



31 January 2023

RIN.06: Replacement capex modelling

Ausgrid's 2024-29 Regulatory Proposal

Empowering communities for a resilient,
affordable and net-zero future.



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1. Introduction

1.1 This document's purpose

This document provides an overview of the reset RIN forming part of Ausgrid's contribution for the AER's Repex Model for the 2024-29 regulatory period.

1.2 Related documents

Att #	Document
5.4.a	Asset Replacement Programs
5.4.b	11kV Switchgear Replacement
5.4.c	Underground Sub-transmission Cable Replacement Projects
5.4.d	Other Major Projects
5.8.a	Innovation Program
5.8.c	Control System Core Refresh Program
5.8.d	OT security Program
5.8.e	Network Digitisation Program
	Reset RIN – Repex 2.2

2. Executive summary

The Repex Model is a series of Microsoft Excel workbooks developed by the AER which, when populated, can provide guidance about an electricity distributor's replacement needs.

Ausgrid considers the Repex Model to be a useful tool to be applied as a top-down evaluation of expenditure. In recognition of this, Ausgrid has constructed an internal version of the Repex Model using Microsoft Power BI.

As well as satisfying its obligations under the Reset RIN, Ausgrid expects this attachment will provide the information needed to apply, calibrate and interpret the Repex Model in a way that is appropriately adjusted to Ausgrid's circumstances.

The replacement decision for some assets is less reliant on failure characteristics and therefore optimal timing for asset replacement cannot be solely reliant on condition. As such, Ausgrid has a number of asset replacement programs driven by emerging issues unrelated to the condition of the asset. These programs target assets with inherent design deficiencies and/or configuration issues.

Ausgrid does, where appropriate, analyse the failures of assets to assign a specific probability distribution to inform replacement. Other assets, where either failure data or asset data is limited continue to be forecast using a trend approach. Refer to Ausgrid's Attachment 5.4.e for further details on our approach.

3. Asset Categorisation

The Repex Model requires Ausgrid's asset base to be broken down into discrete categories as defined in the RIN reporting requirements. The Repex Model relies on three key inputs:

1. Age profile (RIN 5.2),
2. Expenditure (RIN 2.2), and
3. Volume replaced (RIN 2.2).

This categorisation is required to reflect variations in asset lives and unit costs between different asset types.

Information about each individual asset category corresponding to the asset groups set out in the AER's Repex Model is addressed below. Among other things, this includes a description of boundary issues and the assumptions made to determine age profile quantities set out according to the description of each asset category. Information detailing the exact data extraction methodology and processing (i.e. the detailed asset categorisation required for reporting) is contained within Ausgrid's Annual RIN Basis of Preparation (BOP) documentation.

At the highest level the information contained within the Annual RIN 5.2 age profile and 2.2 repex tabs (and used in the Repex Model) excludes all privately owned assets and those covered by alternate control services.

Ausgrid notes the following to be read in conjunction with each asset group:

- Unless otherwise noted asset age and volumes used to generate the age profiles are sourced from either the geographic information system (GIS) or the enterprise resource planning system (ERP).
- Ausgrid's ERP/GIS contains the best estimate of asset populations and ages however due to the relative infancy of these systems compared to Ausgrid's asset base, during implementation of the system, some assets were assumed to have an age based on a suburb age methodology. Whilst this is assumed to provide a relatively good estimate of the global population profile, individual and local population ages can be inaccurate. Since the implementation of these systems, where any new assets are installed the actual commissioning dates have been captured and utilised.
- Where asset commissioning date is prior to provided RIN template columns for the age profile, the population is added to the last available column.
- Asset categories can be a mix of linear and discrete assets (i.e. measured in kms or units). Replacement of discrete components of a complex asset for example pillars along a distributor, are not always included in the volume of pillar replacements when the project being undertaken is the replacement of the distributor. As a result the age profile may not align to the annual volumes replaced.
- Ausgrid has replacement programs for which there is no asset category. These include civil assets, earthing systems and smaller electrical assets such as bushings and surge arrestors with this expenditure grouped in the Other asset group sub-section.
- A number of programs are undertaken at a higher level than the asset categories (e.g. distribution substations), so require apportioning of the expenditure and asset volumes replaced amongst the relevant categories.
- Several replacement programs relate to meeting compliance obligations such as environmental legislation (oil containment) and licence conditions (under frequency load shedding) unrelated to the age of the asset; refer to the various AER asset group sub-sections below.
- Not all assets are replaced "like for like" (e.g. towers are generally replaced with poles), which affects in particular, the expenditure related to the replacement. When assets are not replaced "like for like", expenditure and asset volumes captured in 2.2 REPEX tab are reported on the retired assets, not the installed assets.
- Ausgrid has several life extension related programs which do not lead to the retirement of the existing asset; refer to the various AER asset group sub-sections below.
- A single RIN category may capture a wide range of varying assets with significant differences in cost (e.g. switchgear group items often include the ground and pole mounted versions).
- Detailed allocation methodology of historical and proposed expenditure and volumes replaced are not included within this document as these are available in the Annual and Reset RINs.
- The categories used within this document are the AER asset groups, it is noted these are slightly different from the Ausgrid Asset Management System (AMS) Asset Class Categories used within Ausgrid's Attachment 5.4.e.

Asset condition largely drives replacement decisions and considers asset metrics including age, environmental factors, inspection, test results and technical engineering risk assessments. The risk factors associated with asset condition will depend on each asset and can also be a function of the asset location. For example, consideration of the asset location when assessing the risk of initiating a bushfire will be a function of the asset location in relation to the declared bushfire prone vegetation areas.

Assets with software and electronic components (typically SCADA and network control and protection equipment) may require ongoing service, support and spares or replacement. This is because they are prone to frequent technology changes and updates to operate as a functioning and interconnected system. Manufacturers will typically only provide support for communication switching equipment for a defined time frame, after which it is more cost effective and better risk management to replace these assets rather than maintain them in service. It is essential that manufacturer support is available, as an operational and well-supported data communications network is important for efficient and secure network operation.

Repairs to Ausgrid's network assets form part of Ausgrid's Maintenance Opex.

While Ausgrid supports the use of Repex in providing a top-down evaluation, its application has limitations that affects the model accuracy as:

- Not all replacement needs can be linked to age (or deterioration of asset condition over time),
- The RIN template excludes many asset categories which need to be captured in Other (e.g. non-electrical assets such as fire systems, perimeters and buildings),
- Calculated expected replacement life assumes the historically replaced volume which does not take into account the risk,
- Asset deterioration is rarely linear with age and, while age generally provides a reasonable proxy for condition, in some asset classes (e.g. 11kV fuse switches) inherent design issues, obsolescence and known failure modes result in unacceptable risks which require asset replacement earlier than suggested by age alone, and
- The RIN categories used for Repex can represent very broad asset groupings with substantial variation in the asset taxonomy such as installation location and type (overhead or underground) and technology (oil, gas or air insulation).

3.1 Poles

AER Definition	These are vertically oriented assets that provide load bearing structural support for overhead conductors or other lines assets. This also includes associated pole top structures, such as cross-arms and insulators where these are replaced in conjunction with a pole replacement project It excludes other pole mounted assets that are included in any other asset group, notably pole mounted substations and pole mounted switchgear such as links, fuses, air break switches etc.
Ausgrid Asset Class reference	Attachment 5.4.a – Overhead Support Structures Attachment 5.4.a – Distribution Substations
Includes	All Ausgrid poles and towers (including stay poles and signage poles for water crossings) used to deliver network services. Asset categories reflect the operating voltages and pole material type.
Excludes	<ul style="list-style-type: none"> • Dedicated public lighting poles, ground anchors, steel substation structures and private poles. • Conductors and feeder earthing assets are covered in other asset categories. • Age profile does not include assets held in store or for spares. • 2.2 Repex excludes staked wooden poles (captured under Staking wooden poles asset group).
Preparation notes	Asset population data has been sourced from Ausgrid's ERP system. Public lighting poles are separated from 'Poles' and have been separated into the 'Public lighting' asset category.

	<p>The following assumptions were applied:</p> <ul style="list-style-type: none"> • Reported quantities are in units. • Pole voltage data has been categorised by the highest conductor voltage on the pole. For example, if a pole carries 33kV and 11kV conductors then the pole will be assigned as a 33kV pole. • 2.2 Repex includes staked poles replaced by new poles.
Replacement drivers	The condition of the pole apart from the 'relocation of poles in road authority hotspots' which is driven by Community Safety.
Solution	Replacement (including the associated pole top structures where the pole is replaced).

3.2 Pole-top Structures

AER Definition	<p>These are horizontally oriented structures and their components that provide support for overhead conductors and related assets to be supported on a pole and provide adequate clearances. This relates to expenditure incurred when a pole top structure is replaced independently of the pole it is located on. This includes cross-arms and insulators. It excludes any pole mounted assets that are included in any other asset group, notably pole mounted substations and pole mounted switchgear such as links, fuses, air break switches etc.</p>
Ausgrid Asset Class reference	Attachment 5.4.a – Overhead Support Structures
Includes	All Ausgrid cross-arms, insulators and terminations mounted on poles to deliver network services are counted as a single pole top structure per pole. Asset categories reflect the operating voltages. Includes stay wires for ground stay poles.
Excludes	<ul style="list-style-type: none"> • Overhead conductor components or any other asset (air break switches or links, reclosers, transformers etc.) attached to the pole.
Preparation notes	<p>Ausgrid does not presently capture pole top structures with ERP and GIS systems and is not able to presently produce an age profile. Ausgrid captures a replacement volume based on the following rules:</p> <ul style="list-style-type: none"> • Reported quantities are in units. • A pole with multiple voltages is assumed to have one cross-arm (of the respective voltage) per voltage. For example, if a pole carries 33kV and 11kV conductors then the pole will have a cross-arm for each of 33kV and 11kV. • A pole that has multiple circuits of the same voltage is assumed to have one cross-arm per circuit. • The cross-arms associated with supporting pole top substations are not included here. • 'Pole Top Structures – Other' consists of ground stays.
Replacement drivers	The condition of the pole top structure
Solution	The replacement of pole top structures is considered a replacement of the relevant component (noting this would generally be referred to as a life extension for the pole).

3.3 Staking wooden poles

AER Definition	The staking of a previously unstaked wooden pole.
Ausgrid Asset Class reference	Attachment 5.4.a – Overhead Support Structures
Includes	All Ausgrid wooden poles that have been deemed suitable for structural reinforcement using a galvanised steel reinforcing member. Asset categories reflect the operating voltages.
Excludes	<ul style="list-style-type: none"> The further reinforcement or replacement of poles that have existing structural reinforcement. Age profile does not include assets held in store or for spares.
Preparation notes	<p>Staking wooden poles includes wood pole assets that have been reinforced with what Ausgrid refers to as a ‘nail’, ‘splint’ or ‘sleeved’. Transactional data for these assets in Ausgrid’s ERP captures the date of installation of the nail (stake) using the following assumptions:</p> <ul style="list-style-type: none"> Reported quantities are in units. Nail age is obtained from the ‘notification’ data (i.e. the record of work for the ‘nailing’ activity). Historical pole assets for which an installation date cannot be determined have been evenly assigned an installation year between 1997 and 2002, as this is the period for which pole nailing (staking) was in effect in Ausgrid but prior to the installation data being stored within the ERP system. Ausgrid currently does not record failures of poles that failed during a staking event as this is considered a maintenance induced failure.
Replacement drivers	The condition of the pole determines the requirement for reinforcement.
Solution	Life extension of a pole utilising pole staking which forms part of Ausgrid’s capital program.

3.4 Overhead Conductors

AER Definition	<p>These assets have the primary function of distributing power, above ground, within the distribution network.</p> <p>It excludes any pole mounted assets that are included in any other asset group.</p>
Ausgrid Asset Class reference	<p>Attachment 5.4.a – Overhead Mains</p> <p>Attachment 5.4.a – Distribution Substations</p>
Includes	All Ausgrid overhead conductors used to deliver network services. Asset categories are assigned according to operating voltages.
Excludes	<ul style="list-style-type: none"> Private lines, service lines, earthing conductors, spreaders, other conductor fittings, pole top structures or conductors with fibre optic cables which are used for protection or communication functions. Age profile does not include assets held in store or for spares.

Preparation notes	<p>These assets are captured within Ausgrid's GIS. Service lines, and fibre optic pilot cables are separated from 'conductors' and have been included in their relevant asset groups. The following assumptions are applied:</p> <ul style="list-style-type: none"> • Reported quantities are in length (km). • 'Overhead Conductors – Other' consists of dedicated low voltage mains.
Replacement drivers	The condition of the overhead conductors, except when replacing conductors due to clearance issues (low mains) which is driven by public safety.
Solution	Ausgrid's capital program incorporates a combination of reconfiguration, replacement and refurbishment based on the sub-asset class.

3.5 Underground Cables

AER Definition	These assets have the primary function of distributing power, below ground, within the distribution network. This includes cable ends, joints, terminations and associated hardware and equipment (e.g. surge diverters, etc.), cable tunnels, ducts, pipes, pits and pillars. It excludes any pole mounted assets that are included in any other asset group.
Ausgrid Asset Class reference	<p>Attachment 5.4.a – Underground Cables</p> <p>Attachment 5.4.a – Distribution Substations</p>
Includes	All Ausgrid underground cables, joints and terminations used to deliver network services. Asset categories are assigned according to operating voltages.
Excludes	<ul style="list-style-type: none"> • Underground service cables, ducts, public lighting cables, and fibre optic or copper pilot cables used for protection or communication functions. • Age profile does not include assets held in store or for spares.
Preparation notes	<p>These assets are captured within Ausgrid's GIS. Service cables, public lighting cables and fibre optic pilot cables are separated from 'conductors' and have been included in their relevant asset groups. The following assumptions are applied:</p> <ul style="list-style-type: none"> • Reported quantities are in length (km). • 'Underground Cables – Other' consists of linkboxes, pillars and pits used to support Ausgrid's underground cable network reported in units.
Replacement drivers	The condition of underground cables where condition issues with particularly types are known. Replacement of other cable types occurs following failure.
Solution	Replacement (including component replacement)

3.6 Service Lines

AER Definition	<p>Includes assets that provide a physical link and associated assets between the distribution network and a customer's premises</p> <p>It excludes any pole mounted assets and meters that are included in any other asset group.</p>
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Ausgrid Asset Class reference	Attachment 5.4.a – Overhead Mains Attachment 5.4.a – Underground Cables
Includes	All Ausgrid owned overhead service lines and underground service cables which provide a physical link between the distribution network and a customer’s premises. Services that are overhead construction are classified as simple and underground as complex.
Excludes	Privately owned lines and LV dedicated conductors, as well as ‘direct distributor’ connections which are large supplies to a customer directly fed from the output of a distribution substation.
Preparation notes	<p>These assets are captured within Ausgrid’s GIS. This GIS information is merged with customer information retrieved from the Metering Business System (MBS) via the National Metering Identifier (NMI) of the supply point connected to the service line to determine the customer type.</p> <p>The following assumptions are applied:</p> <ul style="list-style-type: none"> • Reported quantities are in units. • Where multiple segments of a service line supply one customer, these segments are counted as a single service. • When commission dates for a service line are not available, Ausgrid assumed that a service line is the same age as customer’s meter.
Replacement drivers	The condition of the service wire
Solution	Replacement with insulated conductors

3.7 Transformers

AER Definition	These are assets used to transform between voltage levels within the network. This includes all its components such as the cooling systems and tap changing equipment (where installed). It excludes any pole mounted assets that are included in any other asset group. For the avoidance of doubt, this does not include instrument transformers as defined in the National Electricity Rules. It also does not include auxiliary transformers.
Ausgrid Asset Class reference	Attachment 5.4.a – Transformers & Reactive Plant Attachment 5.4.a – Distribution Substations
Includes	All Ausgrid distribution and sub-transmission power transformers, standalone instrument transformers such as current transformers or voltage transformers, 132/66kV bushings, earthing transformers, resistors, capacitors and power reactors (one per phase). Asset categories are assigned according to voltage/configuration.
Excludes	<ul style="list-style-type: none"> • Instrument transformers such as current transformers or voltage transformers where they are incorporated into other assets e.g. instrument transformers within switchgear or transformer bushings. • Reactors and capacitors contained within customer load control injection equipment. • Regulating transformers are captured in the ‘Other’ asset group. • Age profile does not include assets held in store or for spares.

Preparation notes	<p>These assets are captured in Ausgrid's ERP system.</p> <p>The following assumptions were applied:</p> <ul style="list-style-type: none"> • Reported quantities are in units. • 'Transformers - Ground Outdoor / Indoor Chamber Mounted ; >=22kV & <=33kV ; <=15MVA' includes 33k/415V ground mounted transformers in addition to 33/11kV ground mounted transformers. • 'Transformers – Other' includes 132/66kV bushings, substation capacitors, standalone current transformers and voltage transformers, reactors, resistors, earthing transformers and 33k/415V pole mounted transformers.
Replacement drivers	The condition of the transformers
Solution	Refurbishment or replacement (noting bushing replacement would be considered refurbishment of the larger asset it is attached to).

3.8 Switchgear

AER Definition	These are assets used to control, protect and isolate segments of the network. This includes disconnect switches, fuses, circuit breakers, links, reclosers, sectionalisers, ring main units, oil insulated fuses etc.
Includes	All Ausgrid high voltage and low voltage circuit breakers, ring main and fuse switch units, isolating / earthing switches, air break switches, enclosed load break switches, reclosers, sectionalisers, links (substation, overhead and underground) and fuses. Asset categories are assigned according to operating voltages and type.
Ausgrid Asset Class reference	Attachment 5.4.a – Switchgear Attachment 5.4.a – Distribution Substations
Excludes	<ul style="list-style-type: none"> • Light/power switches in substation buildings. • Age profile does not include assets held in store or for spares.
Preparation notes	<p>These assets are captured in Ausgrid's ERP system. The following assumptions were applied:</p> <ul style="list-style-type: none"> • Reported quantities are in units. • Switchgear is categorised using the operating voltage rather than rated voltage. • Where switchboards are utilised, the assets captured are based on the switching components rather than the busbar (noting that some new circuit breakers have been retrofitted into switchboards). • 'Switchgear – Other' includes switchgear that does have an associated RIN category such as >11kV fuses.
Replacement drivers	The condition of the switchgear
Solution	Replacement with modern equivalents

3.9 Public Lighting

AER Definition	Public lighting services are the installation, repair, replacement and maintenance of public lighting whether owned by the NSP or by another party. This also includes alteration and relocation of existing public lighting assets. Public lighting assets include luminaires, brackets, lamps and dedicated public lighting poles (not poles that deliver network services).
Ausgrid Asset Class reference	n/a
Includes	All Ausgrid owned luminaires, brackets, lamps and poles/columns that are used for streetlighting only. Asset categories are assigned based on the wattage of the light being typically used on major/minor roads.
Excludes	Privately owned streetlighting assets and poles/columns captured under Poles category.
Preparation notes	Ausgrid reports its public lighting assets on AER RIN Asset Age Profile (5.2), however, not on the AER RIN Repex (2.2) due to classification as an Alternate Control Service: <ul style="list-style-type: none"> Reported quantities are in units.
Replacement drivers	n/a
Solution	n/a

3.10 SCADA, Network Control and Protection Systems

AER Definition	Replacement expenditure associated with SCADA and network control hardware, software and associated IT systems. Includes replacement of protection and control systems and communication systems. This excludes all costs associated with SCADA and Network Control Expenditure that exist within gateway devices (routers, bridges etc.) at corporate offices. Protection systems has the meaning prescribed in the National Electricity Rules.
Ausgrid Asset Class reference	Attachment 5.4.a – Communications, Control & Protection
Includes	All Ausgrid owned relays (protection, voltage regulation and control), Supervisory control and data acquisition (SCADA) remote terminal units (RTUs), fibre optic / copper pilot/communication cables, batteries and battery chargers, customer load control injection equipment, communications sites, SCADA master station assets and associated secondary wiring.
Excludes	<ul style="list-style-type: none"> DC systems, panels etc. on which relays are mounted, corporate communications devices and local SCADA control boards / terminals in substations. SCADA, Network Control and Protection Systems data does not include assets held in store or for spares.
Preparation notes	These assets are captured in Ausgrid's ERP system. The following assumptions were applied: <ul style="list-style-type: none"> Reported quantities are in units (except Local Network Wiring Assets and Communications Linear Assets which are in length (km)).

- Due to historical data capture, commissioning dates for these assets is not always accurate, these dates have been adjusted based on known dates associated with the technology of assets.

AER Definition	Includes	Source
Field Devices		
This includes old fashioned electromechanical relays and modern digital relays that incorporate many functions. This includes field devices such as relays, Remote Terminal Unit, Program Logic Controllers, Data storage, communication interfaces, and local master stations.	Relays (protection, voltage regulation and control), remote terminal units (RTUs), communications devices, controllers, GPS, Human Machine Interface (HMI), network SCADA terminals, batteries and battery chargers	ERP
Local Network Wiring Assets		
Assets that connect sensors, current and voltage transformers and other status indicators to the field devices.	Secondary wiring for associated SCADA, Network Control and Protection Systems	Estimated based on commissioning year and primary assets held in ERP.
Communications Network Assets		
Network assets which facilitate the communication of SCADA, Network Control and Protection systems assets beyond the gateway devices (routers, bridges etc.) at corporate offices.	Hardware supporting communications including multiplexers, routers, cabinets and fibre patch panels	ERP and PNI database
Master Station Assets		
Includes those network assets dedicated communication devices, front end processers, data servers, master station servers, control room HMIs including wall mounted large screens.	Assets supporting network control function including monitors, workstations, KVM switches etc.	OT register
Communications Site Infrastructure		
Nil	Communications sites that support network communications	ERP
Communications Linear Assets		
Nil-	Fibre optic or copper pilot / communication cables	GIS
AFLC		
Nil	Frequency injection generator and cell	ERP
Other		
Nil	Radio units	ERP

Replacement drivers	Asset condition and some heightened technical risk for modern microprocessor based devices.
Solution	Replacement

3.11 Other

Ausgrid Definition	These categories and associated expenditure are not applicable for modelling with Repex as they do not align to the current asset category definitions or are not replaced due to condition issues and therefore cannot be correlated to age as they are driven by compliance requirements such as WHS or environmental legislation.																
Ausgrid Asset Class reference	<ul style="list-style-type: none"> Attachment 5.4.a – Overhead Support Structures Attachment 5.4.a – Overhead Mains Attachment 5.4.a – Underground Cables Attachment 5.4.a – Transformers & Reactive Plant Attachment 5.4.a – Switchgear Attachment 5.4.a – Communications, Control & Protection Attachment 5.4.a – Buildings, Grounds & Land Attachment 5.4.a – Distribution Substations 																
Includes	Ausgrid assets that do not align to current asset category definitions (e.g. civil assets), are not suitable for Repex analysis as they do not relate to degradation (e.g. 'not age related') or do not have an age profile able to be calculated.																
Excludes	<ul style="list-style-type: none"> Those captured in other asset groups/categories. Other data does not include assets held in store or for spares. 																
Preparation notes	<p>These assets are captured in Ausgrid's ERP system. The following assumptions were applied:</p> <ul style="list-style-type: none"> Due to historical data capture, commissioning dates for these assets is not always accurate and are provided as an age profile where available. 'Not age related' is used to support replacement expenditure not related to the age of the asset. Since these assets population are already captured across the other categories, no data is used in this field for the age profile. Failures are not available/relevant to items labelled 'Not age related' as these are captured under the associated 'Other' item. <table border="1" data-bbox="341 1659 1524 2094"> <thead> <tr> <th>Ausgrid Definition</th> <th>Population</th> <th>Description</th> <th>Expenditure (E) / Volume Replaced (V) / Failures (F)</th> </tr> </thead> <tbody> <tr> <td colspan="4">Distribution Substations</td> </tr> <tr> <td rowspan="2">A substation on a distribution network that transforms voltage at high voltage (greater than or equal to 1kV) to low voltage. General distribution</td> <td rowspan="2">All Ausgrid distribution Substations – reported in 'Distribution</td> <td colspan="2">Other</td> </tr> <tr> <td>Distribution substation housings, refurbishment of pole substations, grounds and other</td> <td>E: Y V: Y F: Y</td> </tr> </tbody> </table>			Ausgrid Definition	Population	Description	Expenditure (E) / Volume Replaced (V) / Failures (F)	Distribution Substations				A substation on a distribution network that transforms voltage at high voltage (greater than or equal to 1kV) to low voltage. General distribution	All Ausgrid distribution Substations – reported in 'Distribution	Other		Distribution substation housings, refurbishment of pole substations, grounds and other	E: Y V: Y F: Y
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substation (including spares) and civil equipment / structures that have been identified for work to be undertaken.	Substations – Other'. Sourced from ERP.	electrical assets not covered by other asset categories. Programs mapped to this category are predominately civil related.	
		Not age related	
		All other distribution civil and environmental assets and programs not related to the age of the asset predominately due to health, safety or environmental drivers such as fire doors and asbestos related works.	E: Y V: Y F: n/a
Distribution Voltage Regulation			
All Ausgrid assets which provide voltage support (power factor correction by pole capacitors or voltage correction by voltage regulators) to the 11kV distribution network excluding equipment in zone or sub-transmission substations.	Voltage regulators and capacitors on the distribution network. Sourced from ERP.	Replacement of voltage regulators and pole capacitors.	E: Y V: Y F: Y
Overhead Conductors			
General overhead (including spares) and civil equipment / structures that have been identified for work to be undertaken.	No population is presently available.	Other	
		Sub-transmission feeder overhead earth wires and reactive overhead work which could not be mapped back to a single asset category.	E: Y V: Y F: Y
		Not age related	
		Includes overhead assets due to health, safety, environmental or severe weather related drivers such as those that are impacted during extreme weather/storm or bushfire conditions or natural disasters and access track works.	E: Y V: Y F: n/a
Towers - >=33kV Refurbishment			
Vertically oriented metal structures that provide load bearing structural support for sub-transmission overhead conductors (typically 132kV).	No population is presently available (tower asset is included with 'Poles – Steel').	Includes refurbishment works only (Poles - Steel includes replacement works).	E: Y V: Y F: n/a

Transformers			
General transformer and associated equipment (including spares) that have been identified for work to be undertaken.	No population is presently available.	Other	
		Includes work which could not be mapped back to a single asset category and component replacement of Transformers e.g. bushing replacement.	E: Y V: Y F: n/a
		Not age related	
		Includes works to Transformer assets predominately due to health, safety and environmental drivers.	No expenditure, replacement volume or failures are presently captured.
Switchgear			
General switchgear and associated equipment (including spares) that have been identified for work to be undertaken predominately due to health, safety and environmental drivers.	No population is presently available.	Other	
		Includes work which could not be mapped back to a single asset category.	No expenditure, replacement volume or failures are presently captured.
		Not age related	
		Includes works to Switchgear assets predominately due to health, safety and environmental drivers.	No expenditure, replacement volume or failures are presently captured.
Underground Cables			
General underground and civil equipment / structures (including spares) that have been identified for work to be undertaken.	No population is presently available.	Other	
		Includes work which could not be mapped back to a single asset category. No works are presently captured.	E: Y V: Y F: Y
		Not age related	
		Expenditure includes underground cable predominately due to health, safety and environmental drivers	E: Y V: Y F: n/a

			including asbestos related works.	
Zone & Sub-transmission Substations				
General zone and sub-transmission substation and civil equipment / structures (including spares) that have been identified for work to be undertaken.	Population is all Ausgrid zone, sub-transmission substations and switching stations. Sourced from ERP.	Other		
		Includes zone and sub-transmission civil structures such as fencing, roofing, earthing, fire systems, cable covers and lightning spires. This also includes assets not covered by a RIN category such as surge arrestors and earthing equipment.	E: Y V: Y F: Y	
		Not age related		
		Includes all zone and sub-transmission civil and environmental assets and programs predominately due to health, safety, environmental or compliance drivers not related to the age of the asset such as fire doors, oil containment, security and asbestos related works.	E: Y V: Y F: n/a	
Field Devices				
General field devices (such as relays, batteries, SCADA RTUs) that have been identified for work to be undertaken predominately due to health, safety or environmental drivers.	No population is presently available.	Not age related		
		Includes protection devices for optical arc fault detection and under frequency load shedding compliance related programs.	E: Y V: Y F: n/a	
Land (i.e. Strategic System Property)				
System land associated with replacement projects.	No population is presently available.	-	E: n/a V: n/a F: n/a	
Substation Buildings				
Buildings associated with Ausgrid's network of substations (distribution, zone and sub-transmission).	No population is presently available.	Buildings (including refurbishment) for Ausgrid Zone, Sub-transmission and Distribution substations.	E: Y V: Y F: n/a	
Switchgear by: Highest Operating Voltage; < = 11 kV; Circuit Breaker Refurbishment				

	Vacuum truck retrofits into existing 11kV switchboards in Zone and Sub-transmission Substations.	Population is a subset of asset category Switchgear. Sourced from ERP.	Zone 11kV circuit breakers that have been replaced by retrofitting a vacuum truck into the existing switchboard.	E: Y V: Y F: n/a
	Climate Resilience			
	Improvement of the climate resilience of Ausgrid's network assets that does not align to existing AER asset groups and categories.	No population is presently available.	Other Used for forecasting purposes, includes programs in development with actual spend and volume mapped to AER asset group and category where available.	E: Y V: n/a F: n/a
Replacement drivers	Asset condition and compliance based requirements			
Solution	Replacement and refurbishment			

4. Forecast

The information provided in Reset RIN template 2.2 has been completed in accordance with the AER RIN requirements and instructions, the following information is provided to support:

4.1 Expenditure

The source of majority of data for expenditure table is Ausgrid's investment plan on the broad investment areas:

- Replacement programs

Ausgrid's investment plan on replacement programs are at individual sub-program level. For each sub-program, Ausgrid has a detailed mapping table to apportion sub-program replacement expenditure across the RIN asset groups and asset categories. For each sub-program expenditure is allocated to the exact same asset categories as the volume mapping table, to ensure the expenditure associated with sub-programs that span multiple asset categories to be appropriately apportioned.
- Major projects

Each major project can have multiple investment drivers, the replacement expenditure portion within the major projects is reported in template 2.2 REPEX. The expenditure associated with each major project is mapped to the relevant asset groups and asset categories based on the project scope.
- Other REPEX expenditure

System property and support costs which do not map directly to any RIN asset categories, have been apportioned across the RIN asset categories. The apportionment is based on the association between the nature of these costs and the RIN categories.

4.2 Asset Replacements

The Source of data for expenditure table is Ausgrid's investment plan on the broad investment areas:

- Replacement programs

Ausgrid's investment plan also forecasts the volumes of replacement programs at individual sub-program level. A detailed mapping table is used to translate the forecasted sub-program volumes into the RIN asset groups and asset categories. The volume mapping table has a one-to-many relationships, allowing sub-programs to be reported against multiple asset categories. This is to ensure the sub-programs involving multiple asset categories to be reported appropriately.
- Major projects

Since major projects span across multiple years, the high-value assets usually incur expenditure across multiple years while the replaced assets volume is only realised when the project is completed. Ausgrid reports the asset volumes in template 2.2 volume table based on the proportion of projected project expenditure cashflow in a particular year. This method ensures that expenditures and volumes for assets with high expenditures are aligned.
- Other REPEX expenditure

No replacement volume is linked to this expenditure.

4.3 Asset Failures

As per the requirement of the AER's Regulatory Proposal RIN Template to provide a forecast into Ausgrid's asset failures between FY23 - FY29, Ausgrid has implemented the following method for forecasting asset failures into FY29:

- Calculated 5 year average failures (or use just FY22 as base where insufficient historical years).
- Apply year-on-year percentage (YoY%) growth of asset failures from failure modelling based on a do-nothing scenario.