lives	Assumed to be a short life asset as standard life is <10 years*
Buildings	Other assets with long lives	
Land	Other assets with long lives	Land is assumed to not depreciate
Other non-system assets	Other assets with long lives	Assumed to be a long life asset as standard life is >10 years*
RAB adjustments		Assumed to be a long life asset as standard life is >10 years* Have not apportioned adjustments as is a simpler method and avoids reconciling amounts.
Deferred depreciation		Assumed to be a long life asset as standard life is >10 years* Have not apportioned deferred depreciation as is a simpler method and avoids reconciling amounts.
Equity raising costs		Assumed to be a long life asset as standard life is >10 years* Have not apportioned equity raising costs as is a simpler method and avoids reconciling amounts.

* In line with section 9 of the AER Economic Benchmarking Instructions and Definitions for Essential Energy.

However, the following categories required disaggregation:

Old RAB categories	New AER categories
Low voltage lines and cables Distribution lines and cables Sub transmission lines and cables	Overhead network assets <33kV Underground network assets <33kV Overhead network assets 33kV and above Underground network assets 33kV and above
Substations Transformers	Distribution substations including transformers Zone substations including transformers

Disaggregating the RAB values for these items
A breakdown of the system Fixed Asset Register by asset class as at 30 June 2013 was obtained – see sheet "Accounting FAR by Profile" in the "RAB sheet – Economic benchmarking for audit.xlsx file. This allowed the existing asset classes to be mapped to the new RAB categories. Once pivoted, the depreciated replacement cost by new RAB category could be easily determined – see "Pivot of FAR" sheet. The ratios to establish the proportion by which the old RAB categories in the RFMs required splitting to "extract" the new RAB category breakdown could then be established – see column H on the "Pivot of FAR" sheet.

Once these rates were established, the RAB values for the categories requiring disaggregation could be determined starting with the 2013 closing RAB value and rolling back using the following calculations for each line.

DISPOSALS

- The ratios on the "Pivot of FAR" sheet have been used to split any disposals on the Input pages in the RFMs. All disposal values have been multiplied by (1+the relevant vanilla WACC rate)^0.5 as per the RFM models.

ADDITIONS

- Additions data for *system assets* for all years EXCEPT 2009 and 2010 was sourced from the Regulatory capex working papers. These work papers have the annual system capex broken down into project types. By aligning the project type to the new RAB categories, Essential Energy was able to restate the additions under these new categories. The additions workings are contained in the workbook "GLOBAL CAPEX model Dec 2013 v0.1.xlsx" on the sheet called "INPUT – CURRENT PERIOD".
- The numbers in the GLOBAL CAPEX file are net of customer contributions
- The additions data for the *non-system* categories were sourced from the relevant RFM.
- The resulting dollars by asset category were then inflated by (1+the relevant vanilla WACC rate)^0.5 as per the RFM models.
- Note: the adjustments made at the end of the 2004-09 period have been adjusted for in the opening RAB values for each asset class in 2010.
- For 2009 the additions amounts were derived using the ratios on the "Pivot of FAR" sheet and applying them to the relevant addition amounts in the applicable RFM.
- For lines and cables assets, the 2010 additions are just the balancing item in the RAB calculation

- For the Substation assets, the 2010 addition amounts were derived using the ratios on the "Pivot of FAR" sheet and applying them to the relevant addition amounts in the applicable RFM.

REGULATORY DEPRECIATION

- The sum of the inflation addition and the straight line depreciation rows equals the regulatory depreciation.

STRAIGHT LINE DEPRECIATION

- The ratios summarised in the "Pivot of FAR" sheet have been used to split the relevant straight line depreciation amounts in the RFMs into the new RAB categories.

INFLATION ADDITIONS

- As the RAB calculation was being rolled back, this could not be simply worked out by taking the opening RAB and multiplying by the appropriate CPI rate.
- Instead, the ratios summarised in the "Pivot of FAR" sheet were used to split the relevant inflation addition amounts in the RFM into the new RAB categories.

OPENING RAB VALUE

- Once all the above items had been established the opening 2013 RAB value could be easily calculated. This amount then formed the closing RAB value for 2012 and the same calculations were applied to work the RAB back for the entire period.
- The only adjustments required to be made occurred:
    - To the opening 2010 RAB value – to account for the adjustments for the prior period, this value was established using the ratios on the "Pivot of FAR" sheet and the opening 2010 RAB values in the transitional RFM.
    - To the closing RAB value in 2009 – given the opening 2010 RAB value differs by the prior period adjustments, the ratios on the "Summary of ratios by year" sheet were applied to the 2009 closing RAB values in the 2004-09 RFM.

CAP CONS

The RAB additions noted are exclusive of capital contributions. However, Essential Energy has received capital contributions and, as requested, amounts have been reported accordingly. The values have been taken directly from the PTRMs.

Table 4.3 Total disaggregated RAB asset values

This table is a direct feed of the average opening and closing RAB values by asset category derived in Table 4.2. Formulas entered accordingly.

Table 4.4.1 Asset Lives – estimated service life of new assets

- The standard life of assets remains unchanged. This is consistent with the Input pages of both RFMs.
- On this basis, only the standard life for *one year* for each new asset category is required to be calculated as all the other years are identical.

For the disaggregated asset categories:

- The 7. Asset Installation 2013 sheet in the workbook has been copied from the 2013 RIN and contains the standard lives for each asset. Some minor

manipulation of the table was undertaken to allow the data to be pivoted as necessary i.e. the Asset Group headings were moved to column A.

- Some basic calculations were undertaken to allow the standard lives to be weighted. The % of assets by year of commission was calculated for each asset category. The assets of "unknown" age were assumed to be half way through their standard life in 2013. The resulting year of commission was kept constant for all other years. Columns DO to GB in the 7. Asset installation 2013 sheet.
- The remaining life of assets by category year was then calculated – columns GC to IO.
- The dollar proportion of assets with a remaining life was then calculated – columns LE to NR.
- The data was then pivoted in the "Pivot of Asset Installation" sheet to draw out the standard life and dollar proportion of assets with a remaining life. The weighted average standard life was then calculated by weighting against the dollar proportion of assets with a remaining life. This value has been assumed to be consistent for all preceding years.
- For simplicity, the standard life calculations have been rounded to the nearest whole number.
- NB. Whilst substation land is included in the RAB values for Substations, it has been assumed to have an indefinite life. As such, it has not formed part of the standard life calculations.

For meters

- The standard life was taken from the Transitional RFM as this RAB category was a direct allocation.
- NB. It is assumed that the estimated service life of new assets in the Meters category for the Network Services columns is the same as for the Standard Control Services columns i.e. the movement of Metering assets from the previous Metering & Load Control does not change the overall new service life of the remaining assets.

For Other long life assets and Other short life assets

- Where there were several RAB categories comprising an asset class, a weighted average standard life was calculated for the asset class based on their dollar value in the RAB at that date.
- These workings are shown on the "Other asset lives" sheet in rows 3 to 30.
- For simplicity, the standard life calculations have been rounded to the nearest whole number.

Table 4.4.2 Asset Lives – estimated residual service life

For the disaggregated asset categories and Meters:

- The average asset life for each asset category was calculated in the "7. Asset Installation 2013" – column QJ, as was a depreciated replacement cost – column QF.
- The 7. *Asset Installation 2013* sheet was then replicated for each of the previous years back to 2006 with the calculations and asset ages adjusted accordingly.
- The data tables for each year were then pivoted to draw out these two variables. The average asset life by new RAB category was then calculated by weighting against the associated depreciated replacement cost for that RAB category.

- The estimated residual service life for each category was then calculated by taking the standard life and subtracting the average asset age as calculated above.

Note:

- It is assumed that the estimated residual service life of assets in the Meters category for the Network Services columns is the same as for the Standard Control Services columns. i.e. the movement of Metering assets from the previous Metering & Load Control category does not change the overall residual service life of the remaining assets.
- Whilst substation land is included in the RAB values for Substations, it has been assumed to have an indefinite life. As such, it has not formed part of the residual life calculations.

For Other long life assets and Other short life assets:

- The opening residual life at the beginning of 2008/09 was taken from the Input sheet in the Transitional RFM. This became the starting point for establishing a residual life.
- The proportionate opening RAB values and net additions amounts for each asset class were taken from the relevant RFM. This allowed proportions to be established for the carried forward amount and additions amounts of the RAB for each year.
- Using the known standard life of the 2008 additions and the overall residual life, the carried forward RAB balance at the start of 2008 was able to be determined for each asset category.
- The relevant calculations could then be rolled forwards and backwards accordingly.

Use of estimated information

As described above, most of the information in the RAB is estimated, generally using the proportions derived from the 2013 FAR or data from the RFMs.

Given that the RAB rolls forward from year to year, as soon as one year contains estimated data, the following year necessarily contains estimates.

There was no other source of data available for this RAB exercise other than what was utilised.

The assumptions made for each row are included in the section above.

Material accounting policy changes

Essential Energy has not undertaken any material changes in accounting policies.

Reliability of information

The data on the *4. Assets (RAB)* sheet is based on assumptions and estimates and caution should be used when using it for benchmarking or decision making purposes. This is due to the number of estimates in the data and the various assumptions that had to be made to extract this data to the level required.

In addition, based on an SKM valuation undertaken as at 30 June 2007, Essential Energy's RAB values are significantly lower than what its assets are actually worth. Further, Essential Energy is in the process of cleaning up asset data in its system, namely, assigning assets of unknown age to a correct year of commissioning. This will necessarily impact on the residual remaining lives section of the data tables. Time constraints have meant this data was not available at the time of completing the Economic Benchmarking RIN, however, the data will be available for the Reset RIN. Asset lives may adjust accordingly.

As a result of all these factors, Essential Energy considers the RAB values to be a very unreliable measure if used in any benchmarking or decision making purposes.

Worksheet 5 – Operational Data

5.1 Total energy delivered

Compliance with requirements of the notice

This section contains the total energy delivered by Essential Energy to the customer based on the customer's metered consumption as per their invoice and relevant financial year.

Source of information

Total energy delivered has been sourced from the annual regulatory accounts. Data from the respective financial years audited Weighted Average Price Cap (WAPC) has been used to prorate the total energy delivered into the required categories..

The WAPC is audited annually by external parties and reported to the AER (previously IPART). Data for the 2012/13 year has not been audited to date.

Streetlighting energy billed for the 2011 to 2013 years is taken from a Cognos report and these amount are different to the amounts reported in the WAPC. Due to the roll off of the retail function not all units billed for Streetlighting energy were included in reports used to compile the WAPC. The data reported in this table is more up to date and reliable than that used in the WAPC for Streetlighting units only for the 2011 to 2013 years.

Methodology and Assumptions

Table 5.1 shows how total energy delivered as reported in the annual regulatory accounts has been prorated using the audited WAPC variable tables for the relevant financial year. Data for the 2012/13 year has not been audited to date.

The WAPC variable template provides a tab with the Distribution consumption and demand at a Tariff level, which is also split by charge type of Fixed, Non time of Use, Peak, Shoulder and Off Peak by Network demand and capacity charge.

The WAPC template has been created each year by extracting all the invoice data from Energy for the relevant financial year and aggregating into the network tariff components.

Peak, shoulder and off- peak periods relate to Essential Energy's own charging periods.

The WAPC template has been created each year by extracting all the invoice data from *Energy/Peace* for the relevant financial year and aggregating into the network tariff components. The following tables below show how energy amounts from the annual regulatory accounts have been apportioned using data from the WAPC into the RIN template, for Table 5.1.

Table 5.1

Variable Code	Variable	Tariffs included
DOPED01	Total energy delivered	Sum of single and ToU

		consumption for all tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook)**

Use of estimated information

As the WAPC for each year was used to pro-rata the total revenue figures from the annual regulatory accounts into individual line items, the information is considered to be estimated.

Material accounting policy changes

n/a

Reliability of information

The data provided in this table is considered to be reliable.

5.1.1 Energy grouping - delivery by chargeable quantity

Compliance with requirements of the notice

This section contains the total energy delivered by Essential Energy to the customer based on the customer's metered consumption as per their invoice and relevant financial year.

Source of information

Data has been sourced from the respective financial years' audited Weighted Average Price Cap (WAPC).

The WAPC is audited annually by external parties and reported to the AER (previously IPART). Data for the 2012/13 year has not been audited to date.

Methodology and Assumptions

Data provided in table 5.1.1 was sourced from the audited WAPC variable tables for the relevant financial year.

The WAPC variable template provides a tab with the Distribution consumption and demand at a Tariff level. This is split further by charge type of Fixed, Non time of Use, Peak, Shoulder and Off Peak by Network demand and capacity charge.

The WAPC template has been created each year by extracting all the invoice data from Energy for the relevant financial year and aggregating into the network tariff components.

Peak, shoulder and off- peak periods relate to Essential Energy's own charging periods.

The table below shows how data has been aggregated from the WAPC into the RIN template.

Table 5.1.1

Variable Code	Variable	Tariffs included
DOPED0201	Energy Delivery where time of use is not a determinant	Sum of all Non time of use tariffs excluding Controlled load and street lighting tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook)**
DOPED0202	Energy Delivery at On-peak times	Sum of the Peak component for all tariffs excluding street lighting tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook)**
DOPED0203	Energy Delivery at Shoulder times	Sum of the Shoulder component for all tariffs excluding street lighting tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook)**

DOPED0204	Energy Delivery at Off-peak times	Sum of the Off peak component for all tariffs excluding street lighting tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook)**
DOPED0205	Controlled load energy deliveries	Sum of all Controlled load tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook)**
DOPED0206	Energy Delivery to unmetered supplies	Sum of all Street lighting tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook)**

Use of estimated information

All information for this table was based off actual invoiced information as reported in the audited WAPC variables template.

Material accounting policy changes

n/a

Reliability of information

The data provided in this table is considered to be reliable, however the 2012/13 data has not been audited.

5.1.2 – 5.1.3 Energy - received from TNSP and other DNSPs by time of receipt & Energy - received into DNSP system from embedded generation by time of receipt

Compliance with requirements of the notice

This section contains the total energy input into Essential Energy's network and as measured by the Bulk supply points.

Source of information

Data has been sourced from an internal reporting system, EDDIS Cognos cube, for the financial years 2009/10 to 2012/13. This information includes any prior year revisions in data.

Prior to 2009/10 the data is provided in the Electricity Network Performance report (ENPR) as reported to Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS), commonly called NSW Trade & Investment.

Methodology and Assumptions

For the financial years 2006 to 2009, the figures included in Table 5.1.2 were sourced from the ENPR and are reported in the 'not included in the above categories' due to the information not being available at a Peak/Shoulder and Off Peak level.

The figures for Table 5.1.3 for embedded generation for the financial years 2006 to 2009 were extracted from the relevant financial years Generator Load report which was run from the obsolete internal system, STARS, as this was the system used for this time period. Only internal embedded generators were summed to obtain a total as the report also included external generators. Data was not available at a Peak/ Shoulder/ Off peak level.

For the financial years 2010 to 2013 all data was extracted from the Internal EDDIS Cognos cube report at a half hourly level and aggregated to total Bulk Supply point. This includes internal categories of BSP, cross border and TUOS pass through.

Based on the Essential Energy definition of Peak, Shoulder and Off Peak, as seen in the below table, the half hourly data was aggregated into Peak, Shoulder and Off Peak buckets in Excel to determine the totals to report in the table.

Table 5.1.2 is not total network load as the generation load has not been added back on.

Off peak readings in the spreadsheet exclude Public holidays and DST as this is how the majority of our small customers are billed, as detailed below.

Essential Energy Time Periods

Peak	7am to 9am and 5pm to 8pm on weekdays
Shoulder	9am to 5pm and 8pm to 10pm on weekdays
Off Peak	all other times

There is a difference between what was reported in the ENPR and the EDDIS cube from 2010. This has occurred due to revisions in data. The main differences are for 2010 and 2011 and this occurred due to an internal data cleansing project that corrected some inaccuracies in settlements/metered data and how it was reported.

	2010	2011	2012	2013
ENPR	12,670	12,900	12,626	12,894
EDDIS	13,043	12,779	12,645	12,897
Difference	- 373	121	- 19	- 3

The EDDIS Cognos cube also contains the embedded generation data and this was extracted along with the Bulk Supply point data and calculated in the same spreadsheet for Table 5.1.3, for the periods 2010 and beyond.

Table 5.1.3 also includes residential embedded generation. This information is only available through the invoicing of customers and this instance came from the invoice data used to populate WAPC tables. Due to the impact of NSW and QLD solar bonus schemes and the significant increase in export GWh since its inception in 2010, the solar units are required to provide total purchase units.

Use of estimated information

All information for these tables was based off actual metered information from the EDDIS Cognos cube for FY 2010 and beyond, prior to this the information was as reported in the annual ENPR.

Material accounting policy changes

n/a

Reliability of information

The data provided for 2010 onwards is considered reliable; however the data for prior years is based on assumptions and estimates so caution should be used when using it for benchmarking or decision making purposes.

5.1.4 Energy grouping - customer type or class

Compliance with requirements of the notice

This section contains the total energy delivered by Essential Energy to the customer based on the customer's metered consumption as per their invoice and relevant financial year.

Source of information

Data has been sourced from the respective financial years audited Weighted Average Price Cap (WAPC).

The WAPC is audited annually by external parties and reported to the AER (previously IPART).

Methodology and Assumptions

Data provided in table 5.1.4 came from the audited WAPC variable tables for the relevant financial year, excluding 2012/13 where the table has not gone through the audit process at this stage.

The WAPC variable template provides a tab with the Distribution consumption and demand at a Tariff level, which is also split by charge type of Fixed, Non time of Use, Peak, Shoulder and Off Peak by Network demand and capacity charge.

The WAPC template has been created each year by extracting all the invoice data from Energy for the relevant financial year and aggregating into the network tariff components.

Peak, shoulder and off- peak periods relate to Essential Energy's own time charging periods as detailed above.

The table below shows how the data has been aggregated from the WAPC into the RIN template.

Table 5.1.4

Variable Code	Variable	Tariffs included
DOPED0501	Residential customers energy deliveries	Sum of all Residential tariffs including Controlled load tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook)**
DOPED0502	Non-residential customers not on demand tariffs energy deliveries	Sum of the consumption billed for all Non domestic tariffs that do not have Demand charges, includes street lighting tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook)**

DOPED0503	Non-residential low voltage demand tariff customers energy deliveries	Sum of the consumption billed for all LV Demand tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook)**
DOPED0504	Non-residential high voltage demand tariff customers energy deliveries	Sum of the consumption billed for all HV Demand, Sub transmission and Site specific tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook)**
DOPED0505	Other Customer Class Energy Deliveries	n/a

Use of estimated information

All information for this table was based off actual invoiced information at the time of the finalisation of the WAPC variables template which is usually 6 months after the end of the period.

Material accounting policy changes

n/a

Reliability of information

The data provided in this table is considered to be reliable, however the 2012/13 data has not been audited.

5.2.1 Distribution customer numbers by customer type or class

Compliance with requirements of the notice

This section contains the average number of customers by required grouping. The average was determined by calculating the average of the numbers at the start of the regulatory period and the end of the regulatory period, as requested in the economic RIN Instructions and Definitions guidance issued by the AER. This is different to Essential Energy's process which determines total billed days for the financial year and divides by the days in the year.

Note that there are no unmetered connections in Essential Energy's data that has not been reported in the customer numbers. It appears that none of Essential Energy's unmetered customers have a National Meter Identifier (NMI) for them to be excluded in the total count.

Source of information

Data has been sourced from an internal reporting system and existing query, Cognos - tariff count, which extracts data from the billing system Energy/Peace.

Methodology and Assumptions

The Tariff count query provides the number of connected premises by tariff class, month and financial year. This report was run for each of the financial years and aggregated in a spreadsheet.

In order to determine the tariff class required to be reported the spreadsheet was linked to the internal Annaj tables which determines Network Description and relevant grouping.

Certain criteria and exclusions are required to ensure the correct categories are met. These are:

- All export tariffs are removed
- All zero network code tariffs are removed as these are pre-existing retail customers
- Gas tariffs are removed, network code 500+
- Tariff 23000 is removed as this is a Remote Metering Fee
- Only Anytime and Peak Energy tariffs are included as these are the primary tariffs and will not result in duplicate premises being counted.

The following table shows the internal groupings aligned with requested Customer type in Table 5.2.1.

Internal Groupings	Requested Customer Type
HV Demand	High voltage demand tariff customer numbers
LV Business continuous	Non-residential customers not on demand tariff customer numbers
LV Controlled Load 1	Excluded
LV Controlled Load 2	Excluded
LV Demand	Low voltage demand tariff customer numbers
LV Residential Continuous	Residential customer numbers

LV Residential TOU	Residential customer numbers
LV TOU over 100 MWh/yr	Non-residential customers not on demand tariff customer numbers
LV TOU under 100 MWh/yr	Non-residential customers not on demand tariff customer numbers
Site Specific	High voltage demand tariff customer numbers
Sub transmission	High voltage demand tariff customer numbers

A count is determined for the first month of the regulatory year and also for the last month of the regulatory year to then calculate the average number of Distribution Customers as per the economic RIN Instructions and Definitions guidance issued by the AER.

The above count has then been used to pro rata the total for each year as provided in Table 5.2.2 into the requested variables.

Unmetered customers have been extracted from the Energy/Peace system through Cognos.

The guidance also required de-energised customer numbers. Unfortunately these numbers are not accounted for in this report. The de-energised numbers have been based on the 2013 de-energised numbers and pro-rated back based on the annual customer numbers. These numbers have been included in the table under the header 'Other Customer Numbers' (DOPCN0106).

Use of estimated information

All information for this table was based off information from the billing system, Energy.

Material accounting policy changes

Essential Energy has not undertaken any material changes in accounting policies.

Reliability of information

This information has not been provided to any other parties and as such has not been audited externally. These reports were set up solely for the ability to report Table 5.2.1.

The information provided in these tables is based on assumptions and estimates and caution should be used when using it for benchmarking or decision making purposes.

5.2.2 Distribution customer numbers by location on the network

Compliance with requirements of the notice

Essential Energy has reported customer numbers in accordance with the economic RIN Instructions and Definitions guidance issued by the AER.

Note that there are no unmetered connections in Essential Energy's data that has not been reported in the customer numbers. It appears that none of Essential Energy's unmetered customers have a National Meter Identifier (NMI) for them to be excluded in the total count.

Source of information

Data has been sourced from PowerOn Fusion and an Access database. PowerOn makes up the central modules of Essential Energy's power Distribution Management and Outage Management Systems (DMS/OMS). Unmetered account information came from table 5.2.1(DOPCN0105)

Methodology and Assumptions

The data has been collected and collated in line with the economic RIN Instructions and Definitions guidance issued by the AER. The only exception is that customer numbers prior to November 2012 did not include de-energised NMIs as this data was not collected at the time. The de-energised numbers from 2012/13 have been prorated across the previous years and added to the numbers in DOPCN02. The unmetered account numbers have been obtained from table 5.2.1 (DOPCN0105) for each year and added onto the total number of customers for each year (DOPCN02). They have then been prorated across the feeder classes for each year (DOPCN0202, DOPCN0203 & DOPCN0204).

Customers are attached to distribution substations in PowerOn Fusion. This data is updated nightly from Peace. Essential Energy has a trace that pulls back the customer numbers from each distribution substation and also the network connectivity. This links the distribution substations to a feeder segment and then to a distribution feeder. Feeders are categorised based on the guidance issued by the AER.

A count is determined for the first month of the regulatory year and also for the last month of the regulatory year to then calculate the average number of Distribution Customers as per the economic RIN Instructions and Definitions guidance issued by the AER.

The spreadsheet used to collate data is named: “DNSP economic benchmarking data templates – NP&R V3”

Use of estimated information

All information for this table was based off information from the billing system, Energy.

Material accounting policy changes

Essential Energy has not undertaken any material changes in accounting policies.

Reliability of information

The data provided in this table is based on assumptions and estimates so caution should be used when using it for benchmarking or decision making purposes.

5.3.1 – 5.3.5 System Demand

Compliance with requirements of the notice

Essential Energy has provided information for non-coincident summated raw system annual maximum demand for zone substations and transmission connection points as well as the coincident summated raw system annual maximum demand for transmission connection points.

Whilst the coincident summated raw system annual maximum demand for zone substations is less accurate, the values presented are justifiable.

The coincident zone substation information provided should be used with caution as it is considered by Essential Energy to be irrelevant as such a figure serves no purpose in its procedures.

The value for the average power factor conversion for power lines is difficult to provide accurately as the Essential Energy network varies widely. Therefore, a best estimate has been provided which allows the requirements of the Notice to be met.

Source of information

For DOPSD0101 and DOPSD0201, the vast majority of zone substation data was sourced from demand meters (via IMDR) and from SCADA (via TrendSCADA). Of the small remainder of zone substations, the vast majority of information was sourced directly from data stored on individual reclosers with only a handful of zone substations having no data recording devices whatsoever.

For DOPSD0107 and DOPSD0207, the transmission connection point data was obtained from demand meters.

Methodology and Assumptions

Essential Energy records the peak loads on its zone substations on a seasonal basis rather than on a financial year basis. For example: the values for summer 2011/12 and winter 2012 were used to provide the 2012 year data for this submission. Private zone substation loads were not included in the zone substation figures.

- **DOPSD0101 and DOPSD0201** – The peak summer loads of the individual zone substations and the peak winter loads of the individual zone substations were summated separately. The higher of the two values was the figure provided.

- **DOPSD0107 and DOPSD0207** – The peak summer loads of the individual transmission connection points and the peak winter loads of the individual transmission connection points were summated separately. The higher of the two values was the figure provided.

- **DOPSD0110** – the Coincident Raw System Annual Maximum Demand has been sourced from the annual regulatory accounts.

- **DOPSD0210** – The loads of the individual transmission connection points at the time of the system peaks were summated to obtain the figure provided.

- **For DOPSD0104 and DOPSD0204** – The coincident loads at the individual zone substations are not available in Essential Energy's data. Zone substation coincident loads were derived by multiplying the raw figure by a diversity factor obtained by dividing the transmission connection point coincident value by the transmission connection point raw value.

- **Power Factor** – With only one 110kV network, the value for DOPSD0309 was chosen from the Terranora 110/66kV substation power factor. For DOPSD0307 and DOPSD0308, the 132kV and 66kV networks have varying amounts of network capacitance installed to improve the power and since the overall Essential Energy power factor is about 0.98, it is reasonable to assume that the 132kV and 66kV power factors would be close to the overall power factor. This hypothesis was verified by running a sample of load flow models of the network using the software Sincal. For the 33kV network (DOPSD0306) network capacitance is installed to improve the power factor with the resultant power factor approaching 0.96 (again verified by running a sample of load flow models in Sincal). SWER lines (DOPSD0304) are inherently leading but at times of high load power factor is likely to be close to unity. The power factor for low voltage (DOPSD0302) is low generally but is lower in summer than in winter because at winter peak there is more resistive load. There is generally no low voltage capacitors connected to the network. The power factor for the 11kV and 22kV lines (DOPSD0303 and DOPSD305) will be higher than the low voltage value but below the higher voltage power factors with again no network capacitors connected on the 11kV and 22kV networks. To verify the 11kV and 22kV power factors, the power factors for a sample of zone substations were obtained then averaged to obtain the final figure. DOPSD0301 is formula driven and is calculated by dividing DOPSD0110 by DOPSD0210.

Use of estimated information

Essential Energy has provided estimated information for DOPSD0104 and DOPSD0204.

- Estimates were provided because zone substation loads at time of system peak are not directly available. It would take an unjustifiable amount of man hours to derive zone substation coincident loads.

- The estimated values are based on the same diversity factor as the transmission connection point and are a reasonable estimation for the whole of Essential Energy's sub transmission network.

The power factor conversion factors for DOPSD0302 to DOPSD0309 have been estimated because actual values do not exist.

Material accounting policy changes

n/a

Reliability of information

Essential Energy advises that the information provided in sections DOPSD0101, DOPSD0104, DOPSD0107, DOPSD0201, DOPSD0204, and DOPSD0207 is largely based on assumptions and estimates and caution should be used when using it for benchmarking or decision making purposes.

The power factor conversion factors for DOPSD0301 and DOPSD0309 are considered reliable. The power factor conversion factors for DOPSD0302 to DOPSD0308 provided are based on assumptions and estimates and caution should be used when using it for benchmarking or decision making purposes.

The power factor values provided should not be used for calculation purposes because there is too much variation in the Essential Energy network for them to be relied upon to give accurate answers.

5.3.6 – 5.3.7 Demand supplied (for customers charged on this basis) – MW & MVA measure

Compliance with requirements of the notice

This section contains the total energy delivered by Essential Energy to the customer based on the customer's metered consumption as per their invoice and relevant financial year.

Source of information

Data has been sourced from the respective financial years audited Weighted Average Price Cap (WAPC).

The WAPC is audited annually by external parties and reported to the AER (previously IPART).

Methodology and Assumptions

All data provided came from the audited WAPC variable tables for the relevant financial year, excluding 2012/13 where the table has not gone through the audit process at this stage.

The WAPC variable template provides a tab with the Distribution consumption and demand at a Tariff level, which is also split by charge type of Fixed, Non time of Use, Peak, Shoulder and Off Peak by Network demand and capacity charge.

The WAPC template has been created each year by extracting all the invoice data from Energy for the relevant financial year and aggregating into the network tariff components.

Peak, shoulder and off- peak periods relate to Essential Energy's own charging periods.

The tables below shows how the data has been aggregated from the WAPC into the RIN templates.

Table 5.3.6

Variable Code	Variable	Tariffs included
DOPSD0401	Summated Chargeable Contracted Maximum Demand MW	Essential Energy does not have contracted Demand
DOPSD0402	Summated Chargeable Measured Maximum Demand MW	Sum of the Demand billed in MW for all relevant tariffs **(Links refer to '1- Customer nos and Demand' tab within the relevant year's WAPC workbook except for 2006 which references to the 'Q (t-1) act' tab)**

Table 5.3.7

Variable Code	Variable	Tariffs included
DOPSD0403	Summated Chargeable Contracted Maximum Demand MVA	Essential Energy does not have contracted Demand, however Essential Energy do have Capacity Biller tariffs which are based on the Max KVA for the prior 12 months, these tariffs are recorded here **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook except for 2006 which references to the 'Q (t-1) act' tab)**
DOPSD0404	Summated Chargeable Measured Maximum Demand MVA	Sum of the Demand billed in MVA for all relevant tariffs **(Links refer to '1-Customer nos and Demand' tab within the relevant year's WAPC workbook except for 2006 which references to the 'Q (t-1) act' tab)**

Use of estimated information

All information for this table was based off actual invoiced information at the time of the finalisation of the WAPC variables template which is usually 6 months after the end of the period.

Material accounting policy changes

n/a

Reliability of information

The data provided in this table is considered to be reliable, however the 2012/13 data has not been audited.

Worksheet 6 – Physical Assets

6.1.1 – 6.1.2 Overhead and underground network length of circuit at each voltage

Compliance with requirements of the notice

The economic RIN Instructions and Definitions guidance issued by the AER requires the circuit length of every in service overhead and underground sub transmission and distribution circuit to be determined for financial years 2006/07 through to 2012/13. For tables 6.1.1 and 6.1.2, this 'circuit length' has been determined by considering each circuit (regardless of voltage) as a separate entity. This is different to route length used in table 8.3, which, in effect, disregards the number of circuits that span between two poles. The file 'Route length examples.jpg demonstrates the difference between circuit length (used for these tables) and route length (used for table 8.3).

Final connections to the mains have been excluded (i.e. overhead service lines and underground service cables), as well as overhead lines and underground cables for public street lighting.

Additional rows have been added for 6.6kV, 110kV and 220kV overhead lines, and for SWER underground cables.

Source of information

2006 and 2007
Figures for 2006 and 2007 were sourced from information provided for the annual 2006 and 2007 Electricity Supply Association of Australia reports respectively.

'ESAA 05-06 survey - Country Energy.xls'
'2007.11.23 Distribution survey return.xls'

2008, 2009 and 2010
Figures for 2008, 2009 and 2010 were sourced from information provided for the annual 2008, 2009 and 2010 Network Performance Reports (NPR) respectively.

'2007-08_CE NPR 2007_08.pdf'
'2008-09_CE NPR.pdf'
'2009-10_CE_NPR_0910.pdf'

2011, 2012 and 2013
Figures for 2011, 2012 and 2013 were sourced from information that was used for the annual 2011, 2012 and 2013 Regulatory Information Notices respectively.

'Essential Energy– Final RIN – 2010–11.xls'
'Essential Energy_ RIN 2011-12_Final.xlsx'
'ESSENTIAL Energy - Annual RIN - 2012-13 non financial information Final.xlsx'

Methodology and Assumptions

The Reset RIN definition of 'Route Line Length' & 'Circuit Line Length' specifically says not to include service lines, therefore overhead and underground service lines has been excluded.

Figures obtained from the GIS are assumed to be 'actual', even though it is acknowledged that the data may have been incomplete or duplicated.

GIS Recording Policy:

The procedures used for recording information in the GIS means that to provide certain reports, some interpretation and/or manipulation of the data is sometimes required.

Interpretation requires a good understanding of the data that is recorded in the system.

The manipulation process often involves using ETL (Extract – Transform – Load) software (e.g. Safe Software's FME). In some cases, manipulating the data to suit the reporting requirements can be a complex process, and in some situations may not be completely (or even partly) achievable. For example:

- To determine where underground cables share a common trench, FME needs to identify where one cable is parallel to another cable in the GIS. This is even more difficult because cables often run parallel for part of their length;
- Overhead service lines are typically drawn from the pole to a premise, however the location of the premise is indicative only, being shown 6 metres inside the front boundary for a typical urban land parcel. Consequently, reporting the length of services is not accurate;
- Overhead lines which are supported by 'H' constructions (two poles with a crossarm between them which supports the conductors) are captured in Smallworld by showing the line joined to only one of the poles, therefore the other pole 'appears' to have no conductor.

2006 and 2007

The data used for these reports is assumed to have come directly from the GIS. The common practice was to export the overhead line and underground cable information (including lengths) into a spreadsheet and/or database and then summarising to suit the particular reporting requirements.

For both 2006 & 2007, Essential Energy have assumed that the '11kV and below' value included 20km of 6.6kV overhead line because subsequent years had a similar quantity.

2008, 2009 and 2010

Essential Energy wrote a script (Smallworld Magik code) and ran it on the Smallworld database to extract the information required for the NPR. The results of the script were placed in a txt file, which was then loaded into Access. A query was run to summarise the information. Access was then used to determine the length of overhead LV service cables and the length of underground LV service cables in order to reduce the length of LV accordingly.

Data was exported from the GIS and summarised to suit the reporting requirements for the NPR.

The figures determined for the 2008 NPR were discovered to be incorrect due to an incorrect method being used in the script. The process was repeated using the correct method; however the correct figures did not appear in the final NPR. Essential Energy has however used the correct figures for the Economic Benchmarking RIN.

The length value for the low voltage overhead lines in 2009 included an estimated 1000km of additional network not yet captured in the GIS.

The length value for the low voltage overhead lines in 2010 included an estimated 800km of additional network not yet captured in the GIS. The previous year's total length of low voltage overhead services and low voltage underground services was used.

2011, 2012 and 2013
Data was exported from the GIS and summarised to suit the reporting requirements for the annual Regulatory Information Notice.

Use of estimated information

2009
In 2009, an estimate of 1000km was added to the total length of low voltage overhead lines.

2010
In 2010, an estimate of 800km was added to the total actual length of low voltage overhead lines because it was known at the time that there was network that had not yet been captured into the GIS.

An estimate of 4,430km for low voltage overhead services lines was used to determine the total length of low voltage overhead lines. This was the actual length used for the 2009 figures.

An estimate of 1,277km for low voltage underground services was used to determine the total length of low voltage underground cables. This was the actual length used for the 2009 figures.

Material accounting policy changes

Essential Energy has not undertaken any material changes in accounting policies.

Reliability of information

The data that has been used for the quantities in tables 6.1.1 and 6.1.2 has primarily come from Essential Energy's GIS, GE Smallworld systems. The accuracy of the information presented in the tables was directly affected by the accuracy of the data in the GIS at the time. Contributing factors to accuracy are listed below.

Data Completeness:
On-going data capture exercises have steadily increased the population of Essential Energy electricity assets recorded in the GIS. This includes:

- The capture of missing low voltage overhead network;

- The capture of missing poles;
- The capture of missing underground network.

As described above, data capture programs have added significant quantities of overhead lines and underground cables to Smallworld prior to and since 2006. We have not reconciled this data back across the proceeding years. For example, it is believed that the 3km length of 220kV overhead line (feeder X4 from Broken Hill to Perilya Mine) was installed prior to 2006, however the figures in the table have not been adjusted to suit.

Similarly, no length has been recorded for underground SWER prior to 2008, although there is anecdotal evidence that suggests that there was 25km prior to 2006.

Data Quality:

The quality of the information stored in the GIS has also been steadily increasing over time. This is due to various reasons, such as:

- Identifying overhead lines where more than one line has been created over the top of another line, but only one line exists in the field, and then removing one of the lines from the GIS;
- Data quality checks being performed by staff as part of their daily routine, which uncovers data issues;
- Regular automated scripts that are then reviewed by staff;
- Identifying network that was incorrectly identified as Country Energy/Essential Energy owned, in particular network owned by Transgrid or private HV;
- Identifying LV lines & cables that are services instead of mains;
- Automated cross checking with other systems such as PowerOn Fusion and Peace.

Various data quality projects have been undertaken (some of which are still in progress), such as:

- The high voltage network connectivity project;
- The CPS (Customer – Premise – Substation) project – to improve the quality of premise to substation information, to locate premises on their physical land parcel, to create services to premises and to improve the low voltage network connectivity;
- HV distribution network alignment project – to align PowerOn Fusion and the GIS;
- The low voltage verification project – to improve the low voltage network connectivity in Smallworld and capture additional data elements such as conductor phasing and type.

The data provided in these tables is based on assumptions and estimates and caution should be used when using this data for benchmarking or decision making purposes.

6.1.3 – 6.1.4 Estimated overhead and underground network weighted average MVA capacity by voltage class

Compliance with requirements of the notice

Essential Energy has provided estimated typical or weighted average capacities for each of the listed voltage classes under normal circumstances taking account of limits imposed by thermal or by voltage drop considerations as relevant. Further detail has been provided in the subsequent subheadings to address compliance requirements.

Source of information

Essential Energy's information regarding tables 6.1.3 and 6.1.4 was sourced from the following:

- Smallworld – Specifically for tables 6.1.3 and 6.1.4 data was sourced on;
    - feeder lengths
    - feeder phase lengths (i.e. single phase, three phase or SWER)
    - feeder linkages to fault level information
    - feeder first segment conductor type
    - feeder underground and overhead lengths
    - feeder voltage
- Sincal -– Specifically for tables 6.1.3 and 6.1.4 data was sourced on;
    - fault levels
- CE Subtransmission Feeder Ratings Version U Draft.xlsx – Specifically for tables 6.1.3 and 6.1.4 data was sourced on;
    - feeder section lengths
    - feeder section ratings
    - underground and overhead lengths
    - feeder voltage
- Operational Manual: Standard Overhead Conductor: Current Rating Guide CEOM7011– Specifically for tables 6.1.3 and 6.1.4 data was sourced on;
    - Conductor and Cable ratings
- Tables 6.2.1 and 6.2.2 of Essential Energy's economic RIN (Distribution transformer total installed capacity and Zone substation transformer capacity)

Methodology and Assumptions

Background:

It should be noted that as the outcome of this table is a km capacity, the methods used below determine the capacity of the line with respect to the line only.
Example: A feeder is connected to a Zone Substation breaker with a rating of 100A. The feeder is made up of three segments, two segments with a thermal capacity of

200A, 10km in total, and one segment with a thermal capacity of 150A, 5km in total. There are no voltage constraints on the feeder capacity.

Under the weighted average capacity methodology the feeder capacity is calculated as;

(200 x 10 + 150 x 5) / 15 = 183A, even though the surrounding infrastructure is not capable of supplying this level of current.
Methodology Part 1:

For the sub transmission network, relatively accurate information is held on feeder sections which includes;

- Region
- Area
- Feeder Number
- From Sub/Tee
- Section Number
- To Sub/Tee
- Operating Voltage (kV)
- Is this the Minimum conductor on the feeder section?
- Summer Day Rating
- Winter Day Rating
- Summer Day Emergency Rating (1.0 m/s wind)
- Winter Day Emergency Rating (1.0 m/s wind)
- Wind and Ambient Temperature Condition
- Alias in ENMAC
- Conductor
- Design Temperature of Line Section (degrees C)
- Section Length (km)
- Construction Type
- Configuration
- Year Line Section Constructed
- OHEW type
- OHEW Dist (km)
- Summer Ambient Temp C
- Winter Ambient Temp C
- Summer Wind Average (m/s)
- Winter Wind Average (m/s)
- Summer Day (A)
- Winter Day (A)
- Summer Day (MVA)
- Winter Day (MVA)
- Diam (mm)
- Rdc 20C (ohm/km)
- 0C k (m Rac/Rdc)
- Coeffic dc resist
- Summer Day (A)
- Winter Day (A)
- Summer Day (MVA)
- Winter Day (MVA)

Derivation of ratings for Subtransmission Feeders

- Overhead conductor ratings are calculated using formulas defined in ESAA D(b)5-1988.

- Underground cable ratings are defined by the cable manufacturer.

Assumptions under Methodology Part 1:

- All sub transmission feeders are to be treated as summer constrained and therefore summer ratings have been used, as the minority of winter constrained feeders will have an insignificant effect on the results.
- All sub transmission feeders are to be treated as thermally constrained, as the minority of voltage constrained sub transmission feeders will have an insignificant effect on the results.
- Some sub transmission feeder section ratings or lengths were unavailable and hence were not used in the calculations, it has been assumed that the minority of feeders with missing data will not have a significant effect on the results

Methodology Part 2:

Essential Energy keeps minimal information on HV feeders and their ratings, particularly when considering the non-uniform rating of HV feeders along their length. For the derivation of the "weighted average MVA capacity" on HV feeders for a given voltage the following data was obtained;

- the maximum fault level along the feeder
- the minimum fault level along the feeder
- the length of the three phase, single phase, and SWER feeder sections for both overhead and underground
- the first conductor in the feeder

Derivation of ratings for HV feeders

The following calculations were performed on the fore mentioned data to determine the rating of each feeder;

- Averaging the minimum and maximum fault levels, to determine the average fault level along the feeder (as an alternative to determining the fault level along every finite section of the HV feeder)
- Taking the voltage based rating for all available HV feeders as 10% of the averaged fault current (if a single phase to earth fault results in a voltage of zero at the location of the fault, 10% of the single phase to earth fault will result in a 10% reduction in voltage – a 10% reduction in voltage being approximately the limit for HV feeders)
- Taking the thermal rating for all available HV feeders as the rating of the first conductor out of the substation based on the conductor type and a 50 degree Celsius rating
- Taking the voltage based rating for all available SWER sections as 10% of the averaged fault current on the SWER section (if a single phase to earth fault results in a voltage of zero at the location of the fault, 10% of the single phase to earth fault will result in a 10% reduction in voltage – a 10% reduction in voltage being approximately the limit for HV feeders)
- Taking the actual rating for the feeder as the minimum of the thermally based rating and the voltage based rating

Assumptions under Methodology Part 2:

- The fault current is a reasonable surrogate for determining maximum current based on voltage, however large variations in the X/R ratio of the fault away from unity will see true current carrying capacity vary according to the power factor of the load.

- HV feeders have a linear reduction in fault level.
- All HV feeders have a 50 degree Celsius rating, whilst this is most likely not the case. Essential Energy believes it to be a reasonable assumption based on the limited data available.

Methodology Part 3:
LV Feeder ratings are virtually non-existent and many LV feeders will be voltage constrained. A methodology to deliver the voltage based current capacity of all LV feeders in the given timeframe was not available.
LV Feeder ratings are hence based solely on the thermal rating of the conductors used.

Assumptions under Methodology Part 3:
- All LV feeders have a 50 degree Celsius rating, whilst this is most likely not the case. Essential Energy believes it to be a reasonable assumption based on the limited data available.
- The conductor information available is a reasonable sample of the available LV feeder stock.
- The conductors have been assumed to be three phase unless further information was available.

Methodology and Assumptions Part 4:

Calculation of "weighted average MVA capacity"
The "weighted average MVA capacity" for a given voltage is determined by assigning a weight to the rating of the feeder section based on the feeder section length divided by the total feeder length for each voltage class and construction type (overhead and underground).
Calculation of historic "weighted average MVA capacity"
The historic "weighted average MVA capacity" has been calculated based on a relatively consistent ratio of Zone Substation and Distribution transformer capacity to weighted average MVA capacity.

Methods investigated in order to evaluate historic weighted average feeder capacity included;
- Constant weighted average capacity, which would indicate that feeder capacity has remained constant as feeder length increases, i.e. additional feeder length is split evenly between new and existing feeders, but has no significant correlation to installed transformer capacity.
- Weighted average capacity relative to installed transformer capacity, which would indicate that capacity of feeders is directly related to installed transformer capacity, but has no significant correlation to length of feeders.
- Weighted average feeder capacity x installed length relative to the installed transformer capacity indicating correlation between feeder length and transformer capacity, e.g. as feeder length increases with no additional transformer capacity added, average feeder capacity decreases i.e.;

  (2013 weighted average MVA capacity x 2013 installed km) / (zone substation capacity + distribution transformer capacity) / 2 = Constant

  Therefore 2012 weighted average MVA capacity = (Constant x ((zone substation capacity + distribution transformer capacity) / 2))/ (2012 installed km)

The major drivers for weighted average feeder capacity vary according to the asset class. The following outlines the methods and reasoning behind the choice of methodology for the particular asset class.

Overhead low voltage distribution, Overhead 11 kV, Overhead SWER, Overhead 22 kV;
- For mature assets where augmentation can include lengthening of assets (generally additions would be below weighted average capacity), reconductoring assets (which would generally be at or above weighted average capacity), and relatively few new feeders (which would generally be at or above weighted average capacity), weighted average feeder capacity x installed length relative to the installed transformer capacity provides the most reasonable outcome.

Overhead 6.6 kV, Overhead 110 kV, Overhead 220 kV, Underground SWER;
- For virtually singular assets (small base km), where minimal changes have occurred (relatively stable km) since construction, the constant weighted average capacity method gives the most reasonable outcome.

Overhead 33 kV, Overhead 66 kV, Overhead 132 kV, Underground 132 kV, Underground 66 kV, Underground 33 kV, Underground 22 kV, Underground 11 kV, Underground low voltage distribution;
- For sub transmission assets where the feeder length does not (generally) have an impact on capacity (including overhead 33kV where the majority of growth has been assumed to be in the sub transmission network) or for underground assets with relatively low base installed km compared to the growth in those assets the most reasonable outcome is provided by using the Weighted average capacity relative to installed transformer capacity.

Use of estimated information

Almost all data involved in the “weighted average MVA capacity” with the exception of feeder lengths can be considered to be estimated. These estimations include:

Sub transmission feeder ratings;
While sub transmission feeder ratings are calculated based on known conductor types and widely used industry principles, the weather parameters used in those calculations are based on area wide assumptions and hence feeder ratings can be considered as best estimates.

HV feeder ratings;
HV feeders do not have uniform ratings along their length for two main reasons. Firstly HV feeders consist of different conductor types and phasing along their length and hence have different thermal ratings along their length. Secondly HV feeders can have, and in Essential Energy’s network the majority will have considerable voltage drop along the length of the feeder, hence even if maximum thermal rating could be delivered, it would not be at voltages required under Essential Energy’s license conditions.

On the surface the most consistent method to estimate HV feeder ratings based on voltage constraints would be to scale the simulated loads along each feeder until a voltage constraint occurs and define the feeder rating as the current under those simulated conditions. This method however fails to deliver the installed “strength” or “capacity” of the network, as the results are skewed by the placement, original size and scaling of the simulated loads which may have small relative inaccuracies in the original modelling, but when multiplied can lead to large inaccuracies. Another issue with the use of this method is that it will not necessarily give a whole of feeder capacity; rather it will define the capacity of the feeder by the weakest link in the feeder, which may or may not have any influence on the actual capacity of the feeder depending on where any growth occurs.

The alternative method used by Essential Energy to formulate the HV feeder ratings as required by the RIN removes some of the reliance on the simulated loads, instead focusing largely on the installed “strength” or “capacity” of the network. This has been achieved by using the average fault level across the available HV feeders, removing any need to rescale loads, with the added benefit of being more easily repeated and with greater consistency. Note that the loading on the feeder is still a contributing factor to the fault level due to the effect on the starting voltage at the time of simulated fault.

This method of using fault current or short circuit current to determine network strength is used in Australian standards such as AS/NZS 61000.3.6:2001 in reference to permitted harmonic thresholds of particular electronic devices.

Historical data;
Unlike assets such as distribution transformers, Essential Energy has little to no record of historic feeder capacity as calculated under the above methodology. As a result, Essential Energy has used the installed distribution and zone substation transformer capacity as a surrogate to determine the historic weighted average network feeder capacity.

Material accounting policy changes

n/a

Reliability of information

The data provided in these tables is based on assumptions and estimates and caution should be used when using this data for benchmarking or decision making purposes.

6.2.1 Distribution transformer total installed capacity

Compliance with requirements of the notice

The information provided reports a breakdown of transformer capacity of distribution transformers owned by Essential Energy, high voltage customers, and spare transformers owned by Essential Energy that are not currently in use. This is in line with the economic RIN Instructions and Definitions guidance issued by the AER. Further detail has been provided in the subsequent subheadings to address compliance requirements.

Source of information

Data has been sourced from Essential Energy's WASP database using SQL and grouping of data in Excel.

Methodology and Assumptions

- **DPA0501 – Distribution transformer capacity owned by utility including Cold Spares**

  SQL Logic:

  1. Distribution transformer capacity owned by utility (not including Cold Spares)

  - Only Substation Sites with an Owner = 'Essential Energy'
  - Only Substation Sites with a Service Status = 'In Service' (Out of Service have been classified as Cold Spares)
  - Excludes Substation Sites with a Substation Type = 'Isolator' or 'Step Up/Down' (this leaves all Distribution Substation Sites)
  - Excludes Isolating Transformers
  - Excludes Substation Sites with a SWER Primary Voltage (6.35kV, 12.7kv, 19.1kV), therefore excluding SWER Isolators in conjunction with the above item.
  - kVA has been obtained from the Substation Site's 'Total KVA'.
    If this is not available, then kVA has been derived as follows (note this has only been required in 2% of cases):
    - if Substation Site 'Total KVA' is blank, then use sum of children Transformer 'KVA'
    - if Substation Site 'Total KVA' and children Transformer 'KVA' fields are blank, then use Substation Site 'Phases' as follows:

      3 phase = 63kVA

      1 phase = 10kVA
    - if Substation Site 'Total KVA' and children Transformer 'KVA' fields are blank and Substation Site 'Phases' is blank, then use Substation Site 'Construction Type' as follows:
      Pad/Kiosk Substation = 500kVA
      Chamber Substation = 1000kVA

Ground Substation = 1000kVA
All others (e.g. Pole Substation) = 10kVA

- MVA was calculated as kVA (derived if necessary as per above)/1000 and summed for each year.
- Year has been obtained from the Substation Site's 'Date Constructed'. If this is not available, then Year has been derived as follows (note this has only been required in 2% of cases):
  - if Substation Site 'Date Constructed' is blank, then use most recent 'Date Manufactured' from the Substation Site's associated children Transformer(s).
  - if Transformer 'Date Manufactured' is not available then it was classified as <1950

2. Cold Spares (added to item (1) once determined)

- All Substations Sites with an Owner = 'Essential Energy' and a Service Status = 'Out of Service'
  plus
  All Transformers with a parent of the Transformer Store or the Contractor Evaluation Store (these are transformers in stores waiting to be evaluated or waiting to be used in the network)
- For 'Out of Service Substation Sites', kVA has been obtained from the Substation Site's 'Total KVA'. If this is not available, then kVA has been derived as follows:
  - if Substation Site 'Total KVA' is blank, then use sum of children Transformer 'KVA'
  - if Substation Site 'Total KVA' and children Transformer 'KVA' fields are blank, then use Substation Site 'Phases' as follows:
    3 phase = 63kVA
    1 phase = 10kVA
  - if Substation Site 'Total KVA' and children Transformer 'KVA' fields are blank and Substation Site 'Phases' is blank, then use Substation Site 'Construction Type' as follows:
    Pad/Kiosk Substation = 500kVA
    Chamber Substation = 1000kVA
    Ground Substation = 1000kVA
    All others (e.g. Pole Substation) = 10kVA
- For Transformers in Stores, kVA has been obtained from the Transformer 'KVA'. If this is not available, then kVA has been estimated to be 63kVA.
- Excludes Substation Sites with a Substation Type = 'Isolator' or 'Step Up/Down' (this leaves all Distribution Substation Sites)
- Excludes Substation Sites and Transformers with a SWER Primary Voltage (6.35kV, 12.7kv, 19.1kV), therefore excluding SWER Isolators in conjunction with the above item.
- MVA was calculated as kVA (derived if necessary as per above)/1000 and summed for each year.

- For ‘Out of Service Substation Sites’, the year has been obtained from the Substation Site's ‘Date Constructed’. If this is not available, then Year has been derived as follows:
  - if Substation Site ‘Date Constructed’ is blank, then use most recent ‘Date Manufactured’ from the Substation Site’s associated children Transformer(s).
  - if Transformer ‘Date Manufactured’ is not available then it was classified as <1950
- For Transformers in Stores, the year has been obtained from the Transformer ‘Date Manufactured’. If this is not available, then the Year has been classified as <1950

The results from the SQL queries were extracted into a spreadsheet and the sum of the MVA was summed up by year resulting in the total MVA installed each year. The totalled installed capacity for 2006-2013 was then determined by summing up the total MVA installed for that particular year and every year prior. The totals of (1) and (2) above were then added together for input into the template for item DPA0501.

- **DPA0502 – Distribution transformer capacity owned by High Voltage Customers**

  SQL Logic:
  - Only Substation Sites with an Owner <> ‘Essential Energy’
  - Only Substation Sites with a Service Status = ‘In Service’
  - Excludes Substation Sites with a Substation Type = ‘Isolator’ or ‘Step Up/Down’ (this leaves all Distribution Substation Sites)
  - Excludes Substation Sites with a SWER Primary Voltage (6.35kV, 12.7kv, 19.1kV), therefore excluding SWER Isolators in conjunction with the above item.
  - kVA has been obtained from the Substation Site's ‘Total KVA’.
    If this is not available, then kVA has been derived as follows (note this has only been required in 2% of cases):
    - if Substation Site ‘Total KVA’ is blank, then use sum of children Transformer ‘KVA’
    - if Substation Site ‘Total KVA’ and children Transformer ‘KVA’ fields are blank, then use Substation Site ‘Phases’ as follows:
      3 phase = 63kVA
      1 phase = 10kVA
    - if Substation Site ‘Total KVA’ and children Transformer ‘KVA’ fields are blank and Substation Site ‘Phases’ is blank, then use Substation Site ‘Construction Type’ as follows:
      Pad/Kiosk Substation = 500kVA
      Chamber Substation = 1000kVA
      Ground Substation = 1000kVA
      All others (e.g. Pole Substation) = 10kVA

- MVA was calculated as kVA (derived if necessary as per above)/1000 and summed for each year.
- Year has been obtained from the Substation Site's 'Date Constructed'. If this is not available, then Year has been derived as follows (note this has only been required in 2% of cases):
  - if Substation Site 'Date Constructed' is blank, then use most recent 'Date Manufactured' from the Substation Site's associated children Transformer(s).
  - if Transformer 'Date Manufactured' is not available then it was classified as <1950

The results from the SQL query were extracted into a spreadsheet and the sum of the MVA was summed up by year resulting in the total MVA installed each year. The totalled installed capacity for 2006-2013 was then determined by summing up the total MVA installed for that particular year and every year prior and input into the template for item DPA0502.

Essential Energy does not record all Private HV Customer transformers as it has no need to. This figure will be lower than reality.

- **DPA0503 – Cold spare capacity included in DPA0501**

  SQL Logic:

  - All Substations Sites with an Owner = 'Essential Energy' and a Service Status = 'Out of Service'
    plus
    All Transformers with a parent of the Transformer Store or the Contractor Evaluation Store (these are transformers in stores waiting to be evaluated or waiting to be used in the network)
  - For 'Out of Service Substation Sites', kVA has been obtained from the Substation Site's 'Total KVA'. If this is not available, then kVA has been derived as follows:
    - if Substation Site 'Total KVA' is blank, then use sum of children Transformer 'KVA'
    - if Substation Site 'Total KVA' and children Transformer 'KVA' fields are blank, then use Substation Site 'Phases' as follows:
      3 phase = 63kVA
      1 phase = 10kVA
    - if Substation Site 'Total KVA' and children Transformer 'KVA' fields are blank and Substation Site 'Phases' is blank, then use Substation Site 'Construction Type' as follows:
      Pad/Kiosk Substation = 500kVA
      Chamber Substation = 1000kVA
      Ground Substation = 1000kVA
      All others (e.g. Pole Substation) = 10kVA
  - For Transformers in Stores, kVA has been obtained from the Transformer 'KVA'. If this is not available, then kVA has been estimated to be 63kVA.

- MVA was calculated as kVA (derived if necessary as per above)/1000 and summed for each year.
- For 'Out of Service Substation Sites', the year has been obtained from the Substation Site's 'Date Constructed'. If this is not available, then Year has been derived as follows:
  - if Substation Site 'Date Constructed' is blank, then use most recent 'Date Manufactured' from the Substation Site's associated children Transformer(s).
  - if Transformer 'Date Manufactured' is not available then it was classified as <1950
- For Transformers in Stores, the year has been obtained from the most recent asset movement date for when the Transformer was moved into the 'Transformer' or 'Contractor Evaluation Store' if available. If this is not available, then the Year has been determined as follows:
  - If no asset movement record into a relevant store, then use the Transformer 'Date Manufactured'.
  - if Transformer 'Date Manufactured' is not available then it was classified as <1950

The results from this SQL query were extracted into a spreadsheet and the sum of the MVA was summed up by year resulting in the total MVA installed each year. The totalled installed capacity for 2006-2013 was then determined by summing up the total MVA installed for that particular year and every year prior for input into the template for item DPA0503.

Use of estimated information

- Essential Energy has used estimated information when there is no 'Date Constructed' for the Substation Site or asset movement date for the Transformer (in the case of Transformers in Stores). This method may result in a lower than actual figure for cold spare capacity in the earlier years due to it not taking into account Transformers that may have been in a store in 2006/2007, but where there put on a Substation Site, resulting in it being captured from 2008 onwards in the Essential Energy owned Transformer data. This methodology will provide a good estimation for years 2014 onward provided the data is extracted regularly (annually).

- Essential Energy has used estimated information when there is no 'Total kVA' for the Substation Site. This was only performed in 2% of cases. The methodology used to estimate the kVA in these instances is considered to provide a reasonable approximation and was determined using averages and most common kVA by Substation Type.

Material accounting policy changes

n/a

Reliability of information

Some of the data provided in these tables is based on assumptions and estimates and caution should be used when using this data for benchmarking or decision making purposes.

6.2.2 Zone substation transformer capacity

Compliance with requirements of the notice

The information provided reports on the transformer capacity of distribution Zone substation transformers owned by Essential Energy. The data is broken down according to transformation steps as well as those that are not currently in use. This is in line with the economic RIN Instructions and Definitions guidance issued by the AER. Further detail has been provided in the subsequent subheadings to address compliance requirements.

Source of information

Data has been sourced from Essential Energy's WASP database using SQL and grouping of data in Excel based on 1 and 2 step transformation.

Methodology and Assumptions

- **DPA0601 – Total installed capacity for first step transformation where there are two steps to reach distribution voltage**
- **DPA0602 – Total installed capacity for second step transformation where there are two steps to reach distribution voltage**
- **DPA0603 - Total zone substation transformer capacity where there is only a single step transformation to reach distribution voltage**
- **DPA0604 - Total zone substation transformer capacity**
  - Sum of DPA0601, DPA0602, DPA0603 and DPA0605.
- **DPA0605 - Cold spare capacity of zone substation transformers included in DPA0604**

  SQL Logic:
  - All ZS Power Transformer assets where the Owner <> 'Private (all others should be Essential Energy owned)
  - All ZS Power Transformers with a Service Status of:
    - DPA0601, DPA0602 & DPA0603 & DPA0605 - 'In Service', 'Out of Service', 'Proposed', 'System Spare', 'Under Construction', 'Under Repair'
      (Includes energised as well as Cold Spare Capacity)
  - Excludes ZS Power Transformers with a Type of:
    - 'Regulators', 'SWER Isolators'
      (Results in only Power Transformers)

- MVA for 1 Step Transformers has been obtained from the 'Maximum Rating (MVA)' attribute. If blank it is assumed to be 5 MVA (note that this has occurred in <1% of cases).
- Year has been obtained from the ZS Power Transformer's 'Year of Manufacture'. If this is not available, then Year has been derived as follows (not this has occurred in <1% of cases):
  - if ZS Power Transformer 'Year of Manufacture' is blank, then use the year from the 'Date Installed' attribute on the ZS Power Transformer.

An extract of these ZS Power Transformers has been reviewed by the Subtransmission Planning group and Zone Substation Engineering group. Each transformer within the extract was tagged with a usage being:

'1' = DPA0601, those transformers which are the first step of a two-step transformation to distribution voltage. E.g. Coleambally 132/33kV (25MVA) as the first step.
'2' = DPA0602, those transformers which are the second step of a two-step transformation to distribution voltage. E.g. following on from Coleambally 132/33kV, those 33/11kV transformers which take 33kV supply from the Coleambally 33kV busbar are tagged as 2.
'3' = DPA0603, those transformers which are one step transformation to distribution voltage. Those transformers generally taking primary side supply from a TransGrid busbar and transforming straight to distribution voltage. E.g. Boronia St 33/11kV takes supply from TransGrid 33kV busbar.
'Spare' = DPA0605, those transformers that are deemed to be out of service, in store or on a site where physical movements is required to utilize the transformer.
'Ignore' = generally transformers that step up from one distribution voltage to another distribution voltage. Correction of some of the listed spares which are to be scrapped were ignored. Transformers that are a 'third' step e.g. Tamworth TransGrid 66kV busbar generally supplies 66/11kV transformers, thus it is one step. It also supplies 33/11kV transformers via a 66/33kV transformation at Quirindi (this step is ignored) and 33/11kV transformers are one step.
'Gen' = transformers used to transform from generator terminals to generator output, no distribution usage. Neither those tagged with 'Ignore' or 'Gen' were counted.

The results from this SQL query and the mappings/updates made have been used to group items into the appropriate RIN categories.

The total capacity for 2006-2013 was then determined by summing up the total MVA installed for that particular year and every year prior and grouped by the RIN categories above for input into the template for items DPA0601, DPA0602, DPA0603 and DPA0605.

Use of estimated information

- Essential Energy has used estimated information when there is no 'Date Installed' for the ZS Power Transformer. This was only performed in <1% of cases. The methodology used to estimate the date in these instances is considered to provide a reasonable estimate.
- Essential Energy has used estimated information when there is no 'Maximum Rating (MVA)' for the ZS Power Transformer. This was only performed in <1%

of cases. The methodology used to estimate the MVA in these instances is considered to provide a reasonable estimate and was determined using averages and most common MVA by Power Transformer Type.

- Essential Energy has reviewed and overridden the 1st and 2nd step transformation MVAs if required. This is not recorded in the WASP database and the accuracy of the data is dependent upon this and the accuracy of the Zone Substation Manuals referenced.

Material accounting policy changes

n/a

Reliability of information

The data provided in these tables is based on assumptions and estimates and caution should be used when using this data for benchmarking or decision making purposes.

The Zone Substation Manuals have the potential to have not been updated with recent changes in the past 2-3 years so there is a risk that the MVAs obtained for the two step transformations are incorrect, however Essential Energy has reviewed these values and assumptions and has overridden anything believed to be incorrect, where possible.

6.3 Public lighting

Compliance with requirements of the notice

The information provided reports the number of public lighting luminaires and public lighting poles. Assets owned by Essential Energy and assets operated and maintained by Essential Energy but not owned by Essential Energy have been included. This is in line with the economic RIN Instructions and Definitions guidance issued by the AER. Further detail has been provided in the subsequent subheadings to address compliance requirements.

Source of information

Data has been sourced from historical records extracted from Essential Energy's WASP database (and stored by the Streetlight Business team) in the regulatory years 2011, 2012 and 2013 using the logic defined below. Years 2006, 2007, 2008, 2009 and 2010 were estimated based on a 1% growth trend each year. This is consistent with the growth from 2011 to 2012 as well as from 2012 to 2013 and is based on suburb growth being consistent over the last 10 years.

Methodology and Assumptions

- **DPA0701 – Public Lighting Luminaires**

  Historical SQL Logic for each year from 2011 to 2012:

  - Only Streetlights with an Owner = 'Essential Energy' or 'RTA' (which we maintain)
  - Only Streetlights with a Service Status = 'In Service'

- Streetlights with a Lighting Category = ‘Quarantined’ were excluded
- Assets with a category of ‘Nightwatch Light’ were excluded

Calculation for each year from 2006 to 2010 (1% growth rate):

[Total for the following year] - [Total for the following year]/ (100+ (1/100))

E.g. for 2010:
[Total for the 2011] - [Total for 2011]/ (100+1%)

- **DPA0702 - Public Lighting Poles**
  - Determined from the Lighting asset having a dedicated pole whose primary purpose is to support the light (Support Type <> ‘Shared or No Pole’). The distinct parent poles were counted regardless of number of luminaires attached.

Use of estimated information

Essential Energy has used estimated information for the years 2006, 2007, 2008, 2009 and 2010 due to not having accurate historical records for these years. Data was not able to be easily obtained from WASP due to the Streetlight ‘Connection Date’ being updated whenever a luminaire is replaced – using the date installed from WASP for luminaires unnaturally skews the results showing a significant rise in new installations over the past few years due to luminaire replacements (updating the date installed) rather than new installations. In reality there has been steady growth / trend.

These years were estimated based on a 1% growth trend each year. This is consistent with the growth from 2011 to 2012 as well as from 2012 to 2013 and is based on suburb growth being consistent over the last 10 years.

Material accounting policy changes

n/a

Reliability of information

The reliability of the data for 2011 – 2013 is dependent on the accuracy of the data within the WASP database at the time that the historical data was extracted as well as the accuracy of the assumptions and estimations that have been used. Therefore caution should be used when using this data for benchmarking or decision making purposes.

The reliability of the data for 2006-2010 is dependent on the accuracy of the data for 2011-2013 (see above) as well as the assumption that an annual 1% growth rate has occurred for the past 8 years. Therefore caution should be used when using this data for benchmarking or decision making purposes.

Worksheet 7 – Quality of services

7.1.1 – 7.1.2 Inclusive & Exclusive of MEDs

Compliance with requirements of the notice

Reliability data has been reported in accordance with the definitions provided in the AER's Service Target Performance Incentive Scheme (STPIS) unless otherwise specified in the methodology and assumptions section below.

Source of information

Data is sourced from PowerOn Fusion and an Access database. PowerOn makes up the central modules of Essential Energy's power Distribution Management and Outage Management Systems (DMS/OMS).

The spreadsheet used to collate data is named: "DNSP economic benchmarking data templates – NP&R V3"

Methodology and Assumptions

The data has been collected and collated in line with the economic RIN Instructions and Definitions guidance issued by the AER. The only exception is that outage data prior to November 2012 did not include de-energised NMIs. This data was not collected at the time. When calculating SAIFI and SAIDI figures these de-energised NMIs would not have been included in the customers affected or contributed to the customer minutes lost but also would not have been included in the total customers. With these missing from both numerator and denominator there would be little effect on the SAIDI and SAIFI figures.

The Threshold for Major Event Days (TMED) for 2012/13 was applied to all years as per the definition.

Use of estimated information

Not applicable as actual information has been provided.

Material accounting policy changes

n/a

Reliability of information

The data provided in this table is considered to be reliable.

7.2 Energy not supplied

Compliance with requirements of the notice

This section contains an estimate of the energy that was not supplied as a result of Customer Interruptions as per the economic RIN Instructions and Definitions guidance issued by the AER.

Source of information

Data has been sourced from reported Planned customer minute off-supply and Unplanned customer minutes off-supply.

Methodology and Assumptions

Essential Energy has not previously reported the Unplanned and Planned Energy not supplied by GWh, other than for the 2012/13 annual regulatory accounts.

The method that was used for the 2012/13 annual regulatory accounts could not be replicated for the previous years due to the following points:

- The Feeder to Tariff report has only being available since Aug 2013 and the inability to run this historically as the source has no date versioning.
- Historically Feeder names have changed from year to year.
- Historically the RIN had only reported the Best and worst feeder information, unlike 2012/13 which lists all.

The information that was available was Planned customer minutes off-supply and Unplanned customer minutes off-supply for the previous financial years. These numbers were obtained from the following:

- 05-06 and 06-07 Data is from corresponding EOY Summary of Data Tables.
- 07-08 to 11-12 Planned Data is from EOY Summary of Data Tables.
- 07-08 to 11-12 DNI Unplanned is from RIN 12-13 1d STPIS MED Threshold.

Total unplanned customer minutes off supply (after removing excluded events allowed under clause 3.3(a) of the STPIS)

Based on the information available the estimated kWh were determined by calculating an average kWh use per minute for each financial year, based on the total consumption divided by the total number of customers divided by the number of minutes in a year. This average kWh use per minute was then applied to the recorded Total Planned and Unplanned customer minutes off supply.

Use of estimated information

All information for these tables was based on an aggregate network level and a best estimate.

Material accounting policy changes

n/a

Reliability of information

The 2013 GWh supplied were as reported in the 2012/13 annual regulatory accounts, so are considered reliable. All other financial years are based on assumptions and estimates so caution should be used when using this information for benchmarking or decision making purposes.

7.3 System losses

Compliance with requirements of the notice

This section contains the proportion of energy that is lost in distribution of electricity from the transmission network to Essential Energy customers.

Source of information

Result is formula driven and data utilised in Table 7.3 came from Table 5.1.2 and Table 5.1.3 for Electricity imported and Electricity delivered was Table 5.1.

Methodology and Assumptions

The methodology used in this section was as provided in the economic RIN Instructions and definitions guidance issued by the AER. Refer to Formula 2 as below.

System losses = (electricity imported – electricity delivered)/ (electricity imported) x 100

The electricity imported is the sum of the Energy received from the TNSP plus the Energy received into the DNSP system from embedded generation.

Use of estimated information

The calculation is based on tables that have been provided. Please refer to Table 5.1, 5.1.2 and 5.1.3.

Material accounting policy changes

n/a

Reliability of information

The data provided for 2010 onwards is considered reliable; however the data for prior years is based on assumptions and estimates so caution should be used when using it for benchmarking or decision making purposes.

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7.4 Capacity utilisation

Compliance with requirements of the notice

This section follows the economic RIN Instructions and Definitions guidance issued by the AER which defines the requirements as;

"Capacity utilisation is a measure of the capacity of zone substation transformers that is utilized each year. Essential Energy must report the sum of non-coincident Maximum Demand at the zone substation level divided by summation of zone substation thermal capacity. 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."

Source of information

Result is formula driven and data utilised in Table 7.4 came from Table 5.3.3 and Table 6.2.2.

Methodology and Assumptions

Essential Energy has ignored feeder capacity and used;

Table 5.3.3 Non–coincident Summated Raw System Annual Maximum Demand divided by Table 6.2.2 Total zone substation transformer capacity.

Use of estimated information

The calculation is based on data in tables that have been provided. Please refer to Table 5.3.3 and 6.2.2.

Material accounting policy changes

n/a

Reliability of information

The calculation is based on data in tables that have been provided. Please refer to Table 5.3.3 and 6.2.2.

Worksheet 8 – Operating environment

8.1 Density factors

Compliance with requirements of the notice

This section has been completed as per the provided formulas in the economic RIN Instructions and Definitions document issued by the AER.

Source of information

'Customer Density' sources information from Table 5.2.2 Total customer numbers and Table 8.3 Route line lengths.

'Energy Density' sources information from Table 5.1 Energy delivered and Table 5.2.2 Total customer numbers.

'Demand Density' sources information from Table 5.3.3 Annual system maximum demand, DOPS0201, and Table 5.2.2 Total customer numbers.

Methodology and Assumptions

The methodology used in this section was as provided in the economic RIN Instructions and Definitions document issued by the AER.

Customer density is the total number of customers divided by the route line length of the network.

Energy Density is the total Mwh delivered to the customer divided by the total number of customers of the network.

Demand density is the non-coincident Maximum Demand at zone substation level, in kVA units, divided by the total number of customers of the network.

Use of estimated information

These calculations are based on tables that have been provided, please refer to Table 5.2.2, Table 8.3, Table 5.1 and Table 5.3.3.

Material accounting policy changes

n/a

Reliability of information

These calculations are based on data provided in tables, please refer to Table 5.2.2, Table 8.3, Table 5.1.2, Table 5.1.3 and Table 5.3.3.

8.2 Terrain factors

Compliance with requirements of the notice

This section has been completed as per the provided formulas in the economic RIN Instructions and Definitions document issued by the AER.

Source of information

- WASP system
- Essential Energy Vegetation Cost Model
- Field survey 2011/12
- Smallworld system

Methodology and Assumptions

Rural proportion

Rural proportion is calculated as short rural feeder length plus long rural feeder length divided by the total route feeder length.

Urban and CBD vegetation maintenance spans

The number of in service poles (less one) classified as urban in the WASP system multiplied by 23.1% that is the percentage of the urban Essential Energy network that is vegetated.

The percentage vegetated is an average based on a sample of all completed scoped urban maintenance areas for the 12/13 financial year and is derived from the number of defects reported divided by the total number of spans in the maintenance area.

The clearing of re-growth (e.g. saplings) is required to slow down or stop new trees from reaching the maintenance space and subsequently requiring on-going pruning and expenditure. The 11/12 field survey found that 85% pruned in a year are also cleared of regrowth in Essential Energy. With this re-growth prevention program in place the percentage of maintenance spans will remain constant.

Rural vegetation maintenance spans

The number of in service poles (less one) classified as rural in the WASP system multiplied by 23.5% that is the percentage of the rural Essential Energy network that is vegetated.

The percentage vegetated is an average based on a sample of all completed rural scoped maintenance areas for the 12/13 financial year and is derived from the number of defects reported divided by the total number of spans in the maintenance area.

The clearing of re-growth (e.g. saplings) is required to slow down or stop new trees from reaching the maintenance space and subsequently requiring on-going pruning

and expenditure. The 11/12 field survey found that 85% pruned in a year are also cleared of regrowth in Essential Energy. With this re-growth prevention program in place the percentage of maintenance spans will remain constant.

Total vegetation maintenance spans

Sum of Rural and Urban vegetation spans outlined in the previous two metrics.

Total number of spans

Total number of in service poles stored in the WASP system for each of the financial years, less one.

Average urban and CBD vegetation maintenance span cycle

Total number of urban vegetation maintenance areas completed in the financial year divided by the total number of urban areas.

Reporting prior to 2012 does not have the completed maintenance areas split into rural and urban so for the prior years the split has been done based on the 2013 actual percentage of rural to urban. Maintenance area completion data is also less reliable for the years prior to 2012 as results were entered by individuals from each region, not calculated centrally as they are for 2012 and 2013.

Average rural vegetation maintenance span cycle

Total number of rural vegetation maintenance areas completed in the financial year divided by the total number of rural areas.

Reporting prior to 2012 does not have the completed maintenance areas split into rural and urban so for the prior years the split has been done based on the 2013 actual percentage of rural to urban. Maintenance area completion data is also less reliable for the years prior to 2012 as results were entered by individuals from each region, not calculated centrally as they are for 2012 and 2013.

Average number of trees per urban and CBD vegetation maintenance span

The vegetation density for all years is based on field survey data from the 2011/12 financial year. 30 vegetation maintenance areas were surveyed across the Essential Energy urban network with the sample made up of vegetation maintenance areas from each of the five vegetation maintenance Zones.

Average number of trees per rural vegetation maintenance span

The vegetation density for all years is based on field survey data from the 2011/12 financial year. 66 vegetation maintenance areas were surveyed across the Essential Energy rural network with the sample made up of vegetation maintenance areas from each of the five vegetation maintenance Zones.

Average number of defects per urban and CBD vegetation maintenance span

Total number of defects reported from all sources for vegetation stored in the WASP system for each of the financial years divided by the total number of maintenance spans for urban areas for each of the financial years.

Average number of defects per rural vegetation maintenance span

Total number of defects reported from all sources for vegetation stored in the WASP system for each of the financial years divided by the total number of maintenance spans for rural areas for each of the financial years.

Tropical proportion

The approximate number of vegetation maintenance spans in the hot humid summer and warm humid summer regions as defined by the below map.

http://reg.bom.gov.au/jsp/ncc/climate_averages/climate-classifications/index.jsp

Data source was the Essential Energy GIS, Smallworld.

Standard vehicle access

The total number of poles that have a Terrain Type in WASP of "Accessible" as entered by (for the most part) asset inspectors divided by the total poles in the network to get a percentage of standard access for the pole network (87%).

The remaining 13% was then applied to the total number of kilometres of line in the Essential Energy network and assumes that all spans are inaccessible if the pole is inaccessible.

Bushfire risk

Essential Energy has an annual bushfire mitigation aerial patrol program that is carried out across the entire rural network. On this basis all rural spans have been included as a bushfire risk.

Use of estimated information

This has been explained in the methodology and assumptions section above.

Material accounting policy changes

n/a

Reliability of information

Essential Energy's internal colour coding system has been used in the RIN template to indicate the level of confidence in each of the cells completed.

8.3 Service area factors

Compliance with requirements of the notice

The Notice requires the route length of overhead lines and underground cables to be determined for financial years 2006/07 through to 2012/13. For table 8.3, the route length disregards the number of circuits that span between two poles and uses the length of any one of the circuits as the route length. The file 'Route length examples.jpg' demonstrates the difference between circuit length (used for tables 6.1.1 and 6.1.2) and route length (used for table 8.3).

Final connections to the mains have been excluded (i.e. overhead service lines and underground service cables), as well as overhead lines and underground cables for public street lighting.

Source of information

The total route length was determined by summing the overhead line route lengths and the underground cable route lengths.

Overhead line route lengths:

2006, 2007, 2008 & 2009
Figures for the overhead route length for 2006, 2007, 2008 and 2009 were obtained by determining the ratio of overhead route length to overhead circuit length for years 2010 to 2013, finding the average and applying that average to the overhead circuit lengths determined in section 6.1.1. The spread sheet 'Route Lengths.xlsx' shows the working.

2010
Figures for the overhead circuit lengths for 2010 were obtained from data that was used for the 2010 ODRC, specifically information in the spread sheet 'Results20100322.xls'.

The information in the spread sheet was based on GIS data extracted on 03/03/2010.

2011, 2012 & 2013
Figures for the overhead circuit lengths for 2011, 2012 and 2013 were obtained from GIS data that was exported for the preparation of the annual RINs.

Underground cable route lengths:

2006, 2007, 2008, 2009 & 2010
Figures for the overhead route length for 2006, 2007, 2008, 2009 & 2010 were obtained by determining the ratio of underground route length to underground circuit length for years 2011 to 2013, finding the average and applying that average to the underground circuit lengths determined in section 6.1.2. The spread sheet 'Route Lengths.xlsx' shows the working.

2011, 2012 & 2013
Figures for the underground circuit lengths for 2011, 2012 and 2013 were obtained from GIS data that was exported for the preparation of the annual RINs. The data was analysed to determine where underground cables were drawn in the GIS within 4m of

another underground cable, and if so these circuits were reduced to a single circuit to represent the route length for the common section of cable.

Methodology and Assumptions

Overhead lines:
Overhead lines are generally drawn in Smallworld on top of each other, from one pole to the next, unless the line is the same voltage as another line. In those cases, one of the lines is drawn parallel to the other line. If there is a switch in the line, the line stops 2m short of the pole to allow for the switch. The methodology used to determine the route length of overhead lines was to determine where there are multiple lines between any 2 poles and if so, remove all but one of the lines. Lines drawn parallel to a line of the same voltage were snapped to the poles, and gaps for switches were also snapped to the pole.

Underground cables:
Underground cables are generally drawn in parallel in the GIS. To determine the route length of underground cables, it was assumed that if part of a cable was drawn in parallel to part of another cable in the GIS (within a tolerance of 4m) shared a trench, and therefore the route length was the length of only one of the cables in parallel. If a cable did not have another cable in parallel then that cable (or part thereof) was accepted as the route length.

The FME Workbench used to determine the route length of underground cables was unable to resolve cables in parallel which had the same voltage. If the Workbench could resolve this issue then the total route length would be less, but it would be extremely difficult to estimate. In addition, due to the way in which underground data has been captured in the GIS and the tolerance that was used, there would be instances where cables have been inadvertently deemed as sharing a trench and others that have been inadvertently missed.

Use of estimated information

Actual GIS data was not available for 2006 to 2010; therefore an estimate was used as described above.

Material accounting policy changes

n/a

Reliability of information

The data provided for 2010 onwards is considered reliable; however the data for prior years is based on assumptions and estimates so caution should be used when using it for benchmarking or decision making purposes.

8.4 Weather stations

Compliance with requirements of the notice

This section contains the weather station number, post code, suburb for all weather stations in Essential Energy's network area that are used for reporting. This is in line with the economic RIN Instructions and Definitions guidance issued by the AER.

Source of information

Data has been sourced from an internal database that stores the information provided to Essential Energy daily as provided by The Bureau of Meteorology (BoM).

Methodology and Assumptions

For Table 8.4 the weather station identifier and description are as provided to Essential Energy by BoM. Based on the description provided by BoM, Essential Energy has determined the Post Code and Suburb the weather station relates to.

Use of estimated information

All information for these tables is based on information as provided by BoM.

Material accounting policy changes

n/a

Reliability of information

All stations are as reported by BoM, therefore the data provided in this table is considered reliable.