Basis of Preparation

Response to Category Analysis RIN 2016-17

essential energy

CONTENTS

1 Purpose

This document is Essential Energy's Basis of Preparation in relation to the audited Category Analysis RIN data as required by part 1.2 of Schedule 1 of the AER Regulatory Information Notice.

It explains the basis upon which information was prepared for all information in the Category Analysis RIN template. As required by the AER, this Basis of Preparation is a separate document that has been submitted with the completed regulatory templates.

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.

Essential Energy must include in its Basis of Preparation, any other information prepared in accordance with the requirements of the Notice.

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

Number	Requirement
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 used 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: • Why an estimate was required, including why it was not possible for Essential Energy to use actual information; • 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.

Table 1 – Requirements of the Basis of Preparation

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 regulatory templates.

When reporting an audit opinion or making an attestation report on the regulatory templates presented by Essential Energy, an auditor or assurance practitioner shall opine or attest by reference to Essential Energy's Basis of Preparation.

Structure of this Document

This document is structured as follows:

- Firstly, Essential Energy's general approach to developing the RIN response is explained. This includes the identification of key systems used to source data, issues relating to data quality and a general comment on the reliability of the data for benchmarking purposes.

- Secondly, the response to worksheets 2.1 to 6.3, is set out in accordance with the AER's instructions. It is noted that Worksheet 1.0 requires no input material.

2 General Approach

In this section, Essential Energy's approach to collecting and preparing information for the Category Analysis RIN is explained.

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

Essential Energy has identified areas where information is considered to be unreliable and once again suggests the AER use caution when applying this data for benchmarking purposes.

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.

Data Quality Issues

In previous consultations on the RIN, Essential Energy raised significant concerns with providing some of the data in the form required by the AER. Although the RIN specifies that all data provided is to be actual (not estimated) from 2014-15 onwards, Essential Energy does not have the information to be able to provide this for all tables. The cost of implementing systems to facilitate the provision of this information is prohibitive and would require an extensive time to implement.

Essential Energy continues to stress concern in relation to the detailed templates submitted and the reliance on some of this information for benchmarking and decision making purposes.

Approaching Essential Energy's Obligations under the NEL

Essential Energy's 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 Essential Energy's systems, there is a reasonable excuse under section 28(5) of the NEL not to comply with that element of the notice. Essential Energy has strong doubts that a RIN can require the business to prepare information by way of estimate that cannot be reasonably derived from information currently held in its systems.

Essential Energy's 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. Essential Energy suggests 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 2016-17 data to the best of its knowledge.

Recognition by AER that "Best Estimates" are Not Robust

The AER has acknowledged that if Essential Energy is 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 this Basis of Preparation document.

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, information has been estimated using 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 any variations have been identified and explained.

Essential Energy has attempted to relax its strict interpretation of estimated data, in order to improve its compliance with the AER's definitions of actual and estimated information, as listed in the Instructions and Definitions document of the Economic Benchmarking RIN. In particular, if submitted information is materially dependent on information from historical records, it is more likely to be treated as actual information. Alternatively, data whose presentation is contingent on judgements and assumptions for which there are valid alternatives and which could lead to a materially different presentation is likely to be classified as estimated information.

In line with its updated approach to distinguishing estimated from actual data, Essential Energy has also adopted a new internal colour coding system for the data provided in the Category Analysis RIN. In previous RINs, data considered to be actual was shaded in green, whilst data considered to be estimated was distinguished using one of three alternate colours, depending on the level of estimation used. Essential Energy's new approach is to leave the data un-coloured, unless it is considered to be estimated, in which case it is shaded yellow.

Reliability of Applying Data to Benchmarking

Essential Energy considers the application of benchmarking to guide regulatory decision making would result in error, leading to outcomes that are detrimental to the long term interests of customers. This view is based on the following:

- As noted in the Data Quality Issues section above, 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 has identified where information has been developed from best estimates and the confidence Essential Energy has in that data. In this respect 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.
- Essential Energy is not convinced that benchmarking tools such as TFP can be used to infer relative efficiency of DNSPs over time. 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 Essential Energy's view this would be driven by the age of the asset base which is likely to vary between DNSPs.
- Essential Energy considers that 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 opex and capex forecasts.

3 Financial Data

Essential Energy has prepared an overarching Basis of Preparation relating to financial data used in the RIN tables where "as incurred" financials are requested. The Basis of Preparation below applies to expenditure data contained in the following tables:

RIN Sheet	Table Number	Table Name
2.2 Repex	Table 2.2.1	Replacement Expenditure, Volumes and Asset Failures by Asset Category
2.3(b) Augex	Table 2.3.3	Augex Data – HV/LV Feeders and Distribution Substations
2.3(b) Augex	Table 2.3.4	Augex Data - Total Expenditure
2.5 Connections	Table 2.5.1	Descriptor Metrics
2.5 Connections	Table 2.5.2	Cost Metrics by Connection Classification
2.6 Non-network	Table 2.6.1	Non-network expenditure
2.7 Vegetation management	Table 2.7.2	Expenditure Metrics by Zone
2.8 Maintenance	Table 2.8.2	Cost Metrics for Routine and Non-Routine Maintenance
2.9 Emergency Response	Table 2.9.1	Emergency Response Expenditure (Opex)
2.10 Overheads	Table 2.10.1	Network Overheads Expenditure
2.10 Overheads	Table 2.10.2	Corporate Overheads Expenditure
2.10(A) Overheads	Table 2.10.1	Network Overheads Expenditure
2.10(A) Overheads	Table 2.10.2	Corporate Overheads Expenditure
2.12 Input tables	Table 2.12.1	Input tables
4.1 Public lighting	Table 4.1.2	Descriptor Metrics Annually
4.2 Metering	Table 4.2.2	Cost Metrics
4.3 Fee-based services	Table 4.3.1	Cost Metrics
4.4 Quoted services	Table 4.4.1	Cost Metrics

High Level Approach for Financial Data

The financial information provided is in accordance with the definitions as provided by the AER.

A master file of financial data has been prepared which ensures that the Category Analysis RIN templates reconcile to the 2016-17 Regulatory Accounts as submitted to the AER.

The overarching Basis of Preparation for financial data is to use, where possible:

- The actual regulatory costs category totals that map to individual RIN sheets or tables.
- These totals are disaggregated where the RIN templates require lower levels of detail.
- The disaggregation is based on the actual Statutory and Management Accounts cost category structures.
- A cost mapping matrix is constructed using actual Statutory Accounts cost categories that aligns to the costs categories in the RIN tables.
- This matrix is then used to apportion the regulated cost totals into the RIN tables.

Thus, the financial information in the RIN templates represents adjusted actual financial information, and has used in its calculation, actual Statutory Accounts cost category splits.

Source of Financial Information

PeopleSoft 2016-17 data has been extracted and reconciled to relevant Statutory and Management Accounts to ensure its validity. The underlying cost structures in this data set have been mapped to the 2016-17 Regulatory Accounts. Cost matrices using Project Types Levels and Resource Categories have been constructed to provide the necessary breakdowns required in the RIN tables.

Methodology & Assumptions for Financial Data

Where the breakdown analysis of PeopleSoft data was not sufficient to satisfy RIN requests, additional mapping tables were requested from Subject Matter Experts (SMEs) in the appropriate operational areas.

Use of Estimated Financial Information

Some estimates have been supplied by operational Subject Matter Experts.

Reliability of financial information

The underlying 2016-17 financial information in the Category Analysis RIN is a reasonably accurate representation of the 2016-17 Regulatory Accounts based on Essential Energy's underlying cost categories and therefore considered to be reliable. Where the RIN templates do not align to either the Regulatory Accounts cost categories and/or Essential Energy's internal cost categories, SME mapping has been used. There is a risk that the aggregated or disaggregated costs mapping may not align to the true intent of the RIN categories and as such, caution should be used when using it for benchmarking or decision making purposes.

There is real risk that the financials to physical units at a line level may also not align, as unit data has not always been captured at the level of detail as required in the RIN and has been prepared using a different methodology compared to the financials. Financials to physical units analyses should not be relied upon.

Glossary of Terms

Term / Acronym	Explanation
CAM	Cost Allocation Methodology
CB	Circuit Breaker
CMDB	ICT's Configuration Management Database
COGNOS	Business reporting system that manages database information.
Diagnostic software	Radio asset database held in CMDB
EDDiS	Energy Data Distribution System
Energy	Energy Customer Information System. This is the system used by Essential Energy to maintain records of customers, meters, tariff information, consumption readings and sales.
ENI	Electricity Network Incident Failure Database
FTE	Full time employee
GIS	Geospatial Information System – also known as WASP
NIEIR	National Institute of Economic and Industry Research
PeopleSoft	Essential Energy's Financial Management System including accounts payable, payroll, asset and equipment registers, and financial reporting functions.
Planning Database	• List of customer initiated projects. • Estimated unit costs for transformers based on OH/UG and kVA. Costing included estimated man hours.
PoF	Power On Fusion
Primavera	Essential Energy's project management system
Reporting Database	Stores information relating to embedded generation projects owned by Essential Energy
ROE device list	IP asset data held in CMDB
SCADA	Essential Energy uses this system to monitor and control the network.
Service Manager	Database of asset replacement and failures
SGfleet	Fleet Management company
Smallworld	Geospatial Information System (GIS) that topographically and/or schematically maps Essential Energy network assets and connections.
STS	Subtransmission substation
TotalSAFE	TotalSAFE Safety and Incident Management System
WASP	Works, Assets, Solutions and People Database
ZS	Zone substation

Worksheet 2.1 – Expenditure summary

Table 2.1.1 – Standard control services capex

Compliance with Requirements of the Notice

This section summarises 2016-17 data for Standard Control Services Capex, broken up into various categories. It also contains a line for Capital Contributions.

Source of Information

This table is mainly a summary of Capex shown in subsequent tables of the Category Analysis RIN template, and as such, the subsequent tables in the Category Analysis RIN template are the main source of data for this table.

The 2016-17 Annual Reporting RIN has also been used to provide the total Capex figure which includes the Capital Contributions component.

Methodology & Assumptions

As most of the data shown in this table is a summary of data found in subsequent tables in the Category Analysis RIN template, the table cells are linked to the appropriate cells of other tables in the Category Analysis RIN template.

Capital Contributions were obtained from the 2016-17 Annual Reporting RIN.

Use of Estimated Information

Wherever linked data is considered to be estimated information, caution should be exercised when using this information for benchmarking or decision making purposes.

Reliability of Information

The data is considered to be reliable. Data sourced from other tables within the Category Analysis RIN template may be based on assumptions and estimates and should be used with caution when used for benchmarking or decision making purposes.

Table 2.1.2 – Standard control services opex

Compliance with Requirements of the Notice

This section contains summary data of the 2016-17 Opex for Standard Control Services, broken up into various categories. It also contains a Balancing Item which equals the Non-Network Expenditure (also included in Network and Corporate Overheads).

Source of Information

This table is mainly a summary of Opex shown in subsequent tables of the Category Analysis RIN template, and as such, the subsequent tables in the Category Analysis RIN template are the main source of data for this table.

The 2016-17 Annual Reporting RIN has been used to provide the total Opex figure. The balancing item is Non-Network Expenditure, which is included in Network and Corporate Overheads to avoid double-counting.

Methodology & Assumptions

As most of the data shown in this table is a summary of data found in subsequent tables of the Category Analysis RIN template, the table cells are linked to the appropriate cells in other tables in the Category Analysis RIN template.

Use of Estimated Information

Wherever linked data is considered to be estimated information, caution should be exercised when using this information for benchmarking or decision making purposes.

Reliability of Information

The data is considered to be reliable. Data sourced from other tables within the Category Analysis RIN template may be based on assumptions and estimates and should be used with caution for benchmarking or decision making purposes.

Table 2.1.3 – Alternative control services capex

Compliance with Requirements of the Notice

This section contains summary data of the 2016-17 Capex for Alternative Control Services, broken up into various categories.

Source of Information

This table is mainly a summary of Capex shown in subsequent tables of the Category Analysis RIN template, and as such, the subsequent tables in the Category Analysis RIN template are the main source of data for this table.

The 2016-17 Annual Reporting RIN was used to provide the total Capex figure.

Methodology & Assumptions

As most of the data shown in this table is a summary of data found in subsequent tables in the Category Analysis RIN template, the table cells are linked to the appropriate cells in other tables in the Category Analysis RIN template.

Use of Estimated Information

Wherever linked data is considered to be estimated information, caution should be exercised when using this information for benchmarking or decision making purposes.

Reliability of Information

The data is considered to be reliable. Data sourced from other tables within the Category Analysis RIN template may be based on assumptions and estimates and should be used with caution for benchmarking or decision making purposes.

Table 2.1.4 – Alternative control services opex

Compliance with Requirements of the Notice

This section contains summary data of the 2016-17 Opex for Alternative Control Services, broken up into various categories.

Source of Information

This table is mainly a summary of Opex shown in subsequent tables of the Category Analysis RIN template, and as such, the subsequent tables in the Category Analysis RIN template are the main source of data for this table.

The 2016-17 Annual Reporting RIN was used to provide the total Opex figure.

Methodology & Assumptions

As most of the data shown in this table is a summary of data found in subsequent tables in the Category Analysis RIN template, the table cells are linked to the appropriate cells in other tables in the Category Analysis RIN template.

Use of Estimated Information

Wherever linked data is considered to be estimated information, caution should be exercised when using this information for benchmarking or decision making purposes.

Reliability of Information

The data is considered to be reliable. Data sourced from other tables within the Category Analysis RIN template may be based on assumptions and estimates and should be used with caution for benchmarking or decision making purposes.

Table 2.1.5 – Dual function assets capex

Compliance with Requirements of the Notice

As Essential Energy has no dual function assets, no data has been input into this table.

Table 2.1.6 – Dual function assets opex

Compliance with Requirements of the Notice

As Essential Energy has no dual function assets, no data has been input into this table.

Worksheet 2.2 – Repex

Table 2.2.1 – Replacement Expenditure, Volumes and Asset Failures by Asset Category

Compliance with Requirements of the Notice

The information provided is based on all assets owned by Essential Energy as well as privately owned assets where they are managed and maintained by Essential Energy.

Data for all asset groups, other than Public Lighting, have been filtered to only include assets that are not a dedicated streetlight asset, and that are “in service”.

All information is in accordance with the definitions provided by the AER.

Source of Information

Several asset management and planning systems and business reports have been queried. These systems are listed below along with the asset group to which the data has been applied.

Source System	Asset Groups	Used For		
		Expenditure	Asset Replacements	Asset Failures
PeopleSoft	All	Yes	Yes	No
WASP	All	No	Yes	No
Planning Database	All	Yes	Yes	No
Pole Failure Database	Poles, Public Lighting	No	No	Yes
ENI - Web	Pole Top Structures, OH Conductors, UG Cables, Service Lines, Transformers, Switchgear	No	No	Yes
ENI - eMWL[1]	Pole Top Structures, OH Conductors, UG Cables, Service Lines,	No	No	Yes

[1] The Electrical Network Incidents (ENI) register was under transition from a fixed to a cloud database in FY 2017 to facilitate a business wide transfer to mobile works platform, hence, data was collected and reconciled from two sources.

	Transformers, Switchgear			
Smallworld	OH Conductors, UG Cables	No	Yes	No
Primavera/Project Online	SCADA, Network Control & Protection Systems	No	Yes	Yes
Service Manager	SCADA, Network Control & Protection Systems	No	Yes	Yes
Diagnostic Software	SCADA, Network Control & Protection Systems	No	Yes	Yes
ROE device list	SCADA, Network Control & Protection Systems	No	Yes	Yes

Methodology & Assumptions

All Expenditure Categories

2016-17 expenditure has been sourced from the appropriate management accounts in PeopleSoft wherever relevant categories existed. Where appropriate categories did not exist, the high level amounts were apportioned with a model that utilises known activity data in the Planning Database to estimate expenditure into more detailed RIN asset classes and categories. For example, where only a total figure for all distribution line replacement work existed, the figure was split into asset categories of poles, pole tops, conductors, services and switchgear, based on the type of work activity described in the Planning Database. These amounts have then been broken down to individual asset categories through a ratio model based on actual unit replacements completed during the year.

All detailed replacement expenditure has been validated back to the approved 2016-17 Regulatory Accounts.

Many capex projects are comprised of both Repex and Augex components. Due to system limitations and the resultant inability to capture the required level of detail, those projects are allocated as either Repex or Augex based on their primary driver.

All Asset Replacements

Asset replacement numbers were primarily sourced from the WASP database. Some units, however, were estimated from capital works projects tracked in the Planning Database that were not recorded in WASP. Only work tasks that have been completed as replacement capital expenditure (repex), have been included in any replacement numbers.

All Asset Failures

Failure numbers were based on data sourced from either the Pole Failure Database, ENI - Web & ENI - Electronic Maintenance Worklog (eMWL)[2] failure records. Only Functional[3] failures of Unassisted[4] type have been included.

Poles

Staking of a Wooden Pole

- 2016-17 pole staking expenditure was inflated by once-off additional purchases of extra materials for future periods (approximately $1.1M) and temporary poles supports/struts (approximately $250k) regularly used in the pole staking process.
- Replacement data has been based on a count of the following completed capitalised WASP work tasks: “Pole – Reinstate”, “Pole reinforcement – install” and “Pole reinforcement – replace”.

Staking Failures

- Failures have been sourced from the Pole Failure Database. All pole failures (including staked poles) are investigated and reported on individually. The Pole Failure Database collects pole asset attributes from WASP, hence, the number of reinforcement failures versus normal poles failures are determined there.

Pole Replacement

- Data has been filtered to include only those poles that are not a dedicated streetlight asset. Unknown material types are assumed to be timber due to their age.
- Replacement data has been based on a count of the following completed capitalised WASP work tasks: “Pole - Condemned – Replace”, “Pole - Concrete – Replace”, “Pole Steel/Tower – Replace”, “Pole - Replace - System Augmentation”, “Pole – Install Additional”, “Pole – Pole Failure”, “Pole – replace” and “Pole – upgrade”. An estimated count has also been included for poles that have been replaced without a work task from the asset and project information provided by the Planning Database.
- Private poles have been excluded except for those managed and maintained by Essential Energy.

Pole Failure

- Data has been sourced from the Pole Failure database. The data is populated from a number of different sources and independently reviewed.
- Failure data has been based on individual Pole Failure reports, and has been filtered to include only those poles that are not dedicated streetlight columns. Private poles have also been excluded.

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[2] The Electrical Network Incidents (ENI) register was under transition from a fixed to a cloud database in FY 2017 to facilitate a business wide transfer to mobile works platform, hence, data was collected and reconciled from two sources.

[3] Functional Failure - Is the term used to describe an asset that is no longer performing its primary purpose and/or role in the network.

[4] Unassisted Failure - Any functional failure of the asset itself will be classified as an ‘unassisted’ failure unless it can be shown that the asset was:

- Subject to sufficient force to exceed the design strength requirements set out by the relevant Utility’s standards at the time of construction;
- Burnt by a fire ignited by any source;
- Compromised by vandalism;
- Struck by lightning; or
- Otherwise subjected to a failure mechanism demonstrated by evidence to be outside the control of Essential Energy.

Pole Top Structures

Pole Top Replacement

- Replacement data has been based on a count of the following completed capitalised WASP work tasks: “Crossarm – Replace” and Crossarm – Upgrade” (for safety and compliance driven replacements). In addition, an estimated amount of pole top structures has been included for those that have been replaced without a work task using the asset and project information provided by the Planning Database.

Pole Top Failure

- Failure data has been based on a count of all ENI records representing unassisted crossarm failure causes.

Overhead Conductors & Underground Cables

Conductor/Cable Replacement

- Replacement data has been sourced from reconductor construction plans entered into Smallworld.
- Data includes all capitalised conductor replacements triggered by condition.

Conductor/Cable Failure

- Failure data has been based on a count of all ENI records representing unassisted conductor or cable failure causes.

Service Lines

Service Line Replacement

- Replacement data has been based on a count of the following completed capitalised WASP work tasks: “LV service conductor – replace” and “Service – Replace Service”. Contractual records were also added to the count from Essential Energy’s Overhead Service Replacement Programme.

Service Line Failure

- Failure data has been based on a count of all ENI records representing unassisted Service Line failure causes.

Transformers

Transformer Categorisation

- Unknown distribution substation types have been assumed to be pole substations. Unknown distribution transformer kVA is assumed to be ≤ 60 kVA. Unknown phasing and SWER is assumed to be single phase.
- As regulators, pole top or kiosk transformers > 22kV do not have their own category, they have been included in “Other”.

Transformer Failure

- Failure data has been based on a count of all ENI records representing unassisted Transformer failure causes.
- Failure data for zone substation transformers is based on WASP asset records for transformers with commissioning dates within the financial year, where the reason for replacement can be identified by a zone substation incident report, or otherwise as the transformer being unfit for service.

Switchgear

Switchgear Replacement

- Replacement data has been based on a count of the following completed capitalised WASP work tasks: “Fuse – EDO Ruse Programmed Replacement”, “Fuse – Replace Fuse”, “Sub(pole mounted) – replace”, “Substation – Programmed Refurbishment”, “ABS – Replace”, “ABS – replace with Gas Switch”, “Gas Switch – Replace – Pole Top Mount”, “Links – Replace”, “OH HV fuse / link – replace”, “OH LV ruse / link – replace”, “UG LV fuse / link – replace” and “Protection Site – Replace Tank”. In addition, an estimated amount of switchgear has been included for those replaced without a work task using the asset and project information provided by the Planning Database.

- Replacement data for zone substation switchgear was based on switchgear commissioned in the financial year based on WASP commissioning dates, and filtered to remove new installations (ie. non-replacements).

Switchgear Failure

- Failure data has been based on a count of all ENI records representing unassisted switchgear failure causes.
- Failure data for zone substation switchgear was based on switchgear commissioned in the financial year based on WASP commissioning dates, where the reason for replacement can be identified by a zone substation incident report or otherwise as the switchgear being unfit for service.

Public Lighting

These figures represent only dedicated streetlight columns. All other numbers represent all streetlights.

Asset Replacements

Asset Type	Included in Totals
Luminaires	Sum of all replacement work task quantities including both routine and non-routine replacements identified by the method described for *Table 4.1.2 – Public Lighting - Descriptor Metrics Annually*.
Brackets	This data was not previously captured in any database. Work tasks have started to be captured from December 2016.
Lamps	There are no volumes included in this section as expenditure on lamps is not considered to be Repex.
Poles	Replacement data has been based on a count of all completed capitalised WASP work tasks where the driver was refurbishment (Pole – Condemned – Replace, Pole – Concrete – Replace, Pole Steel/Tower – Replace, Pole – Replace – System Augmentation). The data has been filtered to only include those assets that are deemed dedicated.

Asset Failures

Asset Type	Included in Totals
Luminaires	Sum of all failures resulting in replacement work task quantities identified by the method described for *Table 4.1.2 – Public Lighting - Descriptor Metrics Annually*.
Brackets	This data was not previously captured in any database. Work tasks have started to be captured from December 2016.
Lamps	There are no volumes included in this section as expenditure on lamps is not considered to be Repex.
Poles	Failure data has been based on unassisted failures only, and has been filtered to include only those assets that are deemed dedicated.

SCADA, Network Control & Protection Systems

- Capital Expenditure was sourced from the Regulatory Accounts and apportioned into the different categories based on actual expenditure in PeopleSoft financials. Capital project data was sourced from both Peoplesoft and Project On-Line, which was used to apportion across the RIN sub-categories. Whilst there are currently issues with the replacement product (Project On-Line replaced Primavera, which was previously used), ongoing reconciliation works are undertaken on a monthly basis between the reported outcomes of both Peoplesoft and Project On-Line.
- Projects to deliver other network infrastructure (non-system) that has a communications component have not been reported in this section. These projects will be reported in other areas of the Category Analysis RIN depending on the specific driver for the project.
- Asset Replacement data was obtained from Service Manager and is based on capital replacement programs to replace End of Life assets or equipment deemed not fit for purpose.
- Asset Failure data was obtained from Service Manager and relates to assets that have been replaced due to unplanned failure. Incidents or faults that have been rectified by means other than an asset replacement have not been included in this section.

Customer Metering & Load Control

Refer to section *3 Financial Data* for the overall Basis of Preparation on finance data prepared for multiple tables in the RIN. The specific methodology and assumptions made for this table are outlined below.

- Data sourced from the Regulated Distribution System Capex Expenditure Report (RDSC) and excludes overheads.
- This report was used to reconcile back to the 2016-17 Regulatory Accounts.

Use of Estimated Information

All information is based on actual data. There is some estimated information in the data splits and disaggregation of totals.

Reliability of Information

Replacement expenditure, at an aggregate level, is considered to be reliable as it has been sourced from the 2016-17 Regulatory Accounts. Apportionment of expenditure into the different categories requested by the AER is based on assumptions and estimates so caution should be used when using this for benchmarking or decision making purposes.

Table 2.2.2 – Selected Asset Characteristics

Compliance with Requirements of the Notice

The information provided is based on all assets owned by Essential Energy as well as privately owned assets where they are managed and maintained by Essential Energy.

Data has then been filtered to only include those assets that are "in service".

Source of Information

Refer to "Source of Information" for Table 2.2.1, above.

Methodology & Assumptions

The methodology and assumptions for each category are outlined below.

Total Poles by Feeder Type

- Data was sourced from WASP with feeder type referenced from Smallworld.
- Data for poles in commission includes all owners (ie. all poles that Essential Energy inspects) and is limited to only those poles with a service status of "In Service". Data for replacements is as per Table 2.2.1.
- Feeder type has been determined by mapping individual assets to the geospatial information held in Smallworld, HV feeders based on reliability categorisation, LV feeders based on their parent HV feeder, and transmission and unknowns distributed by ratio across the three categories.
- The "Asset Volumes Currently in Commission" column includes the "Staking of a Wooden Pole" asset category, whilst the "Asset Replacements" column does not.

Overhead Conductors by Feeder & Material Type and Underground Cable by Feeder Type

- Data has been sourced from GIS Smallworld.
- Data for conductor/cable in commission includes only Essential Energy owned assets and is not limited by service status. Streetlight conductors/cables have been included; however LV services have been excluded. Data for replacements is as per Table 2.2.1.
- Feeder type has been determined by mapping individual assets to the geospatial information held in Smallworld, HV feeders based on reliability categorisation, LV feeders based on their parent HV feeder, and transmission and unknowns distributed by ratio across the three categories. Essential Energy has no CBD category feeders.
- Material type has been assigned from Smallworld attributes, with unknowns spread by ratio. All covered conductors besides LV ABC (HV ABC, CCT, etc.) have been included in "Other".

Transformers by Total MVA

- Data has been primarily sourced from WASP.
- Data for transformers in commission is a sum of the maximum MVA for all distribution and zone substation power transformers. It does not include regulators, zone substation auxiliary transformers, step up transformers, or SWER isolating transformers.

- Zone substation transformer MVA has been assumed to be 5MVA for assets with an unknown rating. Distribution transformer MVA for assets with an unknown rating has been derived from the Substation Site's “Total KVA”. If this is not available, then kVA has been derived as follows (note this has only occurred 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 (eg. Pole Substation) = 10kVA
- Data for transformers disposed is based on Essential Energy’s Master Disposals List “SCRAPPED POWER TX SALE DETAILS”.
- Data for transformers replaced is based on a sum of the maximum MVA for all distribution transformers with a capitalised WASP work task (“Substation - Replace Tank” and “Transformer – replace”), the sum of the estimated MVA amount of transformers in the Planning Database as well as a sum of the maximum MVA from transformer commissioning records for zone substation transformers (filtered to include only replacements). The same inclusions/exclusions and assumptions apply as per the In Commission transformer sum.

Use of Estimated Information

All information is based on actual data. There is some estimated information in the data splits and disaggregation of totals.

Reliability of Information

While Essential Energy have provided their best estimate of the data, the information provided is based on assumptions and estimates and caution should be used when using it for benchmarking or decision making purposes.

Worksheet 2.3(a) – Augex

Table 2.3.1 – Augex Asset Data – Subtransmission Substations, Switching Stations & Zone Substations

Compliance with Requirements of the Notice

In the following subheadings Essential Energy demonstrates how the information provided is consistent with the requirements of this Notice.

Source of Information

Data has been sourced from PeopleSoft, Essential Energy's financial system, and cross-referenced against Primavera and Project Online, Essential Energy's project management systems and COGNOS, Essential Energy's alternate reporting system.

Methodology & Assumptions

To extract the data, the following assumptions have been made:

- Transformer Units added - It is assumed that replacing one transformer with two transformers is the addition of one unit.
- Transformer MVA added - It is assumed that replacing a 10MVA with a 30MVA transformer is the addition of 20MVA.
- Switchgear Units added:
    - It is assumed that if you replace one circuit breaker ("CB") with another CB, there has been no addition.
    - It is assumed that replacing a CB and CT with a dead tank counts as a one for one replacement.
    - It is assumed that only ABS CT VT and CB are the primary plant.
    - Earth switches, FI gear, surge arrestors and fault throwers have not been included.
    - Analysis has been performed on single line diagrams for units, but PeopleSoft dollars for total expenditure are based on manufacturer's names.
- Installation hours are inclusive of all hours on the project including design, and project management.
- Civil works is inclusive of the major contract (and other contracts). This could not be separated out.
- Total direct expenditure and major contract expenditure equates to the total direct costs of the project.

For the purposes of preparing the information, normal conditions are defined as those which allow the element to operate within manufacturer's specifications under a standard operational state and expected typical loads.

Use of Estimated Information

There has been no use of estimated data for this table.

Reliability of Information

The data in this table is considered reliable.

Table 2.3.2 – Augex Asset Data – Subtransmission Lines

Compliance with Requirements of the Notice

In the following subheadings Essential Energy demonstrates how the information provided is consistent with the requirements of this Notice.

Source of Information

Data has been sourced from PeopleSoft, Essential Energy's financial system, and cross-referenced against Primavera and Project Online, Essential Energy's project management systems and COGNOS, Essential Energy's alternate reporting system.

Methodology & Assumptions

To extract the data, the following assumptions have been made:

- Installation hours are inclusive of all hours on the project including design, and project management.
- Civil works is inclusive of the major contract (and other contracts). This could not be separated out.
- Total direct expenditure and major contract expenditure equates to the total direct costs of the project.

For the purposes of preparing the information, normal conditions are defined as those which allow the element to operate within manufacturer's specifications under a standard operational state and expected typical loads.

Augmentation works were new lines which connected a subtransmission substation to a zone substation at 66kV.

Use of Estimated Information

There has been no use of estimated data for this table.

Reliability of Information

The data in this table is considered reliable.

Worksheet 2.3(b) – Augex

Table 2.3.3 – Augex Data – HV/LV Feeders and Distribution Substations

Descriptor Metrics

Feeder Augmentation

Compliance with Requirements of the Notice

The information provided reports a breakdown of circuit kilometres of both high voltage and low voltage feeders added and augmented in the current period.

Source of Information

The data for the current period was provided by the GIS team and sourced from Smallworld. The data is recorded in Smallworld by work pack close out officers at the completion of each work pack.

Methodology & Assumptions

Circuit kilometres added/upgraded

The yearly conductor alterations are extracted from Smallworld and rolled up for the reporting period. Conductor alterations recorded as “New” are reported for “Units Added” and “Reconductored” are reported as “Upgraded”.

The AER driver for each project is extracted from WASP and only projects with an Augex driver are included.

High voltage consists of all voltages not LV or Streetlight with LV being only LV voltages.

Many capex projects are comprised of both Repex and Augex components. Due to system limitations and the resultant inability to capture the required level of detail, those projects are allocated as either Repex or Augex based on their primary driver.

Use of Estimated Information

No information has been estimated.

Reliability of Information

The data in this table is reliant on close out officers recording the information at the completion of each work pack. The quality of this data is of a reasonably high standard.

Substation Augmentation

Compliance with Requirements of the Notice

The information provided reports a breakdown of substations that have been added or augmented in the current period.

The information is divided into the following classes:

- Pole Mounted Substations
- Ground Mounted Substations
- Indoor Substations

Source of Information

The data for the current period was sourced from a report that looks at the construction unit assemblies associated with projects and their work packs in WASP and identifies those that involve a transformer store item being ordered.

Methodology & Assumptions

Distribution Substations Added/Refurbished/Upgraded

The data for the current period was sourced by categorising the transformers in the WASP report into Pole, Ground or Indoor substations based on the description of the transformer store item being ordered (an example of a description is “Transformer 25kVA 22kV 1Ph [GWD]”).

The AER driver for each project was extracted from WASP and only projects with a driver considered to be an Augex driver were included (ie. anything other than “Refurbishment”).

Distribution Substations included in these projects were classified as “Upgraded” if they met any of the following conditions:

- Associated with a “Substation - Programmed Refurbishment” work task that is in an Augex project as a result of a decision to augment instead of refurbish; or
- Associated with a unit assembly of “8250” (Remove Rural Transformer) or “8251” (Remove Town Transformer) indicating that the existing transformer was removed and replaced/upgraded; or
- The existing Substation Site asset was linked to the new transformer being ordered indicating that a transformer is being replaced/upgraded;
- The estimate/work pack for the project that the Distribution Substation is a part of has a description that meets one of the following conditions (where % is a wildcard):
    - like “%new sub%”
    - like “%sub%upgrade%”
    - like “%tx%upgrade%”
    - like “%transformer%upgrade%”
    - like “%upgrade%transformer%”
    - like “%upgrade%sub%”
    - like “%upgrade%tx%”

All remaining Distribution Substations from the projects identified were classified as “New”.

Many capex projects are comprised of both Repex and Augex components. Due to system limitations and the resultant inability to capture the required level of detail, those projects are allocated as either Repex or Augex based on their primary driver.

Use of Estimated Information

As described above, the transformers category was derived from the transformer description which may be misleading in some cases.

Reliability of Information

The data in this table should be used with caution if it is to be used for benchmarking or decision making purposes.

Cost Metrics

Compliance with Requirements of the Notice

Refer to section *3 Financial Data* for the overall Basis of Preparation on finance data prepared for multiple tables in the RIN. The specific methodology and assumptions made for this table are outlined below.

Source of Information

Source data was from the RSDC Regulatory Report from Cognos. This report is used in the process of collating the data for the Annual Reporting RIN.

Methodology & Assumptions

Information was sourced from the "Capex - Summary" worksheet in the CA RIN workfile. A Cognos report is run to split out Capex between Augex and Repex by various asset categories. This report is used in the collation of data for the Regulatory Accounts.

Regulatory Accounts asset categories are consistently grouped based on model parameters.

Mapping was performed to comply with the requirements of the RIN tables. The mapping is included in the "Capex – Summary" worksheets, which was based on the judgements of SMEs.

Use of Estimated Information

Total Augex is based on actual data. There is some estimated information in the data splits and disaggregation of totals.

Reliability of Information

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

Table 2.3.4 – Augex Data – Total Expenditure

Compliance with Requirements of the Notice

Refer to section *3 Financial Data* for the overall Basis of Preparation on finance data prepared for multiple tables in the RIN. The specific methodology and assumptions made for this table are outlined below.

Source of Information

Data is sourced from the RSDC Regulatory Report from COGNOS. This report is used in collating Capex data for the Annual Reporting RIN.

Methodology & Assumptions

The figures in Table 2.3.3.2 have been used to populate Table 2.3.4. Connections is excluded from both tables, with the financial data for Connections captured in Table 2.5.1.

The other assets line is not a balancing item but picks up individual asset categories from the "Capex - Summary" worksheet in the CA RIN workfile.

The total of all line items reconciles back to the "Capex - Summary" worksheet, which reconciles back to the Annual Reporting RIN for 2016-17.

The expenditure shown for the “Subtransmission Substations, Switching Stations, Zone Substations” and “Subtransmission Lines” rows at the top of Table 2.3.4 do not reconcile to Tables 2.3.1 and 2.3.2, respectively. This is because Tables 2.3.1 and 2.3.2 show expenditure relating to relevant projects which have been closed out during the financial year, whilst Table 2.3.4 shows total expenditure for the financial year for those asset categories.

Many capex projects are comprised of both Repex and Augex components. Due to system limitations and the resultant inability to capture the required level of detail, those projects are allocated as either Repex or Augex based on their primary driver.

Use of Estimated Information

Total Augex is based on actual data. There is some estimated information in the data splits and disaggregation of totals.

Reliability of Information

Estimated information has been used to apportion actual Augex across RIN categories, so caution should be used when using this data for benchmarking or decision making purposes.

Worksheet 2.5 – Connections

Table 2.5.1 - Descriptor Metrics

Compliance with Requirements of the Notice

The Notice requires the number, total MVA , total length of HV and LV augmentation and cost of new Underground and Overhead connections and distribution transformers for Rural, Commercial/Industrial & Subdivision premises for the financial period. It also requires the total number of embedded generation sites supplied by overhead/underground along with the total number of projects undertaken by Essential Energy to augment the network to facilitate the installation of embedded generation sites. These projects are broken down into MVA added, number of substations installed, HV augmentation and LV augmentation.

Source of Information

System	Data
Energy	• Premise with Creation Date. • Premise with Residential/Commercial flag. • All embedded generation sites with Application Date and Installation Date.
Smallworld	• Premises with Underground/Overhead flag. • Return premises supplied by substations affected by projects reported from WASP.
WASP	• Substations with Underground/Overhead flag. • List of projects where Essential Energy has financially contributed during the reporting period. Extract included kVA, number of transformers, total Essential Energy cost for the project and project completion date. • List of projects partially funded by a customer during the reporting period.
Planning database (Contestable Works)	• List of customer initiated projects. • Estimated unit costs for transformers based on OH/UG and kVA. Costing included estimated man hours.
Reporting Database (Contestable Works)	• All embedded generation projects completed by Essential Energy in the reporting period.

Methodology & Assumptions

The main assumptions are:

- Essential Energy has no Subdivision assets based on the definition “is intended to capture expenditure in connecting un-reticulated lots or areas.”
- The ratio of known projects is the same as the ratio of unknown projects.
- The ratio of known embedded generation is the same as the ratio of unknown embedded generation.
- Embedded generation with no installed date were installed in the same financial year as the application date.

- Where practical, the determination of Underground/Overhead was derived from GIS Smallworld, otherwise WASP was used.

Number of Connections

Total new connections were determined by the number of premises with a creation date in the financial period.

Expenditure

This is based on the standard methodology adopted for all finance expenditure data in the Category Analysis RIN. Refer to section *3 Financial Data* for the overall Basis of Preparation on finance data prepared for multiple tables in the RIN. The specific methodology and assumptions made for this table are also outlined below.

Overhead/Underground Totals

The Residential/Commercial flag was derived from Energy.

Distribution Substations Installed – for Residential/Commercial and Subdivision Connections

The list of projects from the planning database combined with the customer funded projects from WASP make up the considered projects for these figures. For these projects WASP is used to determine if Essential Energy or an external party paid for the transformer.

For each project, a ratio of Residential to Commercial premises affected by the project was assigned. This ratio was then used to determine the portion of the kVA, number of transformers and costs that would be reported as Residential and Commercial. Total cost is an estimate of the cost to install the transformers plus the estimated man hours to install.

For all projects where the Commercial\Residential status could not be determined, these were deemed “Unknown”. The Unknowns were distributed across all categories based on the ratio of the known projects.

Augmentation HV/LV

The list of projects from the planning database combined with the customer funded projects from WASP make up the considered projects for these figures.

For each project, GIS Smallworld provided the amount of network added or reconductored as a part of the project. A ratio of Residential to Commercial premises affected by the project was also assigned. This ratio was then used to determine the portion of the line length that would be classified as Residential and Commercial.

For all projects where the Commercial/Residential status could not be determined, these were deemed “Unknown”. The Unknowns were distributed across all categories based on the ratio of the known projects.

Embedded Generation

Energy embedded generation data was used as the basis for this data. Where the installation date was blank, the application date was used.

Use of Estimated Information

Essential Energy has used estimated information for premises where Residential/Commercial or Overhead/Underground could not be determined.

An estimate was required in the following cases:

- Where Residential/Commercial could not be determined. Premise data is historical where status data is current. Premises may have become extinct, but exist historically, therefore no Residential/Commercial value can be determined.
- Premises have no network connect therefore no Overhead/Underground value can be determined.
- The project was not found in GIS Smallworld.
- All premises where the Overhead/Underground or Commercial/Residential status could not be determined were deemed "Unknown". The Unknowns were distributed across all categories based on the ratio of the known premises.
- Essential Energy has used estimated information for embedded generation where Residential/Commercial could not be determined.

Reliability of Information

The data used for determining the overall quantities has been provided previously and has been categorised based on assumptions and estimates.

The data used for determining the quantities has come from three major Essential Energy data repositories where the data is considered reasonably reliable. There were a number of projects that did not exist in GIS Smallworld which had to be averaged, based on assumptions and estimates.

This information should be used with caution for benchmarking or decision making purposes.

The assumptions were made in the best effort to optimise the information at Essential Energy's disposal without compromising the reliability of the figures.

Table 2.5.2 - Cost Metrics by Connection Classification

Compliance with Requirements of the Notice

The Notice requires the total number of embedded generation sites supplied by overhead/underground along with the total number of projects undertaken by Essential Energy to augment the network to facilitate the installation of embedded generation sites. These projects are broken down into MVA added, number of substations installed, HV augmentation and LV augmentation.

Source of Information

System	Data
Energy	• Premise with Creation Date. • Premise with Residential/Commercial flag. • All embedded generation sites with Application Date and Installation Date.
Smallworld	• Premises with Underground/Overhead flag. • Return premises supplied by substations affected by projects reported from WASP.
WASP	• Substations with Underground/Overhead flag. • List of projects where Essential Energy has financially contributed during the reporting period. Extract included kVA, number of transformers, total Essential Energy cost for the project and project completion date.

	• List of projects partially funded by a customer during the reporting period.
Planning database (Contestable Works)	• List of customer initiated projects. • Estimated unit costs for transformers based on OH/UG and kVA. Costing included estimated man hours.
Reporting Database (Contestable Works)	• All embedded generation projects completed by Essential Energy in the reporting period.

Methodology & Assumptions

The main assumptions are:

- Essential Energy has no Subdivision assets based on the definition "is intended to capture expenditure in connecting un-reticulated lots or areas".
- The ratio of known projects is the same as the ratio of unknown projects.
- The ratio of known embedded generation is the same as the ratio of unknown embedded generation.
- Embedded generation with no installed date was installed in the same financial year as the application date.
- Essential Energy has no complex services.

Expenditure

This is based on the standard methodology adopted for all finance expenditure data in the Category Analysis RIN. Refer to section *3 Financial Data* for the overall Basis of Preparation on finance data prepared for multiple tables in the RIN. The specific methodology and assumptions made for this table are also outlined below.

The expenditure in Table 2.5.2 reflects Connections capital expenditure, with Connections operating expenditure captured within corporate and divisional overheads (non-direct expenditure).

Residential/Commercial & Subdivision Connections

The Residential/Commercial flag was derived from Energy. Essential Energy has deemed it has no complex services.

Embedded Generation

Energy embedded generation data was used as the basis for this data. Where the installation date was blank, the application date was used.

Use of Estimated Information

Essential Energy has used estimated information for embedded generation where Residential/Commercial could not be determined.

Reliability of Information

The data used for determining the overall quantities has been provided previously and has been categorised based on assumptions and estimates. Caution should therefore be used when using this information for benchmarking or decision making purposes.

Worksheet 2.6 – Non-network

Table 2.6.1 - Non-network expenditure

Compliance with Requirements of the Notice

In the following sub headings Essential Energy demonstrates how the information provided is consistent with the requirements of this Notice.

Source of Information

Capex data was sourced from the 2016-17 Regulatory Accounts, with the expenditure attributed to Standard Control Services derived from the Cognos Projects for Non-System Regulated Distribution Capex ("PNSRDC") report.

Opex data was sourced from PeopleSoft.

Methodology & Assumptions

This is based on the standard methodology adopted for all finance expenditure data in the Category Analysis RIN. Refer to section *3 Financial Data* for the overall Basis of Preparation on finance data prepared for multiple tables in the RIN. The specific methodology and assumptions made for this table are also outlined below.

Motor vehicles – Opex & Capex

Data was sourced from PeopleSoft to obtain total Fleet operating costs. The CAM was used to identify the regulated Fleet expenditure. Actual operating costs are not captured by RIN categories in the general ledger. As a proxy, the SG Fleet list which details vehicles types and forms the basis for the Fleet Hire Charge, was used to apportion the actual Fleet operating costs across RIN categories.

Total Capex for 2016-17 was sourced from the 2016-17 Regulatory Accounts workfiles. The PNSRDC report was utilised to allocate the regulatory account figures into the RIN categories.

Motor vehicles Capex and Opex categories relating to trailers and other fleet are not included in the RIN categories but have been used to reconcile to the total in the Regulatory Accounts, as shown below:

Asset Type	Expenditure Type	$
Trailers	Opex	2,046,260
	Capex	24,661
Other	Opex	2,936,220
	Capex	25,986

Reconciling item for Table 2.6.1 – Other Fleet Assets

Buildings and Property – Opex & Capex

2016-17 Opex data was sourced from PeopleSoft. Property operating costs were based on expenditure within the Property division (department structure). Capex data was sourced from the 2016-17 Regulatory Accounts workfiles.

Furniture & Fittings – Capex

Data was sourced from the 2016-17 Regulatory Accounts workfiles.

ICT – Opex & Capex

2016-17 Opex data was sourced from PeopleSoft. ICT operating costs were based on expenditure within the IT division. The CAM was used to identify regulated ICT expenditure. Figures were mapped to RIN categories based on mapping provided by SMEs. Attribution to CA RIN categories was as follows:

- Operating expenditure line items were reviewed and an assessment made as to whether the costs within the line item were predominately client device, recurrent or non-recurrent expenditure;
- Staff-related costs were apportioned with reference to FTEs based on position title and the predominate function of the position as client device, recurrent, or non-recurrent expenditure;
- Temporary staff costs were considered non-recurrent.

Capex data was sourced from the 2016-17 Regulatory Accounts, with the expenditure attributed to Standard Control Services derived from the PNSRDC report. Expenditure was mapped to the Category Analysis RIN based on mapping provided by SMEs. The category splits were based on project data from Cognos.

Use of Estimated Information

Estimated information has been used to apportion actual non-network expenditure across RIN categories. Caution should be used when using this data for benchmarking or decision making purposes.

Reliability of Information

Given the underlying assumptions and methods used to derive this data, caution should be exercised when using this for benchmarking or decision making purposes.

Table 2.6.2 - Annual Descriptor Metrics – IT & Communications Expenditure

Compliance with Requirements of the Notice

In the following sub headings Essential Energy demonstrates how the information provided is consistent with the requirements of this Notice.

Source of Information

System/Source	Used for
ICT's Configuration Management Database (CMDB)	Extract used for determining number of devices as at 30 June 2017.

Extract from PeopleSoft HR for 30/6/2017	Determining employee numbers
Extract from PeopleSoft HR for 30/6/2017	Determining user numbers

Methodology & Assumptions

The following method and assumptions have been made when compiling this data:

Employee Numbers

Standard Control Services FTEs were derived by taking the year end number of Essential Energy's FTEs from PeopleSoft and multiplying them by the Standard Control Services percentage, with the Standard Control Services percentage arrived at by reference to the instructions in the CAM.

User Numbers

The number of active IT system log in accounts used for Standard Control Services is based on the number of employees recorded in PeopleSoft that were active as at 30 June 2017. This number reflects the number of IT system log in accounts, as Essential Energy's standard practice is to allocate system access accounts to all employees as they are engaged. This also includes agency staff and contractors. The total user number was then multiplied by the Standard Control Services percentage.

Number of Devices

The device numbers include laptops, desktops, tablets, handset devices (corporate smartphones using an employee's personal SIM/service), satellite phones and smartphones. and are based on information within the ICT Configuration Management Database (CMDB).

The 30 June 2017 total has been multiplied by the Standard Control Services percentage.

Use of Estimated Information

The underlying data which provides total company numbers for employees, users and devices is accurate, and as such, the data provided for this table is considered accurate.

Reliability of Information

The data is considered to be reliable.

However, given the underlying assumptions and methods used to derive this data, caution should be exercised when using this for benchmarking or decision making purposes.

Table 2.6.3 - Annual Descriptor Metrics – Motor Vehicles

Compliance with Requirements of the Notice

In the following subheadings, Essential Energy demonstrates how the information provided is consistent with the requirements of this Notice.

Source of Information

- PeopleSoft
- SGfleet
- 2016-17 Regulatory Accounts workfiles

Methodology & Assumptions

The following assumptions have been made when compiling this data:

- Average data from the SGfleet database is considered to be representative of the network;
- Non-motorised fleet have been excluded, as shown below.

Trailers	Number purchased	3
	Number in fleet	1,175
	Proportion of total fleet expenditure allocated as regulatory expenditure (%)	96.34%
Other Fleet	Number purchased	7
	Number in fleet	607
	Proportion of total fleet expenditure allocated as regulatory expenditure (%)	96.34%

Average kilometres travelled by vehicle type

The last 3 months of travel were annualised from SGfleet fuel records. That is, the last fuel fill in April 2017 was subtracted from the last fuel fill in June 2017, and the result was divided by the number of days between the two fills, and then multiplied by 365. Then the average kilometres per vehicle type were calculated.

Number purchased by vehicle type

The number of purchases by fleet type were listed in the SGfleet 2016-17 Annual Report.

Number leased by vehicle type

The number of leased vehicles by vehicle type were extracted from the SGfleet 2016-17 Annual Report.

Number in fleet by vehicle type

The SGfleet 2016-17 Annual Report was used to extract the number of vehicles by type.

Proportion of total fleet expenditure allocated as regulatory expenditure

This proportion has been taken from the 2016-17 Regulatory Accounts workfiles and has been calculated in accordance with Essential Energy's CAM.

Use of Estimated Information

Certain assumption underlie the data used above, particularly surrounding the Regulatory Accounts workings.

Reliability of Information

Generally, the data in this table is considered to be reliable. However, consideration should be given to the assumptions underlying the data if it is to be used for benchmarking or decision making purposes.

Worksheet 2.7 - Vegetation management

Table 2.7.1 - Descriptor Metrics by Zone

Compliance with Requirements of the Notice

This section demonstrates how the information provided is consistent with the requirements of this Notice.

Source of Information

- VIMS
- WASP
- Field survey 2011-12
- LIDAR aerial surveys from 2016 and 2017
- Smallworld

Background

Statutory obligations in NSW

This section demonstrates that in NSW, minimum vegetation clearance standards are mandated via the statutory instruments and the Code of Practice Electricity transmission and distribution asset management, February 20095, as shown in Figure 1-1.

[5] NSW Resources and Energy, *Code of Practice Electricity transmission and distribution asset management*, February 2009

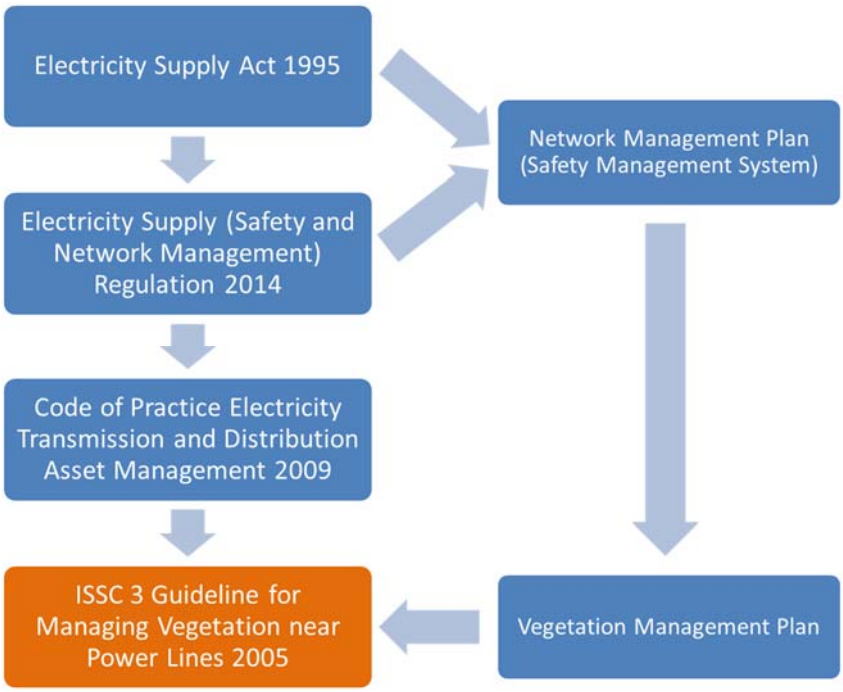


Figure 1-1: Statutory obligations – path to ISSC 3

The Electricity Supply Act 1995 (NSW) obligates Essential Energy "to deliver a safe and reliable supply of electricity" (clause 3(a)) and "to promote and encourage the safety of persons and property in relation to the generation, transmission, distribution and use of electricity" (clause 3(b)). The Act states that it may make regulations in relation to "the development and implementation by network operators of plans designed to ensure the safe operation of their transmission or distribution systems" (clause 191(g1)) and "the removal or trimming of trees by distribution network service providers" (clause 191(h)).

The Electricity Supply (Safety and Network Management) Regulation 2014 (NSW) obligates Essential Energy to "take all reasonable steps to ensure that the design, construction, commissioning, operation and decommissioning of its network (or any part of its network) is safe" (clause 5). The regulation requires Essential Energy to prepare a safety management system that relates to vegetation management, in particular the "management of bushfire risk relating to electricity lines and other assets of the network operator's network that are capable of initiating bushfire" (clause 7(1)(b)(iv)). The safety management system must be "in accordance with AS 5577 or with any other code or standard that the Secretary may, by written notice given to the network operator, nominate" (clause 7(1)(a)).

The 2014 regulation replaced the Electricity Supply (Safety and Network Management) Regulation 2008 on 1 September 2014. The 2008 regulation similarly required Essential Energy to prepare a network management plan that relates to vegetation management and to "take into account such codes, standards or guidelines as the Director-General, by notice in writing to the network operator, requires to be taken into account in the development and implementation of the chapter" (clause 13(1)).

In 2010, the Director-General directed that Essential Energy is required to incorporate the Code of Practice - Electricity transmission and distribution asset management, February 2009 in its network management plan. Although this directive was issued while the 2008 Regulation was in place, the obligation to comply continues under the 2014 regulation: "Any act, matter or thing that, immediately before the repeal of the Electricity Supply (Safety and Network Management) Regulation 2008, had effect under that Regulation continues to have effect under this Regulation" (clause 44(1) – 2014 regulation).

The Code of Practice - Electricity transmission and distribution asset management, February 2009 is intended to:

- … promote common practices in electricity transmission and distribution to embed in the State's electricity supply infrastructure, its operation and maintenance, features which are generally accepted as appropriate for meeting the needs of the public in terms of safety, access and network impacts.[6]
- support the streamlining of the regulatory regime under The Act by providing guidance on achieving the minimum standard of electrical safety to customers, the public and industry workers, contractors and their employees. This Code shall be followed unless there is an alternative course of action which achieves the same or better outcomes.[7]

The Code sets out the maintenance requirements for the network including requirements for vegetation management:

A system of maintenance for overhead lines, their structures and components shall consider: … tree management programmes designed to:

- ensure public safety,
- minimise the risk of fires caused by contact between trees and overhead lines,
- reduce the number of interruptions to supply caused by trees, and
- protect the electricity distributor's assets from damage[8].

The Code references ISSC 3 Guideline for Managing Vegetation near Power Lines 2005 (ISSC 3) for detailed guidance on vegetation management maintenance works.

ISSC 3 was developed for application in NSW and "seeks to provide guidance to network operators and the community generally in the safe and environmentally responsible management of vegetation near power lines by integrating community, safety and environmental values"9. ISSC 3 specifies minimum vegetation clearances, as well as additional allowances and "clear to sky" requirements for bushfire prone areas.

To comply with the Act, the Regulations and the Code, Essential Energy developed appropriate Network Management Plans (now referred to as the Safety Management Systems in the 2014 regulation) and its Vegetation Management Plan (CEOP8008), based on ISSC 3, is a requirement of those plans. The Vegetation Management Plan is a key instrument in the Bushfire Risk Management Plan required by statute. Essential Energy's forecast vegetation management expenditure is based on maintaining vegetation in accordance with the Vegetation Management Plan and is, therefore, considered to be related to delivering a prudent volume of work activities.

Methodology & Assumptions

VIMS Source Data Verification

In 2016-17, the majority of network data relating to vegetation has been drawn from the Vegetation Information Management system (VIMS). To ensure the background data within the VMA table reflects the latest changes to the network, a full update was run by the Field & Engineering Systems (FES) Business Systems Manager prior to running the analysis. The methodology used to update each field is detailed below.

[6] NSW Resources and Energy, *Code of Practice Electricity transmission and distribution asset management*, February 2009, p. 5

[7] NSW Resources and Energy, *Code of Practice Electricity transmission and distribution asset management*, February 2009, p. 5

[8] NSW Resources and Energy, *Code of Practice Electricity transmission and distribution asset management*, February 2009. p. 20

[9] Industry Safety Steering Committee, *ISSC 3 Guideline for managing vegetation near power lines*, December 2005, p. 1

VIMS FIELD NAME	NEW FME DATA (Post 23/08/2017)
NAME	All VMAs in Smallworld, except “Not Applicable”, which were left in the table & not updated.
TYPE	VMA type in Smallworld.
DEPOT	The depot that the VMA is in. If the VMA is of Type “Sub-Transmission”, use the existing value because some cross depots (therefore the correct one cannot be determined).
REGION	The region that the VMA is in. If the VMA is of Type “Sub-Transmission”, the region should remain the same (provided it is Northern, Southern or North Coast, otherwise update to the new region).
POLE_COUNT	Uses poles grouped by the Pole VMA value (some subtransmission poles incorrectly have the name of the distribution VMA).
SPAN_COUNT (Bays using current terminology)	For the Span_Count table, duplicate Spans were discarded (based on the Span Asset Label & VMA name), then grouped by the Spans VMA value. Privately owned were not included. Services were not included.
SPAN_LENGTH (Total Bay Length, or Route Length)	Duplicate Spans were discarded based on the Span Asset Label & VMA name, then grouped by the Spans VMA value. Privately owned were not included. Services were not included. Included Out of Service.
TOTAL_KM (Total Span Length, or Circuit Length)	Sum of span lengths grouped by the VMA value on the span. Will not include dual circuits because they currently are not modelled as spans. Services are not included.

Route Length within Zone

Through Spotfire, there is a live data link to the VMA table within the Vegetation Management System (VIMS). The data feed is “VM_WORKPACK_VW” and lists all active Vegetation Management Areas across the Essential Energy network. Against each of these VMAs, there are a number of fields populated with aggregated data from the SmallWorld GIS system. One of the fields is route length and through Spotfire, this number was pivoted against the vegetation zone to produce the Route Length within Zone.

Number of Maintenance Spans

Using Spotfire and a live data link into VIMS, all vegetation defects created within the relevant year were extracted. Using “pole from” and “pole to” data, unique identifier for the spans to which the defects referred were created and using Spotfire, unique instances of these spans for the relevant year were counted. This data was pivoted within Spotfire to consolidate against the vegetation zone.

Total Length of Maintenance Spans

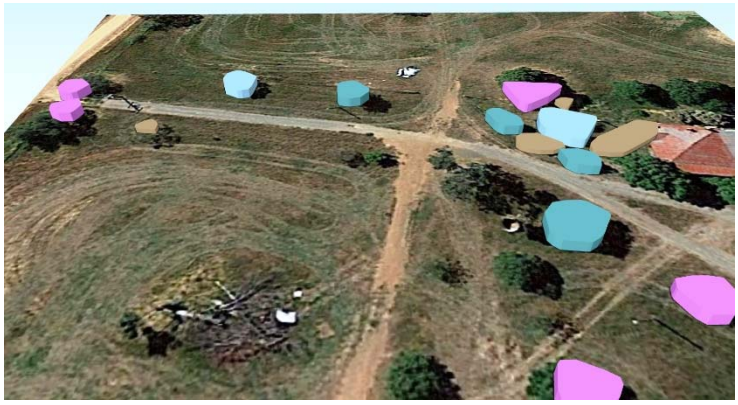
The number of maintenance spans in the relevant year within a given zone were divided by the total spans in the same zone to derive a ratio. This was applied to the total route line length for those same zones.

Length of Vegetation Corridors

Using Spotfire and a direct data link into the WASP system, all vegetation defects created since 1/7/2010 (1,300,205 defects) were extracted. Using the Asset ID value as a unique identifier for the span, total spans worked on within a given VMA during the period from 1/7/2010 to the present were counted. The assumption is that if a span is not referenced within this period, then the span is either not vegetated or contains vegetation that does not or will not encroach within the clearance zone. Taking the total number of spans worked on during the aforementioned period and dividing it by the total spans in the VMA provided a ratio which was then applied to the total route line length for the VMA. These VMA values were then pivoted within Spotfire to arrive at length of vegetation corridors per zone.

Average number of trees per urban and CBD vegetation maintenance span

This utilised tree counts based on shape files provided by LiDAR contractors. Shape files from the LiDAR data were extracted, including A1 to A4 and C1 to C7, from years 2014 to 2016. This data included data points that described vegetation on the Essential Energy network. Data used was A1 to A4 and C1 incursion data (shapes). The reduction was a compromise between trees and those observations that may not become trees, ie. shrubs picked up as category C7. The subset shape files included complimentary meta data attached to the shape file. This meta data was used as counts of individual trees. These unique counts, in addition to the unique span counts within depot, were calculated for each of the rural and urban classifications.



Average frequency of the cutting cycle

Using Spotfire with a direct link into WASP, all vegetation defects for the last 7 years (from 2011) were extracted. This data was pivoted in Spotfire to provide a data table with each row representing a VMA and the total number of defects cut within that VMA for each of the 7 years. If in a given year, more than 10 defects were cut, then that year would score a one. A cyclic frequency could then be derived for that VMA

as per the below. Again in Spotfire, this data was pivoted against the “Master Zone” (shown in the table below), to arrive at an average cycle time per zone.

10 columns from WASP Veg Defects Pivot

Veg Area	2011 count	2012 count	2013 count	2014 count	2015 count	2016 count	2017 count	Average Cycle Time	Master Zone
V-3025 - Kelvin	0	1	0	0	1	0	1	2.33	Rural Zone 5 - NTH & NW
V-3026 - 4Ways	0	0	0	0	1	0	0	7.00	Rural Zone 5 - NTH & NW
V-3027 - Mihi	0	0	0	0	1	0	1	3.50	Rural Zone 5 - NTH & NW
V-3028 - Wean	1	0	0	0	1	0	1	2.33	Rural Zone 5 - NTH & NW
V-3029 - Blue Vale	0	0	1	0	0	0	0	7.00	Rural Zone 5 - NTH & NW
V-303 - Little Run	1	1	0	0	1	1	1	1.40	Rural Zone 2 - MNC
V-3030 - Gulligal	0	1	0	0	1	0	1	2.33	Rural Zone 5 - NTH & NW
V-3031 - Binanda	0	1	1	0	1	0	1	1.75	Rural Zone 5 - NTH & NW
V-3032 - Nandewar	0	0	0	0	1	0	1	3.50	Rural Zone 5 - NTH & NW
V-3033 - Therribri	0	1	0	0	1	0	1	2.33	Rural Zone 5 - NTH & NW
V-3034 - Curracabah	0	1	0	0	1	0	1	2.33	Rural Zone 5 - NTH & NW
V-3035 - Nungadoo	0	1	1	0	1	0	1	1.75	Rural Zone 5 - NTH & NW
V-3036 - Warragrah	0	0	0	0	1	0	1	3.50	Rural Zone 5 - NTH & NW
V-3037 - Gundare	0	1	0	0	1	0	1	2.33	Rural Zone 5 - NTH & NW
V-3038 - Bebara	0	1	1	0	1	0	1	1.75	Rural Zone 5 - NTH & NW
V-3039 - Urban Boggabri	0	1	0	0	1	1	1	1.75	Urban Zone 5 - NTH & NW
V-304 - Cundle Flat	0	0	0	1	0	0	0	7.00	Rural Zone 2 - MNC
V-3040 - Urban Gunnedah East	0	1	1	1	1	1	1	1.17	Urban Zone 5 - NTH & NW
V-3041 - Urban Gunnedah West	0	1	1	1	1	1	1	1.17	Urban Zone 5 - NTH & NW
V-305 - Wyoming	1	1	0	1	0	1	1	1.40	Rural Zone 2 - MNC
V-306 - Marlee	1	1	0	0	1	1	1	1.40	Rural Zone 2 - MNC
V-308 - Elands	1	1	1	1	1	1	1	1.00	Rural Zone 2 - MNC

Use of Estimated Information

This has been explained in the Methodology and Assumptions section above.

Reliability of Information

The colour coding system has been used in the RIN template to indicate the level of confidence in each of the cells completed.

Table 2.7.2 – Expenditure Metrics by Zone

Compliance with Requirements of the Notice

This is based on the standard methodology adopted for all finance expenditure data in the Category Analysis RIN. Refer to section *3 Financial Data* for the overall Basis of Preparation on finance data prepared for multiple tables in the RIN. The specific methodology and assumptions made for this table are also outlined below.

Source of Information

Data was sourced from the 2016-17 Regulatory Accounts. PeopleSoft data was used to split expenditure across RIN categories.

Methodology & Assumptions

- Geographical areas have been split from Zone 1 to Zone 6 via a mapping exercise, ie. from RIN categories to geographical zones.
- Service subcategories have been extracted from PeopleSoft for 2016-17.
- Project types provided for the zone split were on a direct cost basis.
- Vegetation Operations Management, Delivery & Performance and Compliance & Stakeholder departments (departments 891, 815 and 781 respectively), were proportionately allocated across Zones 1 to 6 based on direct dollar spend. The resulting proportions were then used to apportion the total direct costs as reported in the 2016-17 Regulatory Accounts.
- Hazard Tree and Ground Clearance in the financials were based on a percentage of those tasks that were completed as a proportion of all vegetation defects that were completed in 2016-17.

Use of Estimated Information

Submitted information is materially dependent on actual financial information from PeopleSoft to separate expenditure across RIN categories. As a result this information is treated as actual information.

Reliability of Information

Estimated information has been used to apportion actual vegetation expenditure across RIN categories. Caution should be used when using this data for benchmarking or decision making purposes.

Table 2.7.3 – Descriptor Metrics Across All Zones – Unplanned Vegetation Events

Compliance with Requirements of the Notice

The following sections outline how Essential Energy has ensured that the information provided is consistent with the requirements of the Notice.

Source of Information

- TotalSAFE
- Microsoft Excel
- Tableau

Methodology & Assumptions

Vegetation Caused Fire Data

On the Fire Report Form in the TotalSAFE system, the available options can be selected from the drop down list for Secondary Cause & Contributory Cause.

There are a set group of options for Vegetation fires to identify whether the offending vegetation was in all probability inside or outside clearances at the time.

For consistency, the investigation officer completes the form on behalf of field staff and selects the appropriate code details from discussions with field staff and photos, where provided.

Data from TotalSAFE is exported to an Microsoft Excel Master register of all fire incidents. This register is used to complete analysis and reporting on a monthly and yearly basis.

A sample of the 2016-17 data from Tableau software is used to analyse data in the Microsoft Excel exported file from TotalSAFE.

Use of Estimated Information

The information in this table is considered to be based on actual data but with some judgement applied to derive the splits of the data into “cause”.

In some cases, classification of the data into “cause” types can be somewhat subjective. On occasions, the distance of vegetation to conductors is clear but on other occasions it is less clear and requires personal judgement based on available evidence. For example, in the case of a fallen tree on the line, one can be confident of the distance the tree was standing from conductors prior to falling. In the case of windborne branches and debris, it is an estimate at best.

Reliability of Information

Confidence in the data is moderate. The data in this table includes estimates, so caution should be used when using it for benchmarking or decision making purposes.

Worksheet 2.8 – Maintenance

Table 2.8.1 – Descriptor Metrics for Routine and Non-Routine Maintenance

Compliance with Requirements of the Notice

The following sections outline how Essential Energy has ensured that the information provided is consistent with the requirements of the Notice.

The information provided is based on all assets owned by Essential Energy as well as privately owned assets where they are managed and maintained by Essential Energy.

Data has then been filtered to only include those assets that are “in service”.

Source of Information

Several systems and planning documents have been queried. These systems and documents are listed below along with the data sets obtained from those systems.

Maintenance Activity	System	Data set
Numerous	PeopleSoft Financial System	
Numerous	WASP	• Count of year end assets from the Asset Register and maintenance events from the work scheduling module. • Streetlight volume data from COGNOS Report Studio.
Numerous	Smallworld	Route length of overhead and underground assets
Numerous	TotalSAFE	
Numerous	Electricity Network Incident Failure Database (ENI)	
Public lighting maintenance	Asset Strategy Development	Average pole replacement cost
SCADA & Network Control Maintenance	Primavera PeopleSoft	Capital project data OPEX, M&R and F&E
SCADA & Network Control Maintenance	Service Manager	Historic Asset Replacements/Asset Failure
SCADA & Network Control Maintenance	Diagnostic Software	Historic & current radio asset data
SCADA & Network Control Maintenance	ROE device list	Historic & current IP asset data

Methodology & Assumptions

The asset quantity for most asset types is based on information from WASP and Smallworld.

Accurate age data within the various asset systems is considered incomplete at best. For this reason current average age data has been assessed based on the best available data. It is assumed that historical replacement and growth rates have not been sufficient to suspend the average age of most assets ensuring a gradual increase in average age dependant on the individual asset. A basic calculation has been used to estimate the historical average age. Data for this algorithm is approximate and should not be considered accurate.

Pole Top, Overhead Line & Service Line Maintenance

Pole Tops & Overhead Lines

- Assets at year end are based on a WASP count of poles (both distributor owned and distributor maintained private poles) that were recorded in WASP.
- The quantity inspected/maintained represents a count of all corrective maintenance tasks (which are not covered in this table) that have been completed as operating expenditure outside the normal zone substation boundary fencing.
- Average age has been estimated as pole average age. Data for this algorithm is approximate and should not be considered accurate.
- The maintenance cycle is assumed to be the inspection cycle as required. Corrective maintenance is normally carried out within nine months of inspection.

Service Lines

- Assets at year end are based on a count of customers. The average customer count was determined by calculating the average at the start and end of the financial year, as requested in the Economic Benchmarking 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 or alternatively provides a count at the end of the period. Data has been sourced from an internal reporting system and existing query, via Spotfire, which extracts data from the Energy/Peace billing system. Unmetered customers have been extracted from the Energy/Peace system through internal reports.
- Quantity inspected/maintained provides a count of all service related corrective maintenance tasks that have been completed as operating expenditure.
- Average age has been determined using a number of factors, including pole age, premise start date and service cable estimated age. Data for this algorithm is approximate and should not be considered accurate.

Pole Inspection & Treatment

- Assets at year end are based on a WASP count of distributor owned and distributor maintained private poles designated as "in service".
- Assets inspected include all WASP pole inspection tasks that were completed for the year. Each task includes the required activities based on pole age and condition. This may include excavation, drilling, visual inspection and routine treatment of decay or termites.
- Average age has been based on pole average age from the age profile in Table 5.2.1. Data for this algorithm is approximate and should not be considered accurate.

Overhead Asset Inspection

- Assets at year end are taken from the GIS Smallworld system and represent the total route length of the overhead network excluding LV services (but including streetlighting). All service statuses have been included.
- The asset quantity inspected is reported as the total route length. This has been calculated based on a quarter of total route length being inspected by the asset inspector each year, plus urban assets being inspected as part of the thermovision program, rural overhead assets being inspected by aerial patrols every year, as well as subtransmission live line inspection on rural radial feeders. The inspections include visual inspection of conductors, crossarms, insulators, transformers, and other overhead equipment.
- The average age is based on assumed conductor age from the age profile in Table 5.2.1. Data for this algorithm is approximate and should not be considered accurate.
- Subtransmission Live Line Inspection: This program targets rural radial subtransmission feeders and allows for close approach pole top inspection using an elevated work platform and specialised live line practices.
- Annual Thermovision Inspection: A detailed thermovision inspection of targeted urban high voltage network is completed each year. Although accurate recording of completed inspections has been sporadic in the past, approximately 100,000 pole top connections are assessed annually. Inspection numbers documented in the table are taken from WASP but are considered unreliable due to past reporting issues.

Network Underground Cable Maintenance: by Voltage

- Assets at year end are taken from the Smallworld system and cover the total circuit length of the underground network (excluding underground services as these are generally maintained by the customer).
- Assets maintained includes a count of all corrective work tasks involving underground assets that were recorded and completed in the respective year, then grouped by voltage.
- The maintenance cycle is shown as four years to correspond with the inspection cycle. Although work tasks are prioritised to various timeframes for completion, the lodgement and scheduling is performed in conjunction with the inspection.
- Average age is based on assumed cable age from the age profile in Table 5.2.1. Data for this algorithm is approximate and should not be considered accurate.

Network Underground Cable Maintenance: By Location

- Assets at year end are taken from the Smallworld system and cover the total circuit length of the underground network (excluding underground services as these are generally maintained by the customer). Total circuit length is shown for non CBD as Essential Energy does not have any underground in any areas classified as CBD.
- Assets maintained includes all corrective work tasks involving underground assets that were recorded and completed in the respective year, then grouped by voltage.
- The maintenance cycle is shown as four years to correspond with the inspection cycle. Although work tasks are prioritised to various timeframes for completion, the lodgement and scheduling is performed in conjunction with the inspection.
- Average age is based on assumed cable age from the age profile in Table 5.2.1. Data for this algorithm is approximate and should not be considered accurate.

Distribution Substation Equipment & Property Maintenance

Distribution Substation Transformers

- Assets at year end in this category include all distribution substation transformers and regulators (both overhead and enclosed).
- Quantity inspected/maintained includes a count of corrective work tasks ("Substation - Replace Tank" and "Regulator - Replace Tank").
- Average age is based on a weighted average of the estimated transformer and regulator ages.
- The maintenance cycle is shown as four years to correspond with the inspection cycle. Although work tasks are prioritised to various timeframes for completion, the lodgement and scheduling is performed in conjunction with the inspection.

Distribution Substation Switchgear

- Assets at year end in this category include all distribution substation switches (both for overhead and enclosed substations). Where actual substation switch information was not available, a consistent algorithm was used to assess the number. This allowed 2.5 switches per overhead substation and 6 switches per enclosed substation. This conservative assumption was based on 1 high voltage switch and an average of 1.5 low voltage units per overhead substation, while enclosed substations allowed for 2 high voltage switches and 4 low voltage units.
- Average age has been estimated as the average of the substation and the transformer age. Data for this algorithm is approximate and should not be considered accurate.

Distribution Substation Other Equipment

Earth Integrity Testing: This four-yearly program ensures the integrity of both high and low voltage earthing systems supporting those assets not available for the regular asset inspection program.

Distribution Substation Property

- Assets at year end in this category represent a count of all distribution substations (both overhead and enclosed).
- Quantity inspected/maintained is a count of all distribution substation corrective tasks (excluding transformer, regulator and switchgear tasks included above).
- Average age is based on the estimated substation site age. Data for this algorithm is approximate and should not be considered accurate.

Zone Substation Equipment Maintenance

Transformers – Zone Substation

- Asset quantity at year end represents all Essential Energy owned zone substation power transformers and does not include regulators, zone substation auxiliary transformers, step up transformers, or SWER isolating transformers.
- Quantity maintained/inspected represents the sum of the number of minor/major preventative work tasks completed during the financial year and the number of zone substations recorded as inspected in WASP, multiplied by the number of transformers and divided by the number of zone substations.
- Inspection cycle (as for all other assets) – Power Transformers are not "Inspected" as an entity. Inspection is a whole-of-substation exercise relevant to all assets. Zone substations are inspected either monthly, bi-monthly or quarterly, depending on various substation attributes. The figure represents the average zone substation inspection interval.
- Maintenance cycle – six years is the current minor maintenance interval for power transformers.

Other Equipment

- Asset quantity at year end represents a simple sum of all “In Service” assets across all asset categories apart from Power Transformers and tap changers.
- Quantity maintained/inspected represents the sum of the number of minor/major preventative work tasks completed during the financial year and the number of zone substations recorded as inspected in WASP, multiplied by the number of other assets and divided by the number of zone substations.
- Average age represents a weighted average of the individual asset category average ages. Individual category averages were taken as the average age of “In Service” assets, calculated from the commissioning date (where known). The fact that a large number of records in some categories do not have a commissioning date recorded, means that the averages will be skewed to a slightly newer figure, given that the older sites would, as a general rule, be the ones missing a commissioning date.
- Inspection cycle represents the average substation inspection frequency. Zone substations are inspected either monthly, bi-monthly or quarterly, depending on various substation attributes.
- Maintenance cycle represents the typical maintenance frequency for other equipment.

Zone Substation Property Maintenance

- Asset quantity represents the number of zone substation site records from WASP with a service status of “In Service” and a type of either “Zone Substation”, “Switching Station” or “Subtransmission”, but not “Regulator” or “FI Plant”.
- Asset quantity inspected/maintained represents the sum of the quantity of zone substations recorded as inspected in WASP, the quantity of zone substations where fire equipment maintenance was recorded, the property maintenances recorded and the number of zone substation property inspections based on the property maintenance contract.
- Average age is based on the substation ages calculated from commissioning dates (where present). The fact that a large number of site records do not have a commissioning date recorded, means that the average will be skewed to a slightly newer figure, given that the older sites would, as a general rule, be the ones missing a commissioning date.
- The inspection cycle figure represents the average of the weighted average zone substation inspection interval by electrical staff, and routine property inspections by contractors.
- The maintenance cycle is shown as six years to correspond with typical major maintenance cycles for Zone Substations.

Public Lighting Maintenance

- Assets at Year End - Data was taken from the end of year asset inventory WASP extract. These reports include all devices except metered and/or quarantined devices. These devices were excluded for the following reasons:
- Quarantined lights do not contain enough information to determine the luminaire size.
- Metered lights are the responsibility of the owner for maintenance and replacement, and the energy consumption is not calculated using the Type7 Unmetered Billing System.
- Assets Inspected/Maintained - This number is the sum of all routine and non-routine streetlight maintenance tasks in 2016-17, including:
    - Spot luminaire maintenance
    - Bulk luminaire maintenance
    - Category V night patrol inspections
    - Dedicated streetlight column inspections

- Average Age of Asset Group - The current average age of the streetlight asset group has been calculated as follows:
    - Extract from WASP providing a count of streetlights by road categorisation, grouped by year.
    - This data was then used to calculate the average age of installed lights – sum of installed age / number of lights installed.
- The inspection and maintenance cycle reflects the period between inspections or planned maintenance activities.

SCADA & Network Control Maintenance

- Asset quantity at year end - Assets captured in this category are those which have a sole purpose of providing SCADA & Network Control functionality to Zone Substations. Assets used to provide communication services to pole top devices have not been included in this section and will be captured elsewhere.
- Asset quantity inspected/maintained - Essential Energy has included all assets in this category that have either been physically inspected or maintained via remote diagnostic systems. Many assets are not physically inspected, but their condition is continually assessed via remote diagnostics software, alerting to any degradation in service or asset condition.
    - Average age of asset group - Data is based on year of purchase for the asset and averaged across all asset categories.
    - In the case of RTUs (field devices), the methodology for the current reporting period differs slightly to that used in previous RIN reports. The basis of calculation has now been modified to include the firmware version of the older devices, thus attaining a more reflective age profile for these largely legacy devices. Newer devices have much better records with respect to purchase/commissioning dates.

Protection Systems Maintenance

- Asset quantity represents all “in service” distribution reclosers owned by Essential Energy.
- Quantity inspected/maintained represents those tasks directly related to maintaining distribution recloser sites and was taken from WASP.
- Average age is based on the recloser or the recloser site estimated age. Data for this algorithm is approximate and should not be considered accurate.

Other Inspection Programs

In previous years, “Other Inspection Programs” has included routine inspection programs that were not directly related to just one of the groups above. This year, that data has instead been included in the most relevant group, above.

Use of Estimated Information

The data in this table is largely estimated using the various assumptions noted above.

Reliability of Information

Assumptions and estimates underlie aspects of the data in this table. This is partially due to maintenance activities often spanning more than one of the asset groups contained in Table 2.8.1. As such, caution should be applied when using this data for benchmarking or decision making purposes.

Table 2.8.2 – Cost Metrics for Routine & Non-Routine Maintenance

Compliance with Requirements of the Notice

The following sections outline how Essential Energy has ensured that the information provided is consistent with the requirements of the Notice.

Source of Information

This is based on the standard methodology adopted for all finance expenditure data in the Category Analysis RIN. Refer to section *3 Financial Data* for the overall Basis of Preparation on finance data prepared for multiple tables in the RIN. Individual maintenance activities have been captured through relevant management reports and estimated where necessary. Total expenditure has been reconciled back to the 2016-17 Regulatory Accounts. Any specific methodology and assumptions utilised for this table are outlined below.

Methodology & Assumptions

- The 2016-17 Regulatory Accounts associated with Essential Energy's maintenance expenditure were used as the base data.
- These accounts were then sorted into either routine or non-routine expenditure and were then mapped to corresponding maintenance activities in the RIN table.
- Where an account covered multiple maintenance activities, a pro-rata system was used to assign the expenditure based on the directly mapped accounts.
- Where no accounts were able to be directly mapped to inspection/maintainance activities, a unit rate system was used to assign expenditure based on like-activities with known expenditure.
- Where maintenance activities contained units both for inspections and maintenance, the routine versus non-routine expenditure was applied pro-rata based on those units.
- Public lighting routine maintenance expenditure is calculated based on expenditure in the following activities:
    - Bulk lamp replacement program
    - Pole inspections for dedicated
    - Category V Night Patrol Inspections
- Public lighting non-routine maintenance expenditure is calculated based on expenditure in the following activities:
    - Spot luminaire maintenance

Use of Estimated Information

Wherever possible, the data splits within this table are based on actual financial management reporting. Where this is not possible, high level assumptions and estimation have been used to provide a relatively accurate response to the required tables. Estimation has been developed based on actual tasks undertaken and a derived unit rate.

Reliability of Information

Maintenance expenditure at a total level aligns to the 2016-17 Regulatory Accounts, however the split into the various categories is based on assumptions and estimation. Caution should be applied when using this information for decision making or benchmarking purposes.

Worksheet 2.9 - Emergency Response

Table 2.9.1 – Emergency Response Expenditure (Opex)

Compliance with Requirements of the Notice

This information is based on all transactions associated with Emergency Response and major event days Essential Energy has encountered. The data relates to Fault & Emergency (F&E) expenditure only.

The Threshold for Major Event Days (TMED) for 2016-17 was applied as per the definition.

Source of Information

Data has been sourced from:

- 2016-17 Regulatory Accounts
- PeopleSoft Query for expenditure against project type Fault & Emergency (excluding overheads)
- Chart of Accounts with COA Mapping – EssentialNet

Major Event Day data is sourced from PowerOn Fusion and calculations managed in 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 titled “RIN Tables Workpapers 16-17”.

Methodology & Assumptions

In the RIN Access Database 2016-17, the following query was generated for the financial year:

- Major Event Day Summary by Date – AER
- This collates all unplanned outages and rolls up customers affected and customer minutes lost by date.
- Uses the average customer base to calculate daily SAIDI.
- Where the daily SAIDI exceeds the 2016-17 TMED, this date is classed as a Major Event Day and will be excluded where defined.
- Details of the cause for the major event day are sourced from the outages within the Access Database.
- Total Fault & Emergency costs were sourced from the Annual Regulatory Accounts.
- Coding was cross-checked with the Annual Regulatory Accounts to ensure a consistent approach.
- Major Events Days Costs are based on day of incident and two days after incident, as major event days would usually take longer than a 24-48 hour period to resolve.

Once a major event day (MED) is triggered it applies to the entire network, rather than just a particular area or areas of the network. As such, all unplanned interruptions are included in the MED. Accordingly, all emergency response expenditure incurred across the network in relation to the MED has been included in parts (B) and (C) of this table.

Use of Estimated Information

The data splits within this table are based on high level assumptions and the data is, therefore, considered to be estimated.

Reliability of Information

Expenditure at the total level is considered reliable. However, the allocation of costs to specific Major Event Days is based on assumptions and estimates, so caution should be used when using this for benchmarking or decision making purposes.

Worksheet 2.10 – Overheads

Table 2.10.1 – Network Overheads Expenditure & Table 2.10.2 – Corporate Overheads Expenditure

These tables do not require any inputs.

Worksheet 2.10(A) – Overheads

Table 2.10.1 – Network Overheads Expenditure & Table 2.10.2 – Corporate Overheads Expenditure

Compliance with Requirements of the Notice

The following sections outline how Essential Energy has ensured that the information provided is consistent with the requirements of the Notice.

Essential Energy capitalises a component of its overhead expenditure. Capitalisation of overheads is governed by CEOP2416 – Operational Procedure: Asset Capitalisation. There have been no material changes in capitalisation policy from the prior year.

Source of Information

The data in this table is based on the standard methodology adopted for all finance expenditure data in the Category Analysis RIN. Refer to section *3 Financial Data* for the overall Basis of Preparation on finance data prepared for multiple tables in the RIN. The specific methodology and assumptions made for this table are also outlined below.

Methodology & Assumptions

- Master file of financial data is prepared as described in section *3*.
- PeopleSoft dataset of operating expenditure has been extracted and reconciled to relevant management accounts to ensure its validity.
- Overheads were split into the required categories using PeopleSoft project type data broken down into resource categories.
- Aggregate Overheads were allocated across the mandatory categories disclosed within the table proportionately based on the Total Network Overhead and Total Corporate Overhead expenditure sourced from PeopleSoft project type data.

Use of Estimated Information

To separate expenditure across RIN categories, submitted information is materially dependent on information from the PeopleSoft financial system. As a result this information is treated as actual information.

Reliability of Information

Given the underlying assumptions and use of estimated data in this table, caution should be exercised when using it for benchmarking or decision making purposes.

Worksheet 2.11 – Labour

Table 2.11.1 - Cost Metrics per Annum

Compliance with Requirements of the Notice

The following sections outline how Essential Energy has ensured that the information provided is consistent with the requirements of the Notice.

Source of Information

Data has been sourced from:

- Labour Opex and Capex file from the Budgeting and Forecasting department which details by department, the split of labour costs by direct and overhead, as well as the split by Standard Control Services, Alternative Control Services, Unregulated Services and Water. This file uses the 2016-17 CAM rates.
- FTE Reports for June 2017 and June 2016.
- Personal Data files for June 2017 and June 2016, showing annual remuneration and hourly rate data per employee.
- Agency Staff reports for June 2017 and June 2016 showing labour hire staff.
- Monthly Overtime Report for June 2017, showing year to date overtime dollars and hours.
- 2017 Working Hours file from Finance, showing available working hours calculated as part of the budgetary process.
- RIN classification file from the Human Resources department ("HR"), showing FTEs classified by categories required in Tables 2.11.1 and 2.11.2.
- 2017 Stand Down Occurrences file from HR.

Methodology & Assumptions

Main Assumptions

- The 2016-17 ASL number is assumed to be the average of the 2015-16 and 2016-17 year end staff numbers converted to Standard Control Services numbers by way of department percentages derived from the Labour Opex and Capex file.
- It is assumed that the average productive work hours for Ordinary Time labour is standard per ASL. This data is not calculated at a more detailed ASL-specific level. It equates to the available hours as calculated in the Working Hours file. The average productive work hours per ASL equates to average productive work hours for Ordinary Time plus average overtime hours per ASL.
- A Standard Control Services percentage has been calculated and this has been applied to labour costs and units.

Total Labour Cost

- The 2016-17 Ordinary Time labour cost per department was taken from the Labour Opex and Capex file and split into Corporate, Network Overheads and Direct Network Standard Control Services labour costs using the departmental splits derived from this file.
- Other staff-related costs by department were taken from the Labour Opex and Capex file. Restructuring and Redundancy provision costs were removed. The remaining costs were then multiplied by the relevant percentage to convert to the Standard Control Services amounts.

- Overtime wages and oncosts were calculated from the Labour Opex and Capex file. Overtime hours were taken from the Monthly Overtime Report for June 2017.These were multiplied by the relevant percentage to convert to the Standard Control Services amounts by department.

Calculation of Costs and Hours Split Between the Different Labour Categories in the RIN

- Total ordinary labour costs and overtime costs by department were calculated.
- The average remuneration per FTE was pivoted to derive the remuneration by department and RIN labour category.
- The total labour costs by department were split into RIN labour categories using the weighting of the remuneration by department and RIN category analysis.
- The applicable ordinary time hourly rate per ASL was used as the hourly rate for labour hire.

RIN Classification

Each employee was assigned their RIN classification by HR Operations.

Employees were categorised into RIN categories using mapping logic based on organisational hierarchy and remuneration code (for Executive and Senior Managers on Contract), Employee class (Apprentices) and Workforce Planning Categories as used in Essential Energy's Public Sector workforce planning external reporting. The results were reviewed and results aligned to the RIN categories where required.

The following table outlines the logic used by HR Operations:

WFP Categories	RIN	Mapping Logic	Rule
Admin	Support	Job Family	WFP Category
Apprentice	Apprentice	Empl Class	Employee Class
Executive Manager	Exec Manager	L2 & L3 & CONEMP	Hierarchy + Contract
Management	Manager	Job Family	WFP Category
Non Trade	Unskilled Worker	Job Family	WFP Category
Prof Spec	Professional	Job Family	WFP Category
Senior Manager	Senior Manager	L4 & L5 & CONEMP	Hierarchy + Contract
Technical	Skilled Electrical	Job Family	WFP Category
Trades	Skilled Electrical	Job Family	WFP Category

ASL Numbers

- The year end FTEs for 2016-17 were taken from the FTE report for June 2017. Using the RIN classification file from HR, FTEs were assigned their applicable labour classification.
- The average FTE numbers were calculated by deriving an average of the closing balance of June 2016 and June 2017 by department.
- The applicable departmental standard control percentage was applied to the average numbers to derive the standard control ASL numbers.
- The average year end labour hire data was calculated by deriving an average of the closing balance of June 2016 and June 2017 by department.

Stand Down Occurrences

Data for the 2017 year regarding stand down occurrences was obtained from HR. The data was analysed by employee ID, labour classification and department. The applicable Standard Control Services percentage per department was applied to give the number of stand down occurrences by labour category.

Use of Estimated Information

The information in this table is considered to be based on actual data but with estimated splits applied to derive the required information.

Further details regarding estimation are described in the Methodology & Assumptions section above.

Reliability of Information

Given the underlying assumptions and estimates made in this data, caution should be applied if using the data in the table for benchmarking or decision making purposes.

Table 2.11.2 - Descriptor Metrics

Compliance with Requirements of the Notice

The following sections outline how Essential Energy has ensured that the information provided is consistent with the requirements of the Notice.

Source of Information

Data has been sourced from:

- Table 2.11.1.
- Monthly Overtime Report for June 2017, showing year to date overtime dollars and hours.

Methodology & Assumptions

Average Productive Work Hours Ordinary Time per ASL and Hourly Rate per ASL

- It is assumed that average productive work hours per ASL equates to the available working hours as shown in the Working Hours file for 2017.
- The total standard control cost for ordinary time and labour hire was divided by the total productive work hours for ordinary time to calculate the hourly rate per ASL per labour category.
- It is assumed that employee and labour hire have the same costs.

Average Productive Work Hours Overtime per ASL and Hourly Rate per ASL

- Overtime hours per FTE was taken from the Monthly Overtime Report for June 2017. The overtime cost was taken from the Labour Opex and Capex file.
- The Standard Control Services percentage per department was applied to extract the Standard Control Services element.
- The RIN labour categories were added to the analysis.
- The data was then pivoted to show the total overtime dollars and hours per labour category.
- The average productive overtime work hours per ASL were derived by dividing overtime hours by the ASL numbers as per Table 2.11.1.
- The hourly rate per ASL was calculated by dividing the overtime dollars by overtime hours.

Use of Estimated Information

The information in this table is considered to be based on actual data but with estimated splits applied to derive the required information.

Further details regarding estimation are described in the Methodology & Assumptions section above.

Reliability of Information

Given the underlying assumptions and estimates made in this data, caution should be applied if using the data in the table for benchmarking or decision making purposes.

Worksheet 2.12 - Input tables

Table 2.12.1 – Input tables

Compliance with Requirements of the Notice

The following sections outline how Essential Energy has ensured that the information provided is consistent with the requirements of the Notice.

Source of Information

The data in this table is based on the standard methodology adopted for all finance expenditure data in the Category Analysis RIN. Refer to section *3 Financial Data* for the overall Basis of Preparation on finance data prepared for multiple tables in the RIN. The specific methodology and assumptions made for this table are also outlined below.

Methodology & Assumptions

- Vegetation Management was split into the requested cost categories using PeopleSoft project type data broken down into resource categories and zones.
- Routine Maintenance was split into the requested cost categories using PeopleSoft project type data broken down into resource categories and RIN subcategories.
- Non Routine Maintenance was split into the requested cost categories using PeopleSoft project type data broken down into resource categories and RIN subcategories.
- Overheads were split into the requested cost categories using PeopleSoft project type data broken down into resource categories and RIN subcategories. Overheads have been lumped into “Other” cost categories based on the time and resources available to dissect the data.
- Augmentation was sourced from the Annual Reporting RIN and split into the cost categories using PeopleSoft project type data broken down into resource categories and RIN subcategories.
- Connections were split into the requested cost categories using PeopleSoft project type data broken down into resource categories and RIN subcategories.
- Major event days (within Emergency Response) were split into the requested cost categories using PeopleSoft project type data broken down into resource categories and RIN subcategories. Sourced from Table 2.9.1 of the Category Analysis RIN. Major storms was used as the balancing item for the remaining Emergency Response spend.
- Public Lighting was split into the requested cost categories using PeopleSoft project type data broken down into resource categories and RIN subcategories.
- Metering was split into the requested cost categories using PeopleSoft project type data broken down into resource categories and RIN subcategories.
- Replacements was sourced from the Annual Reporting RIN and split into the cost categories using PeopleSoft project type data broken down into resource categories and RIN subcategories.
- Non Network Expenditure has been lumped into “Other” costs. Data was sourced from Worksheet 2.6 of the Category Analysis RIN.

Use of Estimated Information

The data splits within this table are based on assumptions and the data is, therefore, considered to be estimated.

Reliability of Information

Given the underlying assumptions and methods used to derive this data, caution should be exercised when using this for benchmarking or decision making purposes.

Worksheet 4.1 - Public lighting

Table 4.1.1 - Descriptor Metrics Over Year

Compliance with Requirements of the Notice

The following sections outline how Essential Energy has ensured that the information provided is consistent with the requirements of the Notice.

Source of Information

- Data was extracted from WASP as at 1 July 2017.
- This data was filtered to exclude Metered, Private and Quarantined lights and to only include In Service lights. These devices were excluded for the following reasons:
    - Quarantined lights do not contain enough information to determine the luminaire size.
    - Metered and Private lights are the responsibility of the owner for maintenance and replacement.

Methodology & Assumptions

The individual device types were counted from the WASP installed data as at 1 July 2017, based on the AEMO load table classification for each light.

Use of Estimated Information

All information has been sourced from WASP and is considered to be actual data. Unknown luminaire types were categorised to be 42W CFL as this is the largest install base for Essential Energy.

Reliability of Information

The data in this table is considered to be reliable.

Table 4.1.2 - Descriptor Metrics Annually

Compliance with Requirements of the Notice

The following sections outline how Essential Energy has ensured that the information provided is consistent with the requirements of the Notice.

Source of Information

- The streetlight data was sourced from WASP extracts.
- GSL Breaches, Payments & Customer Complaints volume data was obtained from the Customer Affairs Business Unit. The data was extracted from the CMS database for 2016-17.
- Cost data in this table is based on the standard methodology adopted for all finance expenditure data in the Category Analysis RIN. Refer to section 3 Financial Data for the overall Basis of Preparation on finance data prepared for multiple tables in the RIN. The specific methodology and assumptions made for this table are also outlined below.

Methodology & Assumptions

The following assumptions have been made to classify the devices and task types for the purpose of this reporting:

Description	Definition
Major Road Lighting	Luminaires with wattage 150 or higher
Minor Road Lighting	Luminaires with wattage less than 150
Routine Maintenance/Replacement	Work of a planned nature (routine inspections, bulk programs, night patrols)
Non-Routine Maintenance/Replacement	Unplanned work performed by Essential Energy
Public Lighting	Installed Type 7 unmetered lights that are billed through the Unmetered Billing System

Light Installation Volume & Expenditure

- Volumes were extracted from the WASP Asset History for 2016-17.
- The streetlight data was categorised between major and minor road using the wattage assumption above.
- There are no costs associated with new light or pole installations as these are customer funded and deemed as gifted assets.

Light Replacement Volume & Expenditure

- Replacement volumes were extracted from the WASP Work Task records for 2016-17. Volumes will include internally and externally funded replacements where the asset is an Essential Energy asset.
- The streetlight data was categorised between major and minor road using the wattage assumption above.
- Total cost for light replacement includes only internally funded work, representing Essential Energy funded replacement expenditure. Customer funded program expenditure has been excluded.

Light Maintenance Volume & Expenditure

- Maintenance volumes were extracted from WASP Work Task records for 2016-17. This will include inspections, spot maintenance work, and bulk lamp replacement programs.
- The streetlight data was categorised between major and minor road using the wattage assumption above.
- Number of poles installed includes the volume of dedicated streetlight pole inspections completed during the period.
- Total cost is the direct operating expenditure associated with maintenance programs for streetlights.

Quality of Supply

Mean Days

- This number was derived from Cognos report PR25 YTD Customer Reported June 2016 Graph. This report identifies the total number of customer reported tasks received, calculates the total number of days taken to repair between the reported date and the completed date (excluding weekends and public holidays), and then provides the average.

Volume of GSL Breaches, Payments & Customer Complaints

This data was obtained from the Customer Affairs Business Unit and the data was extracted from the CMS Database.

Use of Estimated Information

All volume information has been sourced from WASP and is considered to be actual data. The data contains no estimates.

Reliability of Information

The data in this table is considered to be reliable.

Table 4.1.3 - Cost Metrics

Compliance with Requirements of the Notice

The following sections outline how Essential Energy has ensured that the information provided is consistent with the requirements of the Notice.

Source of Information

- The number of Replacement and Maintenance work tasks for 2016-17 were obtained from WASP work task records.
- Financial information was provided at a transaction level for the relevant public lighting project types. This data was provided by Finance.

Methodology & Assumptions

The main assumptions for this table are:

- Average unit rates are applied as financial information is not available at a light type.

Light Installation – Major & Minor Road

There are no costs associated with any light or pole installations as these are deemed as gifted assets.

Light Replacement – Major & Minor Road

- Replacement Work Task records by light type and road type for 2016-17 were extracted from WASP.
- Material costs were sourced from a number of areas being Procurement Inventory Listing and both the CAPEX and PTRM SLUOS models.
- Internal labour costs were derived from the PTRM SLUOS model and include plant and labour.
- Contractor maintenance and replacement rates were advised by Project Manager at the commencement of the new contract period.

Light Maintenance

- Maintenance Work Task records by light type and road type for 2016-17 were extracted from WASP.
- Contractor maintenance and replacement rates were advised by Project Manager at the commencement of the new contract period.
- All material costs were sourced from either Procurement Inventory Listing, CAPEX or PTRM SLUOS models.

- Where material costs were not available, the costs of similar size materials were used.

Use of Estimated Information

The data in this table contains assumptions and estimates. As works are completed from two separate streams, being bulk contractor works and internal spot works, the estimated cost provides a hybrid weighted average of the two.

Reliability of Information

Given the underlying assumptions and estimates made in this data, caution should be applied if using the data in the table for benchmarking or decision making purposes.

Worksheet 4.2 – Metering

Table 4.2.1 – Metering Descriptor Metric

Compliance with Requirements of the Notice

In the following subheadings Essential Energy seeks to demonstrate how the information provided is consistent with the requirements of this Notice.

Source of Information

- EDDiS - This system is used by metering services, in its capacity as an accredited Meter Provider and Meter Data Provider in the NEM, to store and process meter readings and meter registry information pertaining to chapter 7 of the NER.

Methodology & Assumptions

- Meter population volumes for 2016-17 have been produced through a query from the EDDiS database, with the query providing total number of meters by type and categories required for completion of this table.
- Note: Meter population numbers are duplicated in the RIN template with details provided by subcategory of Single Phase and Multi Phase Meter Populations and also by subcategory of Current Transformer and Direct Connect Meter Populations. The sum of Single Phase and Multi Phase meters should equal the sum of Current Transformer and Direct Connect Meter populations.

Use of Estimated Information

The data in this table is considered to be actual data other than the duplication of meter numbers noted above.

Reliability of Information

Given the data duplication within this table, caution should be applied if using the data for benchmarking or decision making purposes.

Table 4.2.2 - Cost Metrics

Compliance with Requirements of the Notice

In the following subheadings Essential Energy seeks to demonstrate how the information provided is consistent with the requirements of this Notice.

Source of Information

- EDDiS - This system is used by metering services to store and process meter readings and meter registry information pertaining to chapter 7 of the NER.
- Reports and budgetary information from PeopleSoft. This data was aligned to the Annual Reporting RIN based on mapping provided by SMEs.

Methodology & Assumptions

Reporting for Metering is in line with how the alternative control data for Type 5 & 6 meters will be recorded in the future.

Meter Purchase

- Financial reports from PeopleSoft have been used for 2016-17. This data was aligned to the Annual Reporting RIN based on mapping provided by SMEs. Volume information for Meter Purchases has been derived from delivery information from Essential Energy's two meter suppliers.

Meter Testing

- Meter testing includes the regulatory compliance testing of meters undertaken by Essential Energy in accordance with the NER. Meter testing figures have come from EDDiS for all works orders raised and completed for Meter Testing Activities
- Information for 2016-17 is based on financial reports from PeopleSoft. This data was aligned to the Annual Reporting RIN based on mapping provided by SMEs.

Meter Investigation and Special Meter Reading

- These are all zero as they have been covered by Network Operation in Section 4.3 Fee Based Services.

Scheduled Meter Readings

- Information for Type 6 readings for 2016-17 is based on financial reports from PeopleSoft. This data was aligned to the Annual Reporting RIN based on mapping provided by SMEs.
- Volume figures come from a count of reads from the meter reading system.

New Meter Installs

- All data for this section is zero as new meter installs are either conducted by Accredited Service Providers or, where an installation of metering with Current Transformers is performed, by Metering Services on a quote for service basis and therefore not included.

Meter Replacement

- Meter replacement includes the pro-active replacement of meters that have failed to meet compliance under the NER. There is no information for 2016-17, as the program was suspended in the lead up to the Power of Choice initiative.

Meter Maintenance

- Meter maintenance includes the routine maintenance of meters, including replacement of meters that have failed in service. Volume figures are based on the amount of works orders raised and completed for meter maintenance activities.
- Data for 2016-17 is based on Metering project type data in PeopleSoft, reconciling back to the Annual Regulatory Accounts.

Remote Meter Reading

- Remote meter reading costs are included in the Type 5 meter reading costs provided under Scheduled Meter Reading. While these meters are set up as Type 5 meters, they are read remotely due to the technical difficulties in probe reading these meters. These costs are estimated based on the volume of sites and the reading frequency. This data was aligned to Annual Reporting RIN based on mapping provided by SMEs.

Other Metering

- Other metering includes redundancies for Meter Reading and Meter Provision, with the balance being costs incurred in the Meter Data Agency section. These costs were obtained from PeopleSoft reports.

Use of Estimated Information

This table contains estimated information as noted in the Methodology section above.

Reliability of Information

Given the assumptions underlying data in this table, caution should be applied if using the data for benchmarking or decision making purposes.

Worksheet 4.3 - Fee-based services

Table 4.3.1 – Cost Metrics for Fee-Based Services

Compliance with Requirements of the Notice

Essential Energy has provided 2016-17 costs and volumes for each of the Ancillary Service Fees it has charged.

Source of Information

- Service orders related to B2B transactions were extracted from Essential Energy's Yambay (Power on Fusion) dispatch system.
- Services related to contestable construction works has been extracted from Essential Energy's Contestable Works Management System.
- Other services have been sourced directly from the managers responsible for the processes.
- Expenditure was sourced from PeopleSoft Financials and COGNOS.

Methodology & Assumptions

Essential Energy's existing service orders/PTJs have been classified as outlined in the table below:

Service Sub-Category	PTJ Type
Special Meter Read	B2B 915 Special Read B2B Check Read
Move in Meter Read	B2B Re-en Read Request
Move out Meter Read	Final Reading Only
Meter Test – 1st Meter	B2B Meter Test
Off Peak Conversion	B2B Change Controlled Load B2B Change Timeswitch
Disconnect - site visit	B2B Disc Non Pay/Fuse B2B Disc Non Pay/Pole (status incomplete)
Reconnect – site visit	B2B Re-en after DNP B2B Re-en After Hours Re-en After DNP AH – SO (status incomplete)
Disconnect/Reconnect – Disconnection Complete	B2B Disc Non Pay/Fuse
Disconnect/Reconnect – Technical Disconnect	NOT USED
Vacant Premise – Reconnect/Disconnect	B2B Final Read/Fuse

Service Sub-Category	PTJ Type
Vacant Premise – Reconnect/Disconnect (site visit only)	B2B Final Read/Disc at Pole B2B Final Read/Fuse
Disconnect – Pillar/Pole	B2B Disc Non Pay/Pole B2B Final Read/Disc at Pole
Reconnect – outside business hours	B2B Re-en After Hours Re-en After DNP AH - SO

- The wasted visit volumes were calculated using the “Completion Status” from Yambay. PTJs with an “Incomplete” status were counted as wasted visits.
- Financial information was extracted from PeopleSoft at a transaction level and summarised at a product code level.
- For the remaining fee-based services Essential Energy has estimated actual service volumes, from the historical revenue recorded in its General Ledger wherever possible. The business has supplemented and verified these estimates using secondary business systems such as the “Contestable Works Database”. Where actual volumes could be extracted at a fee level, those volumes were applied to Essential’s estimated costs.

Use of Estimated Information

The financial data in this table is chiefly comprised of actual information from the PeopleSoft source system. There was some amalgamation of amounts to better reflect the standing categories and historical levels of effort.

Reliability of Information

Given the assumptions and estimations underpinning the data in this table, caution should be applied if using the data for benchmarking or decision making purposes.

Worksheet 4.4 - Quoted services

Table 4.4.1 – Cost metrics for quoted services

Compliance with Requirements of the Notice

Essential Energy has provided 2016-17 costs and volumes for each of the Ancillary Service Fees it has charged.

Source of Information

- Service orders related to B2B transactions were extracted from Essential Energy's Yambay (Power on Fusion) dispatch system.
- Services related to contestable construction works has been extracted from Essential Energy's Contestable Works Management System.
- Other services have been sourced directly from the managers responsible for the processes.
- Expenditure was sourced from PeopleSoft Financials and COGNOS.

Methodology & Assumptions

Essential Energy's existing service orders/PTJs have been classified as outlined in the table below:

Service Sub-Category	PTJ Type
Special Meter Read	B2B 915 Special Read B2B Check Read
Move in Meter Read	B2B Re-en Read Request
Move out Meter Read	Final Reading Only
Meter Test – 1st Meter	B2B Meter Test
Off Peak Conversion	B2B Change Controlled Load B2B Change Timeswitch
Disconnect - site visit	B2B Disc Non Pay/Fuse B2B Disc Non Pay/Pole (status incomplete)
Reconnect – site visit	B2B Re-en after DNP B2B Re-en After Hours Re-en After DNP AH – SO (status incomplete)
Disconnect/Reconnect – Disconnection Complete	B2B Disc Non Pay/Fuse
Disconnect/Reconnect – Technical Disconnect	NOT USED
Vacant Premise – Reconnect/Disconnect	B2B Final Read/Fuse

Service Sub-Category	PTJ Type
Vacant Premise – Reconnect/Disconnect (site visit only)	B2B Final Read/Disc at Pole B2B Final Read/Fuse
Disconnect – Pillar/Pole	B2B Disc Non Pay/Pole B2B Final Read/Disc at Pole
Reconnect – outside business hours	B2B Re-en After Hours Re-en After DNP AH - SO

- The wasted visit volumes were calculated using the “Completion Status” from Yambay. PTJs with an “Incomplete” status were counted as wasted visits.
- Financial information was extracted from PeopleSoft at a transaction level and summarised at a product code level.
- For the remaining fee-based services Essential Energy has estimated actual service volumes, from the historical revenue recorded in its General Ledger wherever possible. The business has supplemented and verified these estimates using secondary business systems such as the “Contestable Works Database”. Where actual volumes could be extracted at a fee level, those volumes were applied to Essential’s estimated costs.

Use of Estimated Information

The financial data in this table is chiefly comprised of actual information from the PeopleSoft source system. There was some amalgamation of amounts to better reflect the standing categories and historical levels of effort.

Reliability of Information

Given the assumptions and estimations underpinning the data in this table, caution should be applied if using the data for benchmarking or decision making purposes.

Worksheet 5.2 - Asset Age Profile

Table 5.2.1 – Asset Age Profile

Poles

Compliance with Requirements of the Notice

The information provided lists the number of poles owned by Essential Energy as well as privately owned poles which are maintained by Essential Energy.

Source of Information

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

Methodology & Assumptions

SQL Logic:

- Both Essential Energy and privately owned poles have been included. Private assets are included as these are poles that Essential Energy inspects and in some cases maintains.
- Includes assets categorised in WASP as "Poles".
- In Service poles only have been included.
- Staked Poles have been determined by those In Service poles that have had a completed "Pole – Reinstate" work task recorded against them (excluding those poles that have been replaced since reinstatement), as well as those poles with a reinforcement attribute but prorated from 1990-91 to 2004-05.
- Staked poles have only been recorded in their own specified row and have not been included in the other pole voltage/material groupings.
- Dedicated street lights have not been included in the pole counts.
- Age is determined from the pole's "Date Installed". Those Poles that do not have a "Date Installed" have been prorated across the existing asset age profile.
- Pole Material is determined from the pole's "Pole Material" and "Pole Type" attributes as follows:

Pole Material	Pole Type	Material
Blank	Blank	Wood
Blank	Copper Chrome Arsenic	Wood
Blank	Low Temperature Creosote	Wood
Blank	Pigment Emulsified Creosote	Wood
Blank	Pressure Impregnated	Wood
Unknown	Blank	Wood
Unknown	Copper Chrome Arsenic	Wood

Unknown	Low Temperature Creosote	Wood
Unknown	Pigment Emulsified Creosote	Wood
Unknown	Pressure Impregnated	Wood
Timber	Blank	Wood
Timber	Copper Chrome Arsenic	Wood
Timber	Copper Chrome Napthenate	Wood
Timber	Low Temperature Creosote	Wood
Timber	Pigment Emulsified Creosote	Wood
Timber	Pressure Impregnated	Wood
Concrete		Concrete
Steel		Steel
Tower		Steel
Aluminium		Steel
Stobie		Concrete
Composite		Other

- Voltage is determined from the pole's "Highest Voltage" and "Pole Function" attributes as follows:

Pole Function	Highest Voltage	Voltage
Bollard Pole	Blank	Bollard - None
HV/LV Pole	Blank	11kV
HV Pole	Blank	11kV
LV Pole	Blank	<=1kV
Street Light Column	Blank	<=1kV
Transmission/HV Pole	Blank	66kV
Transmission/HV/LV Pole	Blank	66kV
Transmission/LV Pole	Blank	66kV
Transmission Pole	Blank	66kV
	Bollard – None	Bollard - None
	6.35	11kV
	6.6	11kV
	11	11kV
	22	22kV
	12.7	12.7kV
	19.1	19.1kV

	33	33kV
	66	66kV
	132	132kV

- If the asset voltage is blank or “Unknown”, then the asset’s maintenance area primary voltage is used instead (determined from Smallworld data).
- If the asset voltage is “Bollard – None”, it has been included in “Other”.
- If the pole material is “Composite”, it has been included in “Other”.

Use of Estimated Information

Essential Energy has used estimated information for the pole material when there is no material listed for the pole. The estimation of using the pole type and pole function gives a fairly accurate estimation. Any poles without a “Date Installed” have been prorated across the existing asset age profile.

Staked Poles have been determined using a combination of work tasks and attributes against the pole; however, this data is only available after 2004. Prior to this, data has been prorated from 1990-91 to 2004-05.

Reliability of Information

The reliability of the data in this table is dependent on the accuracy of the data within the WASP database as well as the accuracy of the assumptions and estimations that have been used. Caution should be applied if using this data for benchmarking or decision making purposes. In particular, the reliability of the ages of staked poles is questionable due to the lack of data.

Overhead Conductors

Compliance with Requirements of the Notice

The data in this table has been prepared in accordance with the requirements of the Notice.

Source of Information

System	Data
WASP	• Substations Site - Asset label, Date Constructed
Smallworld	• Cable - Date Installed, Purpose, Operating Voltage, Service Status, Owner, Nominal Length, Geometry (both Centreline and Actual Centreline combined), LV Service Type, Parent Substation • Substation Site – Asset Label, Location

Methodology & Assumptions

Smallworld Cables used in the analysis were filtered by:

- Purpose = Overhead
- Owner = Essential Energy
- LV Service type not equal to “Service”
- Service Status = all

The Date Installed was converted into financial year. Lengths were summed by financial year and regulatory voltage category, ie. ≤1kV, and entered into the "quantity by year" cells of the table.

- An estimate date installed was unachievable for a total of 13,100km of line – this length was spread across the age classes prior to 2004 according to the age distribution for each voltage category.

Use of Estimated Information

Date Installed (Smallworld Cable)

Essential Energy has used a combination of actual and estimated information for the Date Installed attribute of lines. The probability of a record having a valid Date Installed value is greater in the years from 2003 onwards. Although legacy data has been used to fill in these values, valid dates are less likely to be available for lines installed by pre-amalgamation distributors. The collection of this information in the field is extremely difficult.

Assumptions:

- Various aging techniques have been undertaken by the business to age unknown sections of the network. These undertakings have been adopted in an effort to age the network as accurately as possible.

Reliability of Information

The reliability of the data in this table is dependent on the accuracy of the data within the GIS Smallworld database and the assumptions and estimations that have been used. Caution should be applied if using this data for benchmarking or decision making purposes.

Underground Cables

Compliance with Requirements of the Notice

The data in this table has been prepared in accordance with the requirements of the Notice.

Source of Information

System	Data
WASP	• Substations Site - Asset label, Date Constructed
Smallworld	• Cable - Date Installed, Purpose, Operating Voltage, Service Status, Owner, Nominal Length, Geometry (both Centreline and Actual Centreline combined), LV Service Type, Parent Substation • Substation Site – Asset Label, Location

Methodology & Assumptions

Smallworld Cables used in the analysis were filtered by:

- Purpose = Underground
- Owner = Essential Energy
- LV Service type not equal to "Service"
- Service Status = all

The Date Installed was converted into financial year. Lengths were summed by financial year and regulatory voltage category, ie. ≤1kV, and entered into the "quantity by year" cells of the table.

- An estimate date installed was unachievable for a total of 1,189km of line – this length was spread across the age classes prior to 2004 according to the age distribution for each voltage category.

Use of Estimated Information

Date Installed (Smallworld Cable)

Essential Energy has used a combination of actual and estimated information for the Date Installed attribute of lines. The probability of a record having a valid Date Installed value is greater in the years from 2003 onwards. Although legacy data has been used to fill in these values, valid dates are less likely to be available for lines installed by pre-amalgamation distributors. The collection of this information in the field is extremely difficult.

Assumptions:

- Various aging techniques have been undertaken by the business to age unknown sections of the network. These undertakings have been adopted in an effort to age the network as accurately as possible.

Reliability of Information

The reliability of the data in this table is dependent on the accuracy of the data within the GIS Smallworld database and the assumptions and estimations that have been used. Caution should be applied if using this data for benchmarking or decision making purposes.

Service Lines

Compliance with Requirements of the Notice

The data in this table has been prepared in accordance with the requirements of the Notice.

Source of Information

System	Data
WASP	• Substations Site - Asset label, Date Constructed
Smallworld	• Cable - Date Installed, Purpose, Operating Voltage, Service Status, Owner, Nominal Length, Geometry (both Centreline and Actual Centreline combined), LV Service Type, Parent Substation • Service Point – Premise Join

Methodology & Assumptions

Cables used in the analysis:

- Purpose = all
- Operating Voltage = LV
- Owner = Essential Energy
- LV Service type = Service
- Service Status = all

In GIS Smallworld, premises are located at an object known as a Service Point. The Smallworld Cable (underground or overhead) connecting the Service Point to the network is attributed as “Service”.

- For each Service Point find the following information:
    - Date Installed of Service Cable (estimated if required – see below)
    - Customer Type Residential or Business
- Convert the date installed into financial years. Count the cables by financial year and enter into the “quantity by year” cells of the table for the appropriate category.

NOTE:

Essential Energy does not have any Services that are not low voltage.

Essential Energy does not have any Services that are complex.

Essential Energy does not have any Services of type subdivision.

All Essential Energy Commercial & Industrial customers are low voltage and are therefore connection complexity = Simple.

Use of Estimated Information

Date Installed (Smallworld Cable)

Essential Energy has estimated the Date Installed value for services. The location of services has not been uniformly populated in the system until recent years. The Customer, Premise, Substation group has been connecting the Service Point to the network in bulk over the past decade – date installed information was not included as part of this process. The collection of this information in the field is both difficult and practically impossible.

Date installed determined the dates in the below categories and if found, assigned the date in the order of priority below:

- Known Service Cable Date
- Land Parcel Registration Date
- Service Pole Installation Date
- Substation Installation Date

Any Service Cable that could not be allocated a date was spread across the age classes according to the age distribution.

Assumptions:

- The land parcel registration date is the date the service was installed and has not been subsequently replaced.
- The service pole installation date is the date the service was installed and has not been subsequently replaced.
- The substation installation date is the date the service was installed and has not been subsequently replaced.

Customer Type

Information regarding the customer type that the cable is servicing is not maintained against the cable object in GIS Smallworld. Therefore this information was obtained from the premise information in Peace.

If a Service Point in GIS Smallworld had at least one residential Premise joined to it, it was considered residential.

Reliability of Information

The reliability of the data in this table is dependent on the accuracy of the data within the GIS Smallworld database and the assumptions and estimations that have been used. Caution should be applied if using this data for benchmarking or decision making purposes.

Transformers

Compliance with Requirements of the Notice

The information provided includes distribution transformers owned by Essential Energy that are currently in use.

Source of Information

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

Methodology & Assumptions

SQL Logic:

Total = [Distribution Transformers] + [Zone Substation Auxiliary Transformers] + [Zone Substation Power Transformers] + [Distribution Regulating Transformers] + [Zone Substation Regulators (single phase)], as determined below:

Distribution Transformers

- Only Substation Sites with an Owner = "Essential Energy".
- All Transformers that are currently In Service (in use).
- Includes SWER Isolators and Step Up/Down Transformers. This varies to the method for completion of EB RIN Section 3.5 Physical Assets.
- Voltage has been determined from the asset's "Primary Voltage".
- 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 approximately 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 (eg. Pole Substation) = 10kVA

- If kVA is still undetermined then kVA is estimated as:

Ground or Chamber Substation < 22kV	<=60kVA
Ground or Chamber Substation >= 22kV	<=15MVA
All Others	<=60kVA

- For larger transformers (Ground and Chamber >= 22kV), the kVA determined above has been converted to MVA by dividing by 1000 for input into the RIN template.

- Mounting Type was determined based on "Construction Type" as follows:
  - "Pole Substation","2 Pole Platform Substation", "Supported Platform Substation" = Pole Mounted
  - "Ground Substation", "Chamber Substation" = Ground Outdoor/Indoor Chamber Mounted
  - "Pad/Kiosk Substation" = Kiosk Mounted

If "Construction Type" is blank, then "Pole Mounted" was assumed (note this was only required in < 0.5% of cases).

- Phases was determined based on the asset Phases attribute as follows:
  - "HV1" = Single Phase
  - Else Multiple Phase
- Year has been obtained from the most recent "Date Manufactured" from the Substation Site's associated children transformer(s). If this is not available, then Year has been derived as follows:
  - Substation Site "Date Constructed".
  - Those Substation Sites that do not have a "Date Constructed" or a transformer with a "Date Manufactured" have been prorated across the existing asset age profile.
- Distribution transformers in stores have not been included.

Zone Substation Auxiliary Transformers

- ZS Auxiliary Transformers with a Service Status of "In Service".
- Only ZS Auxiliary Transformers with an Owner = "Essential Energy".
- All ZS Auxiliary Transformers have been categorised as "Ground Outdoor/Indoor Chamber Mounted".
- All ZS Auxiliary Transformers have been categorised as "Multiple Phase".
- Voltage has been obtained from the ZS Auxiliary Transformer's "Primary Voltage". If "Primary Voltage" is blank, then "<22kV" has been assumed. This was only required in < 0.5% of cases.
- kVA has been obtained from the ZS Auxiliary Transformer "Rating (kVA)". If this is not available, then kVA has been derived as follows:
  - If ZS Auxiliary Transformer "Rating (kVA)" is blank, then use "Primary Voltage" as follows:

    < 22kV = ">60kVA and <=600kVA"

    >= 22kV = "<=15MVA"
  - If "Primary Voltage" is blank or "Unknown", then a kVA of ">60kVA and <=600kVA" has been assumed.

    - For larger transformers (Ground and Chamber >= 22kV), the kVA determined above has been converted to MVA by dividing by 1000 for input into the RIN template.
- Year has been obtained from the ZS Auxiliary Transformer's "Year of Manufacture". If this is not available, then Year has been derived as follows:
    - If ZS Auxiliary Transformer "Year of Manufacture" is blank, then use the "Commissioning/Install Date".
    - Those ZS Auxiliary Transformers that do not have a "Year of Manufacture" or "Commissioning/Install Date" have been prorated across the existing asset age profile.

Zone Substation Power Transformers

- ZS Power Transformers with a Service Status of "In Service".
- Only ZS Power Transformers with an Owner = "Essential Energy".
- Excludes ZS Power Transformers with a Type of "Regulator" or a Usage of "Spare" (these are included in "Other").
- All ZS Power Transformers have been categorised as "Ground Outdoor/Indoor Chamber Mounted".
- All ZS Power Transformers have been categorised as "Multiple Phase".
- MVA 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:
    - If ZS Power Transformer "Year of Manufacture" is blank, then use the "Date Installed" attribute from the ZS Power Transformer.
    - If ZS Power Transformer "Date Installed" is not available, they were prorated across the existing asset age profile.

Distribution Regulating Transformers

- Recorded in "Other".
- Only Regulating Transformers with an Owner = "Essential Energy".
- Regulating Transformers with a Service Status of "In Service".
- Year has been obtained from the Regulating Transformer's "Date Manufactured". If this is not available, then Year has been derived as follows:
    - If Regulating Transformer "Date Manufactured" is blank, then use the "Date Constructed" attribute from the Regulator Site.
    - If Regulator Site "Date Constructed" is not available then they were prorated across the existing asset age profile.
- Voltage has been determined from the asset's "Primary Voltage". If blank, it is assumed to be <22kV.
- Phases are determined as:
    - HV1, LV1, SWER = Single Phase
    - HV3, LV2, LV3 = Multiple Phase

Zone Substation Regulating Transformers (Single Phase)

- Recorded in “Other”.
- ZS Regulating Transformers (Single Phase) with a Service Status of “In Service”.
- Only ZS Regulating Transformers (Single Phase) with an Owner = “Essential Energy”.
- All ZS Regulating Transformers (Single Phase) have been categorised as “Ground Outdoor/Indoor Chamber Mounted”.
- All ZS Regulating Transformers (Single Phase) have been categorised as “Single Phase”.
- Year has been obtained from the ZS Regulating Transformer’s “Year of Manufacture”. If this is not available, then Year has been derived as follows:
    - If ZS Regulating Transformer’s “Year of Manufacture” is blank, then use the “Date Installed” attribute from the ZS Power Transformer.
    - If ZS Regulating Transformer’s “Date Installed” is not available, they were prorated across the existing asset age profile.

Use of Estimated Information

- Essential Energy has used estimated information when there is no “Date Constructed” for the Substation Site or “Date Manufactured” on the child Transformer(s) for Distribution Substations.
- Essential Energy has used estimated information when there is no “Year of Manufacture” or “Commissioning/Install Date” for the ZS Auxiliary Transformers as per the existing age profile.
- Essential Energy has used estimated information when there is no “Total kVA” for the Substation Site as per the logic detailed above. This only occurred 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.
- Essential Energy has used estimated information when there is no “Rating (kVA)” for the ZS Auxiliary Transformers as per the logic detailed above. This only occurred in approximately 17% 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 Voltage.

Reliability of Information

The reliability of the data is dependent on the accuracy of the data within the WASP database as well as the accuracy of the assumptions and estimations that have been used. It has been determined that the data is reasonably reliable for all items, however caution should be applied if using this data for benchmarking or decision making purposes.

Switchgear

Compliance with Requirements of the Notice

The information provided lists Switchgear assets that are owned by Essential Energy and are currently in use. Switchgear includes Reclosers, Sectionalisers, Disconnecting Links, Fuses, Air Break Switches, Load Break Switches, Fuses/Switches that are part of Substations and Zone Substation Circuit Breakers.

Source of Information

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

Methodology & Assumptions

These figures were determined in four parts:

1. Extract data/age profile for Distribution Switchgear currently recorded in WASP.
2. Extract data/age profile for Zone Substation Circuit Breakers recorded in WASP.
3. Extract data/age profile for Zone Substation Switches recorded in WASP.
4. Estimate the number of Fuses/Switches that are part of Substations (both pole mounted and ground/enclosed substations) that are not discretely recorded in WASP.

The results from these queries/estimations were then combined. The logic for each of these three parts is detailed below:

1. Extract data/age profile for Distribution Switchgear currently recorded in WASP

SQL Logic:

- Circuit Breakers = assets with a category of "Recloser Site".
- Switches = assets with a category of "Sectionaliser Site", "Disconnecting Link", "Air Break Switch", "Load Break Switch Site".
- Fuse = assets with a category of "Fuse - O/H".
- When the fuse's voltage > 11kV, it is included in the category of "Switches".
- Only assets with an owner of "Essential Energy".
- Service Status = "In Service".
- Year has been determined by the asset's "Constructed Date". If this is not available, then Year has been derived as follows:
    - If the "Constructed Date" is blank, then use the parent pole's "Date Installed" if available or applicable.
    - Those assets that do not have a "Constructed Date" or a parent pole with a "Date Installed" have been prorated across the existing asset age profile.
- Voltage has been determined from the asset's "Primary Voltage". If the asset voltage is blank or "Unknown", then the Voltage has been derived as follows:
    - If no asset Voltage is available, the parent pole's "Highest Voltage" is used if available or applicable.
    - If the parent pole's Highest Voltage is unknown, then the asset's Maintenance Area primary voltage is used instead (determined from Smallworld data).

2. Extract data/age profile for Zone Substation Circuit Breakers recorded in WASP

SQL Logic:

- ZS Circuit Breakers with a Service Status indicating it is in service or will be in future ("In Service", "Open Point", "System Spare", "Under Construction", "Out of Service", "Not Applicable", or "Under Repair").
- Only ZS Circuit Breakers with an Owner = "Essential Energy".

- All ZS Circuit Breakers have been categorised as “Circuit Breaker”.
- Voltage has been obtained from the ZS Circuit Breaker’s “Primary Voltage”. If “Primary Voltage”’ is blank, then “<=11kV” has been assumed.
- Year has been obtained from the ZS Circuit Breaker’s “Year of Manufacture”. If this was not available, then Year has been derived as follows:
    - If ZS Circuit Breaker “Year of Manufacture” is blank, then use the ZS Circuit Breaker’s “Commissioning/Install Date”.
    - If the ZS Circuit Breaker’s “Year of Manufacture” and “Commissioning/Install Date” is blank, then the parent Zone Substation’s “Year of Manufacture” was used.
    - Those ZS Circuit Breakers that do not have a “Year of Manufacture” or “Commissioning/Install Date” and whose parent Zone Substation does not have a “Year of Manufacture” have been prorated across the existing asset age profile.

3. Extract data/age profile for Zone Substation Switches recorded in WASP

SQL Logic:

- ZS Switches with a Service Status indicating it is in service or will be in future (“In Service”, “Open Point”, “System Spare”, “Under Construction”, “Out of Service”, “Not Applicable”, or “Under Repair”).
- Excludes Fault Throwers and Capacitor Discharge Switches.
- Only ZS Switches with an Owner = “Essential Energy”.
- All ZS Switches have been categorised as “Switch”.
- Voltage has been obtained from the ZS Switch’s “Primary Voltage”. If “Primary Voltage” is blank, then “<=11kV” has been assumed.
- Year has been obtained from the ZS Switch’s “Year of Manufacture”. If this was not available, then Year has been derived as follows:
    - If ZS Switch’s “Year of Manufacture” is blank, then use the ZS Switch’s “Commissioning/Install Date”.
    - If the ZS Switch’s “Year of Manufacture” and “Commissioning/Install Date” is blank, then the parent Zone Substation’s “Year of Manufacture” was used.
    - Those ZS Switches that do not have a “Year of Manufacture” or “Commissioning/Install Date” and whose parent Zone Substation does not have a “Year of Manufacture” have been prorated across the existing asset age profile.

4. Estimate the number of Fuses/Switches that are part of Substations and are not discretely recorded in WASP

Fuses/Switches that are part of substation sites (both pole mounted and ground/enclosed) are not typically discreetly recorded in WASP. These were estimated as follows:

Pole mounted Substation Sites:

- The quantity of pole mounted Substation Sites was determined from WASP. It was determined that there are approximately 130,431.
- The average quantity of fuses for overhead/pole mounted Substation Sites was determined. Based on the existing configuration of Substation Sites across Essential Energy’s network it was determined that on average there are 2.5 fuses per Substation Site; 1.5 LV fuses and 1 HV fuse per Substation Site.

- The estimated quantity of fuses for overhead/pole mounted Substation Sites was determined by multiplying steps 1 and 2:
    - LV Fuses = 1.5 x 130,431 = 195,647
    - HV Fuses = 1 x 130,431 = 130,431
- The profile of Primary Voltage for existing pole mounted Substation Sites was determined from WASP as follows:

Voltage	Count	Percentage	Mapping
11kV	87,056	67%	<=11kV
12.7kV	3,398	2%	>11kV and <=22kV
19.1kV	5,052	4%	>11kV and <=22kV
22kV	33,531	26%	>11kV and <=22kV
33kV	1,367	1%	>22kV and <=33kV

Split	
<=11kV	67%
>11 and <=22kV	32%
>22 and <=33kV	1%
	100%

- These percentages were applied to the estimated counts in step 3 to determine the quantities per voltage group:
    - LV Fuses
        - LV = 100% x 195,647 = 195,647
    - HV Fuses
        - <=11kV = 67% x 130,431 = 87,389
        - >11kV and <=22kV = 32% x 130,431 = 41,738
        - >22kV and <=33kV = 1% x 130,431 = 1,300
- All of these were categorised as “Fuse”.

Ground Mounted/Enclosed Substation Sites:

- The quantity of ground mounted/enclosed Substation Sites was determined from WASP. It was determined that there are approximately 6,733.

- The average quantity of fuses/switchgear for ground mounted/enclosed Substation Sites was determined. Based on the existing configuration of these Substation Sites across Essential Energy's network it was determined that on average there are 6 fuses/switches per Substation Site; 4 LV fuses and 2 HV fuses per Substation Site.
- The estimated quantity of fuses for ground mounted/enclosed Substation Sites was determined by multiplying steps 1 and 2:
    - LV Fuses = 4 x 6,733 = 26,932
    - HV Fuses = 2 x 6,733 = 13,466
- The profile of Primary Voltage and categorisation (fuse, circuit breaker or operational switch) for existing ground mounted/enclosed Substation Sites was determined from WASP as follows:

LV Switchgear

Split	
LV Circuit Breaker	11%
LV Fuse	89%
	100%

HV Switchgear

Split	
11kV Circuit Breaker	35%
22kV Circuit Breaker	5%
11kV Fuse	41%
22kV Fuse	3%
11kV Operational Switch	10%
22kV Operational Switch	6%
	100%

- These percentages were applied to the estimated counts in step 3 to determine the quantities per voltage group:
    - LV Switchgear
        - LV Circuit Breaker = 11% x 26,932 = 2,963
        - LV Fuse = 89% x 26,932 = 23,969
    - HV Switchgear
        - <=11kV Circuit Breaker = 35% x 13,466 = 4,713
        - <=11kV Fuse = 41% x 13,466 = 5,521

–	<= 11kV Operational Switch	= 10% x 13,466	=	1,347
–	>11kV and <=22kV Circuit Breaker	= 5% x 13,466	=	673
–	>11kV and <=22kV Fuse	= 3% x 13,466	=	404
–	>11kV and <=22kV Operational Switch	= 6% x 13,466	=	808

- The age profile of the equivalent category of the existing switchgear was then applied to each of these estimated counts to determine year/age.

Use of Estimated Information

Essential Energy has estimated information for:

- Distribution Switchgear currently recorded in WASP as follows:
    - The asset's age when there is no "Construction Date" for that asset. The estimation uses the parent pole's "Date Installed" if available which gives a fairly accurate estimation. If neither of these dates were available to determine age, then the assets were aged as per the existing age profile.
    - The asset's voltage when there is no voltage listed for that asset. The estimation uses the parent pole's voltage or the Maintenance area's primary voltage which gives a fairly accurate estimation.
- Zone Substation Circuit Breakers recorded in WASP as follows:
    - the asset's age when there is no "Year of Manufacture" for that asset. The estimation uses the asset's "Commissioning/Install Date" for the ZS Circuit Breaker. If neither of these dates were available to determine age then the assets were aged as per the existing age profile.
    - the asset's voltage when there is no voltage listed for that asset. The estimation assumes <=11kV in < 0.05% of cases.
- Distribution Switchgear that is considered part of Substation Sites and is not discretely recorded in WASP has been entirely estimated based on knowledge of the network and existing data in WASP.

Reliability of Information

The reliability of this data is dependent on the accuracy of the data within the WASP database as well as the accuracy of the assumptions and estimations that have been used.

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 but not owned by Essential Energy have been included.

Source of Information

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

Methodology & Assumptions

SQL Logic:

- For the luminaire count - only Streetlights with an Owner = “Essential Energy” or “RTA” (which Essential Energy maintains) are included.
- For the dedicated streetlight pole count – only Streetlights that are owned by Essential Energy or Privately Owned but maintained by Essential Energy. No RTA poles.
- Only Streetlights with a Service Status = “In Service”.
- Streetlights with a Lighting Category = “Quarantined” were excluded.
- Streetlights with a wattage >= 150 are assumed to be Major Road. All else are classified as Minor Road.
- Assets with a category of “Nightwatch Light” were excluded.
- Age is determined from the parent pole’s “Date Installed” attribute.
    - If this does not exist then the streetlight’s “Connection Date” attribute is used to determine the age.
    - Those assets that do not have a “Date Installed” or a “Connection Date” have been prorated across the existing asset age profile.

Use of Estimated Information

Essential Energy has used some estimated information for the streetlight’s age when there is no install date for the parent pole. When there is no install date, the streetlight’s “Connection Date” is used which gives a fairly accurate estimation. Those assets that do not have a “Date Installed” or a “Connection Date” have been prorated across the existing asset age profile.

Reliability of Information

The reliability of this data is dependent on the accuracy of the data within the WASP database as well as the accuracy of the assumptions and estimations that have been used.

SCADA and Network Control

Compliance with Requirements of the Notice

The information provided shows the number of Essential Energy owned zone substation SCADA Remote Terminal Units (“RTU”s) that are currently in use.

Source of Information

This data has been obtained from:

- Essential Energy’s WASP database using SQL.
- Firmware version dates, where WASP data has been of a lower confidence.
- Grouping of data in Excel.

Assets captured in this category are those which have a sole purpose of providing SCADA and Network Control functionality to zone substations. Assets used to provide communication services to pole top devices have not been included in this section and will be captured elsewhere.

Methodology & Assumptions

SQL logic:

- Includes assets categorised in WASP.
- Only Essential Energy assets included.
- Only In Service assets included.
- No age data is available for asset category so the Firmware version is then utilised to affirm the installed date of the RTU.

Use of Estimated Information

The age of the zone substation SCADA has been entirely estimated based on knowledge of the Firmware version dates and existing data in WASP.

Material Accounting Policy Changes

Essential Energy has not undertaken any material changes in accounting policies around the items reported under zone substation "SCADA and Network Control" in this table over the period requested.

Reliability of Information

The reliability of this data is dependent on the accuracy of the data within the WASP database as well as the accuracy of the assumptions and estimations that have been used.

Other - Zone Substation Property

Compliance with Requirements of the Notice

The information provided shows the number of Essential Energy owned Zone Substation Sites that are currently in use.

Source of Information

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

Methodology & Assumptions

SQL Logic:

- Includes assets categorised in WASP as "ZS 3 Site".
- All owners are included.
- Only In Service assets included.
- Excludes types = Regulators, FI Plant, 11kV Switching Stations, Privately Owned, Other.
- Age is obtained from site's commissioning year. If this is not available then the year was estimated from either site drawings or child asset age.
- Those assets where age cannot be estimated are distributed across the existing asset age profile.

Use of Estimated Information

Where the age of the of the Zone Substation Sites is not recorded in WASP, it has been estimated based on knowledge of the network and existing data in WASP.

Reliability of Information

The reliability of this data is dependent on the accuracy of the data within the WASP database as well as the accuracy of the assumptions and estimations used.

Other - Zone Substation Batteries

Compliance with Requirements of the Notice

The information provided shows the number of Zone Substation Batteries that are currently in use.

Source of Information

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

Methodology & Assumptions

SQL Logic:

- Includes assets categorised in WASP as "ZS Battery".
- All owners are included.
- Only In Service assets included.
- Age is obtained from site's "Year of Manufacture". If this is not available, then the Zone Substation Site's "Commissioning Year" is used.
- Those assets with unknown ages are distributed across the existing asset age profile.

Use of Estimated Information

Where the age of the of the Zone Substation Battery or the Zone Substation Site is not recorded in WASP, it has been estimated based on knowledge of the network and existing data in WASP.

Reliability of Information

The reliability of this data is dependent on the accuracy of the data within the WASP database as well as the accuracy of the assumptions and estimations used.

Other - Zone Substation Current Transformers

Compliance with Requirements of the Notice

The information provided shows the number of Zone Substation Current Transformers that are currently in use.

Source of Information

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

Methodology & Assumptions

SQL Logic:

- Includes assets categorised in WASP as “ZS Current Transformer”.
- All owners are included.
- Only In Service assets included.
- Age is obtained from site’s “Year of Manufacture”. If this is not available, then the Zone Substation Site’s “Commissioning Year” is used.
- Those assets with unknown ages are distributed across the existing asset age profile.
- Exclude those with Type = “LV Typroid”.

Use of Estimated Information

Where the age of the of the Zone Substation Current Transformer or the Zone Substation Sites is not recorded in WASP, it has been estimated based on knowledge of the network and existing data in WASP.

Material Accounting Policy Changes

Essential Energy has not undertaken any material changes in accounting policies around the items reported under “Zone Substation Current Transformers” in this table over the period requested.

Reliability of Information

The reliability of this data is dependent on the accuracy of the data within the WASP database as well as the accuracy of the assumptions and estimations used.

Other - Zone Substation Voltage Transformers

Compliance with Requirements of the Notice

The information provided shows the number of Zone Substation Voltage Transformers that are currently in use.

Source of Information

This data has been obtained from Essential Energy’s WASP database using SQL and grouping of data in Excel.

Methodology & Assumptions

SQL Logic:

- Includes assets categorised in WASP as “ZS Voltage Transformer”.
- All owners are included.
- Only In Service assets included.
- Age is obtained from site’s “Year of Manufacture”. If this is not available, then the Zone Substation Site’s “Commissioning Year” is used.
- Those assets with unknown ages are distributed across the existing asset age profile.

Use of Estimated Information

Where the age of the of the Zone Substation Voltage Transformer or the Zone Substation Sites is not recorded in WASP, it has been estimated based on knowledge of the network and existing data in WASP.

Reliability of Information

The reliability of this data is dependent on the accuracy of the data within the WASP database as well as the accuracy of the assumptions and estimations used.

Other - Zone Substation Surge Diverters

Compliance with Requirements of the Notice

The information provided shows the number of Zone Substation Surge Diverters that are currently in use.

Source of Information

This data has been obtained from Essential Energy's WASP database as well as some estimation.

Methodology & Assumptions

SQL Logic:

- Includes assets categorised in WASP as "ZS Surge Diverter".
- All owners are included.
- Only In Service assets included.
- Age is obtained from Surge Diverter's "Commissioning/Install Date".
- Those assets with unknown ages are distributed across the first 24 years of the existing asset age profile (based on replacement every 24 years).
- 11 and 22kV arresters are not kept in WASP as ZS Surge Diverters but instead are determined by the number of outdoor ZS Circuit Breakers.

Use of Estimated Information

Where the age of the of the Zone Substation Surge Diverter is not recorded in WASP, it has been estimated based on knowledge of the network and existing data in WASP.

Reliability of Information

The reliability of this data is dependent on the accuracy of the data within the WASP database as well as the accuracy of the assumptions and estimations used.

Other - Zone Substation Protection Relays

Compliance with Requirements of the Notice

The information provided shows the number of Essential Energy owned Zone Substation Protection Relays that are currently in use.

Source of Information

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

Methodology & Assumptions

SQL Logic:

- Includes assets categorised in WASP as “ZS 4 PC Circuit”.
- Only Essential Energy assets included.
- Only In Service assets included.
- No age data is available for asset category, so the age profile for >33kV Switchgear has been used to estimate age.

Use of Estimated Information

The age of the Zone Substation Protection Relays have been entirely estimated based on knowledge of the network and existing data in WASP.

Reliability of Information

The reliability of this data is dependent on the accuracy of the data within the WASP database as well as the accuracy of the assumptions and estimations used.

Other - Type 5 & 6 Meters Installed

Compliance with Requirements of the Notice

The information provided shows the number of Essential Energy owned Type 5 & 6 Meters Installed.

Source of Information

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

Methodology & Assumptions

Age profiles for metering equipment are useful in determining potential replacement or maintenance activities and resultant expenditure.

Type 5 & 6 Meters Installed provides Essential Energy’s best estimate of the age profile of Essential Energy’s installed metering assets based on the year of installation. Estimation is required due to some data losses during the amalgamation of legacy organisations over such a long period of time.

Installation information on years >2002 is accurate due to information being available in systems.

Use of Estimated Information

This table contains estimated information.

Reliability of Information

The reliability of the data in this table is dependent on the accuracy of the data within the EDDiS database and the assumptions and estimations that have been used. Caution should be applied if using this data for benchmarking or decision making purposes.

Economic Life (years)

Mean

The data compiled in this column represents the economic life of the assets reported upon in this table. It is based on the data reported in the 2013-14 Category Analysis RIN, which in turn came from Essential Energy's Revenue Roll Forward Model as approved by the AER. Essential Energy believes that the data is reliable and will be updating it for the next regulatory period.

Standard Deviation

The data in this column represents the square root of the data in the "Mean" column. This method of deriving the standard deviation was noted as one possible method in section 5 "Replacement capex" (page 51) in the AER's Explanatory Statement to the Category Analysis RIN, issued March 2014.

Worksheet 5.3 - MD - Network level

Table 5.3.1 – Raw and Weather Corrected Coincident MD at Network Level (Summed at transmission connection point)

Compliance with Requirements of the Notice

In order to provide the actual loads for 2016-17, the Winter of 2016 and the Summer of 2016-17 were used, which included loads from April 1st 2016 to March 31st 2017. An example of the reasoning behind this method is where there is a very high load Winter, with a large peak in June and another in July. A financial year split will count these events as two separate years, such that the data misses the previous and next Summer peaks. Essential Energy does not consider the use of financial years to be adequate for use in forecasting.

Source of Information

The data is based on the maximum network demand as per the Annual Regulatory Accounts and what was reported in the Economic Benchmarking RIN.

The network level maximum demand is sourced from the half hourly demand meters (via Spotfire).

Methodology & Assumptions

The maximum network demand is determined by the sum of Essential Energy's Bulk Supply Points, Cross Border Supplies, and the inclusion of the Embedded Generators load at a half hourly level. From the half hourly data the Maximum Demand is determined with the date and time recorded. The actual dates and times of the occurrence have been reported in this table.

Private zone substation loads were not included in the zone substation figures.

The figures provided for the Weather Corrected 10% and 50% POEs network coincident MDs were as those provided by the external consultant NIEIR and align with the figures provided for DOPSD0111 and DOPSD0112 in the Economic Benchmarking RIN.

Use of Estimated Information

Actual data was used for determining the maximum demand, generation and applicable dates.
The Weather corrected 10% and 50% POEs came from External provider NIEIR which was based on actual data that Essential provided to them.

Reliability of Information

The maximum demand information is considered reliable.

Worksheet 5.4 - MD & utilisation-Spatial

Table 5.4.1 - Non-Coincident & Coincident Maximum Demand

Compliance with Requirements of the Notice

Substation Definition:
Any substation (or a part of a substation) that transforms voltages that supply subtransmission networks (33kV and above), have been included as a subtransmission substation ("STS"). Any substation that transforms voltages (from 33kV and above) that supply distribution networks (33kV and below) have been included as a zone substation ("ZS").

Substation Rating:
The AER definition of "Normal cyclic rating (for substations)" is "The maximum peak daily loading based on a given load cycle that a substation can supply each day of its life under normal conditions resulting in a normal rate of wear".

Essential Energy defines the rating of a substation to meet the above definition to be 110% in Summer and 120% in Winter of the combined nameplate rating of all transformers within the substation. For example, based on a Summer peak load, if the substation only has one transformer the substation rating will be 110% of the nameplate rating of that transformer, or if it has two or more transformers that can be used simultaneously to supply the load, the substation rating will be 110% of the combined nameplate rating of all the transformers.

Source of Information

The individual STS data was obtained from demand meters (via IMDR). The individual zone substation data was obtained from demand meters (via IMDR) and from SCADA (via TrendSCADA).

Methodology & Assumptions

There is a simple relationship between components of supplied electrical power. Some of these components include MW, MVAr, MVA and pf. These values can be calculated when two or more components are known by using fundamental equations for electrical properties. MW is the real power supplied, MVAr is reactive power, MVA is apparent power and pf is the power factor. The most relevant equation for this section is;

$$\frac{MW}{MVA} = pf$$

In this equation power factor equals a value between 0 and 1, so MVA is always equal to or greater than MW.

Change to timing arrangements:
In order to provide the actual loads for 2016-17, the Winter of 2016 and the Summer of 2016-17 was used, which included loads from April 1st 2016 to March 31st 2017. An example of the reasoning behind this method is where there is a very high load Winter, with a large peak in June and another in July. A financial year split will count these events as two separate years, so the data misses the previous and next Summer peaks. Essential Energy does not consider the use of financial years to be adequate for use in forecasting.

Raw Adjusted MD:

- **Non – coincident Maximum Demand**
  The vast majority of STSs and ZSs have reliable data recording devices. A minor number of the very small ZSs have limited methods to record the peak demand such as recloser data or maximum demand

indicators from which maximum demand has been derived. The raw data from each substation is collated into a common format and is compared against network configuration changes and filtered where an absence or abnormality is present. The peak demand is then screened and further cleansed if required to eliminate abnormal peaks to determine the true peak demand.

- **Coincident Maximum Demand**
  The raw coincident maximum demand for the 2016-17 year was extracted from each site after it has been compiled into the common format required for screening the non-coincident maximum demand.

- **Adjustments – Embedded Generation**
  Only discrete embedded generation units that impact the demand of the STSs or ZSs are included in the table. Rooftop photovoltaic generation is not shown as its impact is included in the actual and forecast demand of the individual ZSs. There are other discrete generation units that connect via Essential Energy's subtransmission network to a TNSP's connection point but they have no impact on the demand of Essential Energy owned STSs or ZSs.

- **Non Coincident Weather Corrected MD**
  The weather corrected data for 50% POE or 10% POE has been calculated for the vast majority of STSs and ZSs based on the nationally consistent methodology of using regression with historical local temperature data. A very small number of sites did not have sufficient history of demand data to accurately produce POE values. The raw adjusted MD was used where POE data could not be produced.

- **Coincident Weather Corrected MD**
  Coincident weather correction is based on the ratio of non-coincident peak demand to non-coincident weather corrected peak demand.

- **Date MD Occurred**
  The date and time of the coincident and non-coincident peak demands were identified during data extraction, where the peak MW and corresponding MVA demand was recorded in this table. Several sites have been identified where the raw adjusted MVA maximum demand occurred at a different time to the raw adjusted MW maximum demand. These situations occur when the site is not quite at the MW peak and the loads have a worse total power factor than at the peak MW time, resulting in a higher MVA than at the peak MW time.

Subtransmission and Zone Substations with MVA Peak different to MW Peak		
Substation	**Non-Coincident MVA Peak**	**Date and Time of MVA Peak**
Bega 132kV	41.12	30/06/2016 18:30
Marulan South 33kV	7.55	16/02/2017 19:00
Snowy Adit 66kV	12.466	23/07/2016 19:30
Yanco 33/66kV	13.122	10/02/2017 20:30
Batlow	1.865	20/03/2017 16:30
Bellata	1.352	20/11/2016 19:30

Subtransmission and Zone Substations with MVA Peak different to MW Peak		
Substation	**Non-Coincident MVA Peak**	**Date and Time of MVA Peak**
Blue Cow	4.993	12/06/2016 7:30
Bodalla	1.448	30/12/2016 15:30
Brogo	0.739	28/01/2017 18:00
Bulahdelah	4.1	31/01/2017 14:00
Caroona	1.182	30/01/2017 16:30
Darlington Point	4.003	28/12/2016 20:00
Eden South	4.856	30/06/2016 10:00
Eulomogo	20.106	6/02/2017 18:30
Googong Dam	1.121	5/10/2016 15:30
Grafton North	19.148	2/02/2017 16:30
Gresford	2.738	5/02/2017 19:00
Gunnedah 22kV	24.176	7/02/2017 17:00
Jugiong	2.05	18/01/2017 15:00
Junee Reefs	0.206	26/06/2016 19:00
Koraleigh	4.307	5/03/2017 18:00
Leeton	19.559	30/01/2017 14:30
Moama	13.984	10/02/2017 17:30
Mt Gipps 6.6kV	0.818	13/01/2017 19:00
Mudgee	31.175	1/02/2017 19:30
Murrumburrah	5.271	10/02/2017 18:00
Nundle	1.874	13/01/2017 20:30
Ringwood Road	2.265	11/02/2017 14:00

Subtransmission and Zone Substations with MVA Peak different to MW Peak		
Substation	**Non-Coincident MVA Peak**	**Date and Time of MVA Peak**
Temora 66/11kV	8.102	10/02/2017 16:30
Ulong	0.417	2/09/2016 8:30
Wallangra	0.198	15/12/2016 6:30

Changes to sites reported
Junee Zone Substation changed its configuration to now be supplied from the 132kV network, with both 66kV and 11kV outgoing feeders. The Junee site reported in previous RINs is now Junee 11kV, and Junee 66kV has been added.

Shannon Creek was identified as an eligible zone substation, so it is now included in this table.

Steeple Flat 22kV has been reported in prior RINs, however it has now been removed as it does not satisfy the zone substation definition.

Thredbo had previously been reported as two separate sites - the snowmaker and the village. The site is now combined in line with the forecasting performed by Essential Energy, as there was no benefit in performing the weather correction and load forecasting separately.

Winter/Summer Peaking:
Essential Energy defines the seasons as between 1st April and 30th September for Winter, and 1st October to 31st March in the following year for the Summer period.

Use of Estimated Information

Refer to the Methodology and Assumptions section above for the use of estimated information.

Reliability of Information

Most data for the 2016-17 year has been gathered from raw metering data and is therefore considered reliable.

Worksheet 6.3 - Sustained interruptions

Table 6.3.1 – Sustained interruptions to supply

Compliance with Requirements of the Notice

Data has been reported in accordance with the definitions provided in the Category Analysis RIN and the AER's Service Target Performance Incentive Scheme (STPIS) unless otherwise specified in the Methodology & Assumptions section below.

Source of Information

Data is sourced from PowerOn Fusion and calculations managed in 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 the data is named: "RIN Tables Workpapers 16-17".

The mapping of the Essential Energy cause list to the AER RIN cause list is contained in the APR database table "ENA Cause List". Additional updates for Detailed Reasons are through queries "RESET RIN Interruptions List 1-7".

Methodology & Assumptions

The data has been collected and collated in line with the Category Analysis RIN Instructions and Definitions guidance issued by the AER. Customer numbers include active NMIs with an active or inactive account. This is the way data has been collected and stored since PowerOn Fusion went live in November 2012.

A sustained interruption has been assumed to be any interruption of one minute or greater duration, ie. it does not include momentary interruptions. This is as per the definition of an interruption in the STPIS.

Unmetered accounts are not included in any of the customer numbers and are not included in any SAIDI, SAIFI or MAIFI data.

The procedure is as follows:

In the RIN Access Database 2016-17 run the following query for the financial year:

- Run Monthly and View SCS Summary Report 3/4 Regions – forms the base for this table query.
    - This query collates outages by feeder.
- Using the group of RESET RIN Interruptions List 1-8 queries:
    - RESET RIN Interruptions List 1: collates all outages by feeder and maps interruption cause data to the AER RIN cause list.
    - RESET RIN Interruptions List 2: updates the Detailed Reason for Interruption where:
        - Cause = Asset failure; Network Type = Zone Sub, then Detailed Reason = Zone substation
        - Cause = Asset failure; Network Type = Distribution - HV, then Detailed Reason = HV
        - Cause = Asset failure; Network Type = Distribution - LV, then Detailed Reason = LV
        - Cause = Asset failure; Network Type = Sub Transmission, then Detailed Reason = Subtransmission
        - Cause = Asset failure; Transgrid = Y, then Detailed Reason = {blank}
        - Cause = Asset failure; Equipment Type = Transformer – Distrib Failed, then Detailed Reason = Distribution substation
        - Cause = Asset failure; Equipment Type = Transformer – Distribution, then Detailed Reason = Distribution substation

        - Cause = Asset failure; Zone Sub = Y, then Detailed Reason = Zone substation
        - Cause = Asset failure; Subtransmission = Y, then Detailed Reason = Subtransmission
    - RESET RIN Interruptions List 3: updates Reason for Interruption where:
        - Transgrid = Y, then Detailed Reason = 5 - STPIS Exclusion (3.3)(a)
    - RESET RIN Interruptions List 4: updates Detailed Reason for Interruption where:
        - Cause = Asset failure; Equipment Type = 'includes *LV*, then Detailed Reason = LV
    - RESET RIN Interruptions List 5: updates Reason for Interruption and Detailed Reason for Interruption where:
        - Outage Type = Planned, then Cause = Planned and Detailed Reason = {blank}
    - RESET RIN Interruptions List 6: updates Reason for Interruption where:
        - Outage Type = Unplanned; Cause = Planned, then Reason = Other
    - RESET RIN Interruptions List 7: rolls up customers affected and customer minutes lost by outage and feeder.
    - RESET RIN Interruptions List 8: calculates SAIDI and SAIFI per outage and feeder based on feeder categories using the average customer base.
    - Effect on SAIDI and SAIFI can be cross-referenced with sheet "16-17 Data":
    - Total Unplanned when filtered by Feeder Classification
    - Normalised when filtered by Feeder Classification, MED = N and Reason for Interruption <> 5 – STPIS Exclusion (3.3)(a)

Please note, in column F of the table, detailed descriptions of reasons for interruptions with a reason of "Other" are not able to be entered as the template does not allow it.

Use of Estimated Information

Not applicable, as only actual information has been used.

Reliability of Information

Information has been sourced from current systems and management is comfortable that the information is reliable.