Basis of Preparation

Response to Category Analysis RIN 2018-19

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 and is a separate document 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 and is shown in Table 1 below.

Table 1 – Requirements of the Basis of Preparation

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.

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.

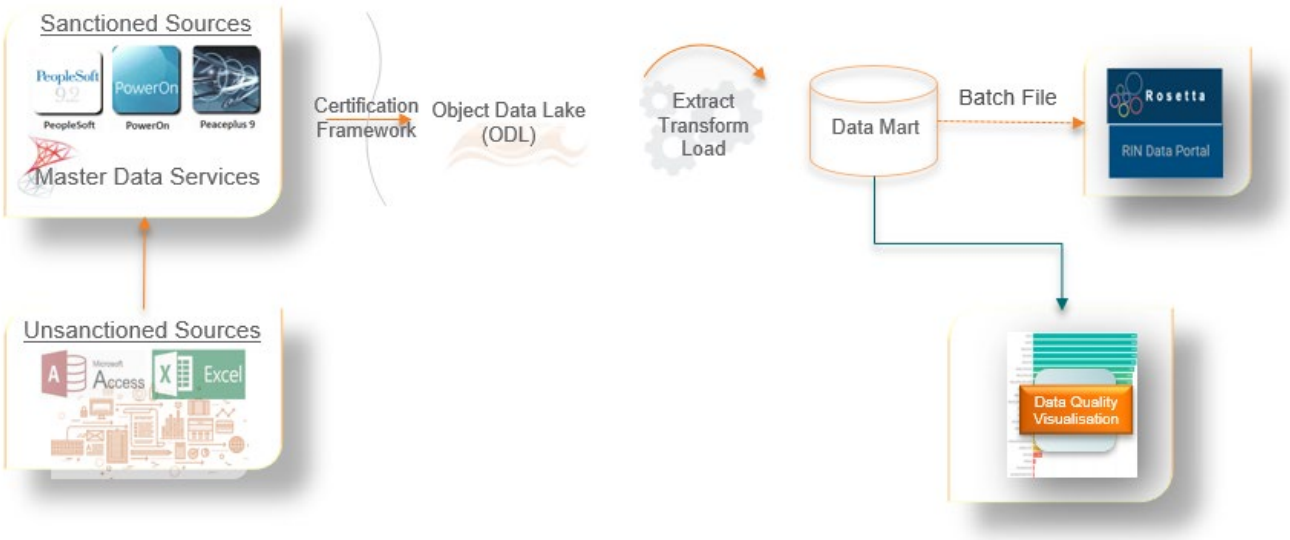
Systems Used to Provide Data

Essential Energy have undertaken a RIN Optimisation project over the previous twelve months, aiming to automate the population of the RIN tables. During this project, the required source data was classified as one of two types, sanctioned and unsanctioned.

Sanctioned data is data available from established databases and source systems such as PeopleSoft, PEACE, WASP, etc. Unsanctioned data is sourced from Excel, Access DB, Text files, etc. Wherever a source was identified as unsanctioned, it was tagged for loading to enable certification of the data load.

This scalable automation framework will feed into a continuous improvement process seeking to build confidence in the quality of the data and minimise the risk of submitting incorrect information.

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.



The transformation logic and business rules used to populate the RINs were captured and documented by the project team. The logic and the rules applied was reviewed and signed-off on by the various data owners across the business. All data is certified during loading and no uncertified raw data inputs are used.

Once transformed, logic is applied to the loaded data, the results are stored in a RIN Data Mart which also tracks history, so that any updates or amendments are tracked accordingly. There is an adjustment framework to cater for any adjustments to previously loaded data, which ensures full traceability and auditing.

Data is loaded from the RIN Data Mart into Rosetta, an independent application used by Essential Energy to populate RIN tables. Data for non-automated RIN tables is entered directly into Rosetta. Rosetta has

review and approval functionality, requiring organisational managers to review and approve assigned completed RIN tables. Once all approvals have been completed, the data is exported from Rosetta into Excel RIN templates ready for submission to the AER.

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.

In compliance with the AER's definitions of actual and estimated information, as listed in the Instructions and Definitions document of the Economic Benchmarking RIN, 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.

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(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 2018-19 Annual 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 2018-19 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 2018-19 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 2018-19 financial information in the Category Analysis RIN is a reasonably accurate representation of the 2018-19 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
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
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 2018-19 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 as shown in AR RIN Tables but splitting out the overhead components using resource categories. Data has been sourced from PeopleSoft, including the GL module and the AM module. It has then been enriched to enable classification into the regulatory categories. Refer to the BOP for the AR RIN Capex schedules 8.2.1 for further details.

Methodology & Assumptions

As described above. The data model used for overall capex reporting has been applied with the overhead components separated for disclosure, based on the resource categories included in the transactional data. Refer to the BOP for the AR RIN Capex schedules 8.2.1 for further details.

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

The data is considered to be reliable.

Table 2.1.2 – Standard control services opex

Compliance with Requirements of the Notice

This section contains summary data of the 2018-19 Opex for Standard Control Services, broken up into direct expenditure for various categories, network and corporate overheads and non-network expenditure. It also contains a balancing item which equals the Non-Network Expenditure amount as this is also included in Network and Corporate Overheads amounts.

Source of Information

This table was derived using data sourced from the Peoplesoft General Ledger, analysed and classified using a CAM methodology. Some adjustments were applied to the Peoplesoft data.

The 2019-19 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

The data is classified into business units using a CAM methodology. The amounts are then allocated to regulatory categories using the Project tree (using project types) and resource categories (to identify overhead components). Non-network data was sourced from Category Analysis RIN Table 2.6.

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

The data is considered to be reliable.

Table 2.1.3 – Alternative control services capex

Compliance with Requirements of the Notice

This section contains summary data of the 2018-19 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. Refer to Category Analysis RIN Table 2.1.1

Methodology & Assumptions

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 represent totals of appropriate cells in other tables in the Category Analysis RIN template. Refer to Category Analysis RIN Table 2.1.1

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

The data is considered to be reliable.

Table 2.1.4 – Alternative control services opex

Compliance with Requirements of the Notice

This section contains summary data of the 2018-19 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. Refer to Category Analysis RIN Table 2.1.2

Methodology & Assumptions

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 represent totals of appropriate cells in other tables in the Category Analysis RIN template. Refer to Category Analysis RIN Table 2.1.2

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

The data is considered to be reliable.

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

Asset replacement and failure quantities have been compiled in accordance (or as close as systematically possible) with the definitions and guidance outlined in the *Regulatory Information Notice* instructions issued to Essential Energy under *Division 4 of Part 3 of the NEL*.

Source of Information

Several asset management and planning systems and business reports have been used. 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 (for estimating units only)	All	Yes	Yes	No
WASP	All	No	Yes	No
Network Planning Database (NPDB)	All	Yes	Yes	No
Pole Failure Database	Poles, Public Lighting	No	No	Yes
Electrical Network Incidents Web (ENI – Web)	Pole Top Structures, OH Conductors, UG Cables, Service Lines, Transformers, Switchgear	No	No	Yes
Electrical Network Incidents Maintenance Work Log (ENI – eMWL)	Pole Top Structures, OH Conductors, UG Cables, Service Lines, Transformers, Switchgear	No	No	Yes
GIS Smallworld	OH Conductors, UG Cables	No	Yes	No
Project Online	SCADA, Network Control & Protection Systems	No	Yes	Yes
ROE Device List	SCADA, Network Control & Protection Systems	No	Yes	Yes
Trio Diagnostics	SCADA, Network Control & Protection Systems	No	Yes	Yes

Source System	Asset Groups	Used For		
		Expenditure	Asset Replacements	Asset Failures
Service Manager	SCADA, Network Control & Protection Systems	No	Yes	Yes

Methodology & Assumptions

All Expenditure Categories

2018-19 actual expenditure information was sourced from Peoplesoft using project accounts and applied directly to the public lighting and SCADA related Asset Categories in Table 2.2.1:

The remaining asset categories in Table 2.2.1 do not specifically exist in Peoplesoft and the NPDB project source data, therefore the amounts were apportioned to the correct asset category using a model that:

- Maps the NPBD Prioritised Investment Programme (PIP) amounts to the correct asset groups in Table 2.2.1.
- Apportions the asset group amounts to the respective asset categories based on Essential Energy replacement capital unit rates or the WASP estimating and packaging tool assembly unit rates.

All Asset Replacements

Asset replacement units were mainly sourced from completed work tasks in the WASP database with the exception of Overhead Conductors and Underground Cables which are queried from GIS Smallworld.

Some values were extracted from Planning Database.

All Asset Failures

Failure numbers were based on data sourced from either the Pole Failure Database, ENI - Web & ENI - Electronic Maintenance Worklog (eMWL)[1] failure records.

Only Functional[2] failures with unassisted causes have been included in accordance with the *Asset failure (repex)* definition outlined in pp 84 of the *Regulatory Information Notice* instructions issued under *Division 4 of Part 3 of the NEL*.

The primary cause recorded against each functional failure determines whether it is unassisted or not.

Poles

Staking of a Wooden Pole

- Replacement data has been based on a count of the following completed WASP work tasks in Repex projects:
    - "Pole – Reinstate"
    - "Pole reinforcement – install"

[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.

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

- "Pole reinforcement – replace"

Staking Failures

- Failures have been sourced from the Pole Failure Database. The data is populated from several different sources and reviewed monthly.
- Staking failures are unassisted pole failures that occurred which had a stake installed.
- Dedicated streetlight poles or columns and private poles have been excluded from the count.

Pole Replacement

- Replacement data has been based on a count of the following completed WASP work tasks in Repex projects:
  - "Pole - Condemned – Replace"
  - "Pole - Concrete – Replace"
  - "Pole Steel/Tower – Replace"
  - "Pole - Replace - System Augmentation"
  - "Pole – Install Additional"
  - "Pole – Pole Failure"
  - "Pole – replace"
  - "Pole – upgrade"
- Dedicated streetlight poles and columns were excluded from the count and provided to the Essential Energy Streetlight team for classification into Major and Minor Road.
- Private poles have been excluded except for those managed and maintained by Essential Energy.
- Bollard pole replacements are included in < 1kV voltage categories and according to their respective material.
- If pole material = "Unknown", then classify as "Wood".
- If pole voltage = "Unknown", then classify as "< 1kV & <= 11 kV".

Pole Failure

- Data has been sourced from the Pole Failure database. The data is populated from several different sources and audited monthly.
- Dedicated streetlight poles or columns and private poles have been excluded from the count.

Pole Top Structures

Pole Top Replacement

- Replacement data has been based on a count of the following completed WASP work tasks in Repex projects:
  - "Crossarm – Replace"
  - "Crossarm – Upgrade" (for safety and compliance driven replacements).
  - "Poletop – replace construction"
  - "Crossarm – Install Longer Crossarm"
  - "Crossarm – install"
  - "Pole – Replace Pole Top Bracket"
- In addition, an estimated amount of pole top structures has been included for those that have been replaced without a work task in WASP. The estimate is calculated by using the project information

provided by the Planning Database and PeopleSoft direct dollar amounts recorded against said Planning database projects for 2018-19.

Pole Top Failure

- Failure data has been based on a count of all ENI records representing unassisted crossarm failures.
- Pole top failures on private poles have been excluded.

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 (units, not km) of all ENI records representing unassisted conductor or cable failure causes.
- Conductor/Cable failures on private poles have been excluded.

Service Lines

Service Line Replacement

- Replacement data has been based on a count of the following completed WASP work tasks in Repex projects:
    - “LV service conductor – replace”
    - “Service – Replace Service”
    - “Service – Programmed Replacement”
- Essential Energy only classifies < 11 kV voltage lines connected to customers as services.
- Due to the lack of system support, replacement work tasks are applied to poles upstream of the service conductor, ie. on the parent pole or pit or pillar. Classification of the Customer Type is given by the highest ratio of customer types attached to the parent asset, eg. if there are a number of services attached to a pole and the ratio of residential customers is > = 0.5, then the Customer Type is assumed to be “Residential”, otherwise it is assumed to be of a “Business” type.

Service Line Failure

- Failure data has been based on a count of all ENI records representing unassisted Service Line failures.
- Failures on private assets have been excluded.
- Service Line failures on private poles, pits or pillars have been excluded.

Transformers

Transformer Replacement

- The following relates to the smaller category transformers known as “distribution” transformers in Essential Energy. For the larger category transformer replacements, refer to the Zone Substation section.
- Replacements have been based on a count of the following completed WASP work tasks in Repex projects:
    - "Substation - Replace Tank"
    - "Transformer - replace"

- "Sub (Chamber) - upgrade"
- "Sub (ground mounted) - upgrade"
- "Sub (padmount) - install"
- "Sub (padmount) - replace"
- "Sub (padmount) - upgrade"
- "Sub (pole mounted) - install"
- "Sub (pole mounted) - upgrade"
- "Transformer - upgrade"
- "Substation - Replace Cubicle"
- "Regulator - Replace Tank"
- "Regulator - replace"
- "Regulator - install"

In addition, an estimated amount of transformer replacements has been included for those that have been replaced without a work task in WASP. The estimation is calculated by using the project information provided by the Planning Database and PeopleSoft direct dollar amounts recorded against said Planning Database projects for 2018-19.

- 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.
- Transformer failures on private poles or within private installations have been excluded.

Switchgear

Switchgear Replacement

- The following relates to the smaller category switchgear known as “distribution” switchgear in Essential Energy. For the larger category switchgear replacements, refer to the Zone Substation section.
- Replacement data has been based on a count of the following completed WASP work tasks in Repex projects:
  - “Fuse – EDO Ruse Programmed Replacement”
  - “Fuse – Replace Fuse”
  - “Sub(pole mounted) – replace”
  - “Substation – Programmed Refurbishment”
  - Sub (pole mounted) – refurbishment”
  - “ABS – Replace”
  - “ABS – replace with Gas Switch”
  - “ABS – upgrade to Gas Switch”
  - “Gas Switch – Replace – Pole Top Mount”
  - “Links – Replace”

- “OH HV fuse / link – replace”
- “OH HV fuse / link – upgrade”
- “OH LV ruse / link – replace”
- “OH LV ruse / link – upgrade”
- “OH LV fuse / link – install”
- “UG LV fuse / link – replace”
- “Protection Site – Replace Tank”
- “Recloser – replace”
- “Sub (pole mounted) – replace”
- “Load break switch – replace”
- “Load break switch – upgrade”

- In addition, an estimated amount of switchgear has been included for those replaced without a work task in WASP. The estimate is calculated using the project information provided by the Planning Database and PeopleSoft direct dollar amounts recorded against said Planning Database projects for 2018-19.
- In addition to the above, estimated 'ASSET REPLACEMENTS (0's)' included in the following categories:

  Switchgear by:

  - ËÂÂ, = 11 kV ; FUSE (6 units)
  - ËÂÂ, = 11 kV ; Switch (75 units)
  - > 11 kV & < = 22 kV ; Switch (13 units)
  - > 22 kV & < = 33 kV ; Switch (13 units)

Switchgear Failure

- Failure data has been based on a count of all ENI records representing unassisted switchgear failure causes.
- Switchgear failures on private poles or within private installations have been excluded.

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 Luminaires replacement tasks from the WASP report “Defects 2018/19”, filtered for Task types; • "Lighting - change luminaire", • "SL luminaire - bulk replacement", • “Street light - upgrade", • "Street light - replace lantern (Serviceable)", • Split for major or minor, and • based on 45 watts LED / 150 watts non-LED.

Brackets	Sum of replacement tasks from the Wasp report “Defects 2018/19” and filtered for “Street light bracket – replace”.
Lamps	There are no volumes included in this section as expenditure on lamps is not considered to be Repex.
Poles	Pole replacements are sorted from a report labelled “CA RIN_REPEX Dedicated SL Pole Replacements” (which contains data extracted from WASP), using the following process; • The asset ID in the files provided (“CA RIN_REPEX Dedicated SL Pole Replacements”) are matched to asset IDs in the luminaire inventory report • The inventory report contains data on luminaire size (this data is not included in the pole data file provided). • Luminaires < 45 watt LED and <150 watt non-LED are "minor"; luminaires > or = 45 watt LED and 150 watt non-LED are "major". • Costs and quantities are apportioned based on this split.

Asset Failures

Asset Type	Included in Totals
Luminaires	Failures are sourced from the “Defects 2018/19” WASP report, based on work task types. All customer reported defects are considered as failures, as well as defects identified from Night Patrol inspections.
Brackets	Bracket failures are not separately recorded in Essential Energy systems. All bracket failures have been included as Bracket Replacements.
Lamps	There are no volumes included in this section as expenditure on lamps is not considered to be Repex.
Poles	Failure data has been taken from the report "CA RIN REPEX Dedicated SL Pole Replacements" and filtered for task type "Pole - Pole failure".

Expenditure

Total Repex expenditure for this category is taken from the Light Replacement Total Cost calculated in Table 4.1.2. This value excludes an amount of $2,772,670.53 customer-funded bulk LED upgrade works.

The expenditure data was then allocated to the asset groups using the following formula:

Total expenditure = Repex Luminaires + Repex Brackets + Repex Poles

To calculate replacement unit rates:

- Poles – a weighted average pole replacement cost was used based on 2018-19 pole usage data and standard installation costs.
- Brackets – the unit rate was sourced from the approved 2019-24 pricing model.
- Luminaires – the weighted average cost per replacement task was calculated based on replacement volumes

Bulk Lamp LED replacement tasks are included in volumes for this section .

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 Online, which was used to apportion across the RIN sub-categories. Whilst there are currently issues with the replacement product (Project Online replaced Primavera, which was previously used), ongoing reconciliation works are undertaken on a monthly basis between the reported outcomes of both Peoplesoft and Project Online.
- 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.
- In the case of Communications assets relating to SCADA, an additional source has been the use of Trio Diagnostics tools (low band radios, where used).
- Totals included in this section are an amalgam of figures from true SCADA (ZSS RTUs) and Telecommunications used for SCADA purposes.

Zone Substations

- CTs, VTs, Batteries - quantities replaced are those with a commissioning date within the 2018-19 financial year, where they are not part of an augmentation project. Failures are those where the VT failed in service and was replaced during the 2018-19 year.
- Property replaced is any site with significant spend during the 2018-19 financial year, from the planning database.
- Surge diverters replaced is the total of 132 + 66 + 33 + 22 + 11 kV surge diverters divided by 24 which is the frequency at which surge diverters are intended to be replaced.
- It is assumed that the policy of replacing surge diverters every 24 years is fully implemented.

Use of Estimated Information

All non-financial units are actual.

Although most expenditure information is based on actual data some of the data splits and disaggregation of totals has been estimated. The information required for the asset categorisation in this table does not exist in the PeopleSoft or NPDB project source data. In addition, PeopleSoft and the Planning Database are not linked to the asset management datasets in WASP which are required to complete this table. Therefore the splits of financial information for asset types have been estimated, with the exception of public lighting and SCADA related expenditure which is actual and sourced from Peoplesoft.

Reliability of Information

Replacement expenditure, at an aggregate level, is considered to be reliable as it has been sourced from the 2018-19 Annual 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

Quantities reported have been compiled in accordance (or as close as systematically possible) with the definitions and guidance outlined in the *Regulatory Information Notice* instructions issued to Essential Energy under *Division 4 of Part 3 of the NEL*.

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 but excludes dedicated streetlight poles/columns.

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 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.

Reliability of Information

This data is considered reliable although Essential Energy acknowledge that data used for this table may not be perfect and some 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 Project Online, Essential Energy's project management system.

Methodology & Assumptions

No material projects are included in the 2018-19 RIN as there were no projects with total life of project expenditure greater than $5M that were closed in 2018-19.

The close date on Subtransmission projects, which typically span across multiple years, can have minimal expenditure in forward years beyond commission of asset. The closure of the project is not hindered if there is insignificant expenditure into a forward year.

All other projects with project expenditure over the total life of less than $5M and that have been closed in 2018-19 have been included in the non-material total line.

Financial amounts that were incurred in prior years have been inflated to $2018-19 using December 4 quarter CPI.

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.

The conversion of past year project costs to 2019 real dollars has been completed using the following CPI Inflator Rate table, supplied by Regulatory Affairs in May 2019:

Base Year	FY18/19
2013/14	1.1005
2014/15	1.0742
2015/16	1.0481
2016/17	1.0325
2017/18	1.0195
2018/19	1.0000

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 Project Online, Essential Energy's project management system.

Methodology & Assumptions

No material projects are included in the 2018-19 RIN as there were no projects with total life of project expenditure greater than $5M that were closed in 2018-19.

The close date on Subtransmission projects, which typically span across multiple years, can have minimal expenditure in forward years beyond commission of asset. The closure of the project is not hindered if there is insignificant expenditure into a forward year.

All other projects with project expenditure over the total life of less than $5M and that have been closed in 2018-19 have been included in the non-material total line.

Financial amounts that were incurred in prior years have been inflated to $2018-19 using the appropriate CPI.

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.

The conversion of past year project costs to 2019 real dollars has been completed using the following CPI Inflator Rate table, supplied by Regulatory Affairs in May 2019:

Base Year	FY18/19
2013/14	1.1005
2014/15	1.0742
2015/16	1.0481
2016/17	1.0325
2017/18	1.0195
2018/19	1.0000

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

System	Data
GIS Smallworld	• Cables information of augmented network as a part of projects extracted from the Network Planning Database.
Network Planning Database	• List of Augex projects completed in the financial year. • .

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 the Planning Database 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 and considered reliable.

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

System	Data
WASP	• Transformer information of Essential Energy funded transformers as a part of projects extracted from the Network Planning Database.
Network Planning Database	• List of Augex projects completed in the financial year. • .

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 the planning Database and only projects with a driver considered to be an Augex driver were included.

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 opening sections of this Basis of Preparation for details on our RIN Optimisation process and finance data prepared for multiple tables in the RIN. Section 3 of this Basis of Preparation discusses the sourcing of financial information used to prepare the data. The specific methodology and assumptions made for this table are outlined below.

Source of Information

Source data was from the Operational Data Lake and is also used in the process of collating the data for the Annual Reporting RIN.

Methodology & Assumptions

Information was sourced from the ODL and split between Augex and Repex by the various asset categories. This data is also used in the collation of data for the Annual 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.

Use of Estimated Information

Total Augex is based on actual data. Drivers have been used for the data splits and disaggregation of totals.

Reliability of Information

The data in this table is considered reliable.

Table 2.3.4 – Augex Data – Total Expenditure

Compliance with Requirements of the Notice

Refer to opening sections of this Basis of Preparation for details on our RIN Optimisation and finance data prepared for multiple tables in the RIN. Section 3 of this Basis of Preparation discusses the sourcing of financial information used to prepare the data. The specific methodology and assumptions made for this table are outlined below.

Source of Information

Data is sourced from the ODL which includes enriched capital expenditure transactions through a RIN Optimisation process (Section 2), and which attaches relevant attributes relating to the expense journal item. This allows each expense item to be classified by RIN Purpose and RIN asset category(which is based on the asset profile). Asset profiles are mainly derived from project types assigned to each project, or estimates (WASP) which split the planned work into the assets to be created, or Activities for Project on Line projects and where the project type does not apply to a specific expense type within the project. The approach is consistent with that used for 2.1 and collating Capex data for the Annual Reporting RIN.

Methodology & Assumptions

All direct expenditure on network system projects which have a project justification type that relates to augmentation are included in the total of table 2.3.4. The RIN asset categories are derived through mapping of the asset profiles (lowest asset classification within our fixed asset register) to the RIN Asset categories relevant to the table. The total of all line items to the Annual Reporting RIN for 2018-19.

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. Drivers, resource categories and derived asset profiles have been used for the data splits and disaggregation of totals.

Reliability of Information

The data in this table is considered reliable.

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 Residential, 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
PEACE	• 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.
Network Planning Database	• List of customer initiated projects. • Estimated unit costs for transformers based on OH/UG and kVA. Costing included estimated man hours.

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.

Specifically, the connections capex expenditure was derived from the PIP4 - Customer Connections portfolio as opposed to unit rate estimations previously utilised. This expenditure falls within the larger Repex/Augex/Connections finance expenditure data described above.

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

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

Mean days to connect residential customer with LV single phase connection (0's)

Not reported as done by Accredited Service Providers under Power of Choice and outside our control.

Use of Estimated Information

Essential Energy has used estimated information for premises where Residential/Customer 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

Methodology & Assumptions

The information in this table is a summation of table 2.5.1 and therefore uses the same underlying methodology and assumptions.

Use of Estimated Information

Essential Energy has used estimated information for this table.

Reliability of Information

The data used for determining the overall quantities into categories is 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 Peoplesoft and workfiles prepared for the 2018-19 Annual RIN.

Opex data was sourced from PeopleSoft.

Methodology & Assumptions

Refer to opening sections of this Basis of Preparation for details on our RIN Optimisation and finance data prepared for multiple tables in the RIN. Section 3 of this Basis of Preparation discusses the sourcing of financial information used to prepare the data.

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 2018-19 was sourced from the 2018-19 Annual RIN. A listing of fleet capex by project (vehicle type) was utilised to allocate the 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.

Buildings and Property – Opex & Capex

2018-19 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 2018-19 Annual Regulatory Accounts.

Furniture & Fittings – Capex

Data was sourced from the 2018-19 Annual Regulatory Accounts.

ICT – Opex & Capex

2018-19 Opex data was sourced from PeopleSoft. ICT operating costs were based on expenditure within the IT division plus the Tech Transformation department. 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 predominant function of the position as client device, recurrent, or non-recurrent expenditure;

Capex data was sourced from the 2018-19 Annual RIN. Expenditure was mapped to the Category Analysis RIN based on mapping provided by SMEs and the category splits were based on project data in Peoplesoft.

Use of Estimated Information

Information is based on actual information, with best practise methodology used to apportion actual non-network expenditure across some RIN categories.

Reliability of Information

This information is considered reliable.

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
ICTs Configuration Management Database (CMDB)	Extract used for determining number of devices as at 5.30pm 30 June 2019.
Finance provided final number	Determining employee numbers
Finance provided final number	Determining user numbers

Methodology & Assumptions

The following method and assumptions have been used 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 (no agency or external contractors) 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 2019. 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 in-use device numbers include laptops, desktops, tablets, mobile phones, satellite phones and smartphones. and are based on information within the ICT Configuration Management Database (CMDB).

The 30 June 2019 total has been multiplied by the Standard Control Services percentage.

Steps for obtaining data

- At 5:30pm 30 June, a scheduled asset report was run and emailed to Change Team members (saved as ASSETS_RIN_30062018_1730.csv).
- Finance provided the final numbers for the FTE data, saved as PEOPLE_RIN_02072018_0100.csv.

Pivot Tables and Numbers

A pivot table was created;

- Physical Status was added to the filter section of the pivot table and "In Use" only was selected.
- Employee ID was added to the filter section and excluded instances where the ID is less than 5 characters, blank or starts with a "-".
- Assets Type was added to "rows" section of table and asset types of mobile broadband or integrated broadband were removed as these are SIMs, not devices.
- The serial number was added to the "values section of pivot table".
- Grand Total should equal 7790 devices ("number of devices" determined).
- Standard control percentage applied.

Finance provide the numbers for fields relating to people

Further Explanation

- Employee IDs from the RIN asset data, where the ID is negative or not of 5 characters are asset groups such as Kiosk machines, stock groups, etc.
- Device count only includes assets that are "in use". On Loan or stock assets or mobile devices that are being terminated or returned to stock are not included in the user count and were also not included in 2017-18.
- Asset data comes from the CMDB and although the data is "actual data", the data could contain errors.
- The CMDB is very fluid, with new devices being allocated or returned frequently. Numbers therefore change on a regular basis.

Use of Estimated Information

The underlying data which provides total company numbers for employees, users and devices comes from source systems, and as such, the data provided for this table is considered actual.

Reliability of Information

The data is considered to be reliable.

Table 2.6.3 - Annual Descriptor Metrics – Motor Vehicles

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

SGfleet (Fleet Intelligence)

Methodology & Assumptions

- Opening odometer readings were taken from the current odometer from 30/6/18 fleet list.

- Closing odometer readings were taken from the current odometer from 30/06/19 fleet list.
- Utilisation was annualised for those units which entered or exited the fleet during the period.
- The return date and in service dates were taken from the fleet list as at 30/06/19 and used to determine those units that entered or exited the fleet.
- Data table was pivoted and calculated average utilisation, count of in service date (units purchased) and count of registration (unit count).
- The Standard Control Percentage was supplied by the Finance team.
- Items of fleet that do not fit within the RIN categories have been excluded.
- Fleet Intelligence shows plant and carrier as separate assets. Plant and carrier were joined to determine utilisation.

Use of Estimated Information

The information reported in this table was based on actual data.

Reliability of Information

The data is considered to be reliable.

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

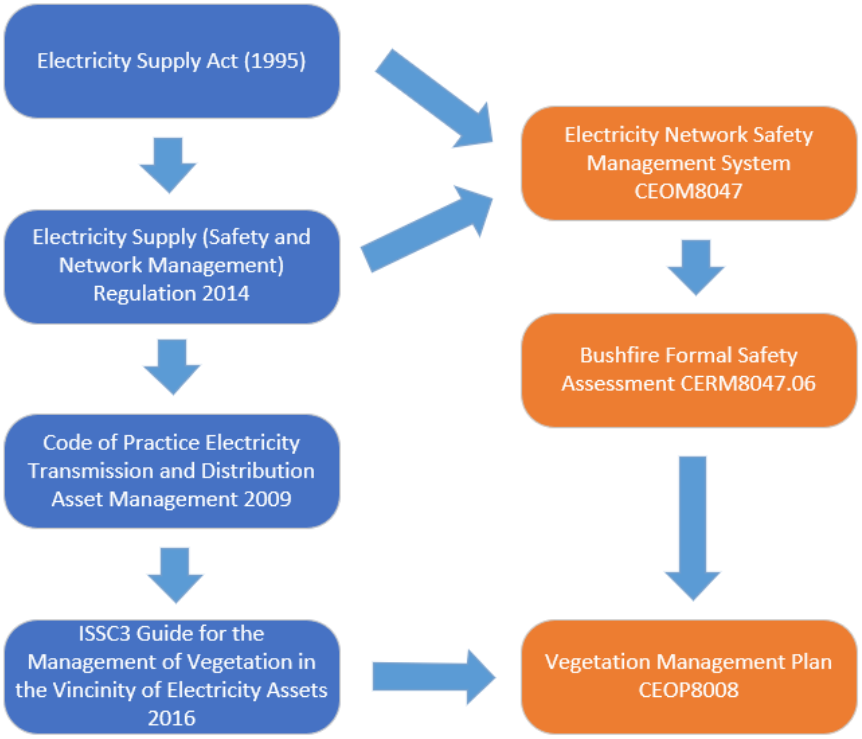
- VIMS
- WASP
- Smallworld

Background

Vegetation management 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 2009[3], as shown in Figure 1-1.

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

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

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.[4]
- 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.[5]

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[6].

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

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

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

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

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"[7]. 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, Regulations and the Code, Essential Energy developed the Electricity Network Safety Management System (ENSMS). The ENSMS provides direction on the development of Formal Safety Assessments (FSAs) that detail the risk assessment methodology and identifies critical controls and the effectiveness of those critical controls in managing the risk to:

- Public
- Network Workers
- Property and network assets
- The environment including network initiated bushfire
- Safety aspects arising from loss of supply

The Bushfire FSA identifies vegetation as a threat scenario and the management of vegetation as a critical control. The Vegetation Management Plan describes how Essential Energy will manage vegetation in the vicinity of network assets to:

- Minimise danger to the public posed by trees in close proximity to powerlines.
- Improve system reliability by reducing vegetation related interruptions to the electricity supply.
- Reduce the risk of fires caused by trees coming into contact with electricity wires.
- Minimise environmental impact.
- Reduce the risk of vegetation causing damage to or interfering with powerlines.
- Provide an approach consistent with industry practices and legal requirements.

Methodology & Assumptions

VIMS Source Data Verification

In 2018-19, 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.

VIMS FIELD NAME	NEW FME DATA (Post 23/08/2017)
NAME	All VMAs in Smallworld, except "Not Applicable", which were left in the table and 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).

[7] 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)
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 with Zone

Total number of spans is generated from running a script out of Small World (the GIS team is normally responsible for providing this data). This data is entered into an MDS Excel table.

Number of Maintenance Spans

We run an extract from VIMS of all pre-list veg defects created since 1/9/2015. We create a field that uniquely identifies the span (normally Pole1 and Pole2 concatenated). We then pivot this data against the VMA which gives us a unique span count per VMA. We add a column which represents the full span count for each VMA in the extract. We then pivot this new table against the zone. We then end up with a table that gives us total cut spans (unique spans) against total spans for all cut VMAs in the zone. If we divide the total span count by the cut span count it gives us a find rate for the zone. We then add a new column that represents total spans in the zone (this might include VMAs that are not yet cut). We create a new calculated field which takes the zone find rate and multiplies this by the total zone span count which gives us the maintenance spans. The initial extract is filtered to only give us urban VMAs.

Total Length of Maintenance Spans

Using the same method as Number of Maintenance Spans to derive the zone find rate we multiply the find rate by the Route Length and arrive at Total Length of Maintenance Spans for each zone.

Length of Vegetation Corridors

We extract all pre-list veg defects created in WASP since the start of 2011. We create a field that uniquely identifies the span (normally AssetID). We then pivot this data against the VMA which gives us a unique span count per VMA. We add a column which represents the full span count for each VMA in the extract.

We then pivot this new table against the zone. We then end up with a table that gives us total cut spans (unique spans) against total spans for all cut VMAs in the zone. If we divide the total span count by the cut span count it gives us a find rate for the zone. We then add a new column that represents total spans in the zone (this might include VMAs that are not yet cut). We create a new calculated field which takes the zone find rate and multiplies this by the route line length which gives us the Length of Vegetation Corridors.

Average number of trees per urban and CBD vegetation maintenance span

We take LiDAR incursion data where the clearance category runs from A1 to C1. We round the Latitude and Longitude values to 4 decimal places. We then concatenate the rounded Latitude and Longitude into a single field which represents a tree (approx. a 10m square). We then count unique instances of these Lat Long values against a zone and divide that value by the total maintenance span count in the same zone to arrive at the average number of trees per maintenance span.

Average frequency of the cutting cycle

We run an extract out of WASP for all veg defects created since 2011. We pivot this data against the VMA and generate new columns which represent total veg defects created per year. We then add new calculated columns (1 per year) which generate a value of 1 if the total count of defects > 10. If the value is less than 10 then it scores a 0. We then create a calculated column that takes the total number of years and divides this by the total score from all years. Therefore, in a 9 year period if we see a score of 4 (i.e. 4 years where the total defect count is > 10 for each year) then we would derive a frequency of 2.25 (i.e. VMA cut on average every 2.25 years). We then pivot this data table against the zone which gives us an average frequency per zone.

Use of Estimated Information

The methodology used relies on establishing a find rate based on historical cutting data in VIMS and this represents the numbers of spans that would typically need to be actioned in a given vegetation cycle. The numbers of spans that would need to be cut in actuality would be influenced by a number of factors that are impossible to predict such as weather and contractor issues. Additionally we are using route line length and bay/span counts derived from Small World circuit data using various scripts. The degree of accuracy cannot be determined when converting circuit/conductor data into distance data therefore it would need to be regarded as an estimate.

Reliability of Information

Caution should be used when using this data for benchmarking or decision-making purposes.

Table 2.7.2 – Expenditure Metrics by Zone

Compliance with Requirements of the Notice

Refer to opening sections of this Basis of Preparation for details on our RIN Optimisation and finance data prepared for multiple tables in the RIN. Section 3 of this Basis of Preparation discusses the sourcing of financial information used to prepare the data.

The specific methodology and assumptions made for this table are also outlined below.

Source of Information

Data at an expense category account and project level was sourced from the 2018-19 Income and Expenditure model as used for AR RIN 8.1. PeopleSoft data was used to split expenditure across RIN categories. Tables linking projects and other work to areas and Zones were used to allocate the expenses to Zones.

Methodology & Assumptions

- Geographical areas have been split from Zone 1 to Zone 6 via a mapping exercise, i.e. from RIN categories to geographical zones.
- Service subcategories (trimming vs inspection) have been extracted from PeopleSoft via the data model. This is based on project types.
- The projects were mapped to Zones using tables provided by the operational areas. For one general project used for contractors across multiple zones a mapping was performed at the AP transaction level. Where the projects were unable to be mapped and were immaterial these were allocated based on the proportions of mapped expenses.
- 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.

Use of Estimated Information

This total for this table uses actual financial information from PeopleSoft however the splits across RIN categories are estimated.

Reliability of Information

The total information is considered reliable and reconciles to the Annual RIN, however the splits into zones are estimated and not considered reliable.

The 6 zones were merged into 3 regions in during 2017-18, however the expenses were allocated to 6 Zones again in 2018-19, using mapping based on project names or tasks to area names. The 6 zones are geographically shown below.

RIN: Veg Zones

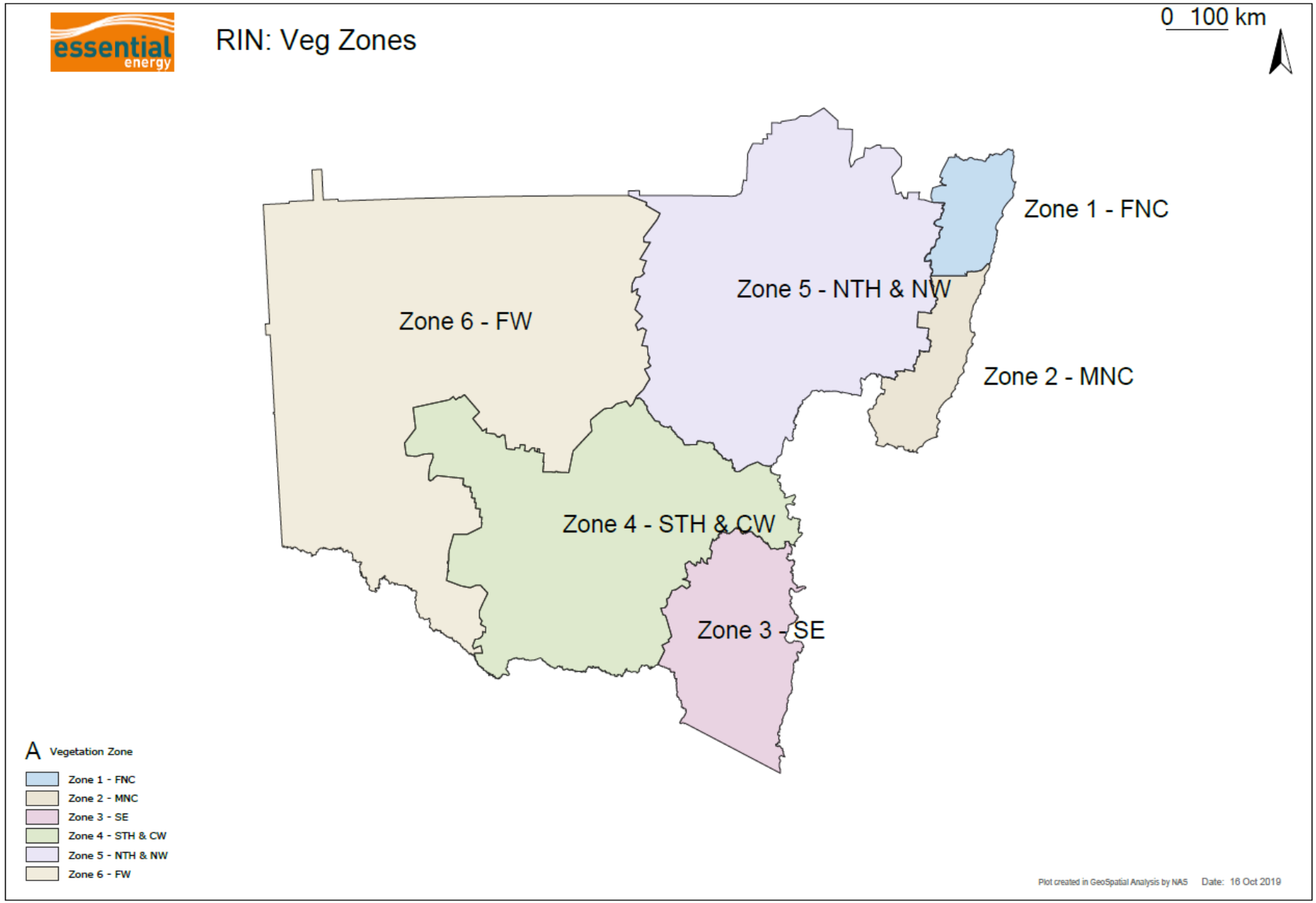


Table 2.7.3 – Descriptor Metrics Across All Zones – Unplanned Vegetation Events

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 a 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 2018-19 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 and is sourced from our TotalSAFE system.

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 may be less clear and requires personal judgement based on available evidence. For example, in the case of a fallen tree on the line, one can not 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.

However data is recorded based on best information available using considered judgement and is considered to be actual.

Reliability of Information

This information is considered reliable.

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	GIS 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

Maintenance Activity	System	Data set
Zone Substation maintenance	GLG Schedule of property visits	Number of property visits
Zone Substation maintenance	Chubb Record of Fire System maintenance 18-19	Number of inspections/maintenances of fire- fighting equipment
Zone Substation maintenance	CEOP8011	Technical Maintenance Plan

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.

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.

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 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 similar equipment.
- 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.

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 zone substation inspection frequency. Zone substations are inspected either monthly, bi-monthly or quarterly, depending on various substation attributes.

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.
- The number of fire-fighting equipment inspections from Chubb is added.

Public Lighting Maintenance

- Assets at Year End - Data was taken from the end of year asset inventory WASP extract on 22nd July and filtered for 2018-19 maintenance tasks. These reports include all devices except metered and/or tariff 6. These devices were excluded for the following reasons:
    - Metered lights and tariff 6 lights are the responsibility of the owner for maintenance and replacement.
    - The 45 watt LED / 150watt non LED rule was used to determine Major/Minor split of assets.
- Assets Inspected/Maintained - This number is the sum of all routine and non-routine streetlight maintenance tasks in 2018-19, including:
    - Spot luminaire maintenance
    - Bulk luminaire maintenance
    - Night patrol inspections
    - Dedicated streetlight column inspections
    - Instructions were as follows:
        - All night patrol inspections work tasks were used from the Inspections 2018-19 report.
        - Repairs 2018-19 report - SL Globe & SL Globe & PE cell bulk replacements, Minor Maintenance, Standard Maintenance, and Repair tasks were used.

- Split between Minor/Major using the 45 watt LED / 150watt non-LED rule.

- 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.
    - Luminaire Effective date was used i to determine average age of streetlights and the 45 watt LED / 150watt non-LED rule was used for the Major/Minor split for number of lights installed.

An improved methodology has been used to report mean life of these assets.

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.
    - In the case of SCADA RTUs, whilst the number of in-service devices is accurate, the use of firmware versions/dates of commissioning remains an indicative age of the device for the older units remaining in service.

Protection Systems Maintenance

- Asset quantity represents all “in service” distribution and zone substation reclosers owned by Essential Energy.
- Quantity inspected/maintained represents those tasks directly related to maintaining 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.

For 2018-19 this category also includes Zone substation protection systems, which were not included in prior years.

All inspection and maintenance cycles are performed in line with asset inspection policies.

An improved methodology has been used to report mean life of these assets.

Use of Estimated Information

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

Reliability of Information

Maintenance expenditure at the total level aligns to the 2018-19 Annual Regulatory Accounts, however the split into the various categories is based on assumptions and estimation. 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. Total expenditure has been reconciled back to the direct maintenance expenditure in table 2.1 of this RIN. Any specific methodology and assumptions utilised for this table are outlined below.

Splitting the high level financial categories down to individual activities is done by utilising task and project type mapping from the Opex model used to develop Essential Energy's annual Opex Statement of Works.

Methodology & Assumptions

- The Regulatory Accounts (as summarised in Table 2.1) 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 and the quantity of units maintained.
- Where no accounts were able to be directly mapped to inspection/maintenance activities, a unit rate system was used to assign expenditure based on like-activities with known expenditure.
- Where maintenance activities contained units for both inspections and maintenance, the routine versus non-routine expenditure was applied pro-rata based on those units.
- It shall be noted that the figures supplied for "SCADA & Network Control" include those costs associated with ZSS SCADA along with the necessary Telecommunications costs associated with these ZSS RTU's (Telecommunications associated with SCADA). It does not include such costs associated with non-related, or indeed, non-system Telecommunication costs.
- Public lighting routine maintenance expenditure is calculated based on expenditure in the following activities:
    - Bulk lamp and PE Cell replacement programs
    - Pole inspections for dedicated streetlight poles
    - Night Patrol Inspections
- Public lighting non-routine maintenance expenditure is calculated based on expenditure in the following activities:
    - Spot luminaire maintenance

Major roads are classified as where luminaire wattage >=45 watts for LED and >= 150 watts for non-LED lights.

Minor roads are classified as where luminaire wattage <45 watts LED and <150 watts for non-LED.

Maintenance costs for Bulk Lamp Replacement, Faults and Emergencies, and Maintenance Repair maintenance types have been allocated as follows:-

- Major roads costs = 1.62 times Minor road costs.

This assumption is based on a comparison of annual SLUOS charges for major and minor roadway lighting in the 2019-24 Regulated pricing model.

Night Patrol and Dedicated Streetlight pole inspection costs have been pro-rated according to the number of major and minor road tasks using the 45w LED / 150w non-LED rule.

Where tasks cannot be directly mapped to a major/minor classification they have been allocated on the basis of the standard population of streetlights as 25% major and 75% minor.

Routine maintenance costs have reduced where LED replacement has been performed in lieu of bulk lamp replacement works.

Use of Estimated Information

The definition for most of the categories in table 2.8.2 require high level assumptions and estimation to be used. We believe these assumptions provide a relatively accurate response, however the definitions for each data point are not adequate to consider the data actual.

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 2018-19 Annual 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 2018-19 was applied as per the definition.

Source of Information

Data has been sourced from:

- 2018-19 Regulatory Accounts
- PeopleSoft Query for expenditure against project type Fault & Emergency (excluding overheads)
- Chart of Accounts with COA Mapping – from 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 18-19”.

Methodology & Assumptions

In the RIN Access Database 2018-19, 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 2018-19TMED, 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.
- Some of the 2018/19 Major Event days were on consecutive days which meant that the above calculation would double count expenditure. As a work around the following example applies:
- Major event day on 15 Dec calculated as the cost of emergency response for the dates 15,16,17 December. For the event that occurred on 16 December this was calculated as the cost for emergency response for 18 December only. At the total level the cost of the major events is in line with other years.

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

Total amounts reported at (A) are balanced to the general ledger and considered actual.

Amounts for Major Event O&M Expenditure (B) and Major Event Days O&M Expenditure (C) are estimates, as all expenditure related to emergency works incurred on these days are recorded on the date, however they may not relate just to those events. Total expenditure reported for emergency work on the date, is for costs incurred on that date and for the subsequent two days.

Reliability of Information

This information is considered reliable, noting that some estimation is included in (B) and (C).

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. The policy specifies that for internally funded assets, the cost of these assets may include directly attributable overheads up to the stage when the asset is ready for use in the location and condition intended by management.

Source of Information

Refer to opening sections of this Basis of Preparation for details on our RIN Optimisation and finance data prepared for multiple tables in the RIN. Section 3 of this Basis of Preparation discusses the sourcing of financial information used to prepare the data.

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.
- 2018-19 PeopleSoft general ledger transactions were uploaded into a data model. Within this model each transactional combination of department, account and project type, and its subtotal, was classified with a label describing if the combination is 'direct' or 'indirect' in nature.
- Transactions within any project type that is classified as Emergency Response, Vegetation Management and Routine and Non-routine Maintenance and is not an overhead transaction is classified as 'Direct'. All other transactions within Maintenance expenditure and Operating expenditure excluding maintenance expenditure are classified as 'Indirect'
- The indirect (overhead) items are further classified as 'Corporate' or 'Network' based on the following:
    - Department classification if the transaction type is 'Support' costs
    - Resource Category classification if the transaction type is 'Project allocations'
    - Account number classification if the transaction type is 'Allocation offset'
    - Other Items which are not assigned in the above are classified as 'Corporate' or 'Network' on a case by case, eg cost of sales transactions are classified as Corporate overheads

Use of Estimated Information

This was reported as estimated in prior years however the RIN Optimisation project has used information from PEOPLESOFT to separate expenditure across RIN categories. As reported information is materially dependent on information from the PeopleSoft financial system it is considered as actual information for 2018-19.

Reliability of Information

This information is considered reliable.

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:

- CA_RIN_Labour_V3_2019_09_19 is a data model which is used to power pivot information derived from the sources listed below. The summary result provides information in the format required for the CA RIN tables derived from Peoplesoft and HR – these include:
- FTE Reports for June 2019 and June 2018 showing head count at year end.
- Personal Data files for June 2019 and June 2018 showing annual remuneration data per employee.
- Agency Staff reports for June 2019 and June 2018 showing labour hire staff.
- The 2019 Working Hours file, showing available working hours calculated as part of the budgetary process.
- The RIN classification file from the Human Resources team ("HR"), showing FTEs classified by the categories required in Tables 2.11.1 and 2.11.2.
- The 2019 Stand Down Occurrences file from Payroll and validated by HR.

Methodology & Assumptions

Main Assumptions

- Refined process in 2018-19 with data from PeopleSoft HR used as the basis for categorising expenditure across the RIN Categories. Ordinary, overtime, allowances, back-pay and bonuses (i.e labour costs excluding on-costs) sourced from PeopleSoft HR. The remaining standard control labour (predominantly oncosts/redundancies) is allocated proportionately across the RIN categories. This is consistent with the method used in the general ledger for allocating oncosts, whereby total ordinary and overtime by department will drive the allocation of oncosts.
- The 2018-19 ASL number is assumed to be the average of the 2017-18 and 2018-19 year end staff numbers converted to Standard Control Services numbers by way of department percentages derived from the CAM methodology.
- 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. This correlates with the allocation of oncosts in actuals ledger. The average productive work hours per ASL equates to average productive work hours for Ordinary Time plus average overtime hours per ASL where average overtime hrs per ASL is calculated as total overtime hours from global payroll divided by number of ASL.
- A Standard Control Services percentage has been calculated for each department using the CAM methodology and this has been applied to the support labour costs and units.

Total Labour Expenditure

- The 2018-19 Ordinary, overtime, allowances, back-pay and bonuses information is sourced from Peoplesoft HR and reconciles back to the global payroll journals in general ledger. The labour data

was then split out across the RIN classifications based on individual employee IDs, with mapping provided by HR

- Labour costs identified above were split between direct and support based on the AER project tree. Project Level 3 – Standard Control used to capture the direct expenditure. Support costs (Project Level 2 – Support and non-project) split between Corporate and Network Overheads based on the CAM (by department)
- Remaining standard control costs excluding temps (which were calculated separately) were prorated across direct/support labour and corporate/network to equal the total Annual RIN internal labour reported amounts. These amounts are primarily made up of oncosts and redundancy costs. The allocation across categories was based on the same allocation proportion as the above ordinary and overtime elements. This correlates to the method in general ledger for allocating oncosts whereby total ordinary and overtime by dept will drive the allocation of oncosts.
- Temp costs as per the annual RIN was allocated proportionately with the number of agency within each row category as a proportion of total agency the driver to allocate within each of corporate overhead, network overhead and Direct network labour.
- Overtime wages were derived from HR overtime information provided from Peoplesoft HR and global payroll. The CAM was applied to departments to provide the Standard Control Services component.

RIN Classification

Each employee was assigned their RIN classification by the HR (Workforce Planning and Analytics) team.

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.

Agency staff (labour hire) were mapped to RIN Classification using vlookups of role descriptions aligned to the mapping used for internal personnel listing. Where a job title did not match an internal personnel role previously mapped professional judgement was applied.

The following table outlines the logic used by the HR team:

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 2018-19 were taken from the FTE report for June 2019. 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 2018 and June 2019 by department.
- The applicable departmental Standard Control Services percentage was applied to the average numbers to derive the Standard Control Services ASL numbers.
- The average year end labour hire data was calculated by deriving an average of the closing balance of June 2018 and June 2019 by department.

Stand Down Occurrences

Data for the 2019 year regarding stand down occurrences was obtained from payroll and reviewed by 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

Most of the information in this table is considered to be based on actual data with best practise methodology applied to derive the required line items. However average productive hours is estimated as accurate records of productive time are not maintained.

Further details regarding this is 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.
- Peoplesoft HR Payroll data
- These elements are housed in CA_RIN_V3_2019_09_19 data model

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 reported in this column (and in table 2.11.2) equates to the available working hours as shown in the Working Hours file for 2019. Actual productive hours for each employee is not recorded in the payroll system but is an estimation. This file is prepared and used as part of budgeting processes using historical actual information and expected outcomes.
- The total Standard Control Services cost for ordinary time was divided by the total productive work hours for ordinary time and further divided by number of ASL to derive a unit rate. This number is then uplifted into a full year rate by multiplying total hours over productive hours to calculate the hourly rate

per ASL per labour category before oncosts. Superannuation (15%), workers compensation (1%) and payroll tax (5%) is then applied to derive the hourly rate per ASL inclusive of oncosts.

- 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 HR payroll report for 2019. The overtime cost was taken from the HR payroll file.
- The Standard Control Services percentage per department (from the CAM) was applied to extract the Standard Control Services element.
- The RIN labour categories were added to the analysis.
- The average productive overtime work hours per ASL was 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 and grossed up for labour oncosts .

Use of Estimated Information

The information in this table is considered to be based on actual data for overtime figures, with best practise methodology used to estimate ordinary time amounts.

Further details regarding this is described in the Methodology & Assumptions section above.

Reliability of Information

While most of this information is considered reliable, some caution should be used with data that includes estimations.

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

Refer to opening sections of this Basis of Preparation for details on our RIN Optimisation and finance data prepared for multiple tables in the RIN. Section 3 of this Basis of Preparation discusses the sourcing of financial information used to prepare the data.

The specific methodology and assumptions made for this table are also outlined below.

Methodology & Assumptions

- The enriched income and expenditure and capital expenditure data includes the 'resource category' which identifies the nature of the expense and which map to broader expense types. The expenses at the lowest level of the RIN category, eg Routine Maintenance, are summarised into labour, materials, contractors, plant, property expenses, allocations and other. The percentage that each of the expense categories (by nature) after combining plant and other and excluding allocations were determined for each of the broad RIN categories.
- The completed CA RIN tables for Vegetation Management, Routine and Non-Routine Maintenance, Augmentation, Replacements, Connections, Non-Network Expenditure, Emergency Response, Quoted services, Fee based Services, Metering and Public Lighting were extracted. Where required the expenses in the tables were summarised to match the required 2.12.1 categories. These expenses were then apportioned between direct labour, direct materials, contractors and other. The overheads and Non-Network expenditure was all classed as other – consistent with previous years.
- 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 capex data 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 on 22nd July and filtered to report on data for the FY19 period.

This data was filtered to exclude Metered and Private lights and lights that were previously classified as Tariff 6 and only includes In Service lights. These devices were excluded for the following reasons:

- Metered, Private and Tariff 6 lights are the responsibility of the owner for maintenance and replacement.
- Unique values based on Type were extracted and the number of lights corresponding to each category were counted.

Methodology & Assumptions

The individual device types were counted from the WASP installed data as at 30 June 2019, based on the AEMO load table classification for each light.

Tariff 6 lights (privately-owned and maintained) have been excluded from inventory count whereas they were previously included.

Use of Estimated Information

All information has been sourced from WASP and is considered to be actual data.

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 and Service Now database for 2018-19.
- Cost data in this table is based on the standard methodology adopted for all finance expenditure data in the Category Analysis RIN. Data was extracted from Peoplesoft and the direct spend for each project reported. 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	LED Luminaires with wattage 45 or higher and non-LED luminaires with wattage 150 or higher
Minor Road Lighting	LED Luminaires with wattage less than 45 and non-LED 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 (excluding tariff 6 lights that are owned and maintained by the customer) that are billed through the Unmetered Billing System

Light Installation Volume & Expenditure

- Volumes were extracted from the WASP Asset History for 2018-19.
- 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.
- Instructions - Compare the Asset Inventory from previous financial year and only consider assets that are not on the previous year's report. Use the 45watt LED / 150watt non-LED rule to arrive at the Major/Minor split.

Light Replacement Volume & Expenditure

- Replacement volumes were extracted from the WASP Work Task records for 2018-19. 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 – customer funding for bulk LED replacements totalled $2,772,670.53 (excluding overheads).
- Instructions - Use the "Defects 2018-19" report, filter for “Lighting – Change luminaire”, "Streetlight-replace", “Streetlight – Upgrade”, “Streetlight – Replace Lantern (Serviceable)” and "SL Luminaire-bulk replacement" work tasks and use the 45watt LED / 150watt non-LED rule to arrive at the Major/Minor split.

Light Maintenance Volume & Expenditure

- Maintenance volumes were extracted from WASP Work Task records for 2018-19. 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.

- Instructions - Poles - number of poles maintained - from the "Poles Streetlights and Inspections_1819FY" report and use value for "Total Dedicated Inspected Poles".
- Instructions - Use the "Defects 2018-19" and “Inspections 2018-19” report, filter for “Lighting – Night Patrol Inspections”, “SL Globe and PE cell – bulk replacement”, “Lighting – Minor Maintenance”, Lighting – Standard Maintenance”, Street Light – Repair” work tasks and use the 45watt LED / 150watt non-LED rule to arrive at the Major/Minor split.

Quality of Supply

Mean Days

- This number was derived from WASP report “PR26 Streetlight Urgent Risk” for 2018-19 financial year. 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)
- Average days to repair is calculated manually by dividing total days by number of tasks.
- Instructions - use the value from AR RIN Table 3.6.7.2 "Street lights - average number of days to repair".

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 (for the period 1/7/2018 to 12/2/2019) and Service Now database for the period 13/2/2019 – 30/6/2019.

- Instructions - GSO Breaches - source from "GSL payments FY19", number of records where “PRT_AMOUNT” =$15.
- Instructions - GSL Payments - source from "GSL payments FY19", sum of the amounts in the "PRT_AMOUNT" column for the relevant GSO breaches.
- Instructions - Customer Complaints – manual calculation based on the data provided from CMS and Service Now reports filtered for streetlighting data.

Use of Estimated Information

All volume information has been sourced from WASP and is considered to be actual data.

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

Data was obtained from the current public lighting pricing model. This model was reviewed in FY19 for the FY20-24 regulatory submission and contained the most up to date information and pricing to be able to estimate unit rates by luminaire type. All unit rates are exclusive of overheads.

Methodology & Assumptions

The pricing model builds up costs using actual materials, labour, plant, and traffic control cost inputs.

Lighting Installation costs have been entered as $0. This assumes that all new installations have been installed through the contestable process and are not funded by Essential Energy.

Light Replacement cost are built up on an assumed amount of time required to replace a luminaire on a spot basis.

Light Maintenance costs are built up based on performing both planned and unplanned maintenance tasks. Planned maintenance incudes the bulk lamp replacement and night patrols. These costs are relatively constant and known. Unplanned maintenance are all other task that are performed when lights are reported to be not working. Historical failure rates for each individual technology are utilised to estimate the unit rate for unplanned maintenance.

The methodology has changed from the 2017-2018 CA RIN in that unit rates provided are directly from the public lighting pricing model.

Use of Estimated Information

The data in this table is estimated from a cost build up perspective and is based on cost to replace going forward. Essential Energy have interpreted the requirements of the RIN on this basis and deem this forward looking approach reasonable.

The amount of time spent for installations and replacements and frequency of spot maintenance are estimated based on past failure data, however material and labour inputs are actual.

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 sub-headings, 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 2018-19 have been produced through queries from the EDDiS database, with the query providing total number of meters by type and categories required for completion of this table

- Type 4 meters single phase or multi phase (Actual) - Type 4 meters single phase or multi phase numbers were calculated using meter phases data
- Type 4 meters current transformer number (Actual) - Type 4 meters current transformer numbers were calculated using meter amps data
- Type 5 meters single phase or multi phase (Actual) - Type 5 meters single phase or multi phase numbers were calculated using meter phases data.
- Type 5 meters current transformer (Actual) - Type 5 meters current transformer numbers were calculated using meter amps data
- Type 6 meters single phase or multi phase (Estimated) - Type 6 meters single phase or multi phase was calculated using the meter model. Each distinct model has a known number of phases. See assumptions
- Type 6 meters current transformer (Estimated) - Type 6 meters current transformer numbers were calculated using a combination of meter model, amps and multiplier. See assumptions
- Type 6 meters direct connect (Estimated) - Type 6 meters direct connect numbers were calculated using a total number of meters minus number of current transformer meters

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.

Some assumptions have been made on type 6 meters to whether some meters are single phase or multi phase due to the Meter Type being unknown

Some assumptions have also been made on type 6 meters to whether meters are current transformer or direct connect due to minimal data on very old meter model's current ranges.

Unknown meter models would be distributed similar to the known models.

Meter Type 4 did not appear in last year's RIN. According to ring fencing rules Essential Energy should not be the Meter Provider for Type 1-4 meters. Essential Energy has not been successful in convincing Retailers to transfer these sites away from Essential Energy and as a result still have contestable Type 4 meters installed. Essential Energy is reporting to the AER on its progress transferring these sites away.

Use of Estimated Information

The data is an apportionment of approximately 90,000 meters into the reported splits based on known meter types. This apportionment is not considered material and the data can be considered as actual.

Reliability of Information

This information is considered reliable.

Table 4.2.2 - Cost Metrics

Compliance with Requirements of the Notice

In the following sub-headings, 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 and PAECE. 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

- There have been no meter purchases. Any meters required for meter maintenance were old stock.
- Volume information for Meter Purchases has been derived from delivery information from Essential Energy's two meter suppliers.
- Meter Purchase financials are zero as the meters are sold to ASP's and gifted back to the Network

Meter Testing

Volumes and Expenditure

- 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 and are considered actual numbers.
- Information Expenditure for 2018-19 is based on financial reports from PeopleSoft. This data has been allocated based on Projects that relate to Meter Testing and are thus considered to be actual information.

Meter Investigation and Special Meter Reading

Volumes for Meter Type 5 and Meter Type 6 (Actual)

- The volumes for the Scheduled Meter Readings are sourced from EDDIS and are considered actual. A report is run and the readings after 30 June 2019 has been removed.

Expenditure for Meter Type 5

- Information for Type 5 readings is based on the number of Type 5 meters being read remotely on a fortnightly basis. These costs are apportioned based on the volume of sites and the reading frequency. 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.

- Scheduled meter reading type 5 assumes 26 reads a year per meter with an estimated a cost of $300 per meter per year

Expenditure for Meter Type 6

- This information has been sourced from PeopleSoft. The data has been extracted based on Projects that relates to Meter Readings and is considered actual data.

New Meter Installs

- All data for this section is zero as Essential Energy is no longer authorised to install new meters. New meter installs are conducted by Accredited Service Providers.

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 2018-19, as the program was suspended as a result of the Power of Choice initiative.

Meter Maintenance

Volumes and Expenditure

- Meter maintenance includes the routine maintenance of meters, including investigation of meters that have suspected to have failed in service. Volume figures are based on the amount of works orders raised and completed for meter maintenance activities. These have been extracted from PEACE and the maintenance activities actioned after 30 June 2019 have been removed. The data is therefore considered to be actuals.
- Essential Energy has no separation between Type 5 and Type 6 maintenance costs with Type 5 costs being included in Type 6 maintenance costs.
- Expenditure Data for 2018-19 has been sourced from PeopleSoft and is allocated based on Metering Projects that relate to maintenance. The data reconciles back to Regulatory accounts and is therefore considered actual information.

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.
- As there are very few type 4 meters installed and maintained these costs have been included in other metering costs.

Use of Estimated Information

The totals come from the general ledger, PEACE and EDDiS and are considered actual.. Best practice methodology has been applied to determine some splits as noted in the Methodology section above.

Reliability of Information

The totals are considered reliable however caution should be applied if using the specific 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 2018-19 costs and volumes for each of the Ancillary Service Fees it has charged.

Source of Information

- Metering Volume Data is extracted from Essential Energy's Peace system. Expenditure data is extracted from PeopleSoft.
- Authorisation Volume Data is maintained using Excel spreadsheets. Expenditure data is extracted from PeopleSoft.
- Connection Application Data is sourced from Essential Energy's Peace, PeopleSoft and Secure Web Forms systems. Expenditure data is extracted from PeopleSoft.
- Connections Data is sourced from Essential Energys corporate system Contestable Works Management System (CWMS). Expenditure Data is extracted from PeopleSoft.
- Note: Reinspect Level 1 data is from CWMS. Reinspect Level 2 is from Secure Web Forms (SWF).
- Physical printouts of Job Sheets taken from Essential Energy's Peace system. Expenditure data is extracted from PeopleSoft.
- For cases where Land Registry Services (LRS) conducts the Searches on Essential Energy's behalf, data comes from the invoices LRS sends.
- For cases where Essential Energy conducts its own Searches', data comes from Essential Energy's Lotus Notes system. Expenditure data is extracted from PeopleSoft.
- Level 2 Accredited Service Provider inspection data is sourced from Essential Energy's Secure Web Forms (SWF) system. Expenditure data is extracted from PeopleSoft.
- Volume and expenditure data is sourced from Essential Energy's PeopleSoft system.

Methodology & Assumptions

Special Meter Read

Move In Move Out Meter Read

Meter Test – 1st Meter

Off peak conversion

Disconnect / Reconnect – Disconnect Complete

Disconnect – Pillar / Pole

Site Establishment per NMI

Disconnect – Disco Non Payment

- Volumetric Meter Data from Peace is downloaded using the Spotfire reporting tool into an Excel worksheet. The download is based on Market Service Order Transactions.
- The extracted Volumetric Meter Data from Excel is summarised using pivot tables and used to populate the RIN template.

- The Finance team extracts all spend data from PeopleSoft into an Excel worksheet and sends to respective RIN authors.
- The RIN authors conduct a line-by-line reconciliation for the financial figures and populate the RIN tables.

Authorisation of ASPs – initial

Authorisation of ASPs - renewal

- For each Authorisation processed, a record is entered into an Excel spreadsheet.
- At the time of RIN population, data is cleansed and summarised before loading into the RIN template.
- The Finance team extracts all spend data from PeopleSoft into an Excel worksheet and sends to respective RIN authors.
- The RIN authors conduct a line-by-line reconciliation for the financial figures and populate the RIN tables.
- Volume and Charges may not match as some applications come in as Initials but are only charged as Renewals, where the customer would have already paid for Initials under a different category.

Connection offer service – basic

Connection offer service – standard

- Connection Application data is downloaded from corporate systems via a SSRS report on a weekly basis.
- The report data is cleansed to remove any possible duplicates and populate missing information.
- The weekly reports are summarised monthly and annually to populate the RIN tables.
- The Finance team extracts all spend data from PeopleSoft into an Excel sheet and sends to respective RIN authors.
- The RIN authors conduct a line-by-line reconciliation for the financial figures and populate the RIN tables.

Connections Interface – Customer Interface Co-ordination and Connections Interface – Relocation Process Facilitation

- Volumes taken from expenditure due to no fee being oncharged in CWMS for service provided so some estimation is included but not considered material.

Connections Interface – Obtaining deeds of agreement

Design Information

Design Certification

Design Rechecking

Inspection Level 1

Reinspect (level 1 and 2 Work)

Access Permit

Substation Commissioning

Administration (Contestable Works)

Notice of Arrangement

Access to network assets (standby)

Planning studies for new connection applications

Install remove HV lv line link

- An extract of contestable work is taken from CWMS into an Excel worksheet on a weekly basis.
- Weekly worksheets are consolidated into an annual summary and summary pivot tables are created to derive volume summary information.
- The weekly reports are summarised monthly and annually to populate the RIN template.
- The data is cleansed to remove any possible duplicates and populate missing information.
- The Finance team extracts all spend data from PeopleSoft into an Excel worksheet and sends to respective RIN authors.
- The RIN authors conduct a line-by-line reconciliation for the financial figures and populate the RIN tables.
- Volumes taken from expenditure due to no fee being oncharged in CWMS for service provided so some estimation is included but not considered material

Connections Interface – Preliminary Enquiry Service

- Manually count the printouts and enter volume into the RIN template.
- The Finance team extracts all spend data from PeopleSoft into an Excel worksheet and sends to respective RIN authors.

The RIN authors conduct a line-by-line reconciliation for the financial figures and populate the RIN tables.

Conveyancing information desk inquiry

- Consolidate data from LRS and Lotus Notes into an Excel worksheet and populate the RIN template.
- The Finance team extracts all spend data from PeopleSoft into an Excel worksheet and sends to respective RIN authors.
- The RIN authors conduct a line-by-line reconciliation for the financial figures and populate the RIN tables.

Inspection of service work (level 2)

- The SWF Reporting function produces an export of Billing data into an Excel spreadsheet monthly.
- The data is cleansed to remove any possible duplicates and populate missing information.
- Monthly data is then consolidated annually to populate the RIN template.
- The Finance team extracts all spend data from PeopleSoft into an Excel worksheet and sends to respective RIN authors.
- The RIN authors conduct a line-by-line reconciliation for the financial figures and populate the RIN tables.

Fitting of Tiger Tails

- Data is sourced from the Finance system, and number of Chargeable Works Dockets processed with charge codes 318 and 104. Volumes are taken from expenditure due to no fee being oncharged in CWMS for service provided and therefore include some estimation, but not considered material.

The sum of Volume and Expenditure for 'Move In / Move out Meter Reads' and 'Disconnect - Disco Non Payment' combined is similar to last period however the splitting of the expenditure for this period is

reversed. The expenditure allocation is based directly off the receipting of skilltech invoices to product codes

Use of Estimated Information

All Volumes & Expenditure are considered as actual.

Reliability of Information

This data is considered reliable with the minor exceptions noted above.

A full listing of all Ancillary Network Services can be viewed here;

https://www.essentialenergy.com.au/-/media/Project/EssentialEnergy/Website/Files/Our-Network/PriceScheduleForAncillaryNetworkServices1July2019.pdf?la=en&hash=F2FA10C5F956760DA540429A408AA1ACF477F725

Worksheet 4.4 - Quoted services

Table 4.4.1 – Cost metrics for quoted services

Compliance with Requirements of the Notice

Essential Energy has provided 2018-19 costs and volumes for each of the Ancillary Service Fees it has charged.

Source of Information

High Load Escorts

- High Load Escort data is maintained in an Excel spreadsheet.

CT Installs

- This service is no longer provided by Essential Energy

Rectification of Illegal Connection

- Rectification of Illegal Connection data is sourced from Essential Energy's corporate system Revenue Risk Database.

Methodology & Assumptions

High Load Escorts

- As each High Load Escort job is processed, a record is created in an Excel spreadsheet. This data is collated annually to populate RIN tables.
- The Finance team extracts all spend data from PeopleSoft into an Excel worksheet and sends to respective RIN authors.
- The RIN authors conduct a line-by-line reconciliation for the financial figures and populate the RIN tables.

CT Installs

- This service is no longer provided by Essential Energy.

Rectification of Illegal Connection

- Each record for a rectification of illegal connection is recorded with a note to advise of an illegal connection in the Revenue Risk Database.
- This data is counted, and volume is populated in the RIN template.
- The Finance team extracts all spend data from PeopleSoft into an Excel worksheet and sends to respective RIN authors.
- The RIN authors conduct a line-by-line reconciliation for the financial figures and populate the RIN tables.

Use of Estimated Information

The financial data in this table is chiefly comprised of actual information from the PeopleSoft financial system.

Reliability of Information

This data is considered reliable.

A full listing of all Ancillary Network Services can be viewed here;

https://www.essentialenergy.com.au/-/media/Project/EssentialEnergy/Website/Files/Our-Network/PriceScheduleForAncillaryNetworkServices1July2019.pdf?la=en&hash=F2FA10C5F956760DA540429A408AA1ACF477F725

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Worksheet 5.2 - Asset Age Profile

Table 5.2.1 – Asset Age Profile

Total volumes are considered to be actual, and reliable. However we note that some volumes in the more past years may not entirely accurate and the age may have been estimated for these early years.

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

Pole Material	Pole Type	Material
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

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

A snap of the GIS Smallworld data was taken as at 1st July. From this snapshot, service cables are extracted using scripts.

Methodology & Assumptions

Smallworld Cables used in the analysis were filtered by:

- Purpose = Overhead
- Owner = Essential Energy
- Operating Voltage equal to "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 14,100 services – these were 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 Service Point – Premise join

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, i.e. ≤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.
- Data from WASP is used for other date and label information.

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

Some 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.
- Data from WASP is used for other date and label information.

NOTE:

Essential Energy does not have any Service lines that are not low voltage.

Essential Energy does not have any Service lines that are complex.

Essential Energy does not have any Service lines 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

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

Although this data is considered reliable, some 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 and Smallworld databases 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 four 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 131,219.
- 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 131,219= 196,829
  - HV Fuses = 1 x 131,219 = 131,219
- The profile of Primary Voltage for existing pole mounted Substation Sites was determined from WASP as follows:

Voltage	Count	Percentage	Mapping
11kV	87,596	67%	<=11kV
12.7kV	3,430	2%	>11kV and <=22kV
19.1kV	5,041	4%	>11kV and <=22kV
22kV	33,739	26%	>11kV and <=22kV
33kV	1,385	1%	>22kV and <=33kV

- These percentages were applied to the estimated counts in step 3 to determine the quantities per voltage group:
    - LV Fuses
        - LV = 100% x 196,829 = 196,829
    - HV Fuses
        - <=11kV = 67% x 131,219 = 87,917
        - >11kV and <=22kV = 32% x 131,219 = 41,990
        - >22kV and <=33kV = 1% x 131,219 = 1,312
- 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 6,987.
- 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 6,987 = 27,948
    - HV Fuses = 2 x 6,987 = 13,974
- 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 27,948 = 3,074
        - LV Fuse = 89% x 27,948 = 24,874
    - HV Switchgear
        - <=11kV Circuit Breaker = 35% x 13,974 = 4,891
        - <=11kV Fuse = 41% x 13,974 = 5,729
        - <= 11kV Operational Switch = 10% x 13,974 = 1,371
        - >11kV and <=22kV Circuit Breaker = 5% x 13,974 = 699
        - >11kV and <=22kV Fuse = 3% x 13,974 = 419
        - >11kV and <=22kV Operational Switch = 6% x 13,974 = 838
- 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

Caution should be used when using this data for decision making or benchmarking purposes.

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

This data has been extracted from WASP and is considered to be actual although 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

Although this data is considered reliable, some caution should be applied if using this data for benchmarking or decision making purposes.

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, along with the number of AFLC plants installed.

Source of Information

This data has been obtained from:

- Essential Energy's WASP database using SQL.
- Firmware version dates, where WASP data has attracted a lower level of 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. Also included in this category are the AFLC plant assets which also reside in the ZSS environment. 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, thus the Firmware version is utilised to obtain the installation date of the RTU.
- Actual dates of commissioning of AFLC plant where available, otherwise dates of manufacture of equipment, such as plant components or oldest surviving AFLC Relays deployed in the area, are used.
- Frequency Injection Relay age data based on similar baseline techniques used for baseline AFLC Plant. Moving from that point to the present; known failure rates (natural attrition), increasing Controlled Load Customer Base data, Bulk Replacement Program data and Stores Movement data have been used to determine the provided Age/SD profiles.

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.

In the case of AFLC plant, the age of the plant is based on known actual dates of commissioning as well as an estimated date of commissioning where records no longer exist. Estimated dates used are concurrent with any manufacturers' records, date stamping of equipment in service, and make/model/serial number series of the oldest AFLC Field relays deployed in the area covered by the AFLC plant in question.

In the case of AFLC plant, this has been successfully acknowledged previously and represents no departure from the methodologies used in previous RINs. In reality, as time progresses and new plant replaces these legacy plants, the variability in these estimations diminishes.

Age profiles for Frequency Injection relays have been based on the same baseline approach used for AFLC plant. However, the progression from that initial point to the current Age/STD profile has been based on additional, separate estimations work based on known failure rates of relays, as well as known increases in Controlled Load population. New equipment installed figures are now supplied from 2010, based on available information sourced from Bulk Replacement program data, along with Stores inventory movements.

Reliability of Information

Caution should be exercised when using this data for decision making or benchmarking purposes.

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

This is actual data from WASP and 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

This data is considered reliable.

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

This is actual data from WASP and 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

Although this data is considered reliable, some caution should be applied if using this data for benchmarking or decision making purposes.

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

This is actual data from WASP and where the age of the of the Zone Substation Current Transformer 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

Although this data is considered reliable, some caution should be applied if using this data for benchmarking or decision making purposes.

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

This is actual data from WASP and 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

Although this data is considered reliable, some caution should be applied if using this data for benchmarking or decision making purposes..

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

This is actual data from WASP and 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

Although this data is considered reliable, some caution should be applied if using this data for benchmarking or decision making purposes.

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, thus the age profile for >33kV Switchgear has been used to estimate age.

Use of Estimated Information

This is actual data from WASP and where the age of the of the Zone Substation Protection Relays is not knows if is based on knowledge of the network and existing data in WASP.

Reliability of Information

Although this data is considered reliable, some caution should be applied if using this data for benchmarking or decision making purposes.

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.

The meter install data shows meters installed by calendar year, eg. 2017-18 shows meters installed in the 2018 calendar year.

Use of Estimated Information

This is actual data from EDDiS and where the age of the of the meter is not recorded, it has been estimated based on knowledge of the meter population .

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.

For overhead conductors and underground cables a more refined methodology has been used to establish the mean life of the assets.

For public lighting calculations are based on the current economic lives of 10, 20 and 35 years for LED, non-LED luminaires and poles/columns respectively.

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.

The standard deviation for SCADA has been calculated using base data points.

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 2018-19, the Winter of 2018 and the Summer of 2018-19 were used, which included the periods from April 1st 2018 to March 31st 2019. This method takes into account 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 occurring in two separate years and 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 Bulk Supply Point and Embedded Generator NMIs (from EDDiS 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 is as per EB RIN Table 3.4.3.2 "Annual system maximum demand characteristics at the transmission connection point – MW measure", rows DOPSD0111 and DOPSD0112, which are based on the ratio of non-coincident peak demand to non-coincident weather corrected peak demand (ie. DOPSD0107, DOPSD0108 and DOPSD0109).

The main variables that influence the PoE calculation for each site include:

- The number of years of historical data used – some sites use less than the full dataset due to network configuration changes.
- The primary weekdays used – many sites have a variation between their weekday and weekend loads, others are consistent every day.
- The weather station used – most sites use the closest weather station, but some correlate better to stations further away and some station data is unreliable.
- The data points used – each site has a unique list of data points used to calculate the site totals. These can change each year due to metering issues or site reconfiguration.
- Outliers – days that include switching or poor metering data are excluded.

Use of Estimated Information

Actual data was used for determining the maximum demand, generation and applicable dates. The weather corrected 10% and 50% POEs are based on best practise methodology in line with AER guidelines and although some calculations are performed it is considered to meet the requirements of actual information.

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 and individual zone substation data was obtained from demand meters (via IMDR) and from SCADA (via TrendSCADA). The calculation of weather corrected POE values requires weather station daily maximum temperatures.

Methodology & Assumptions

MW and MVA

There is a simple relationship between components of supplied electrical power, including MW, MVAr, MVA and pf. 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 two most relevant equation for this section are to calculate the pf and determining MVA from MW and MVAr

The equation for determining pf 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.

To calculate MVA from MW and MVAr, the equation is:

$$MVA = SQRT(MW^2 + MVAr^2)$$

The data measured is typically MW and MVAr, so this equation is used to determine the MVA for each site. The summation of MVA also uses this equation, where the sum of MW and sum of MVAr are determined. This equation is then used to calculate the MVA sum.

Change to timing arrangements

In order to provide the actual loads for 2018/19, the winter of 2018 and the summer of 2018/19 was used, which included loads from April 1st 2018 to March 31st 2019. 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 2018/19 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. The main variables that influence the POE calculation for each site include:

- The number of years of historical data used – some sites use less than the full dataset due to network configuration changes.
- The primary weekdays used – many sites have a variation between their weekday and weekend loads, others are consistent every day.
- The weather station used – most sites use the closest weather station, but some correlate better to stations further away and some station data is unreliable.
- The data points used – each site has a unique list of data points used to calculate the site totals. These can change each year due to metering issues or site reconfiguration.
- Outliers – days that include switching or poor metering data are excluded.

- **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
Adaminaby 33kV	2.141	11/07/2018 6:30
Ardlethan	0.861	17/01/2019 19:30
Ashmont	21.5	22/01/2019 15:00
Ballina 132kV	17.981	2/05/2018 19:00
Barham	5.972	28/04/2018 0:30
Boambee South 11kV	9.597	25/03/2019 10:00
Bomen	12.136	22/01/2019 12:30
Bourke 33kV	2.953	19/12/2018 19:00
Brogo	0.678	30/12/2018 16:30
Bulahdelah	3.399	31/01/2019 13:00
Bullocks Portal	0.936	8/07/2018 7:30
Buronga Town	13.979	2/03/2019 18:00
Carathool	0.651	24/01/2019 19:00
Casino 132/66kV	29.813	23/01/2019 18:00
Clearwater Cr	18.325	16/07/2018 18:30
Cobar CSA	19.381	13/12/2018 15:00
Dubbo 132/66kV	64.56	16/01/2019 15:30
Dubbo South	19.158	16/01/2019 19:30

Subtransmission and Zone Substations with MVA Peak different to MW Peak		
Substation	Non-Coincident MVA Peak	Date and Time of MVA Peak
Dunedoo	5.075	27/01/2019 16:00
Dunoon	7.22	13/02/2019 18:00
Edrom	2.333	14/02/2019 6:30
Ewingsdale	16.107	10/07/2018 18:30
Forbes Town	15.416	17/01/2019 20:00
Ganmurra	0.674	15/01/2019 19:30
Girilambone	2.092	12/08/2018 21:00
Goddard Lane	13.481	16/01/2019 15:30
Hanwood	13.744	6/02/2019 15:00
Harrington	3.316	26/01/2019 17:30
Hastings Point	17.379	25/09/2018 13:30
Hay 132	13.472	22/07/2018 19:30
Jindabyne 33kV	0.716	18/08/2018 18:30
Kew	7.155	26/07/2018 12:30
Lightning Ridge	3.112	17/01/2019 18:00
Macksville	984.088	4/11/2018 1:00
Maclean 66/33kV	1.155	6/03/2019 6:30
Maher Street	14.578	26/06/2018 8:30
Moruya Town	6.841	28/12/2018 12:00
Murrurundi	3.035	17/01/2019 18:30
Orange West	14.562	17/06/2018 17:30
Peak Hill	1.83	17/01/2019 19:30
Pinnacles Place	87.148	14/10/2018 20:00
Prince St	8.191	12/02/2019 14:00

Subtransmission and Zone Substations with MVA Peak different to MW Peak		
Substation	Non-Coincident MVA Peak	Date and Time of MVA Peak
Providence Portal	0.382	20/12/2018 4:00
Redcliff	1.155	6/03/2019 6:30
Snowy Adit 11kV	0.024	26/02/2019 11:00
Steeple Flat 132/66kV	5.618	30/08/2018 1:00
Sunset Strip 22	1.062	30/12/2018 21:30
Sunset Strip 33	4.069	17/01/2019 20:30
Talbingo	1.29	13/06/2018 12:00
Tumut	18.711	22/01/2019 16:30
Ulong	0.402	25/07/2018 9:00
Walcha South 66/22kV	1.793	21/08/2018 2:00
Wallangra	0.331	24/08/2018 10:30
Wellington 11kV	11.196	17/01/2019 19:30
West Jemalong	2.254	17/01/2019 19:30
Whitton	5.377	15/01/2019 23:30
Wilcannia	1.532	24/01/2019 20:30
Willbriggie	1.802	24/03/2019 9:30
Wingham	11.073	31/01/2019 16:00
Woodburn	6.827	13/02/2019 18:00
Yarrandale	7.742	18/01/2019 10:00
Yenda	7.837	24/01/2019 22:30

Changes to sites reported

- Current Year;

  There are no changes that affect the number of sites reported this year.
- 2017/18 changes;

  Marulan South is a new zone substation to replace the old Marulan South zone substation.

- 2016/17 changes;

  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

Data is actual.

The Weather corrected 10% and 50% POEs are based on best practise methodology in line with AER guidelines and although some calculations are performed it is considered to meet the requirements of actual information.

Reliability of Information

Most data for the 2018-19 year has been gathered from raw metering data and is therefore considered to be 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 18-19".

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 1-8".

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.

The procedure is as follows:

- 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 “18-19 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.