Appendix 1.10: Evoenergy Asset Portfolio Strategy: Overhead Assets

Regulatory proposal for the ACT electricity distribution network 2024–29

OVERHEAD ASSETS

ASSET PORTFOLIO STRATEGIES

This **Asset Portfolio Strategy** provides an overview of the asset management strategy for all Overhead assets and the risks, needs, opportunities and other considerations used to create this document.

CONTENTS

EXECUTIVE SUMMARY

Evoenergy's Overhead asset portfolio is comprised of a diverse range of infrastructure. This ranges from ageing timber poles through to overhead switchgear and pole mounted substations. Altogether, these form eight asset classes. This Asset Portfolio Strategy summarises the asset management strategies and covers a rolling 10-year period, currently from FY25 to FY34.

The following asset classes are included within this portfolio:

- Poles
- Transmission line structures
- Overhead service conductors
- Overhead distribution lines
- Overhead transmission lines
- Pole hardware
- Overhead switchgear and automation
- Pole substations.

Each asset class can be broken down further into multiple asset types and this is introduced in Section 2 and discussed throughout Section 4.

Asset objectives, key risks, and opportunities are explored in this Asset Portfolio Strategy document, drawn from Evoenergy's Asset Management Policy, Strategic Asset Management Plan, and the Asset Risk Value Framework. This is used to determine the optimal strategy and program of work investment for the assets. In this document, each asset class is described, objectives and issues explored, strategies expounded, expenditure forecast, and resourcing requirement estimated alongside programs of work. Together, these items form a cohesive portfolio strategy for the Overhead assets.

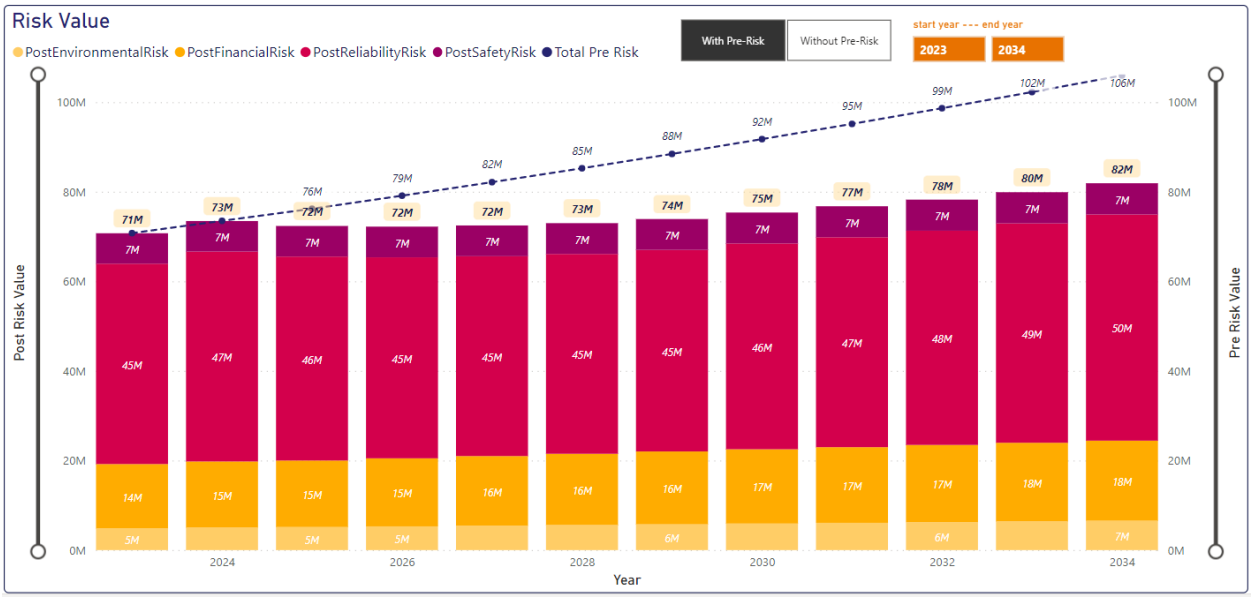
The information in this document is presented in the following structure:

- Section 1: Purpose – explains the scope of this document and introduces Evoenergy's Asset Management System (AMS) and its components at high level. It also presents the hierarchy of the plans within the AMS, where this document sits within the hierarchy, what informs this document, and how the information from this document cascades down.
- Section 2: Portfolio Overview – provides brief information on each of the constituting asset classes.
- Section 3: Asset Portfolio Objectives – provides brief information on Evoenergy's ongoing and planned business drivers and organisational objectives such as safety, sustainability, and quality of supply. It describes how this organisational context informs and influences the asset management strategy of this portfolio of assets.
- Section 4: Asset Class Strategies – describes the asset management strategy options available to Evoenergy and what is being proposed for each asset class after considering the management objectives, status of the asset and its current characteristics, failure modes, risk level, and available opportunities.
- Section 5: Program of Work – summarises planned program of work including maintenance activities and major replacement and renewal projects across this asset portfolio. Presents a summary of projected expenditure from FY25 to FY34 that is required to fulfil the objectives, address the drivers, and maintain/mitigate the risks to acceptable level.

Figure 1 demonstrates the comparison between the baseline risk ('Total Pre Risk') and the forecasted risk levels over the ensuing 10 year period under the asset strategies as described within this document. The risk

is displayed in nominal dollars and is an indication of the environmental, direct financial, reliability, and safety risk factors.

FIGURE 1. 10-YEAR FORECAST FOR ASSET PORTFOLIO RISK VALUE

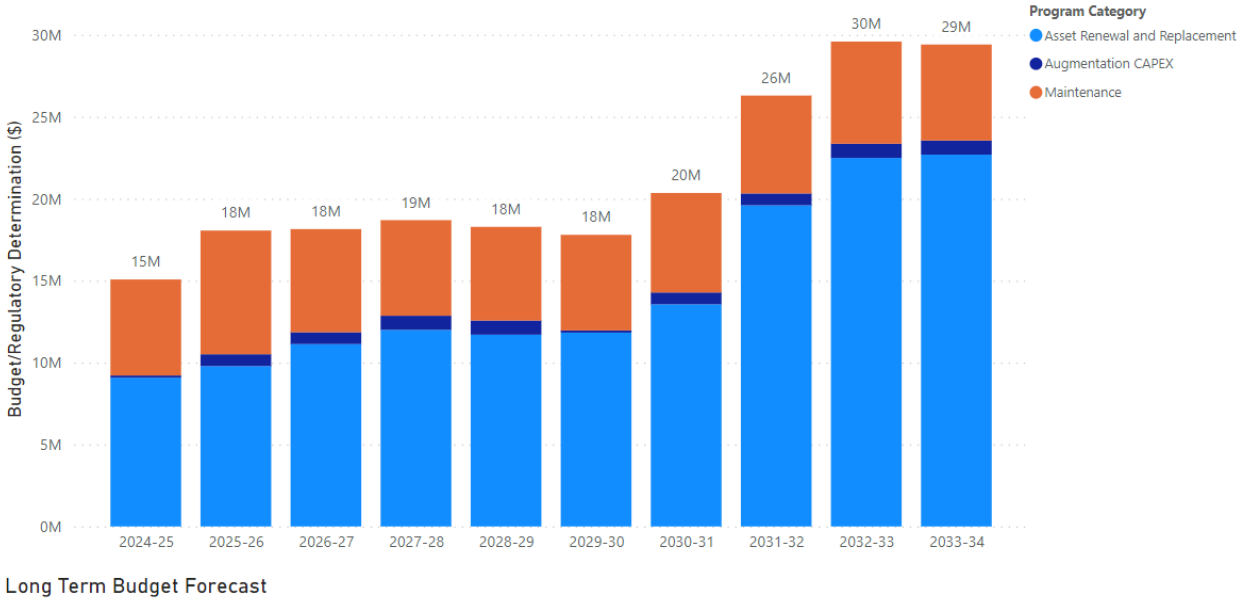


Key components of the program of work include:

- Replacement of *Support Structures* such as planned replacement of ageing distribution poles, reactive replacement of ageing transmission poles
- Reactive and planned replacement of *Overhead Distribution Equipment* including ageing pole substations and air-break switches with gas switches
- Replacement of *Overhead Conductors and Hardware* such as reactive replacement of overhead Low Voltage (LV) services, unplanned replacement of LV crossarms and ageing bare conductors with LV Aerial Bundle Cables (ABCs).

The overall 10-year Overhead Assets portfolio budget (in FY23 dollars) is shown in Figure 2.

FIGURE 2. 10-YEAR OVERHEAD ASSETS PORTFOLIO BUDGET (IN FY23 DOLLARS)



1. PURPOSE

The purpose of this document is to detail Evoenergy's Overhead asset management strategy and plans, and to provide future expenditure profiles.

The key information presented includes descriptors of each asset class, key issues and objectives, asset class strategies, expenditure forecasts, and a program of work. Together, these form a cohesive portfolio strategy.

1.1. SCOPE

This Asset Portfolio Strategy document covers all eight of Evoenergy's Overhead asset classes for a rolling ten-year period. The objective of this document is to provide an overview of the asset management strategy for all the asset classes in this portfolio and to discuss their existing and emerging risks, needs, opportunities, and other key considerations.

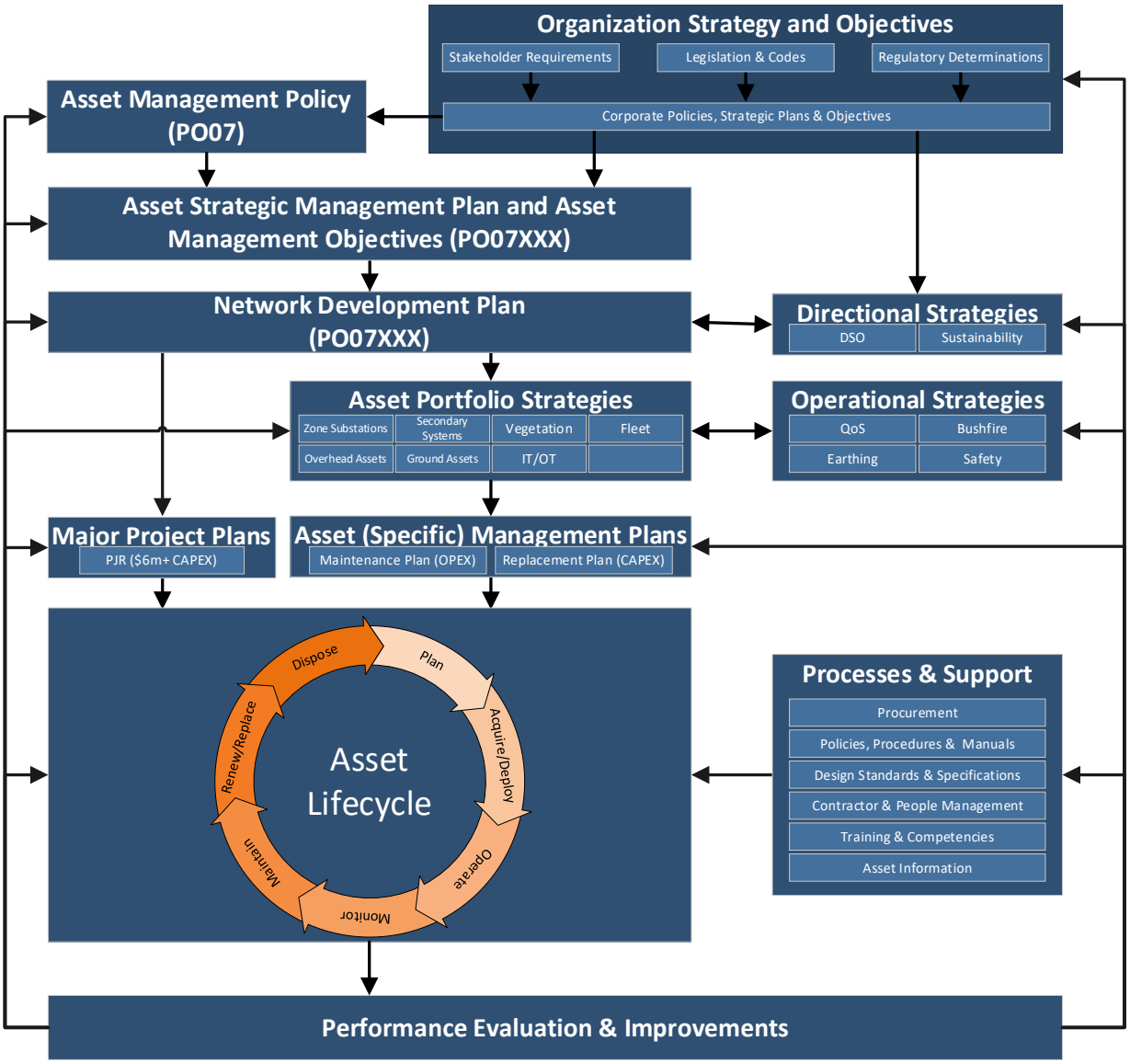
This document links the overarching business objectives and organisational drivers and the low-level operational decisions described in Evoenergy's asset management system.

Figure 3 provides an overview of Evoenergy's Asset Management System.

Figure 4 shows Evoenergy's Asset Management System hierarchy of plans, showing the interrelationship of this document within the overall plans.

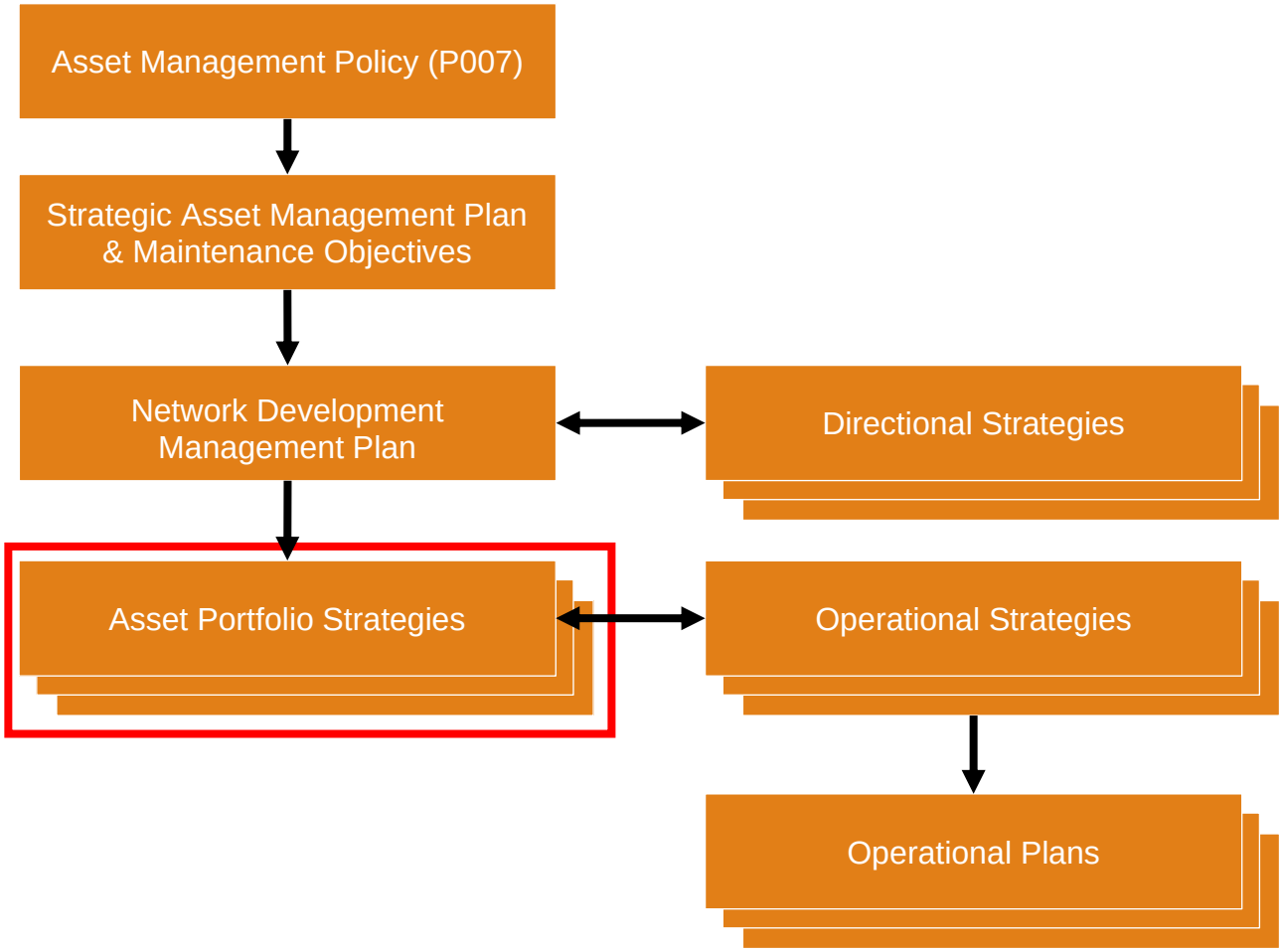
1.2. ASSET MANAGEMENT SYSTEM

FIGURE 3. EVOENERGY'S ASSET MANAGEMENT SYSTEM



1.3. HIERARCHY OF PLANS

FIGURE 4. ASSET MANAGEMENT SYSTEM HIERARCHY OF PLANS (SHOWING THE INTERRELATIONSHIP OF THIS DOCUMENT WITHIN THE OVERALL PLANS)



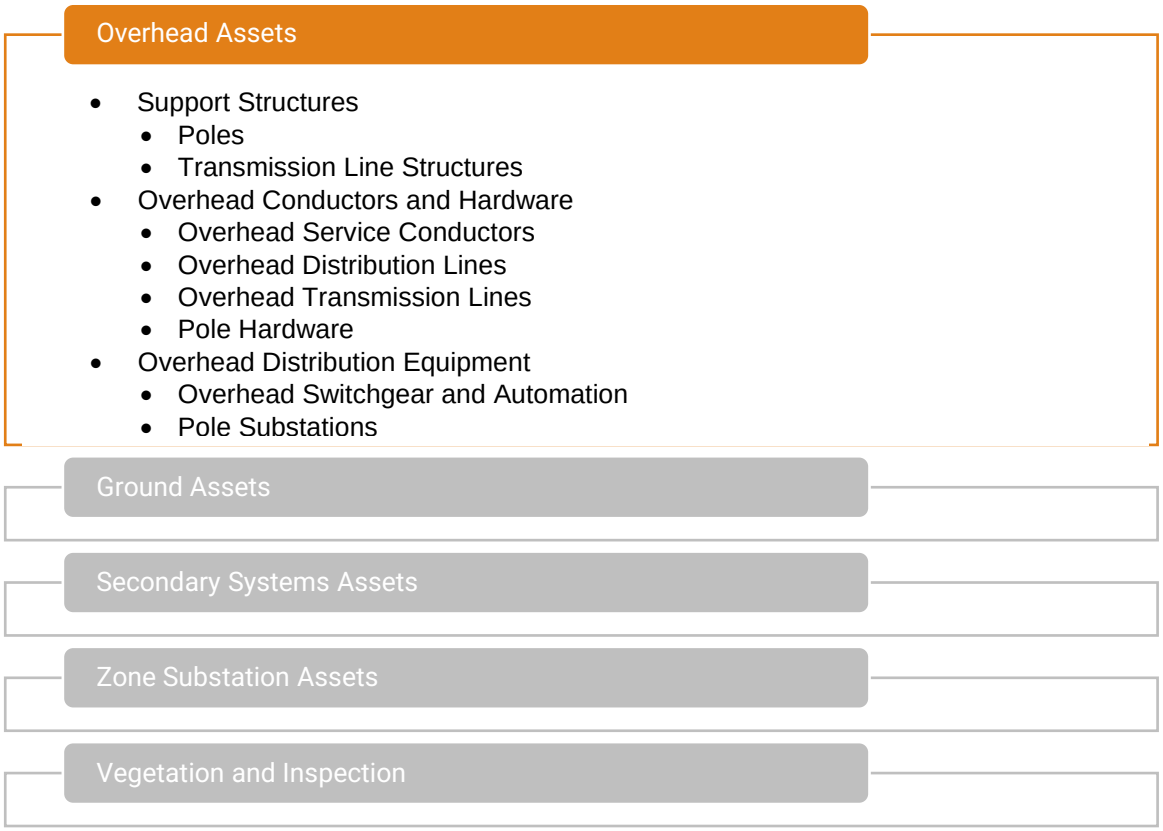
2. PORTFOLIO OVERVIEW

Compared with other portfolios, overhead assets are relatively high-volume but low value. Despite this the Overhead asset portfolio forms one of the largest proportions of Evoenergy's regulated asset base in terms of both total asset costs and quantities. It includes a diverse range of linear and discrete asset items with varied technologies, functions, asset designs, lifecycle requirements, and characteristics. While varied, these assets generally have long (45+ years) asset lives.

This portfolio includes all the support structures, overhead conductors and hardware, and overhead distribution equipment that collectively form Evoenergy's overhead network system.

This section provides an overview of the asset grouping and asset classes contained within this asset portfolio.

FIGURE 5. ASSET HIERARCHY (ONLY SHOWING THE ASSET CLASSES WITHIN THE OVERHEAD ASSET PORTFOLIO)



The Overhead asset portfolio constitutes a major network asset category and, together with other asset portfolios, forms Evoenergy's collective network asset system. This portfolio includes eight asset classes in three asset groups as highlighted in Figure 5. Each asset group may be comprised of multiple asset classes and similarly each asset class may comprise of multiple asset types.

All these classes have assets that are located overhead (i.e., above the ground) on support structures such as poles and transmission towers. This asset portfolio ties together or connects all the elements of Evoenergy's network systems and allows the safe, reliable, and efficient transportation of electricity from and to its customers. A more comprehensive breakdown of the asset groups and asset types associated with this asset portfolio is provided in Section 4.

Table 1 offers a count of assets within this portfolio.

Individual asset data is not available for some asset types.

TABLE 1. POPULATION OF OVERHEAD ASSETS – SUMMARY

ASSET GROUP	ASSET CLASS	ASSET TYPES	QUANTITY	QUANTITY (UNIT)
Overhead Conductors and Hardware	OH Services	OH Services	61,547	Each
	OH Distribution Lines	Distribution OH Conductor HV	982	km
		Distribution OH Conductor LV	1,205	km
		Distribution OH Feeder	242	Each
	OH Transmission Lines	Transmission Line	213	km
	Pole Hardware	Animal Guards	N/A	
		Distribution Line Crossarm	72,027	Each
		Distribution Line Insulator	231,779	Each
		Spacer	12,573	Each
		Transmission Line Crossarm	N/A	
		Transmission Line Insulator	N/A	
		Pole Stays	4,796	Each
Overhead Distribution Equipment	OH Switchgear and Automation	Fault Passage Indicator	595	Each
		Air Break Switches	1,516	Each
		Drop-out Fuses	1,598	Each
		Fuse or Fuse Base	N/A	
		HV Gas Switches	122	Each
		HV Links	1,510	Each
		Load Break Switch	6	Each
		LV Links	N/A	
		Reclosers	47	Each
		Surge Diverters	2,741	Each
	Pole Substations	Overhead Line Voltage Regulator	N/A	
		Pole Substation	1,384	Each
		Pole Transformer	1,384	Each
Support Structures	Poles	Concrete Pole	11,631	Each
		Creosote Pole	5,583	Each
		Fibreglass Poles	4,371	Each
		Natural Round Timber Pole	14,240	Each

ASSET GROUP	ASSET CLASS	ASSET TYPES	QUANTITY	QUANTITY (UNIT)
		Steel Pole	5,901	Each
		Stobie Pole	354	Each
		Tanalith Pole	6,983	Each
	Transmission Line Structures	Transmission Concrete Pole	893	Each
		Transmission Steel Pole	8	Each
		Transmission Steel Tower	200	Each
		Transmission Timber Pole	424	Each

The assets within the asset portfolio have a functional relationship with the asset classes in Table 2. Further information can be found in their respective Asset Portfolio Strategy documents.

TABLE 2. ASSOCIATED ASSET CLASSES

ASSOCIATED ASSET CLASS	DESCRIPTION OF RELATIONSHIP
Pole Substations	All the pole substations are mounted on poles, so any change in pole profile will have direct impact on pole substation profiles.
Communications Equipment	The list of equipment that communicates with each other using combination of Supervisory Control and Data Acquisition (SCADA) and telemetry such as load break switches, reclosers and ring main units (RMU). Some communications equipment is mounted on overhead structures and will be directly impacted if there is any damage to overhead structures (transmission structures).
Overhead Lines and Pole Hardware	All the overhead lines and associated hardware are also mounted on poles and will be affected if a pole is reinforced/replaced.
Overhead Switchgear and Automation	All the overhead switchgear is mounted on poles or transmission structures and its performance will be affected if pole is replaced or reinforced.
Distribution Earthing	Depending upon network design, poles provide an important component to carry an earth wire from pole to pole or down to earth along pole length. Any pole replacement may have direct impact on earthing.
Underground Cables	Depending upon network design, underground cables may be terminated onto LV overhead bare conductors on poles so any change in pole profile will impact underground cables. Refer to the Ground Assets Portfolio Strategy for further details.
Underground Services	Some of the underground services will be terminated ono poles and will be impacted if pole needs replacement/reinforcement. Refer to the Ground Assets Portfolio Strategy for further details.
External party assets such as streetlights and communications assets	Some of the external party assets are installed on poles and will be impacted if pole is replaced/reinforced.

ASSOCIATED ASSET CLASS	DESCRIPTION OF RELATIONSHIP
Vegetation	Vegetation around poles is managed by vegetation management strategy and may not impact poles directly.
Access Tracks	Access tracks are critical for all the operation and maintenance needed for transmission structures. The position of a transmission structure is generally fixed and access tracks need to be maintained so that all the equipment and spares are available on site for inspection and maintenance activities.

3. ASSET PORTFOLIO OBJECTIVES

Evoenergy's Asset Management Objectives are documented in the Strategic Asset Management Plan (SAMP) as informed by the Asset Management Policy (P007) and business strategies and plans.

This document, therefore, provides alignment to the high-level organisational aspirations, with specific strategies and plans for the asset portfolio for asset replacement and augmentation, and details the maintenance requirements to meet the Asset Management Objectives. The alignment between organisational strategic directions and the day-to-day activities of managing assets is an important aspect of the Asset Management System.

Table 3 provides an overview of the Overhead asset objectives.

TABLE 3. OVERHEAD ASSET MANAGEMENT OBJECTIVES

ASSET MANAGEMENT OBJECTIVES	OVERHEAD ASSET OBJECTIVES
Operate and maintain our network safely	• Embed and integrate safety culture, strategies, and initiatives • In conjunction with the requirements of AS5577: ENSMS, the Formal Safety Assessments (FSAs) have identified electricity network hazards, especially pertaining to the Overhead asset portfolio that could cause or contribute to an incident. • Risk control measures and treatments appropriately identified and evaluated in accordance with methodologies

Meet our network reliability targets	• As per NER clauses 4.2; s5.1; s5.1a, provide secure operating state and power system security:
	  • Maintain system security operating within a satisfactory state following a credible contingency event
	  • Operate within a technical envelope
	  • Provide a suitable level of network redundancy, in accordance with submitted annual planning report
	• As per NER clause 4.3.4 – Network service providers:
	  • Maintain system asset data and ratings in the event that it is requested by AEMO (including expected maximum current flow, at any point)

Deliver Affordability	• Manage our network for the least total lifecycle cost by informed decisions and balancing performance to extend the life of the assets
Manage our network for the least total lifecycle cost	• Continue to implement Reliability Centred Maintenance (RCM) in order to maximise reliable service life of assets. This results in improved condition monitoring practices and life-extending refurbishment works.

ASSET MANAGEMENT OBJECTIVES	OVERHEAD ASSET OBJECTIVES
Manage and invest in our network using prudent risk management approaches	• Maintain earthing compliance through efficient investment • Proactively identify earthing risks
Deliver sustainable and cost-efficient network investments	• Actively planning for the net-zero carbon future • Reduction of overhead infrastructure by opportunistic replacement with underground infrastructure • Promote opportunities to create revenue by making support structures available to support other infrastructure such as street lighting, telecommunications, and security assets
Operate an AMS that satisfies the needs of our stakeholders	• Optimise and manage our network asset management strategy to achieve asset longevity, cost reductions, and to maintain network reliability service levels
Manage opportunities and drive continuous improvement	• Opportunity to implement improved condition monitoring practices (e.g., Non-destructive testing of poles) to reduce costs and increase network reliability through an improved understanding of network condition

Evoenergy needs to assess its risk exposure, plan its investment to address those risks to as low as reasonably practicable, meet market demand and the changing need of energy transformation, and ensure optimal functioning and performance of this asset portfolio to meet these obligations. The subsequent sections in this portfolio document systematically describe Evoenergy's approach in addressing these requirements via its Asset Management System and pertaining to its Overhead asset portfolio.

Evoenergy is presently facing several challenges within this asset portfolio, such as:

- Large population of ageing staked poles
- An increasing proportion of the timber pole population that is approaching end-of-life
- Targeted transmission structure rebuilds in the EN24 period to proactively address reliability concerns.

The overarching key strategies implemented for the Overhead Portfolio include condition monitoring, condition-based refurbishment and replacement, to achieve the lowest lifecycle cost. This strategy looks to optimise costs and manage the risk presented through considered CAPEX and OPEX trade-offs, with a view to optimising the strategy to lower the total cost of ownership with minimal impact on risk.

Defects are raised against assets identified as requiring refurbishment or replacement, which are prioritised based on the risk to the public safety, employee safety, network reliability and asset integrity. All dangerous defects which can harm the public, employee or asset are addressed immediately. All defects that present an unacceptable hazard to public safety, employee safety and asset integrity are categorised and addressed according to the risks presented.

Overarching key strategies for the Overhead asset portfolio have been developed as described in the following sub-sections.

3.1. KEY STRATEGIES FOR SUPPORT STRUCTURES

A key challenge for Evoenergy within the poles asset class is the rapidly ageing population of natural timber poles. While activities such as reinforcement or staking prolong the life of these assets, replacements must occur to maintain Evoenergy's high safety and reliability standards. As all poles are replaced with concrete or fibreglass, replacements have the added benefit of a longer life and greater resilience to bushfires and extreme weather events.

Condition monitoring of poles is carried out to detect timber poles with rapid condition deterioration are replaced before functional failure and assets which deteriorate slowly remain in service while they meet performance criteria. An increasing rate of non-destructive testing of pole strength will continue, with a view to eradicating the use of destructive testing techniques if proven to be successful.

Planned refurbishment typically extends service life by an average of 8 - 15 years. Poles are refurbished when the minimum criteria for below ground wall thickness is reached and while the serviceability criteria is met for wall thickness at above ground.

Pole Replacement is required when poles fail to meet minimum service criteria. This reduces the risk of functional failure. There are 3 circumstances in which a pole may be identified for replacement:

- Pole is non-refurbished and fails serviceability criteria for below ground wall thickness and serviceability criteria for above ground;
- Pole is refurbished (staked or nailed) and fails serviceability criteria for above ground;
- Economic to replace – pole top components in poor condition and it is more economically efficient to bring forward the pole replacement to combine pole top works in one activity.

3.2. KEY STRATEGIES FOR OH CONDUCTORS AND HARDWARE

An ongoing challenge with the management of overhead conductors and hardware is the back yard reticulation of the LV network, with respect to customer notification for access when carrying out maintenance and replacement works. Access to poles, pole top hardware and conductors can be challenging and often require the need to use scaffold in situations where machinery cannot access a pole location, or the pole is nailed.

Condition Monitoring strategies for Overhead Conductors and Hardware include:

- Pole and line inspection – Visual inspection of overhead line and pole top hardware is completed as part of any routine pole inspection. Defects in the overhead lines and pole top hardware associated with the pole are identified by the inspection through visual comparison with images of example defects. Where possible, overhead service conductors are also inspected at this time..
- Thermovision survey – Thermovision surveys are performed on 100 selected overhead feeders every year. Every winter 80 overhead feeders are surveyed and every summer 20 overhead feeders are surveyed.
- Aerial inspection – High voltage rural overhead lines are inspected for vegetation every year.. At the same time, high resolution photographs of the pole tops are taken to determine the condition of the pole top hardware. This inspection process is a key component of Evoenergy's Bushfire Operations Plan (BOP).

Unplanned maintenance or replacement is identified in either the pole inspection program or from reactive work including replacement of LV pot heads, crossarm replacements, conductors re-tensioning, due to low spans identified from pole inspections or customer complaints, spacer installation to mitigate LV lines clashing, spacers on LV mains identified from pole inspections or due to tree into lines incidents and pole stay installation.

PVC-insulated overhead service conductors are replaced during pole replacement or pole top renewal (e.g., crossarm replacement), and are budgeted under the pole replacement program accordingly. Older overhead services are generally replaced, rather than re-tensioned, as there is minimal cost difference between re-tensioning and replacement.

3.3. KEY STRATEGIES FOR OH DISTRIBUTION EQUIPMENT

Major overhaul or maintenance is rarely completed on pole substations as it is more cost effective to replace the pole substation or transformer as they reach to their end-of-serviceable life.

Condition monitoring is carried on substations and overhead switchgear via the pole inspection program, as well as targeted thermovision inspections as part of the pole top hardware monitoring program. Defective

assets are repaired or replaced accordingly. Additionally, reclosers and load break switches are tested and maintained every five years in accordance to the Recloser and Load Break Switch Maintenance Procedure.

Replacement of two pole substations continues across the network, where aged or failed timber two-pole substations, are replaced with single concrete pole mounted substations. Replacement of switchgear such as air-break switches with gas switches occurs in areas at risk of bushfire and air-break switches with reclosers on feeders where reliability improvements are required.

4. ASSET CLASS STRATEGIES

4.1. SUMMARY OF CLASS STRATEGIES

A high-level summary of asset class strategies is introduced in this section.

Overhead assets are critical for the supply of energy to end users in Evoenergy's distribution network. Most distribution feeders are located on poles, as are some switching and protection equipment. As this class includes all assets that exist overhead, the assets themselves and their functions are diverse.

There are opportunities where assets can be monitored by making ongoing condition assessments. In doing so, assets can be proactively managed, costs can be kept to a minimum, and risk can be maintained to acceptable levels. This is Evoenergy's preferred strategy, where it is applicable. Where assets are found to present unacceptable levels of risk, Evoenergy refurbishes or replaces these assets.

4.2. SUPPORT STRUCTURES STRATEGY

Support structures primarily carry conductors in the distribution and transmission networks. As such, they are critical for serving energy to customers.

The support structure asset group is categorised into the following asset classes:

- Poles
- Reinforced Poles
- Transmission Structures.

4.2.1 Poles

This asset class describes all the service, distribution and transmission poles that support the overhead network system which transports electricity throughout Evoenergy's network. Overhead network systems are rated from 240V to 132kV. This asset class consists of the following asset types:

- Fibreglass poles
- Steel poles
- Concrete and Stobie poles
- Timber poles
- Transmission timber poles
- Transmission concrete poles
- A small number of poles of unknown type.

Timber poles are the most common asset type in this asset class.

4.2.1.1 Asset Class Summary and Objectives

Distribution poles form a critical part of Evoenergy's distribution network. Poles carry the bulk of the distribution network feeders, as well as some switching and protection equipment. End-of-life poles pose significant risks for network reliability, bushfire prevention, and customer safety.

Pole assets are responsible for providing a structure to support low and medium voltage distribution assets. This includes all poles servicing 400V, 11kV, and 22kV distribution network feeders. Additionally, distribution poles frequently support overhead switches and transformers.

A range of pole types exist within Evoenergy's network. These are introduced in the following sections.

4.2.1.2 Asset Types

Evoenergy currently has many kinds of poles in use within the network.

a) Concrete and Stobie Poles

Concrete poles are now Evoenergy's preferred pole type as they have the lowest overall lifecycle cost compared with alternatives. Concrete poles are installed in all locations where crane access is possible.

Stobie poles have not been installed for over 60 years and only around 350 remain in the Evoenergy network.

b) Fibreglass Poles

Fibreglass poles are Evoenergy's preferred pole type for installation in locations where crane access is not possible. Due to its light weight and sectionalised format, installation can occur in limited access areas such as residential backyards. Most low voltage poles in backyards are now being replaced with fibreglass.

c) Steel Poles

Before fibreglass poles were introduced, steel poles were used in difficult access locations. Like fibreglass poles, steel poles were supplied in multiple sections and were lighter weight than concrete poles. Concrete or fibreglass poles are now preferred for new installations.

d) Timber Poles (Tanalith, Natural Round and Creosote)

Natural round timber poles were the first pole type to support the overhead distribution network. Three types of timber poles have been used in the Evoenergy distribution network. These are:

- Tanalith
- Natural round
- Creosote.

Originally, natural round timber poles were used but once timber treatments became available, creosote poles were used. Following this came tanalith poles. Treated timber poles are now only installed:

- In heritage areas as a requirement of the ACT government
- In like-for-like reactive emergency replacements where an existing transmission timber pole requires replacement.

Reinforcement of timber poles, on both the Transmission and Distribution networks, is utilised to extend the life of older timber poles by adding strength at the ground level where wood decay is generally most advanced. Reinforced poles make up approximately 48% of the total of creosote, natural round and tanalith pole populations.

e) Transmission Concrete Poles

Concrete poles are the dominant structural type and the preferred choice for replacement due to their low lifecycle cost, a wide range of load carrying capacity, and fire resistance in bushfire areas where a big part of the transmission network is located.

f) Transmission Timber Poles

Timber poles are the oldest of Evoenergy's transmission support structures. When timber poles reach the end of their service life, they are replaced with concrete poles.

g) Transmission Steel Poles

Steel poles have recently been installed in the transmission network and constitute a minimal number.

4.2.1.3 Current Population, Age, and Health Profile

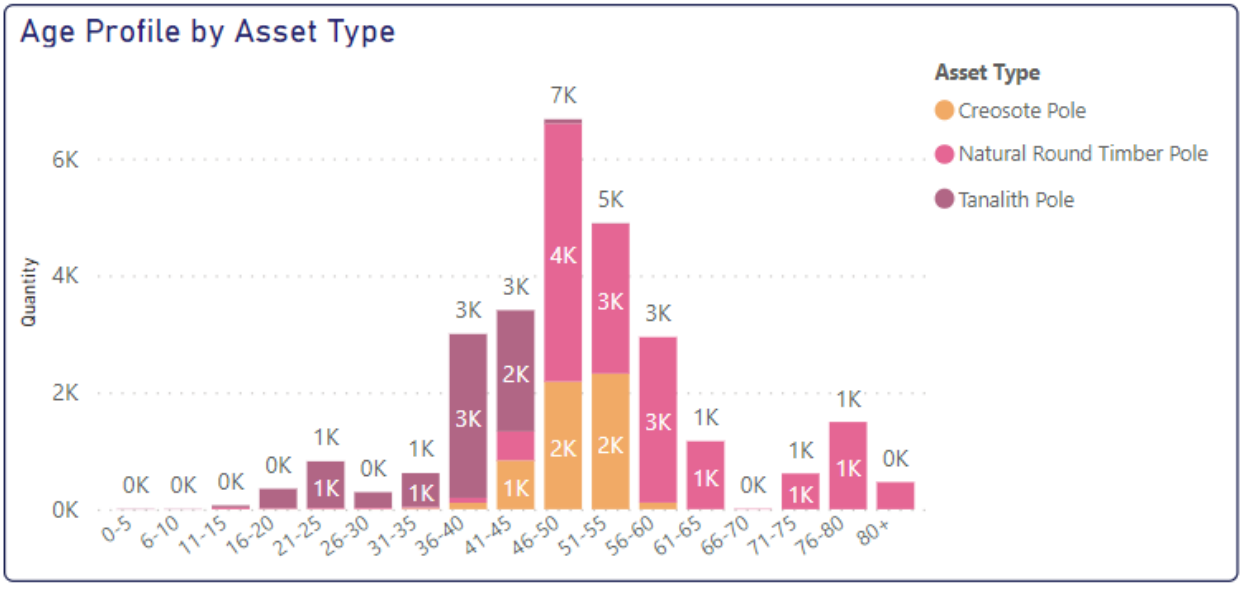
As of 1 July 2022, the Evoenergy distribution network has approximately 50,000 poles. Table 4 offers a high-level breakdown of pole types, and any notable population performance or potential failure concerns are highlighted in the Health Category column.

TABLE 4. ASSET POPULATION, AGE, AND HEALTH PROFILES – SUPPORT STRUCTURES

Asset Specific Plan	Quantity	Unit	Design Life (yrs)	Average Age	Critical Health Qty	Average Health Score	Health Category
Support Structures	50,388	each	55	37	3,340	80.15	Fair
Concrete Pole	11,631	each	80	23	0	99.78	Very Good
Creosote Pole	5,583	each	50	49	0	58.55	Fair
Fibreglass Pole	4,371	each	50	9	0	100.00	Very Good
Natural Round Timber Pole	14,240	each	40	57	3,293	38.09	Poor
Steel Pole	5,901	each	50	21	1	99.45	Very Good
Stobie Pole	354	each	80	76	0	81.74	Good
Tanalith Pole	6,983	each	50	36	0	78.62	Good
Transmission Concrete Pole	893	each	80	29	0	97.77	Very Good
Transmission Steel Pole	8	each	50	3	0	100.00	Very Good
Transmission Timber Pole	424	each	70	44	46	47.54	Fair

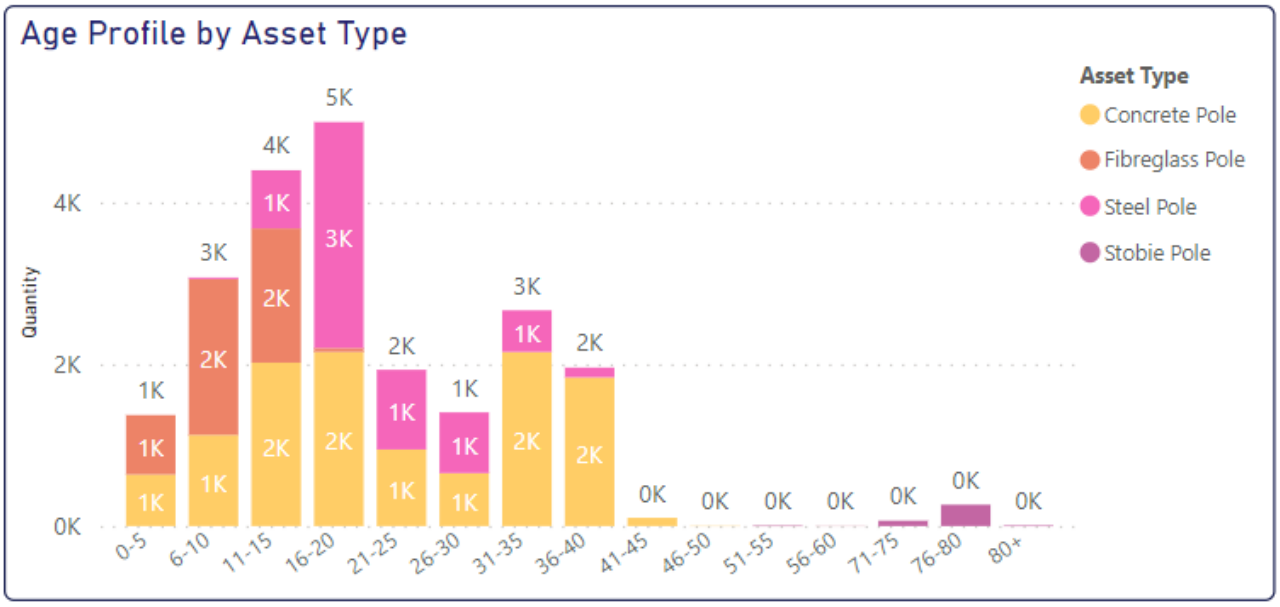
The age profile of existing assets within the support structure asset group is reflected in Figure 6, Figure 7, and Figure 8. The natural round timber poles and the transmission timber poles constitute the majority of Evoenergy's ageing assets within this asset class.

FIGURE 6. ASSET AGE PROFILE CHART (AS AT JULY 2022) – SUPPORT STRUCTURES – CHART 1 OF 3



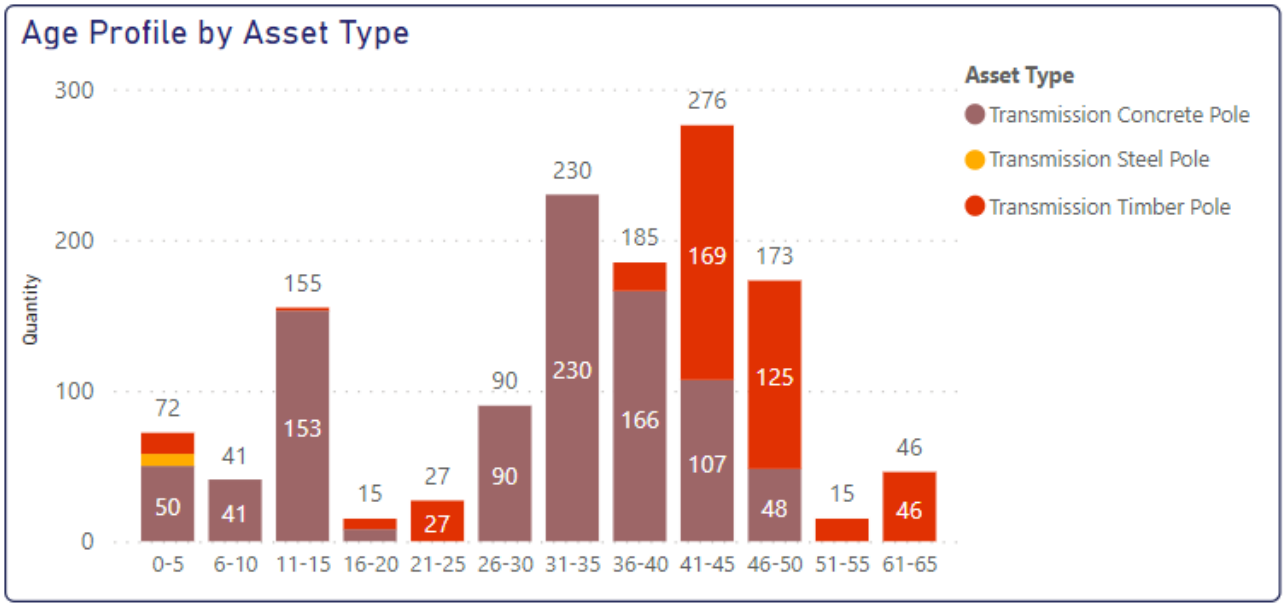
The age profile of distribution timber poles (including natural round poles, tanalith, and creosote poles) shows an ageing population of 14,240 poles above 40 years old and an average age of 57. More than 3,293 poles are above 80 years old and in poor condition requiring replacement to control the risk of failure.

FIGURE 7. ASSET AGE PROFILE CHART (AS AT JULY 2022) – SUPPORT STRUCTURES – CHART 2 OF 3



The age profile of the concrete, fibreglass, steel, and Stobie poles shows a large number of these pole populations is under 35 years, with very few Stobie poles older than 70 years old. This pole group is in good health condition.

FIGURE 8. ASSET AGE PROFILE CHART (AS AT JULY 2022) – SUPPORT STRUCTURES – CHART 3 OF 3

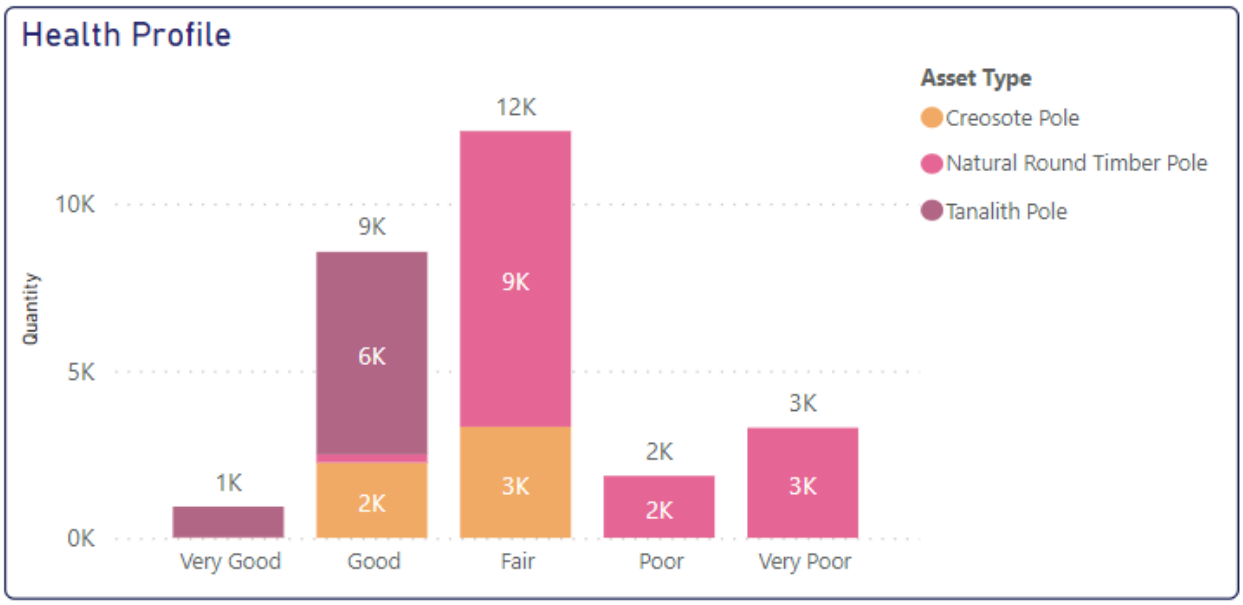


The age profile of transmission poles shows a significant number of timber poles exceeding 40 years and in fair health condition, with a few in critical condition requiring replacement. Evoenergy is taking a prudent approach toward replacement in transmission lines by identifying the most critical condition poles and replacing them. Two transmission lines, Woden – Wanniassa and Bruce – City East, were identified for bulk replacement with a more structural-wise line configuration to reduce the cost of CAPEX and OPEX.

Asset health is a measure of the useful remaining life of an asset. The lower the health index of an asset, the closer it is to the end of its life, and thus, the more likely it is to fail. To account for the deterioration of assets over time (i.e., time-based degradation that is exhibited by all physical electricity network infrastructure), the age of the asset forms the basis of asset health.

The health profile of existing assets within the support structure asset group is summarised in Figure 9, Figure 10, and Figure 11. A significant proportion of the natural round timber poles has poor to very poor health within this asset class.

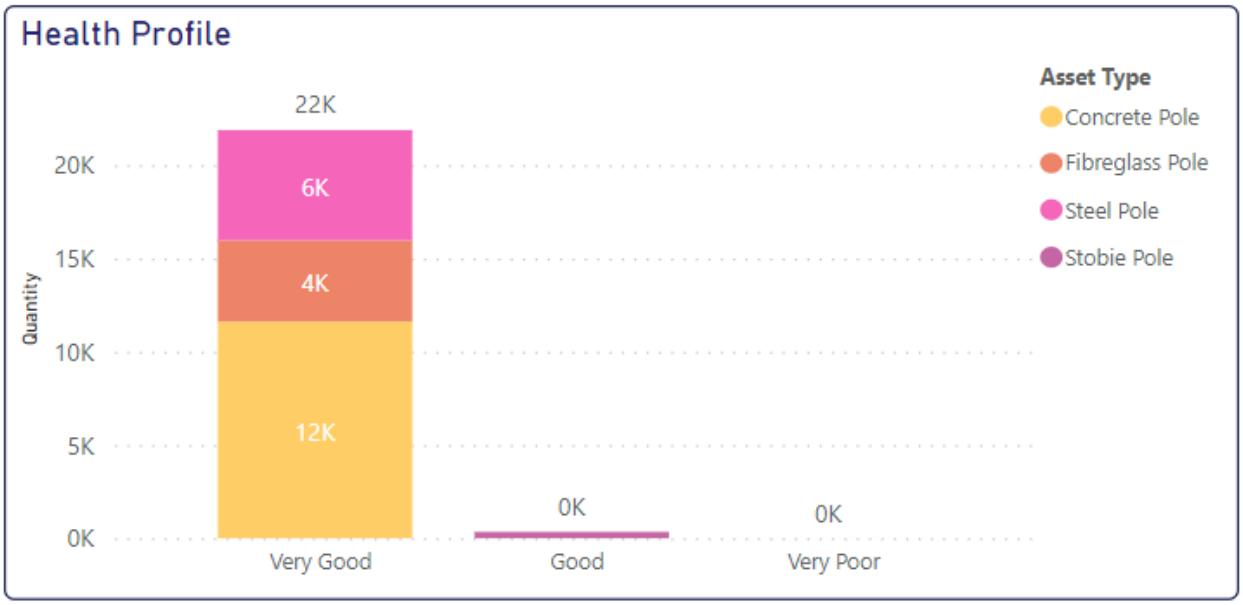
FIGURE 9. ASSET HEALTH PROFILE (AS AT JULY 2022) – SUPPORT STRUCTURES – CHART 1 OF 3



*Health Score: Very Good (100-91), Good (90-61), Fair (60-41), Poor (40-11), Very Poor (10-0)

The timber poles health profile shows many of the distribution timber poles population's condition is between fair and very poor. This condition indicates the timber poles' decreasing capacity to perform their intended function to the required level of reliability. A pole replacement program is developed to target the highest risk, worst condition poles to control the risk of failure. Evoenergy is trialling non-destructive testing technologies to evaluate timber poles structural integrity accurately.

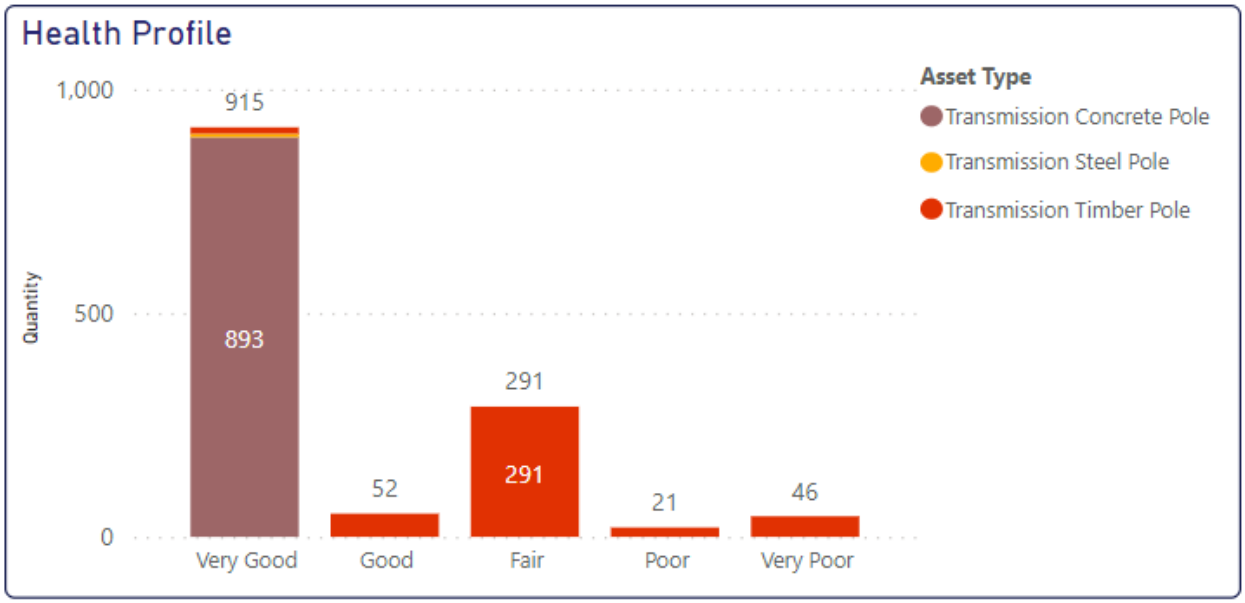
FIGURE 10. ASSET HEALTH PROFILE (AS AT JULY 2022) – SUPPORT STRUCTURES – CHART 2 OF 3



*Health Score: Very Good (100-91), Good (90-61), Fair (60-41), Poor (40-11), Very Poor (10-0)

The health profile of concrete, fibreglass, steel, and Stobie poles shows this pole material is in very good condition due to higher expected service life and more durable material properties.

FIGURE 11. ASSET HEALTH PROFILE (AS AT JULY 2022) – SUPPORT STRUCTURES – CHART 3 OF 3



*Health Score: Very Good (100-91), Good (90-61), Fair (60-41), Poor (40-11), Very Poor (10-0)

The transmission poles health profile chart shows that most timber poles passed their mid-life span. The health index of these poles is fair to very poor condition. A holistic approach to replacement is considered more acceptable due to the geographic location and changing weather conditions in ACT, with increasing wet days that hinder access to these assets for a considerable period of the year.

a) Timber Poles (Tanalith, Natural Round and Creosote)

Timber poles make up 55% of Evoenergy's distribution network:

- Most creosote poles (11%) are over 45 years old with an average health of Fair
- Most tanalith poles (14%) are over 35 years old with an average health of Good
- Most natural round timber poles (29%) are over 55 years old with an average health of Fair.

Most distribution poles in the Evoenergy distribution network are natural round timber. These deteriorate more rapidly than alternatives and are calculated to be in the worst condition. It is expected that most pole substitution or refurbishment works in the 2024-29 period will be natural round timber pole replacements. The refurbishment of timber pole (also referred to as pole "nailing" or pole "staking") activities is further elaborated under the asset management strategy in Section 4.2.1.6 and in Section 4.2.2.

See Section 4.2.1.4 of this portfolio strategy document for improved condition monitoring opportunities that Evoenergy will commence testing through 2022-2023 and onwards.

b) Concrete and Stobie Poles

Concrete poles make up 24% of Evoenergy's distribution network, are under the age of 40 years old and have an average health of Very Good with very few apparent condition or performance issues.

Stobie poles make up less than 1% of Evoenergy's distribution network, most are over the age of 70 years old and are approaching end of life. However, only 355 poles remain in service, which are being systematically replaced.

c) Fibreglass Poles

Fibreglass poles make up 9% of Evoenergy's distribution network, most are under the age of 10 years old and have an average health of Very Good with no apparent condition or performance issues.

d) Steel Poles

Steel poles make up 12% of Evoenergy's distribution network, with most under the age of 30 years old and have an average health of Very Good with very few apparent condition or performance issues.

e) Transmission Concrete Poles

Concrete poles make up 59% of Evoenergy's transmission network, with most under the age of 30 years old and have an average health of Very Good with very few apparent condition or performance issues.

f) Transmission Timber Poles

Timber poles make up 28% of Evoenergy's transmission network, with most over the age of 40 years old and have an average health of Fair. Timber transmission poles have similar challenges and health profiles as distribution network timber poles.

g) Transmission Steel Poles

Steel poles make up only 1% of Evoenergy's transmission network, with most under the age of 10 years old and have an average of Very Good health.

h) Transmission Towers

Steel towers make up 13% of Evoenergy's transmission network, with most either under the age of 25 or within 51-60 years old and have an average health of Very Good with very few apparent condition or performance issues.

4.2.1.4 Risks and Opportunities

Poles are critical assets, located in the public domain, where failures present significant risk to people, environment, and property. Poles with compromised strength and integrity can result in inadequate clearance issues, live conductor contact to property or ground, step and touch potentials, arcing, fires, or catastrophic failure.

The State of the Climate report 2022 (CSIRO and Bureau of Meteorology) predicts 'continued increase in air temperature, more heat extremes and fewer cold extremes', as well as 'More intense short-duration heavy rainfall events, even in regions where the average rainfall decreases or stays the same'. These changing climate parameters pose various risks to our network.

Emerging risks related to this asset class include:

- Managing and removing distribution poles treated with copper chrome arsenate (CCA), estimated at 10% of the total population of backyard poles
- Safety risks due to ageing asset failure. Modelling shows uptrend of poles reaching end of life in 2030.
- Safety risks due to bushfire-related asset failures
- High temperatures can compromise the mechanical properties of assets, resulting in an increased risk of defect or failure
- Intense rainfall events and storms can damage various overhead network assets leading to public safety risks and outages. Intense storm damage was experienced by the Evoenergy network in January of 2022, causing widespread damage to assets and outages.
- High rainfall events can result in inaccessible assets due to boggy or obstructed access roads
- Safety risks due to unassisted failures due to storm or third-party incidents
- Increased cost of supply to customers.

Opportunities for poles include:

- Reduction of overhead infrastructure by opportunistic replacement with underground infrastructure
- Investigate new non-invasive pole inspection technologies to improve the accuracy of asset condition assessment data

- Promote opportunities to create revenue by making support structures available to support other infrastructure such as street lighting, telecommunications, and security assets
- Further investigate alternative materials, such as composite poles, to allow for more cost-effective replacement for backyard reticulation and reduction of failure modes
- Further investigate alternative materials, such as composite poles, to allow reduction of failure modes (termites, wood-rot, etc.) and reduction of maintenance
- Continue to refine risk-based approach when implementing replacement projects.

4.2.1.5 Planned Projects, Replacements and Retirements

Poles are primarily replaced as a result of defects identified during our condition monitoring program. For the EN24-29 period however the highest risk poles have been identified for reinforcement or replacement resulting in an expected:

- 1,955 distribution timber pole planned replacements
- 50 reactive replacements
- 250 timber pole reinforcements
- 40 Transmission timber pole planned replacements.

Woden to Wanniassa 132kV Line wood pole replacement project is expected to take place in FY30 and FY31 resulting in:

- 77 Transmission Timber Pole planned replacements in the Woden to Wanniassa 132kV Line.

Bruce to City East 132kV Line wood pole replacement project is expected to take place in FY32, FY33 and FY34 resulting in:

- 98 Transmission Timber Pole planned replacements in the Bruce to City East 132kV Line.

4.2.1.6 Asset Management Strategy

Due to the high cost of failure of poles, the asset management strategy aims to eliminate complete asset failures through replacement and refurbishment to manage the environmental, safety and network reliability risks. The condition monitoring program is responsible for tracking the condition of poles so they can be assessed against defined serviceability criteria over time and flagged for refurbishment or replacement prior to complete failure.

Maintenance opportunities are somewhat limited for poles however refurbishment activities can extend the service life of certain types of poles. Steel poles corrode below ground level due to moisture in the soil. To extend the service life of steel poles, the corroded below-ground areas can be exposed and treated with an anti-corrosion product. Timber poles also usually deteriorate below ground first due to moisture in the soil accelerating rot. A timber pole that fails below-ground serviceability criteria but meets above-ground serviceability criteria can be reinforced by installing a ridged metal structure, often called a nail or stake, which is fixed to the pole below and above ground level to add strength to the compromised section of the pole. Planned refurbishment of the pole in this manner is a cost-effective treatment that extends service life an average of 15 years while managing the risk.

Poles can be identified for replacement due to failing serviceability criteria while being unsuitable for refurbishment or already refurbished, or due to being identified as economical to replace as part of other associated works. Poles are replaced with new concrete or fibreglass poles.

In summary, where possible, timber poles are refurbished. Where poles cannot be staked or have otherwise reached their end-of-life, timber poles are replaced with either concrete or fibreglass poles.

For all non-timber pole assets, end-of life management involves ongoing “fit for purpose” assessments. If the asset is no longer fit for purpose, then it is retired and replaced.

4.2.2 Transmission Structures

This asset class describes the structures that support the overhead transmission lines which are rated at 132kV.

4.2.2.1 Asset Class Summary and Objectives

The transmission structures asset class consists solely of transmission towers. These support the 132kV transmission lines that form the “backbone” of the Evoenergy electricity networks.

Note that some transmission poles are present within the Evoenergy network. These are discussed in Section 4.2.1.

4.2.2.2 Asset Types

Only one asset type exists within this asset group, namely transmission towers. Transmission towers support the network by supporting the conductors and optical ground wire.

While some transmission poles are present within the Evoenergy network, most transmission support structures are self-supporting lattice towers.

4.2.2.3 Current Population, Age, and Health Profile

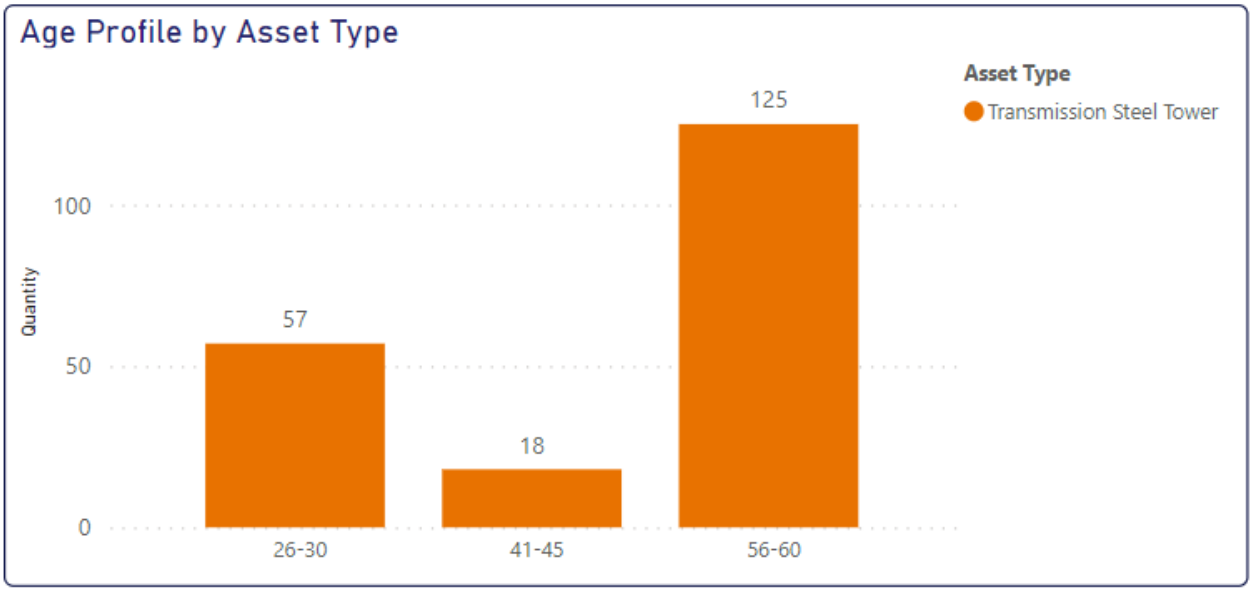
Table 5 offers a high-level count of transmission structure assets within the Evoenergy network, and any notable population performance or potential failure concerns are highlighted in the Health Category column.

TABLE 5. ASSET POPULATION, AGE, AND HEALTH PROFILES – TRANSMISSION STRUCTURES

Asset Specific Plan	Quantity	Unit	Design Life (yrs)	Average Age	Critical Health Qty	Average Health Score	Health Category
Support Structures	200	each	90	47	0	98.04	Very Good
Transmission Steel Tower	200	each	90	47	0	98.04	Very Good

The age profile of existing assets of this type is reflected in Figure 12. The majority of them are more than 50 years old.

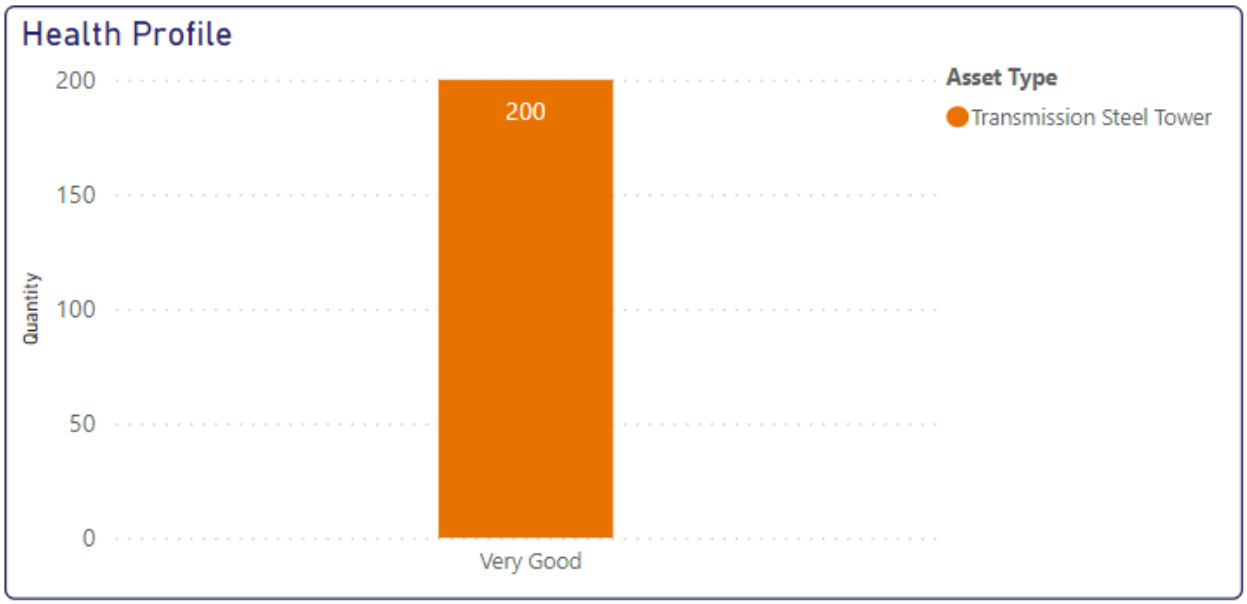
FIGURE 12. ASSET AGE PROFILE CHART (AS AT JULY 2022) – TRANSMISSION STRUCTURES



The health profile of existing asset of this type is summarised in Figure 13. They all are deemed Very Good. Age is the primary driver of time-based deterioration exhibited by all physical assets. The asset age profile of transmission steel towers shows that more than 60% of this asset group are between 40-60 years old.

Continuous inspection, maintenance and deteriorated structural elements replacement are used to control age-related health index decline.

FIGURE 13. ASSET HEALTH PROFILE (AS AT JULY 2022) – TRANSMISSION STRUCTURES



*Health Score: Very Good (100-91), Good (90-61), Fair (60-41), Poor (40-11), Very Poor (10-0)

The steel towers health graph shows very good health condition of the entire population of this asset group.

Transmission towers have a typical service life of 90 years. The average age of towers in the Evoenergy network is 47 years. Therefore, the average asset health for towers is considered to be Very Good.

If structural elements are identified during routine inspection as being in a critical condition, then these will be addressed through planned remedial maintenance. Investigations into the root cause of the observed defects will drive the scope of preventative maintenance and this will be reviewed to include additional works as deemed necessary.

4.2.2.4 Risks and Opportunities

Transmission assets are considered to be critical assets. High availability and very high reliability are important to maintain. Risks for the transmission tower asset type are primarily triggered by a lack of monitoring for maintenance purposes, and damage to structures. This is mitigated through annual aerial inspection and four-yearly ground inspection cycles, as discussed in Section 4.2.2.6. Common mitigation actions for steel towers include corrosion treatment, lattice component replacements, and footing reinforcement. Safety risks include touch potential to individuals in the event of leakage current and bird nests that cause a flashover event.

The State of the Climate report 2022 (CSIRO and Bureau of Meteorology) predicts ‘continued increase in air temperature, more heat extremes and fewer cold extremes’, as well as ‘More intense short-duration heavy rainfall events, even in regions where the average rainfall decreases or stays the same’. These changing climate parameters pose various risks to our network.

Other existing and emerging risks related to this asset class include:

- High temperatures can compromise the mechanical properties of assets, resulting in an increased risk of defect or failure
- Intense rainfall events and storms can damage various overhead network assets leading to public safety risks and outages. Intense storm damage was experienced by the Evoenergy network in January of 2022, causing widespread damage to assets and outages.
- High rainfall events can result in inaccessible assets due to boggy or obstructed access roads

- Safety risks due to unassisted failures due to storm or third-party incidents
- Bushfire due to structural elements failure or arc flash
- Exposure to asbestos or lead-containing paint
- Electrical shock to public or line workers due to deteriorated earthing components.

Opportunities for Transmission assets include:

- Reduction of overhead infrastructure by opportunistic replacement with underground infrastructure
- Investigate life extension program through comprehensive inspection of concrete footing and steel components of the towers
- Further investigate alternative materials, such as composite with higher fire resistance, to allow reduction of failure modes and maintenance costs
- Continue to refine risk-based approach when implementing replacement projects.

4.2.2.5 Planned Projects, Replacements and Retirements

No replacements are expected during the EN24 period however the following refurbishment activities will take place:

- 75 transmission steel tower refurbishments to remove rust and restore galvanisation.

4.2.2.6 Asset Management Strategy

Evoenergy carries out two types of inspections on its overhead transmission assets:

- Ground inspection (pole) – Completed on a 4-yearly cycle, the inspections consist of structure integrity testing and visual inspection of cross-arms, insulators, fittings, and conductors.
- Aerial inspection – Completed annually, the inspections consist of aerial photographs followed by a desktop inspection of the images.

Any required maintenance is generally identified during inspections and is therefore reactive. When required, steel towers can be treated in a variety of ways, including corrosion treatment, replacement of individual lattice components, and footing reinforcement.

4.3. OVERHEAD CONDUCTORS AND HARDWARE STRATEGY

Overhead conductors carry electricity throughout the transmission and distribution networks.

The overhead conductors and hardware asset group is categorised into the following asset classes:

- Overhead Service Conductors
- Overhead Distribution Lines
- Overhead Transmission Lines
- Pole Hardware.

4.3.1 Overhead Service Conductors

These assets form the final link between the distribution network and most of the connected customers (i.e., residential premises). This asset class runs between a point of attachment on a customer's premises and the LV mains conductors.

Overhead services are of varying length depending on the layout of the customer premises and its proximity to Evoenergy's low voltage distribution network.

4.3.1.1 Asset Class Summary and Objectives

Service cables supply customers via overhead or underground cables that connect to the low voltage distribution network. Underground service cables are covered by the underground assets section. The asset class detailed here includes only overhead service conductors.

Overhead service conductors connect between the customer's point of attachment and the low voltage mains conductors and fuses. Depending on the pole configuration, they can also interface with the pole and crossarm assets.

Overhead service conductors are generally categorised by the type of insulating material. The main types of insulating material are cross-linked polyethylene (XLPE) and PVC. All overhead service conductors installed since 1995 are insulated with XLPE which provides more resistance to UV radiation. Overhead service conductors are also known as "overhead service cables", "overhead service lines", or simply "overhead services".

Older service conductors vary widely. Where service conductors are identified as being degraded or of poor quality, these are replaced. Generally, when a service crossarm is replaced so are all associated service conductors.

4.3.1.2 Asset Types

This asset class only contains one type i.e., overhead service conductors. As described above, these are conductors that link customer premises to the overhead distribution network.

4.3.1.3 Current Population, Age, and Health Profile

Table 6 offers a high-level count of overhead service conductor assets within the Evoenergy network, and any notable asset health concerns are highlighted in the Health Category column.

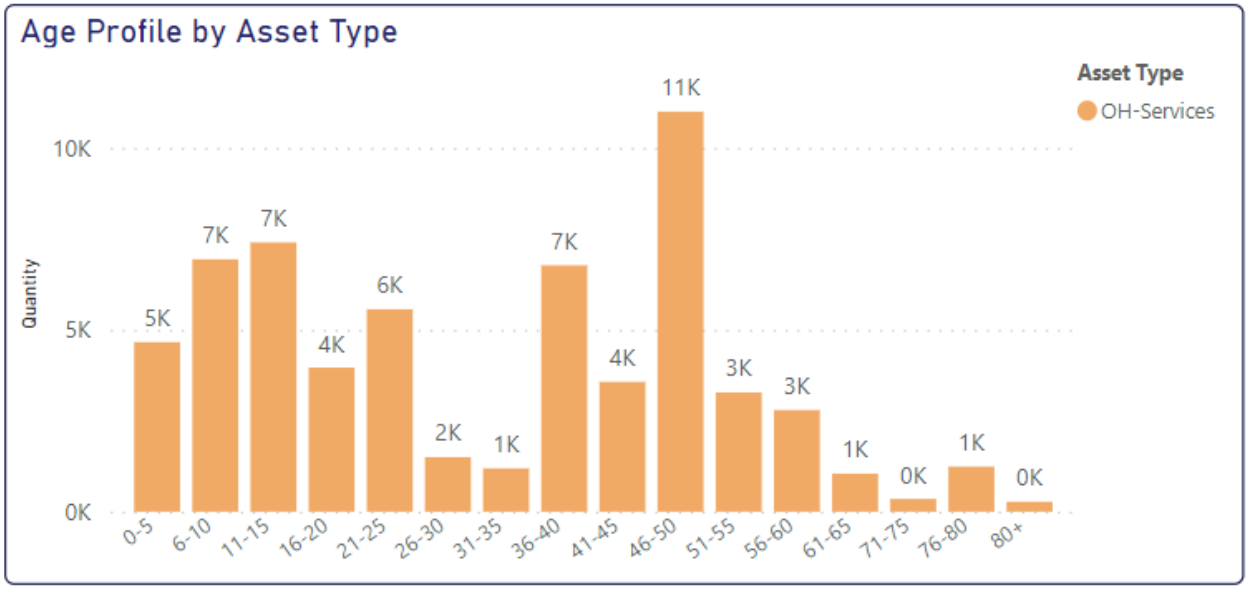
The age of individual service conductors is not tracked so an indicative age profile has been developed based on the age of the suburbs that overhead services have been installed in.

TABLE 6. ASSET POPULATION, AGE, AND HEALTH PROFILES – OVERHEAD SERVICE CONDUCTORS

Asset Specific Plan	Quantity	Unit	Design Life (yrs)	Average Age	Critical Health Qty	Average Health Score	Health Category
Overhead Conductors and Hardware	61,547	each	40	31	1,163	94.96	Very Good
OH-Services	61,547	each	40	31	1,163	94.96	Very Good

The age profile of existing assets is reflected in Figure 14.

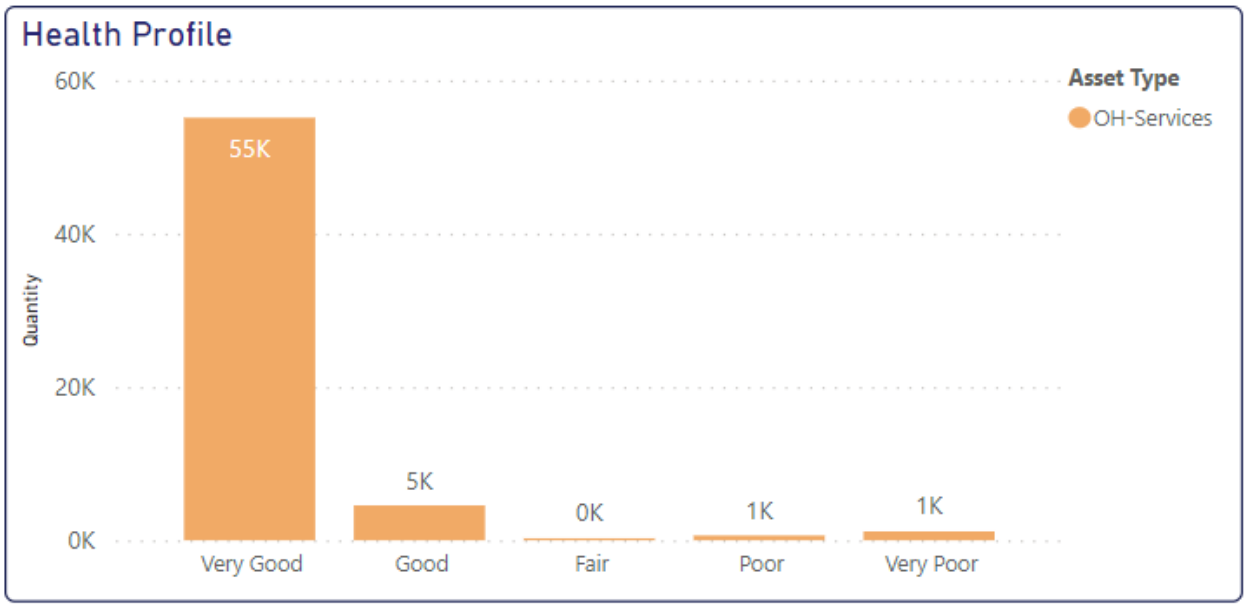
FIGURE 14. ASSET AGE PROFILE CHART (AS AT JULY 2022) – OVERHEAD SERVICE CONDUCTORS



The Age profile shows the about 40% of this asset group are below their estimated design life. The average age is 31 years.

The asset class health profile is summarised in Figure 15.

FIGURE 15. ASSET HEALTH PROFILE (AS AT JULY 2022) – OVERHEAD SERVICE CONDUCTORS



*Health Score: Very Good (100-91), Good (90-61), Fair (60-41), Poor (40-11), Very Poor (10-0)

Health profile is determined by combining the asset condition rating with its criticality rating. About 90% of OH Services are in a very good condition. Failure in this asset group is localised with limited impact to single customer outage. Assets with the lowest health will be scheduled for earliest replacements.

As described above, because a large portion of commissioning date information for the overhead service conductor asset type is not available, accurate condition estimates are not possible.

4.3.1.4 Risks and Opportunities

Backyard electrical reticulation is a major challenge in the ACT and there is minimal provision for utility easements between residential yards, such as independent easement land or alley ways. As such overhead service conductors are mostly located in residential backyards and, when failures occur, present significant risk to ACT residents, environment, and property. Key risks are insulation and joint degradation, reduced conductor strength, clearance breaches, live conductor contact to property or ground, step and touch voltage/potential rise, catastrophic failure, arc flash, and bushfire.

The State of the Climate report 2022 (CSIRO and Bureau of Meteorology) predicts ‘continued increase in air temperature, more heat extremes and fewer cold extremes’, as well as ‘More intense short-duration heavy rainfall events, even in regions where the average rainfall decreases or stays the same’. These changing climate parameters pose various risks to our network.

Emerging risks related to this asset class include:

- Ageing asset population
- High temperatures can compromise the mechanical properties of assets, resulting in an increased risk of defect or failure
- Intense rainfall events and storms can damage various overhead network assets leading to public safety risks and outages. Intense storm damage was experienced by the Evoenergy network in January of 2022, causing widespread damage to assets and outages.
- High rainfall events can result in inaccessible assets due to boggy or obstructed access roads

Opportunities for overhead service conductors include:

- Reduction of overhead infrastructure by opportunistic replacement with underground infrastructure
- Continue to default to underground reticulation on residential “knock-down-rebuilds”
- Investigate new technologies (LiDar, drone monitoring, smart metering) to improve asset condition monitoring and reduce the whole-of-life cost
- Continue to invest in UV-resistant XLPE insulated conductors when replacement opportunities arise
- Investigate opportunities to invest in and test new overhead line materials such as insulated conductors to reduce maintenance costs
- Invest in works planning optimisation to reduce costs associated to replacement and augmentation
- Continue to refine risk-based approach when implementing replacement projects.

4.3.1.5 Planned Projects, Replacements and Retirements

As mentioned above, overhead service conductors are replaced opportunistically. No systematic program of replacement is in place as this is not considered to be cost effective. For the EN24-29 period the highest risk overhead service conductors have been identified for replacement resulting in an expected:

- 640 planned replacements.

4.3.1.6 Asset Management Strategy

a) Condition Monitoring

Where possible, overhead service conductors are inspected as part of nearby pole and line inspections.

b) Replacement (Unplanned Maintenance)

Approximately 240 overhead services are replaced annually due to failure or poor condition. This is identified in either the pole inspection program or from reactive work. Approximately half service replacement work requires scaffolding.

PVC insulated overhead service conductors are replaced during pole replacement or pole top renewal (e.g., crossarm replacement).

These overhead service replacements are budgeted under the pole replacement program.

In general, older overhead services are not re-tensioned as there is minimal cost difference between re-tensioning and replacement.

c) Expected Service Life

PVC insulated overhead service conductors have a 25-year expected service live. XLPE insulated overhead service conductors have a 40-year expected service life.

4.3.2 Overhead Distribution Lines

This asset class includes the conductors that carry electricity at distribution voltage levels throughout Evoenergy’s network. Conductors are arranged in a 3-phase configuration and lines are rated from 415V to 22kV. This asset class consists of the following asset types:

- Overhead high voltage feeders
- Overhead low voltage lines.

Overhead high voltage distribution feeders form the backbone of the distribution network. These connect distribution substations to the distributed step-down transformers that supply the low voltage network that supplies customers. Low voltage lines form the “last mile” link between distribution transformers and customers.

4.3.2.1 Asset Class Summary and Objectives

Overhead distribution lines include low voltage lines and high voltage feeders. Pole-top hardware is discussed in Section 4.4.

Evoenergy's high voltage overhead distribution network lines consists of 46.6% All Aluminium Conductor (AAC), 13.6% Aluminium Conductor Steel Reinforced (ACSR), 18.5% Hard Drawn Copper conductor (HDC) and 21.2% steel conductors.

Most of the low voltage overhead lines are either AAC or HDC (94.1% of the low voltage network). The aerial bundled conductor is also used in the low voltage network to address clearance issues. Only 5% of the low voltage network is ABC. The remainder of the low voltage network is comprised of steel conductors.

4.3.2.2 Asset Types

A variety of asset types exist within this class. These are briefly introduced in this section.

a) Overhead High Voltage Feeders

Overhead high voltage distribution feeders form the backbone of the distribution network. These connect distribution substations to the distributed step-down transformers that supply the low voltage network that supplies customers.

b) Overhead Low Voltage Lines

Low voltage lines form the "last mile" link between distribution transformers and customers.

4.3.2.3 Current Population, Age, and Health Profile

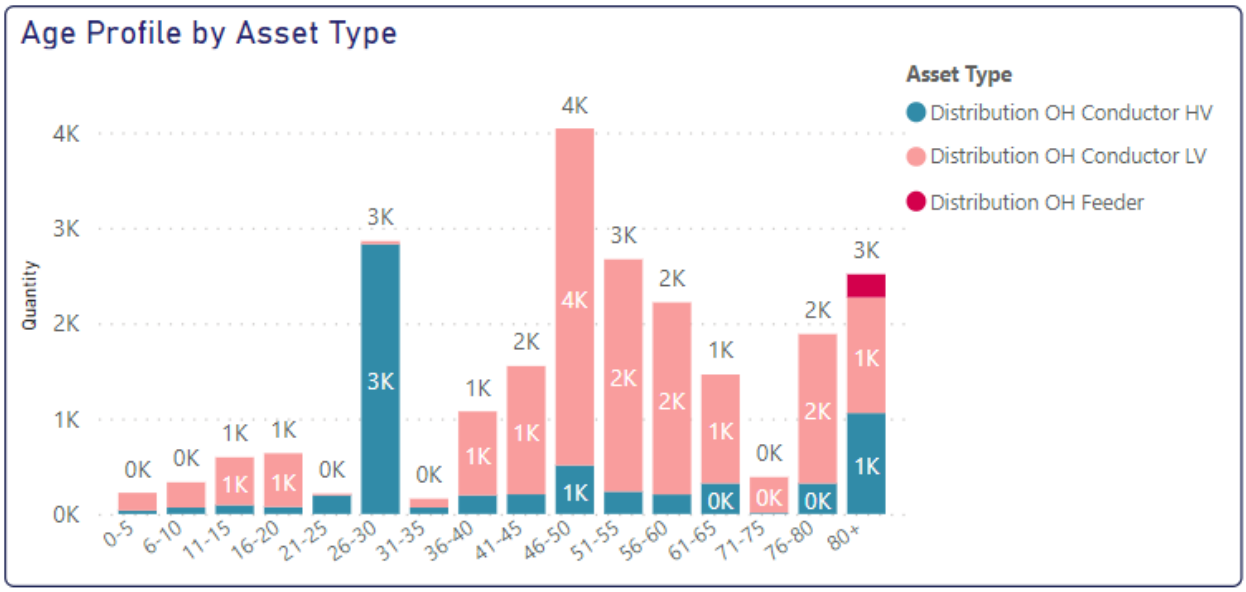
The majority of Evoenergy's overhead distribution network consists of low voltage mains. A significant proportion of 11kV overhead conductors also exist. A relatively short 34.2 km length of 22kV overhead network exists from legacy networks. Table 7 offers a count of overhead distribution line assets within the Evoenergy network.

TABLE 7. ASSET POPULATION, AGE, AND HEALTH PROFILES – OVERHEAD DISTRIBUTION LINES

Asset Specific Plan	Quantity	Unit	Design Life (yrs)	Average Age	Critical Health Qty	Average Health Score	Health Category
Overhead Conductors and Hardware	2,187,848	each		54	3,952	76.21	Good
Distribution OH Conductor HV	982,450	km		52	1,284	76.79	Good
Distribution OH Conductor LV	1,205,156	km		54	2,426	77.12	Good
Distribution OH Feeder	242	each		123	242	0.00	Very Poor

The age profile of existing assets within the overhead distribution line asset group are reflected in Figure 16.

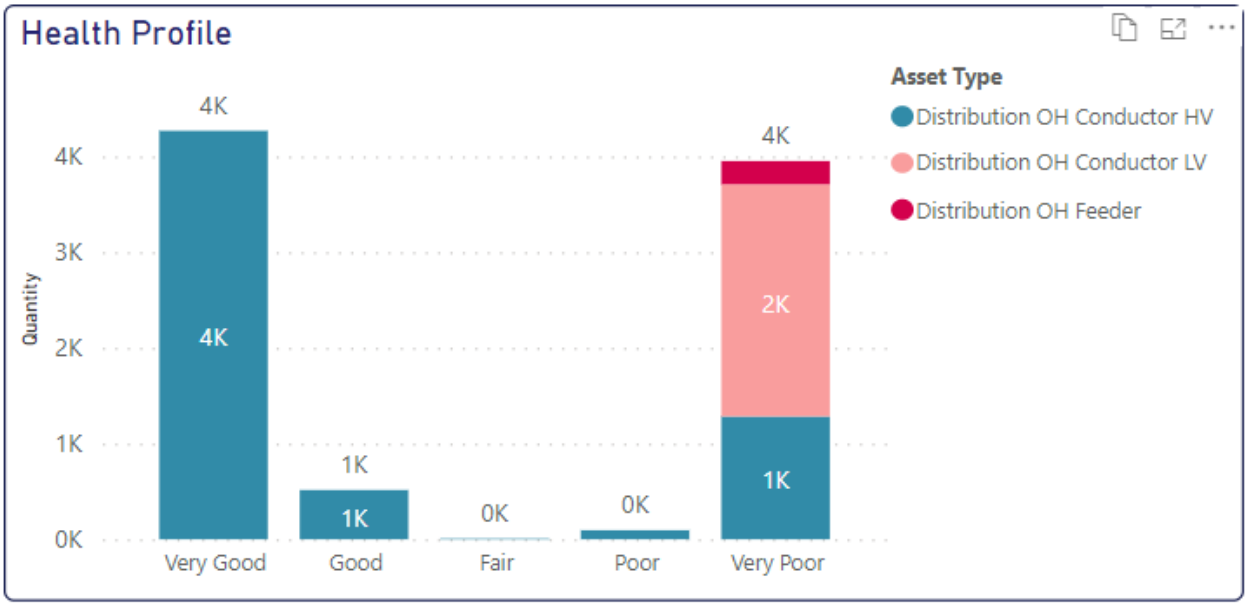
FIGURE 16. ASSET AGE PROFILE CHART (AS AT JULY 2022) – OVERHEAD DISTRIBUTION LINES



The asset age profile of distribution OH conductors shows that more than 70% of this asset group are between 36 – 80 years old. Age is the primary driver of time-based deterioration exhibited by all physical assets. Continuous inspection, maintenance, deteriorated structural elements, and replacement is used to control age-related failures.

The health profile of existing assets within the overhead distribution lines asset group is summarised in Figure 17.

FIGURE 17. ASSET HEALTH PROFILE (AS AT JULY 2022) – OVERHEAD DISTRIBUTION LINES



*Health Score: Very Good (100-91), Good (90-61), Fair (60-41), Poor (40-11), Very Poor (10-0)

The health score of 75% for OH high voltage conductors are very good, while OH low voltage conductors and feeders are in very poor health condition. These groups of poor condition conductors are priorities, scheduled for earlier replacement.

Any lines identified as being in a critical condition will be addressed through replacement. Investigations into the root cause of the observed defects will drive the scope of replacement activities and this will be reviewed to include additional works as deemed necessary.

4.3.2.4 Risks and Opportunities

Overhead distribution lines are mostly located in public spaces and, when failures occur, present significant risk to people, environment, and property. Key risks are insulation and joint degradation, reduced conductor strength, clearance breaches, live conductor contact to property or ground, step and touch voltage/potential rise, catastrophic failure, arc flash, and bushfire.

The State of the Climate report 2022 (CSIRO and Bureau of Meteorology) predicts 'continued increase in air temperature, more heat extremes and fewer cold extremes', as well as 'More intense short-duration heavy rainfall events, even in regions where the average rainfall decreases or stays the same'. These changing climate parameters pose various risks to our network.

Emerging risks related to this asset class include:

- Ageing asset population
- High temperatures can compromise the mechanical properties of assets, resulting in an increased risk of defect or failure
- Intense rainfall events and storms can damage various overhead network assets leading to public safety risks and outages. Intense storm damage was experienced by the Evoenergy network in January of 2022, causing widespread damage to assets and outages.
- High rainfall events can result in inaccessible assets due to boggy or obstructed access roads.

Opportunities for overhead distribution lines include:

- Reduction of overhead infrastructure by opportunistic replacement with underground infrastructure
- Investigate new technologies (LiDar, drone monitoring, smart metering) to improve asset condition monitoring and reduce the whole-of-life cost
- Continue to invest in UV-resistant XLPE insulated conductors when replacement opportunities arise
- Investigate opportunities to invest in and test new overhead line materials such as insulated conductors to reduce maintenance costs
- Invest in works planning optimisation to reduce costs associated with replacement and augmentation
- Continue to refine risk-based approach when implementing replacement projects.

4.3.2.5 Planned Projects, Replacements and Retirements

Overhead distribution lines are replaced opportunistically. No systematic program of replacement is in place as this is not considered to be cost effective. Over the course of EN24-29 it is estimated that there will be:

- 150 reactive replacements.

4.3.2.6 Asset Management Strategy

a) Ongoing Condition Monitoring

A key function in the asset management strategy is ongoing condition monitoring. Three routine overhead line and pole top hardware inspections are performed regularly. These are:

- Pole and line inspection
- Thermovision survey
- Helicopter aerial inspection.

High voltage rural overhead lines are inspected for vegetation every year in March. At the same time, high resolution photographs of the pole top are taken to determine the condition of the pole top hardware. High voltage urban overhead lines are inspected for vegetation every two years. At the same time, high resolution photographs of the pole top are taken to determine the condition of the pole top hardware. This inspection process is a key component of Evoenergy's BOP.

Ground inspection of overhead line and pole top hardware is completed at the same time as the pole inspection.

Thermovision surveys are performed on 100 selected overhead feeders every year. Every winter 80 overhead feeders are surveyed and every summer 20 overhead feeders are surveyed. These feeders are selected based on the loading of the feeder, the total overhead line length, and past failures caused by hot spots.

b) Planned Maintenance

Some poles require the renewal of pole top hardware during the pole's service life. The requirements for pole top hardware renewal are identified from the pole inspections and high resolution aerial pole top photograph. Alongside the renewal of the pole top hardware on the suitable poles, OH Distribution Lines can be opportunistically replaced when it is economical to do so.

c) Unplanned Maintenance

Where inspections identify defects requiring urgent attention, unplanned maintenance may occur. All dangerous defects which can harm the public, employee, or asset are addressed immediately. All defects that present an unacceptable hazard to public safety, employee safety, and asset integrity are addressed before the next inspection cycle.

4.3.3 Overhead Transmission Lines

This asset class describes the conductors that transport electricity at 132kV throughout Evoenergy's network and this forms the backbone of Evoenergy's electricity network.

Transmission lines carry electricity throughout the distribution network and are supported by overhead structures which may consist of timber poles, concrete poles and steel towers depending upon the various conductor sizes, insulator types, and associated line hardware. All these are dependent on operating voltage, ground clearance and topography of the site.

4.3.3.1 Asset Class Summary and Objectives

Evoenergy's overhead transmission network links its distribution network to the Australian National Electricity Market (NEM) for the supply of electricity to the ACT. The overhead transmission network is 183 km in total circuit length and connects to TransGrid's transmission network at three supply points.

The transmission system forms the "backbone" of the electricity network in the ACT, transmitting large amounts of energy to customers. This network connects Evoenergy's zone substations where electricity is transformed to distribution network voltages and ultimately serving customers on the distribution network.

This asset class is concerned with transmission line conductors. Towers are discussed in Section 4.2.2.

4.3.3.2 Asset Types

Only one asset type exists within this class. This is transmission line conductors, as described above.

4.3.3.3 Current Population, Age, and Health Profile

A total of 183 km of overhead transmission conductors currently exists within the Evoenergy transmission network.

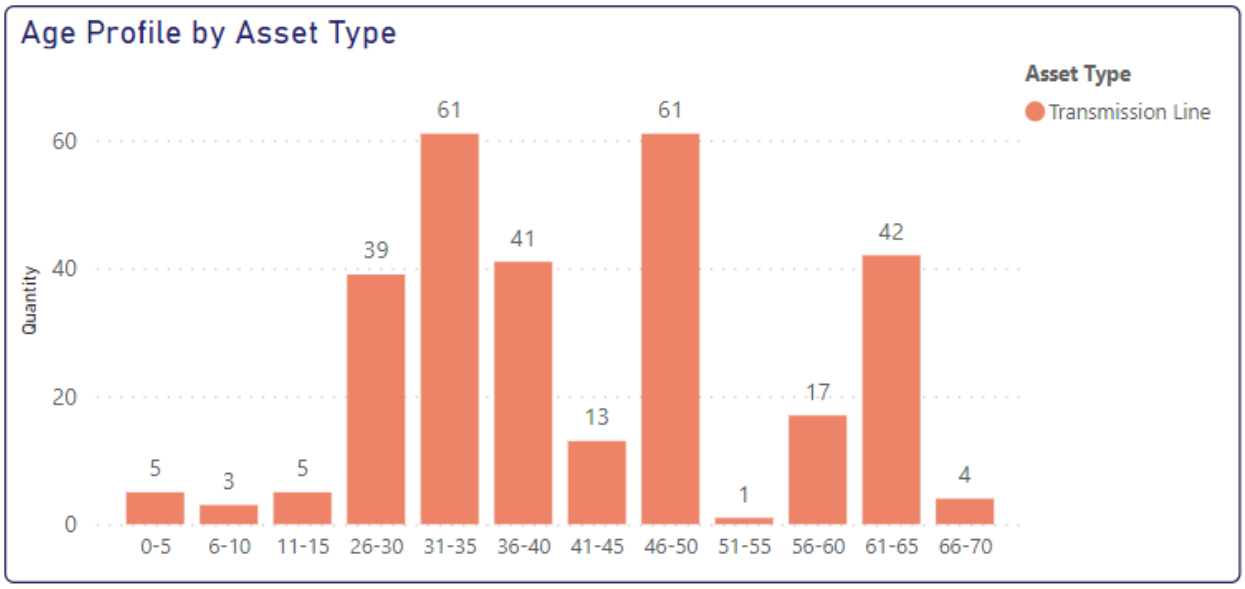
Table 8 offers a high-level count of overhead transmission line assets within the Evoenergy network, and any notable population performance or potential failure concerns are highlighted in the Health Category column.

TABLE 8. ASSET POPULATION, AGE, AND HEALTH PROFILE – OVERHEAD TRANSMISSION LINES

Asset Specific Plan	Quantity	Unit	Design Life (yrs)	Average Age	Critical Health Qty	Average Health Score	Health Category
Overhead Conductors and Hardware	213,314	km	80	42	0	94.01	Very Good
Transmission Line	213,314	km	80	42	0	94.01	Very Good

The age profile of existing assets is reflected in Figure 18.

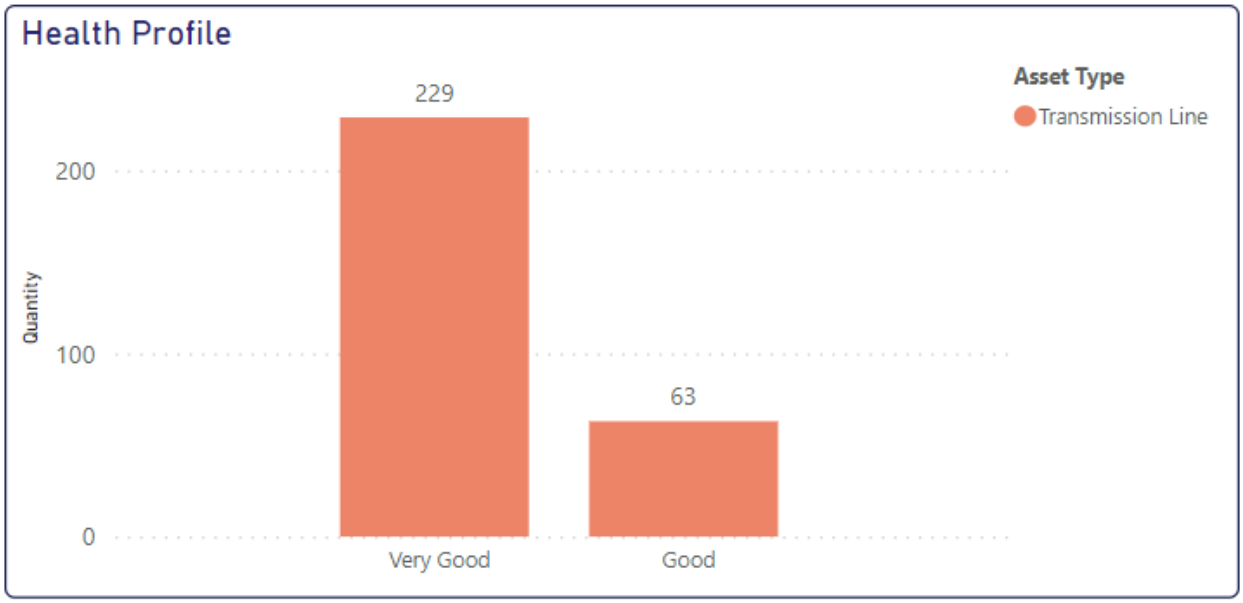
FIGURE 18. ASSET AGE PROFILE CHART (AS AT JULY 2022) – OVERHEAD TRANSMISSION LINES



The age profile of transmission lines shows that all asset groups are within potential design life. The largest group count is between 26-50 years old, with an average age of 42.

The health profile of existing assets within the overhead transmission lines asset group is summarised in Figure 19.

FIGURE 19. ASSET HEALTH PROFILE CHART (AS AT JULY 2022) – OVERHEAD TRANSMISSION LINES



*Health Score: Very Good (100-91), Good (90-61), Fair (60-41), Poor (40-11), Very Poor (10-0)

The health profile of transmission lines shows this asset group is in very good condition, which indicates asset age shown in the age profile and condition deterioration pattern.

Overhead transmission assets are designed to maintain very high reliability standards. Evoenergy planning standards ensure that adequate redundancy is built into the transmission network. The transmission network has a minimum redundancy of “N-1”, meaning that customer’s power supply will not be interrupted in the event of any single transmission line outage.

Any lines identified as being in a critical condition will be addressed through planned remedial maintenance. Investigations into the root cause of the observed defects will drive the scope of preventative maintenance and this will be reviewed to include additional works as deemed necessary.

4.3.3.4 Risks and Opportunities

The primary residual risk from overhead transmission line asset failures is health and safety, environmental risk, and reduced reliability. This risk arises from failures that may result in overhead assets falling to the ground. For example, a pole or conductor falling to the ground will also result in power outage which may also impact Evoenergy's reliability measures. Risk assessment and management of overhead transmission lines is based on zones that rank public safety and environmental (bushfire) risk.

The State of the Climate report 2022 (CSIRO and Bureau of Meteorology) predicts 'continued increase in air temperature, more heat extremes and fewer cold extremes', as well as 'More intense short-duration heavy rainfall events, even in regions where the average rainfall decreases or stays the same'. These changing climate parameters pose various risks to our network.

Emerging risks related to this asset class include:

- Increased failure risks due to ageing asset population
- High temperatures can compromise the mechanical properties of assets, resulting in an increased risk of defect or failure
- Intense rainfall events and storms can damage various overhead network assets leading to public safety risks and outages. Intense storm damage was experienced by the Evoenergy network in January of 2022, causing widespread damage to assets and outages.
- High rainfall events can result in inaccessible assets due to boggy or obstructed access roads.

Opportunities for overhead transmission lines include:

- Invest in augmentation projects to enable the decommissioning of ageing zone substation and sub-transmission lines supplying substations. Replacing entire transmission lines as part of broader asset replacement projects in this manner helps to achieve operational efficiency and mitigate risk associated with ageing transmission poles and sections of overhead transmission lines in critical areas.
- Review the feasibility of joint community investment of undergrounding 66/132kV OH sections of overhead network
- Optimising the network design when opportunity arises for like-for-like replacement
- Investigate new technologies (LiDar, drone monitoring, smart metering) to improve asset condition monitoring and reduce the whole-of-life cost
- Invest in works planning optimisation to reduce costs associated with replacement and augmentation
- Continue to refine risk-based approach when implementing replacement projects.

4.3.3.5 Planned Projects, Replacements and Retirements

Overhead Transmission Lines are replaced opportunistically. There are no planned replacements for the EN24-29 period however there is allowance within the transmission pole replacement budget for opportunistic replacement of transmission lines.

4.3.3.6 Asset Management Strategy

Overhead transmission lines are repaired or replaced when it is economical to do so as part of other associated works, or in response to defects identified typically through condition monitoring inspections.

Overhead transmission lines are inspected every 4 years as part of ground-based pole inspections, and annually as part of aerial inspections. During aerial inspections photographs are taken, and a subsequent desktop inspection of the photographs is completed.

4.3.4 Pole Hardware

This asset class describes all the structural elements, devices and hardware that, together with the Poles asset class, form the distribution and transmission pole structures that support the overhead lines. Overhead network assets are rated from 240V to 132kV. This asset class consists of the following asset types:

- Spacers
- Animal guards
- Cross-arms
- Insulators
- Pole stays
- Transmission line cross-arms
- Transmission line insulators.

These asset types are diverse in function and characteristics and are usually grouped with other overhead asset classes when reporting or describing Evoenergy's overhead network assets, projects, or work activities.

4.3.4.1 Asset Class Summary and Objectives

Pole hardware assets are critical for Evoenergy's overhead network operation. Pole top hardware consists of pole stays, distribution crossarms, support brackets, insulators, hand ties, armour rods, vibration dampers, aircraft warning markers, spacers, and other accessories attached to a pole or overhead conductor.

All the pole top hardware components play an important role contributing towards high reliability of the overhead network.

4.3.4.2 Asset Types

A variety of asset types exist within this asset class. These are briefly introduced in this section.

a) Spacers

Spacers are a critical component used in overhead conductors to hold conductors in their intended position and avoid conductors clashing. Different spacers will be used for different conductor types and span length of a conductor.

b) Animal Guards

Animal guards are typically constructed from polypropylene plastic in a hinged-case form that creates a barrier over a distribution bushing. Animal guards are installed to reduce animal-related electrical service interruptions on transformers, substation insulators, and bushings.

c) Cross-arms

The function of a crossarm is to support insulators, conductors, and other equipment up to the maximum design loading and to maintain conductor clearances. The crossarm is physically bolted or strapped to the distribution/transmission pole. A crossarm or steel bracket is also used to support or hang overhead distribution switchgear such as air-break switches and dropout fuses.

Most of the distribution crossarms in service are timber. Other crossarm material types include composite (fibreglass), steel (bracket for holding overhead switchgears and transformers), and laminated wooden crossarms. Laminated wooden crossarms only exist in limited numbers. All new crossarms are now composite (fibreglass).

d) Pole Stays

A pole stay is a steel wire that is used to support a pole when the tip load exceeds the pole capacity. The stay may be anchored in the ground or to another pole. Where stays are required, the options available include conventional ground stays, head or aerial stays, and sidewalk stays. Ground stays are preferred over aerial and sidewalk/footpath stays.

e) Insulators

The function of a distribution/transmission insulator is to support the conductor. Insulators are bolted to the crossarm and are designed to withstand normal operating voltage, lightning, and switching surge so that the conductor does not short circuit to earth.

Other asset types that are classified in this class, but not tracked in the asset management system (PowerPlan) include the following:

- Aircraft marker ball – The function of an aircraft marker ball is to provide visual warning to legal and low flying aircraft of the powerline locations.
- Armour/Armor Rods – Armor rods are designed to protect overhead conductors against bending, compression, abrasion, and flashover. They also improve a conductor's mechanical strength. An armour rod is wrapped around the overhead conductor where it is positioned onto the insulator, and the conductor with the armour rod is secured onto the pin or post insulators with hand ties.
- Dead End Grip – A dead end grip is a helical termination primarily used for bare aluminium conductor termination onto the insulator attached to the pole. For termination poles, a dead-end grip is used to secure the conductor onto the strain insulator assembly.
- Hand Ties – As the name suggests, these ties are used to secure overhead conductors to clamp top insulators or over armour rods. They provide abrasion protection for all types of LV conductors under different operating conditions.
- Vibration Damper – The function of vibration dampers is to reduce aeolian vibration damage by disrupting and negating the conductor motion produced by the wind. Vibration dampers are physically installed on the overhead conductor and directly interface with the conductor.

4.3.4.3 Current Population, Age, and Health Profile

Detailed individual asset data is not available for these asset types. Asset count is known for distribution line crossarms, distribution line insulators, spacers and pole stays, however asset age information is unknown for all asset types. A meaningful health profile therefore cannot be produced for this section. Known asset counts are as follows:

- 231,779 Distribution Line Insulators
- 72,027 Distribution Crossarms
- 4,796 Pole Stays
- 12,573 Spacers

Those units identified as being in a critical condition will be addressed through planned remedial maintenance. Investigations into the root cause of the observed defects will drive the scope of preventative maintenance and this will be reviewed to include additional works as deemed necessary.

Polymeric insulators on two transmission lines have known defect of brittle failure. Evoenergy is condition monitoring and gradual replacement program is planned to replace these insulator types and install Corona Rings to control Corona discharge.

4.3.4.4 Risks and Opportunities

Pole hardware are critical assets, located in the public domain, where failures present significant risk to people, environment, and property. Pole hardware with compromised strength and integrity can result in thermos degradation, live conductor contact to property or ground, step and touch potentials, arcing, fires, or catastrophic failure.

The State of the Climate report 2022 (CSIRO and Bureau of Meteorology) predicts 'continued increase in air temperature, more heat extremes and fewer cold extremes', as well as 'More intense short-duration heavy rainfall events, even in regions where the average rainfall decreases or stays the same'. These changing climate parameters pose various risks to our network.

Emerging risks related to this asset class include:

- Safety risks due to bushfire related asset failures

- High rainfall events can result in inaccessible assets due to boggy or obstructed access roads
- Safety risks due to unassisted failures due to storm or third-party incidents
- Increased cost of supply to customer.

Opportunities for pole hardware include:

- Reduction of overhead infrastructure by opportunistic replacement with underground infrastructure
- Investigate new non-invasive pole inspection technologies to improve the accuracy of asset condition assessment data, such as drone inspections and drone mounted thermos inspections
- Investigate alternative composite materials for insulators that are resistant to UV degradation and bird damage
- Further investigate alternative materials, such as quick release fixings, to allow for more cost-effective repair for backyard reticulation and reduction of failure modes
- Further investigate alternative materials, such as composite poles, to allow reduction of failure modes (termites, wood-rot, etc.) and reduction of maintenance
- Continue to refine risk-based approach when implementing replacement projects
- Continue to improve asset data sets through updated maintenance and inspection procedures and explore asset data management opportunities such as improved system synchronisation.

4.3.4.5 Planned Projects, Replacements and Retirements

Pole hardware is replaced in response to defects identified during our condition monitoring program. It is expected that during EN24-29 there will be:

- 155 Animal Guard reactive replacements
- 350 Crossarm reactive replacements
- 245 Insulator reactive replacements
- 1,250 Spacer reactive replacements
- 12 Transmission Line Crossarm reactive replacements (includes allocation for reactive Transmission Line Insulators).

4.3.4.6 Asset Management Strategy

Pole hardware is inspected during routine pole visual and aerial inspections. Defects identified during these cycles drive replacement and maintenance activities. Where possible, pole hardware should be replaced when it is economical to do so as part of other associated works such as pole or transformer replacement. Replacing pole hardware at the same time as other works in this manner improves operational efficiency.

4.4. OVERHEAD DISTRIBUTION EQUIPMENT STRATEGY

These assets enable the distribution network to operate safely. While the assets included are diverse, they are all located on poles or transmission structures.

The overhead distribution equipment asset group includes assets that help protect the network and pole-mount transformers that step down sub-transmission voltages to distribution voltages for customers. This group is categorised into the following asset classes:

- Overhead Switchgear and Automation
- Pole Substations.

4.4.1 Overhead Switchgear and Automation

This asset class describes all the protection, detection, switching, and isolation devices that are installed on overhead structures throughout Evoenergy's network. These devices are rated from 240V to 132kV. This asset class consists of the following asset types:

- Load break switches
- Drop-out fuses
- Air-break switches
- Fault passage indicators
- Surge diverters
- High voltage links
- High voltage overhead gas switches
- Reclosers.

These asset types are diverse in function and characteristics.

4.4.1.1 Asset Class Summary and Objectives

Evoenergy uses pole mounted overhead switchgear for switching and isolating in the distribution network. It includes both automated and non-automated overhead switchgear operating at 11kV and 22kV distribution networks.

A variety of overhead switchgear is in use in Evoenergy's distribution overhead network. Many of these assets are approaching the end of their design life and will require replacement during the upcoming period.

4.4.1.2 Asset Types

Different types of overhead switchgear, depending upon their functionality, are used in the network to provide both switching and isolation functions in the overhead network and are very effective in managing transient faults in the network. These are introduced in this section.

a) Air-Break Switches

Air-break switches are manually operated by field crews and are used to isolate a section of the network for maintenance or emergency repairs.

b) Drop-out Fuses

Drop out fuses protect assets from network faults. These require manual replacement by a field crew after their operation (opening of circuit).

c) Fault Passage Indicators

Fault passage indicators are used to detect and identify fault locations occurring downstream from the device. It constantly monitors the network and increases operational (restoration) efficiency by directing the field crew to the fault location.

d) High Voltage Links

HV links are single phase removable metal conductors that can provide isolation at their location if manually removed. They are not automated or remotely controlled.

e) High Voltage Overhead Gas Switches

Gas switches isolate sections of network for maintenance or emergency repairs. However, unlike air-break switches, these can be remotely operated.

f) Load Break Switches

Load break switches are similar to air-break switches except that these can be operated while the network is energised.

g) Reclosers

Reclosers automatically break and reconnect lines responding to downstream faults. These are frequently used and prevent unnecessary crew attendance for temporary issues such as transient or temporary faults caused by animals or tree branches on the overhead lines. These are programmable devices to tailor the timing and count of opening and closing of the circuit under fault or normal operational conditions.

h) Surge Diverters

Surge diverters operate to divert transient overvoltage, typically caused by lightning strikes, to protect the assets by diverting it to the earth.

4.4.1.3 Current Population, Age, and Health Profile

Table 9 offers a high-level count of overhead switchgear and automation assets within the Evoenergy network, and any notable population performance or potential failure concerns are highlighted in the Health Category column.

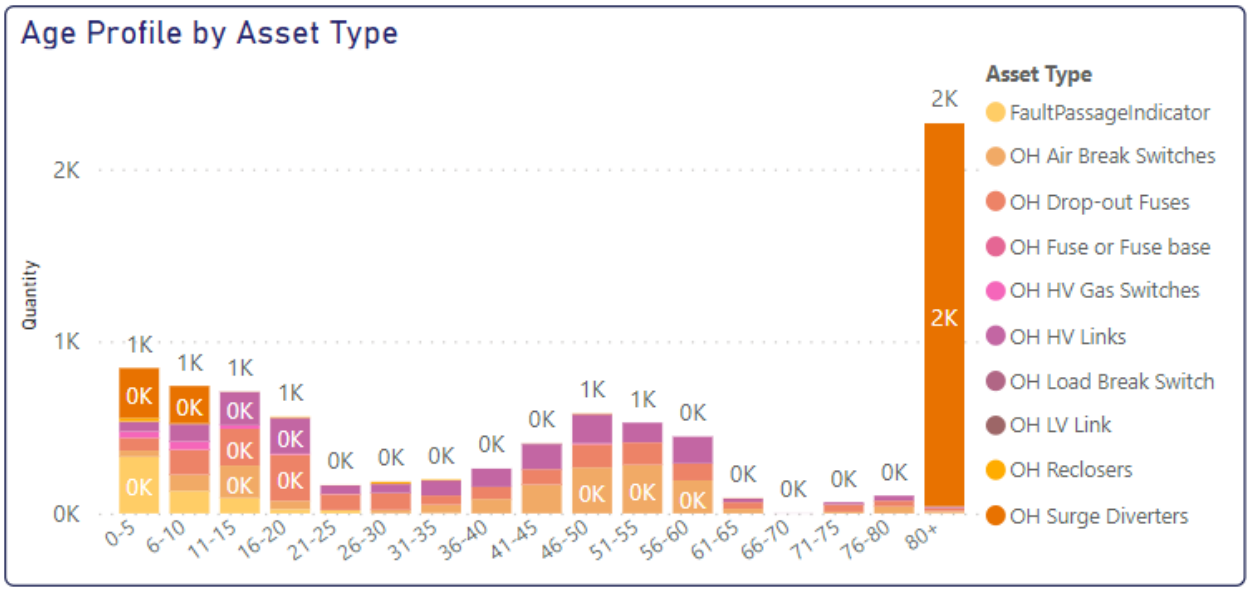
Individual asset data is missing for OH Fuse or Fuse base and OH LV Links so instead a placeholder '1' count is included to signify the unavailable data. Average age and health is therefore also undefined for these asset types.

TABLE 9. ASSET POPULATION, AGE, AND HEALTH PROFILE – OVERHEAD SWITCHGEAR AND AUTOMATION

Asset Specific Plan	Quantity	Unit	Design Life (yrs)	Average Age	Critical Health Qty	Average Health Score	Health Category
Overhead Distribution Equipment	8,137	each	34	55	2,598	61.77	Good
FaultPassageIndicator	595	each	15	7	61	83.81	Good
OH Air Break Switches	1,516	each	35	41	79	77.23	Good
OH Drop-out Fuses	1,598	each	35	32	0	98.60	Very Good
OH Fuse or Fuse base	1	each		123	1	0.00	Very Poor
OH HV Gas Switches	122	each	35	11	1	96.61	Very Good
OH HV Links	1,510	each	35	34	228	72.88	Good
OH Load Break Switch	6	each	35	26	0	86.83	Good
OH LV Link	1	each		123	1	0.00	Very Poor
OH Reclosers	47	each	35	14	0	97.28	Very Good
OH Surge Diverters	2,741	each	35	101	2,227	18.68	Very Poor

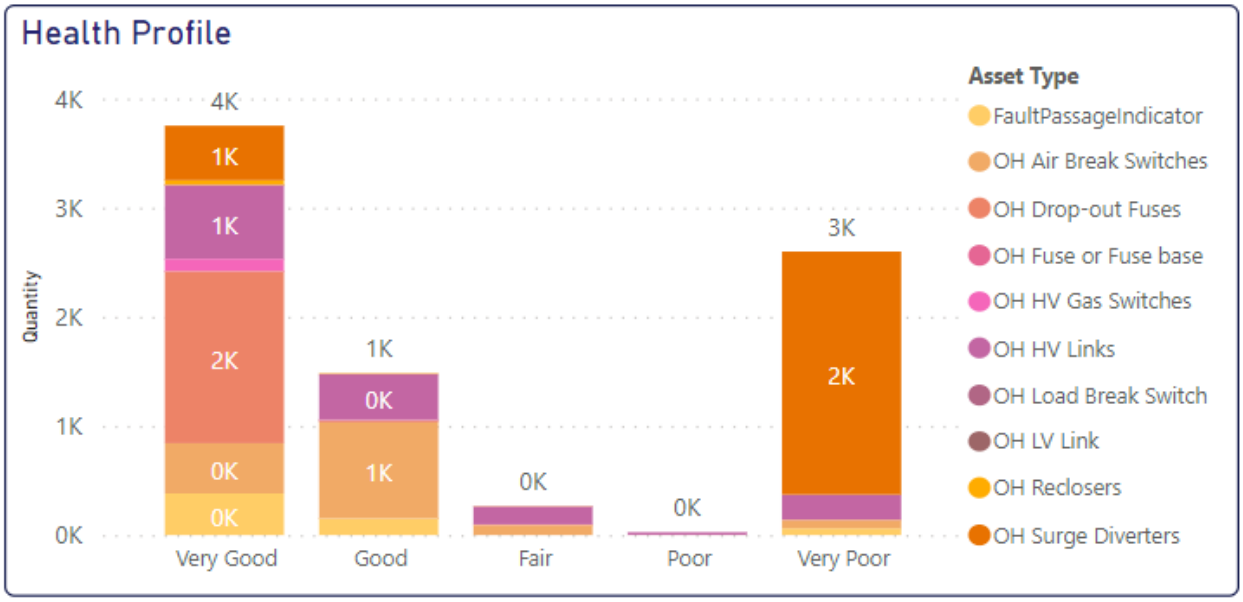
The age profile of existing assets is shown in Figure 20.

FIGURE 20. ASSET AGE PROFILE CHART (AS AT JULY 2022) – OVERHEAD SWITCHGEAR AND AUTOMATION



The asset class health profile is summarised in Figure 21.

FIGURE 21. ASSET HEALTH PROFILE (AS AT JULY 2022) – OVERHEAD SWITCHGEAR AND AUTOMATION



*Health Score: Very Good (100-91), Good (90-61), Fair (60-41), Poor (40-11), Very Poor (10-0)

The design life of most overhead switchgear (air-break switches, drop out fuses, HV links, load break switches, reclosers) is 35 years. The average age of overhead switchgear is around 34 years which indicates that the majority of switchgear will need replacement in the near future.

4.4.1.4 Risks and Opportunities

Overhead switchgear failure can lead to equipment damage connected downstream of the switch, has the potential to initiate fires which may lead to grassfires or bushfires, and poses a health and safety risk to personnel operating it. There are hidden risks associated with switching plan operations, which are not evident until manual operation is required, and escalate under fault conditions.

Switchgear insulation materials (air, gas, oil) can represent an environmental risk if not adequately contained, maintained, and managed. Inadequate or failed insulation can pose a safety risk to workers and the public.

Other existing and emerging risks include:

- Environmental impact due to gas escape or oil leakage
- Operational failure due to ageing infrastructure, where 60% of the 7,800-strong asset population has exceeded the 35-year life expectancy
- Loss of electrical continuity and reduction in reliability due to ageing equipment
- Damage to the network equipment or loss of supply due to operational failure
- Bushfire due to arc flash
- Physical injury to the public or line workers due to faulty equipment.

Opportunities for overhead switchgear and automation include:

- Investigate and invest in new operational technologies and improved material to reduce failure and maintenance frequency
- Utilise customer-initiated projects to upgrade the network equipment for higher reliability levels
- Utilise network design and re-configuration to optimise expenditure for maintenance and replacement
- Increase return on investment through balancing the network flexibility with the whole-of-life cost.
- Improve reliability levels by installing advanced equipment to reduce cost of reactive maintenance
- Invest in works planning optimisation to reduce costs associated with replacement and augmentation. More effective works planning leads to bundling of works that enables increased staff efficiency as a single crew can complete more work per deployment.

4.4.1.5 Planned Projects, Replacements and Retirements

As described above, a large portion of these assets are operating beyond the intended design life. As such, replacement is necessary to maintain an acceptable risk profile. It is expected that during EN24-29 there will be:

- 44 Air-Break Switch planned replacements
- 50 Drop-out Fuse reactive replacements
- 35 Fuse or Fuse Base reactive replacements
- 65 HV Link reactive replacements
- 21 HV OH Gas Switch reactive replacements
- 30 Surge Arrestor Conductor reactive replacements
- 75 LV Link reactive replacements
- 10 Recloser planned replacements
- 50 Surge Diverter reactive replacements.

4.4.1.6 Asset Management Strategy

Evoenergy already has a condition assessment strategy which takes care of overhead equipment which operates during peak load and high fire risk areas. To deal with issues around thermal loading both during summer and winter peaks, all the feeders where loading is greater than 80% of the thermal rating are inspected using theromovision surveys which identifies hotspots in the network. This is in addition to visual inspection and the pole inspection program. All the reclosers and load break switches are also tested and maintained every five years as per the relevant maintenance procedures.

In addition to condition assessment, Evoenergy also undertakes planned replacement and reactive replacement programs depending upon the existing condition of the asset. Special emphasis is on drop-out fuses located in bushfire-prone areas that have the potential to start a fire under operation. Evoenergy is already working on converting non-automated switchgear into automated switchgear thus improving the safety and reliability at the same time.

Keeping this in mind Evoenergy should be proactively replacing the overhead equipment which is towards the end of its life.

4.4.2 Pole Substations

This asset class describes all the equipment or sites that either transform or regulate voltage levels within an area of Evoenergy's network. This equipment is rated between 415V and 22kV. This asset class consists of the following asset types:

- Pole transformers
- Overhead line voltage regulators
- Pole substation sites.

These asset types are similar in technology and lifecycle characteristics, but their functions differ.

4.4.2.1 Asset Class Summary and Objectives

Distribution pole substations act as a crucial interface between Evoenergy's High voltage / Low voltage network. The distribution pole substations reduce the HV to LV which then can be used by LV customers and act as a suitable isolation point for the transformer.

4.4.2.2 Asset Types

A variety of asset types exist within this class. These are briefly introduced in this section.

a) Pole Transformers

Pole-mounted transformers step down high voltage distribution feeders to low voltage for use by network customers. The primary side is usually energised at 11kV three phase and the secondary side is energised at 415kV three phase.

The pole transformers come in various sizes from 100kVA, 200kVA, and 315kVA. Depending upon the load requirements a selection of transformer can be done for a particular location or load.

b) Overhead Line Voltage Regulators

Line voltage regulators automatically adjust the voltage to maintain an acceptable nominal level in the distribution network.

c) Pole Substation Sites

Pole mount substations include a transformer (as described above) and switchgear on either side of the transformer. These assets are hosted above ground on the pole(s) structure.

There are two types of pole substations in Evoenergy's network, single pole substations and two pole substations, with the basic difference being how the transformer is hung on the pole(s).

4.4.2.3 Current Population, Age, and Health Profile

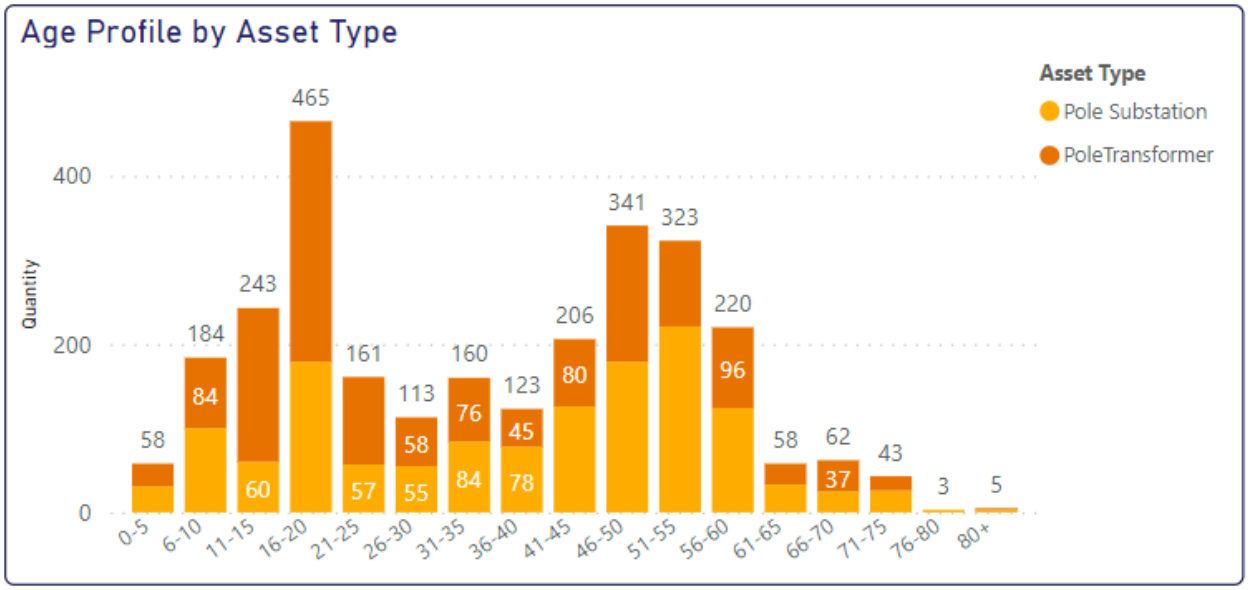
Table 10 offers a high-level count of pole substation assets within the Evoenergy network, and any notable population performance or potential failure concerns are highlighted in the Health Category column.

TABLE 10. ASSET POPULATION, AGE, AND HEALTH PROFILE – POLE SUBSTATIONS

Asset Specific Plan	Quantity	Unit	Design Life (yrs)	Average Age	Critical Health Qty	Average Health Score	Health Category
Overhead Distribution Equipment	2,768	each	50	35	67	85.37	Good
Pole Substation	1,384	each	50	38	61	80.00	Good
PoleTransformer	1,384	each		32	6	90.74	Very Good

The age profile of existing assets is reflected in Figure 22.

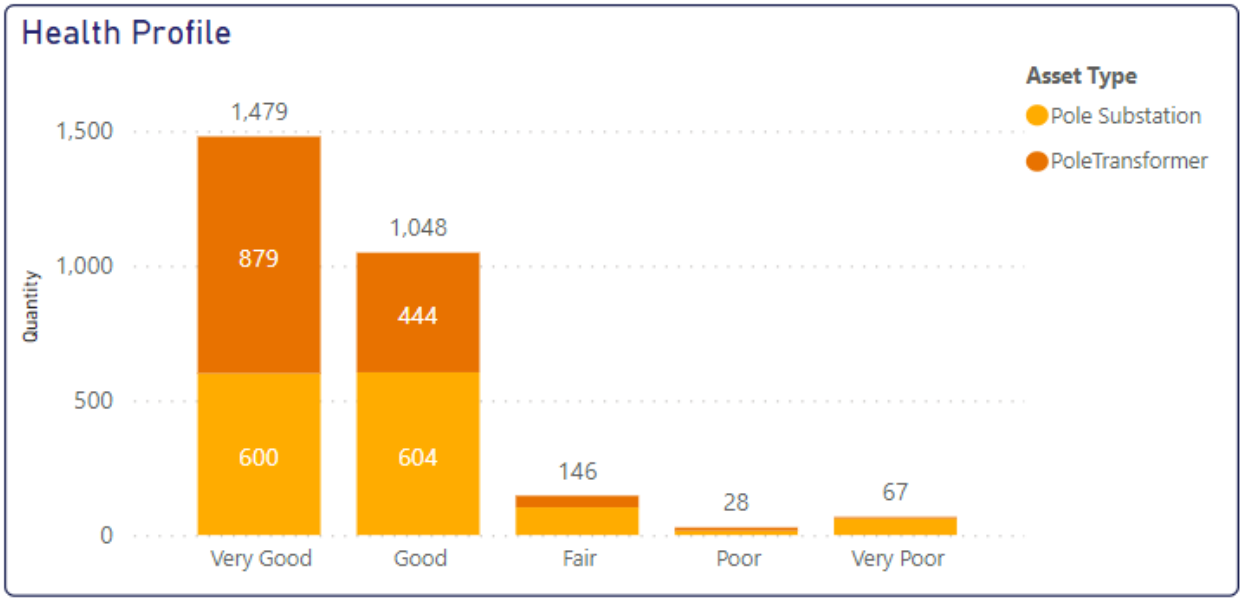
FIGURE 22. ASSET AGE PROFILE CHART (AS AT JULY 2022) – POLE SUBSTATIONS



The age profile of pole substations and pole transformers shows about 50% of this asset group passed its potential design life of 50 years.

The asset class health profile, as of 2022, is summarised in Figure 23.

FIGURE 23. ASSET HEALTH PROFILE (AS AT JULY 2022) – POLE SUBSTATIONS



*Health Score: Very Good (100-91), Good (90-61), Fair (60-41), Poor (40-11), Very Poor (10-0)

Pole substation and pole transformer health score shows very good and good health condition. There is a limited number with Fair to Very Poor health condition, which is prioritised, scheduled for replacement.

Both pole substation sites and pole transformers average age is less than their design age which indicates that these assets will not need replacement in near future. Overhead line voltage regulators are all relatively new, and near the start of their design life.

Any units identified as being in a critical condition will be addressed through planned remedial maintenance. Investigations into the root cause of the observed defects will drive the scope of preventative maintenance and this will be reviewed to include additional works as deemed necessary.

4.4.2.4 Risks and Opportunities

Most of the pole substation transformers in Evoenergy's network are replaced towards end of their service life which indicates that they have high operational reliability. It is important to carefully manage transformer replacement events as there is substantial cost associated with transformer replacement, and the procedure requires customer power outages. Transformer assets are located within kiosks, chambers, substations, or elevated above ground on poles. As such, the public is often protected from failure events, however Evoenergy staff are at risk of exposure during any such events. Transformer oil insulation escape events pose safety risks resulting from fires and environmental risks where oil is not adequately contained.

Other existing and emerging risks include:

- Environmental impact due to gas, oil leakage, or excessive noise
- Bushfire due to asset operational failure, arc flash, or weather-related incidents
- Physical injury to the public or line workers due to asset failure, inadequate design, or electrical shock
- Economic disadvantage due to loss of supply
- Safety risk to the public due to discontinuity of supply.

Evoenergy will continue to install ground-mounted transformers at greenfield sites, further improving system reliability and reducing environmental risk resulting from ageing pole-mounted transformer failure which typically has oil leak failure modes towards the end of life.

Other opportunities for pole substation transformers include:

- Utilise customer-driven projects and new development to reduce maintenance and replacement expenditure through undergrounding lines or relocation of the assets
- Utilise new technologies to reduce maintenance and renewal frequencies through better design and material selection and remotely sensing devices to monitor performance
- Increase return on investment through rationalising life cycle cost analysis against maintenance costs
- Reduce maintenance cost by optimising outage benefits by grouping other asset maintenance in the same asset class.

4.4.2.5 Planned Projects, Replacements and Retirements

Replacement activities for pole substations include replacement of transformers due to identified defects, planned replacement of pole substation sites due to age, and replacement of Insulation Piercing Clamp (IPC) neutral connections due to identified defects. The expected quantities are as follows:

- 20 Pole transformer reactive replacements
- 25 Pole substation planned replacements
- 55 Replace IPC Neutral Connections.

4.4.2.6 Asset Management Strategy

Pole substations are one of the most reliable components of the overhead distribution network and as a result need minimal maintenance during their useful life.

Evoenergy uses the following strategies to address any issues with this asset class:

- Condition Monitoring – Under the condition monitoring program, routine inspections are carried out for assets, and for pole substations which have reached their end of service life they are replaced with a like-for-like or underground transformer.

- Planned Maintenance – Under the planned maintenance program, all the legacy two pole substations are rebuilt to single pole construction, which are easier to maintain
- Unplanned Maintenance – Under the unplanned maintenance program, all the single pole substations flagged for replacement are replaced due to existing issues with the pole identified during inspection
- Neutral connection upgrade – Under this program, all the old types of neutral connections using IPCs will be replaced with gel port type neutral connections, as this approach will reduce insulation deterioration.

5. PROGRAM OF WORK

This section provides a detailed breakdown of quantities and yearly budget per program of work

5.1. REPLACEMENT PROGRAM

TABLE 11. REPLACEMENT PROGRAM OF WORK YEARLY BUDGET FY25-29

EXPENDITURE CATEGORY	FY 24-25		FY 25-26		FY 26-27		FY 27-28		FY 28-29	
	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)
Asset Renewal and Replacement Overhead Assets	**4609**	**$8,774,633**	**4658**	**$9,536,878**	**4748**	**$10,748,112**	**4845**	**$11,618,460**	**4845**	**$11,618,460**
Overhead Conductors and Hardware	**3103**	**$1,230,345**	**3103**	**$1,230,345**	**3133**	**$1,287,369**	**3183**	**$1,382,408**	**3183**	**$1,382,408**
Reactive Replacement	**119**	**$318,062**	**119**	**$318,062**	**149**	**$375,085**	**199**	**$470,125**	**199**	**$470,125**
Replace insulators	8	$29,253	8	$29,253	8	$29,253	8	$29,253	8	$29,253
Replace overhead service	90	$171,071	90	$171,071	120	$228,095	170	$323,134	170	$323,134
Unplanned Transmission Pole Hardware (crossarms & insulators)	1	$20,000	1	$20,000	1	$20,000	1	$20,000	1	$20,000
Replace Crossarm	20	$97,737	20	$97,737	20	$97,737	20	$97,737	20	$97,737
Refurbishment	**1963**	**$337,289**	**1963**	**$337,289**	**1963**	**$337,289**	**1963**	**$337,289**	**1963**	**$337,289**
Install spacer	250	$171,928	250	$171,928	250	$171,928	250	$171,928	250	$171,928
Install Spacer (inc. Poles and crossarms)	1659	$0	1659	$0	1659	$0	1659	$0	1659	$0
Install LV neutral bond	20	$48,180	20	$48,180	20	$48,180	20	$48,180	20	$48,180
Install Misc Pole Top Hardware (Armr Rd, Tie Wr)	34	$117,182	34	$117,182	34	$117,182	34	$117,182	34	$117,182
Replacement	**1021**	**$574,994**	**1021**	**$574,994**	**1021**	**$574,994**	**1021**	**$574,994**	**1021**	**$574,994**
Replace conductor (Replace Bare conductor with LV ABC)	30	$180,722	30	$180,722	30	$180,722	30	$180,722	30	$180,722
Replace crossarm	50	$244,350	50	$244,350	50	$244,350	50	$244,350	50	$244,350
Install Crossarm (inc. Poles)	400	$0	400		400		400		400	
Replace overhead service (inc. Poles and crossarms)	500	$0	500	$0	500	$0	500	$0	500	$0
Replace insulators	41	$149,922	41	$149,922	41	$149,922	41	$149,922	41	$149,922
Overhead Distribution Equipment	**228**	**$1,507,686**	**227**	**$1,468,319**	**227**	**$1,468,319**	**229**	**$1,522,177**	**229**	**$1,522,177**
Project										
Reactive Replacement	**29**	**$580,083**	**29**	**$580,083**	**29**	**$580,083**	**29**	**$580,083**	**29**	**$580,083**
Replace air break switch	4	$107,715	4	$107,715	4	$107,715	4	$107,715	4	$107,715
Replace drop out fuse	10	$48,450	10	$48,450	10	$48,450	10	$48,450	10	$48,450
Replace overhead HV link	8	$31,544	8	$31,544	8	$31,544	8	$31,544	8	$31,544
Replace recloser	2	$97,129	2	$97,129	2	$97,129	2	$97,129	2	$97,129
Replace pole substation (single and double)	5	$295,244	5	$295,244	5	$295,244	5	$295,244	5	$295,244
Replacement	**199**	**$927,603**	**198**	**$888,237**	**198**	**$888,237**	**200**	**$942,094**	**200**	**$942,094**

EXPENDITURE CATEGORY	FY 24-25		FY 25-26		FY 26-27		FY 27-28		FY 28-29	
	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)
Replace air break switch	4	$107,715	4	$107,715	4	$107,715	6	$161,573	6	$161,573
Replace overhead gas switch	5	$196,834	4	$157,467	4	$157,467	4	$157,467	4	$157,467
Replace pole transformer (assumes includes pole)	4	$236,196	4	$236,196	4	$236,196	4	$236,196	4	$236,196
Replace pole substation (single and double)	0	$0	0	$0	0	$0	0	$0	0	$0
Replace IPC neutral connection	11	$40,623	11	$40,623	11	$40,623	11	$40,623	11	$40,623
Replace surge arrestor conductor	6	$22,869	6	$22,869	6	$22,869	6	$22,869	6	$22,869
Replace surge diverter	10	$37,619	10	$37,619	10	$37,619	10	$37,619	10	$37,619
Replace Fuse or Fuse base	7	$7,366	7	$7,366	7	$7,366	7	$7,366	7	$7,366
Replace LV Link	15	$53,092	15	$53,092	15	$53,092	15	$53,092	15	$53,092
Replace Service Cable UGOH Assembly	5	$52,240	5	$52,240	5	$52,240	5	$52,240	5	$52,240
Replace Service Pothead	5	$19,325	5	$19,325	5	$19,325	5	$19,325	5	$19,325
Replace HV Link	5	$19,720	5	$19,720	5	$19,720	5	$19,720	5	$19,720
Replace LV Pothead	4	$28,784	4	$28,784	4	$28,784	4	$28,784	4	$28,784
Replace Service Fuse Holder/Cartridge (1405 to 500)	100	$105,222	100	$105,222	100	$105,222	100	$105,222	100	$105,222
Support Structures	**1278**	**$6,036,602**	**1328**	**$6,838,214**	**1388**	**$7,992,424**	**1433**	**$8,713,875**	**1433**	**$8,713,875**
Project	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**
Reactive Replacement	**15**	**$432,759**	**15**	**$432,759**	**20**	**$705,197**	**20**	**$705,197**	**20**	**$705,197**
Replace distribution pole	10	$160,322	10	$160,322	10	$160,322	10	$160,322	10	$160,322
Unplanned Transmission Pole Replacements - Target Woden Wanniassa TL	5	$272,437	5	$272,437	10	$544,874	10	$544,874	10	$544,874
Refurbishment	**868**	**$585,875**	**868**	**$585,875**	**868**	**$585,875**	**868**	**$585,875**	**868**	**$585,875**
Transmission Tower cleaning and restore Galvanization (full tower body)	15	$270,000	15	$270,000	15	$270,000	15	$270,000	15	$270,000
Defective polymeric insulators replacement on (CA-GI & GI-TH2)	20	$200,000	20	$200,000	20	$200,000	20	$200,000	20	$200,000
Install Pole Base	783	$0	783	$0	783	$0	783	$0	783	$0
Reinforce distribution pole	50	$115,875	50	$115,875	50	$115,875	50	$115,875	50	$115,875
Replacement	**395**	**$5,017,968**	**445**	**$5,819,580**	**500**	**$6,701,353**	**545**	**$7,422,804**	**545**	**$7,422,804**
Replace distribution pole (Planned Age)	300	$4,809,672	350	$5,611,284	405	$6,493,057	450	$7,214,508	450	$7,214,508
Replace Timber Batten	38	$84,227	38	$84,227	38	$84,227	38	$84,227	38	$84,227
Install/Replace Pole Cap	26	$32,127	26	$32,127	26	$32,127	26	$32,127	26	$32,127
Install/Replace Wild Life Cover	31	$91,943	31	$91,943	31	$91,943	31	$91,943	31	$91,943
Reliability and Power Quality Improvements	**0**	**$340,562**	**0**	**$681,124**	**0**	**$681,124**	**0**	**$804,562**	**0**	**$804,562**
Reliability and Power Quality Improvements Distribution	**0**	**$340,562**	**0**	**$681,124**	**0**	**$681,124**	**0**	**$804,562**	**0**	**$804,562**
Project	**0**	**$340,562**	**0**	**$681,124**	**0**	**$681,124**	**0**	**$804,562**	**0**	**$804,562**

EXPENDITURE CATEGORY	FY 24-25		FY 25-26		FY 26-27		FY 27-28		FY 28-29	
	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)
EN24 LV Circuits OH Program (NZ45 - Augex)	1	$232,000	2	$464,000	2	$464,000	3	$696,000	3	$696,000
EN24 Intellirupter Reliability Program	1	$108,562	2	$217,124	2	$217,124	1	$108,562	1	$108,562

5.2. MAINTENANCE PROGRAM

TABLE 12. MAINTENANCE PROGRAM OF WORK YEARLY BUDGET FY25-29

EXPENDITURE CATEGORY	FY 24-25		FY 25-26		FY 26-27		FY 27-28		FY 28-29	
	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)
Maintenance Overhead Assets	**16082**	**$6,022,394**	**26300**	**$8,880,665**	**19985**	**$7,294,726**	**21979**	**$6,960,263**	**19104**	**$6,688,817**
Overhead Conductors and Hardware	**1443**	**$3,635,442**	**1465**	**$3,641,470**	**1442**	**$3,635,168**	**1471**	**$3,643,114**	**1467**	**$3,642,018**
Condition Monitoring	**478**	**$490,154**	**500**	**$496,182**	**477**	**$489,880**	**506**	**$497,826**	**502**	**$496,730**
Inspect transmission line - Line patrol	14	$3,836	36	$9,864	13	$3,562	42	$11,508	38	$10,412
Inspection overhead lines - thermovision	146	$217,686	146	$217,686	146	$217,686	146	$217,686	146	$217,686
Thermo-vision inspection of transmission assets	250	$250,000	250	$250,000	250	$250,000	250	$250,000	250	$250,000
Reactive Patrol OH lines	68	$18,632	68	$18,632	68	$18,632	68	$18,632	68	$18,632
Unplanned Maintenance	**965**	**$3,145,288**	**965**	**$3,145,288**	**965**	**$3,145,288**	**965**	**$3,145,288**	**965**	**$3,145,288**
Repair HV overhead line - retention	40	$177,040	40	$177,040	40	$177,040	40	$177,040	40	$177,040
Repair overhead line & pole top	1	$5,032	1	$5,032	1	$5,032	1	$5,032	1	$5,032
Retension Conductor	10	$108,090	10	$108,090	10	$108,090	10	$108,090	10	$108,090
Repair overhead service	350	$1,698,550	350	$1,698,550	350	$1,698,550	350	$1,698,550	350	$1,698,550
Repair overhead service - retention	360	$468,360	360	$468,360	360	$468,360	360	$468,360	360	$468,360
Repair Hot spot	69	$265,098	69	$265,098	69	$265,098	69	$265,098	69	$265,098
Resaddle Cable	25	$31,350	25	$31,350	25	$31,350	25	$31,350	25	$31,350
Repair bare conductor	81	$246,159	81	$246,159	81	$246,159	81	$246,159	81	$246,159
Repair Insulator	29	$145,609	29	$145,609	29	$145,609	29	$145,609	29	$145,609
Overhead Distribution Equipment	**315**	**$617,686**	**314**	**$615,791**	**315**	**$619,449**	**321**	**$643,160**	**317**	**$628,528**
Planned Maintenance	**20**	**$74,100**	**19**	**$72,205**	**20**	**$75,863**	**26**	**$99,574**	**22**	**$84,942**
Maintain load break switch		$0	1	$5,421	1	$5,421	2	$10,842	2	$10,842
Maintain recloser	10	$36,580	8	$29,264	9	$32,922	14	$51,212	10	$36,580
Maintain Air Break Switch	10	$37,520	10	$37,520	10	$37,520	10	$37,520	10	$37,520
Unplanned Maintenance	**295**	**$543,586**	**295**	**$543,586**	**295**	**$543,586**	**295**	**$543,586**	**295**	**$543,586**
Repair air break switch	28	$106,568	28	$106,568	28	$106,568	28	$106,568	28	$106,568

EXPENDITURE CATEGORY	FY 24-25		FY 25-26		FY 26-27		FY 27-28		FY 28-29	
	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)
Repair overhead HV link	19	$62,662	19	$62,662	19	$62,662	19	$62,662	19	$62,662
Repair pole substation	1	$5,978	1	$5,978	1	$5,978	1	$5,978	1	$5,978
Remove Foreign Object	223	$252,882	223	$252,882	223	$252,882	223	$252,882	223	$252,882
Repair pole substation defects	14	$91,406	14	$91,406	14	$91,406	14	$91,406	14	$91,406
Repair Transformer neutral connection	10	$24,090	10	$24,090	10	$24,090	10	$24,090	10	$24,090
Support Structures	**14324**	**$1,769,266**	**24521**	**$4,623,404**	**18228**	**$3,040,109**	**20187**	**$2,673,989**	**17320**	**$2,418,271**
Condition Monitoring	**13813**	**$1,140,502**	**24010**	**$3,994,640**	**17717**	**$2,411,345**	**19676**	**$2,045,225**	**16809**	**$1,789,507**
Inspect distribution pole - Aerial inspection	7262	$290,480	6443	$257,720	5481	$219,240	7023	$280,920	6682	$267,280
Inspect distribution pole L1 - Visual and asset information	2021	$137,428	4186	$284,648	3145	$213,860	4760	$323,680	2818	$191,624
Inspect distribution pole L2 - Steel/Stobie U/G	387	$35,604	1492	$137,264	987	$90,804	2418	$222,456	988	$90,896
Inspect distribution pole L3 - Tanalith U/G		$0	2	$184		$0		$0	38	$3,496
Inspect distribution pole L4 - Timber U/G	1184	$485,440	7245	$2,970,450	3845	$1,576,450	2443	$1,001,630	2324	$952,840
Inspect distribution pole L5 - Reinforced	1005	$92,460	2652	$243,984	2288	$210,496	1477	$135,884	2008	$184,736
Inspect distribution pole L6 - C splint nailed pole	3	$615	1	$205	7	$1,435		$0	1	$205
Inspect distribution pole L7 - Bushfire minor	1921	$86,445	1959	$88,155	1934	$87,030	1525	$68,625	1920	$86,400
Test distribution pole soil compaction	30	$12,030	30	$12,030	30	$12,030	30	$12,030	30	$12,030
Unplanned Maintenance	**511**	**$628,764**	**511**	**$628,764**	**511**	**$628,764**	**511**	**$628,764**	**511**	**$628,764**
Remove distribution pole	12	$64,968	12	$64,968	12	$64,968	12	$64,968	12	$64,968
Repair distribution pole	20	$66,200	20	$66,200	20	$66,200	20	$66,200	20	$66,200
Tighten or Replace Nuts/Bolts	27	$16,929	27	$16,929	27	$16,929	27	$16,929	27	$16,929
Treat Termites	18	$5,544	18	$5,544	18	$5,544	18	$5,544	18	$5,544
Remove Pole	14	$75,796	14	$75,796	14	$75,796	14	$75,796	14	$75,796
Remove Pole Nail	312	$252,096	312	$252,096	312	$252,096	312	$252,096	312	$252,096
Test Soil for Contamination	99	$39,699	99	$39,699	99	$39,699	99	$39,699	99	$39,699
Straighten distribution pole	9	$107,532	9	$107,532	9	$107,532	9	$107,532	9	$107,532
Maintenance Transmission	2418	$1,213,149	2042	$1,112,976	2397	$1,149,541	2270	$1,176,247	2418	$1,213,149
Overhead Conductors and Hardware	**150**	**$311,250**	**150**	**$311,250**	**150**	**$311,250**	**150**	**$311,250**	**150**	**$311,250**
Condition Monitoring	**150**	**$311,250**	**150**	**$311,250**	**150**	**$311,250**	**150**	**$311,250**	**150**	**$311,250**

EXPENDITURE CATEGORY	FY 24-25		FY 25-26		FY 26-27		FY 27-28		FY 28-29	
	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)	QTY	TASK COST ($)
Inspect transmission line - Line patrol	150	$311,250	150	$311,250	150	$311,250	150	$311,250	150	$311,250
Support Structures	**2268**	**$901,899**	**1892**	**$801,726**	**2247**	**$838,291**	**2120**	**$864,997**	**2268**	**$901,899**
Condition Monitoring	**2268**	**$901,899**	**1892**	**$801,726**	**2247**	**$838,291**	**2120**	**$864,997**	**2268**	**$901,899**
Test Earthing - Distribution	150	$311,250	150	$311,250	150	$311,250	150	$311,250	150	$311,250
Earthing test - Transmission concrete pole	150	$311,250	150	$311,250	150	$311,250	150	$311,250	150	$311,250
Ground Full Inspection Pole Level 1	237	$24,411	67	$6,901	422	$43,466	122	$12,566	237	$24,411
Inspect transmission pole - Aerial inspection	1525	$172,325	1525	$172,325	1525	$172,325	1525	$172,325	1525	$172,325
Inspect transmission pole L5 - Reinforced	181	$76,563		$0		$0	86	$36,378	181	$76,563
Inspect Transmission Pole L8 - Full Ground Inspection	25	$6,100		$0		$0	87	$21,228	25	$6,100

5.3. LONG TERM FORECAST

Table 13 presents the high level 10-year long term forecast from FY24/25 to FY33/34.

TABLE 13. HIGH LEVEL LONG-TERM BUDGET FORECAST

EXPENDITURE CATEGORY	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30	FY 30-31	FY 31-32	FY 32-33	FY 33-34
Asset Renewal and Replacement Overhead Assets	**$8,774,633**	**$9,536,878**	**$10,748,112**	**$11,618,460**	**$11,618,460**	**$12,554,445**	**$14,446,592**	**$19,255,748**	**$22,293,875**	**$22,513,875**
Overhead Conductors and Hardware	**$1,230,345**	**$1,230,345**	**$1,287,369**	**$1,382,408**	**$1,382,408**	**$1,450,000**	**$1,493,500**	**$1,600,000**	**$1,680,000**	**$1,800,000**
Reactive Replacement	**$318,062**	**$318,062**	**$375,085**	**$470,125**	**$470,125**	**$485,331**	**$496,736**	**$521,446**	**$540,454**	**$567,065**
Replace insulators	$29,253	$29,253	$29,253	$29,253	$29,253	$29,253	$29,253	$29,253	$29,253	$29,253
Replace overhead service	$171,071	$171,071	$228,095	$323,134	$323,134	$338,341	$349,745	$374,456	$393,464	$420,075
Unplanned Transmission Pole Hardware (crossarms & insulators)	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000
Replace Crossarm	$97,737	$97,737	$97,737	$97,737	$97,737	$97,737	$97,737	$97,737	$97,737	$97,737
Refurbishment	**$337,289**	**$337,289**	**$337,289**	**$337,289**	**$337,289**	**$354,844**	**$366,201**	**$388,569**	**$408,187**	**$438,474**
Install spacer	$171,928	$171,928	$171,928	$171,928	$171,928	$180,180	$185,682	$198,748	$209,064	$224,193
Install LV neutral bond	$48,180	$48,180	$48,180	$48,180	$48,180	$50,589	$52,998	$55,407	$57,816	$62,634
Install Misc Pole Top Hardware (Armr Rd, Tie Wr)	$117,182	$117,182	$117,182	$117,182	$117,182	$124,075	$127,521	$134,414	$141,307	$151,647
Replacement	**$574,994**	**$574,994**	**$574,994**	**$574,994**	**$574,994**	**$602,992**	**$630,991**	**$688,124**	**$724,666**	**$786,687**
Replace conductor (Replace Bare conductor with LV ABC)	$180,722	$180,722	$180,722	$180,722	$180,722	$186,746	$192,770	$210,842	$216,866	$234,938
Replace crossarm	$244,350	$244,350	$244,350	$244,350	$244,350	$259,011	$273,672	$298,107	$317,655	$346,977
Replace insulators	$149,922	$149,922	$149,922	$149,922	$149,922	$157,236	$164,549	$179,175	$190,145	$204,772
Overhead Distribution Equipment	**$1,507,686**	**$1,468,319**	**$1,468,319**	**$1,522,177**	**$1,522,177**	**$1,567,842**	**$1,614,878**	**$1,663,324**	**$1,900,000**	**$2,000,000**
Reactive Replacement	**$580,083**	**$580,083**	**$580,083**	**$580,083**	**$580,083**	**$580,083**	**$643,977**	**$648,822**	**$707,871**	**$820,329**
Replace air break switch	$107,715	$107,715	$107,715	$107,715	$107,715	$107,715	$107,715	$107,715	$107,715	$107,715
Replace drop out fuse	$48,450	$48,450	$48,450	$48,450	$48,450	$48,450	$53,295	$58,140	$58,140	$62,985
Replace overhead HV link	$31,544	$31,544	$31,544	$31,544	$31,544	$31,544	$31,544	$31,544	$31,544	$31,544
Replace recloser	$97,129	$97,129	$97,129	$97,129	$97,129	$97,129	$97,129	$97,129	$97,129	$145,694

EXPENDITURE CATEGORY	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30	FY 30-31	FY 31-32	FY 32-33	FY 33-34
Replace pole substation (single and double)	$295,244	$295,244	$295,244	$295,244	$295,244	$295,244	$354,293	$354,293	$413,342	$472,391
Replacement	**$927,603**	**$888,237**	**$888,237**	**$942,094**	**$942,094**	**$858,183**	**$893,082**	**$986,545**	**$1,001,394**	**$1,059,030**
Replace air break switch	$107,715	$107,715	$107,715	$161,573	$161,573	$161,573	$188,502	$215,431	$215,431	$242,360
Replace overhead gas switch	$196,834	$157,467	$157,467	$157,467	$157,467	$157,467	$157,467	$196,834	$196,834	$196,834
Replace pole transformer (assumes includes pole)	$236,196	$236,196	$236,196	$236,196	$236,196	$236,196	$236,196	$236,196	$236,196	$236,196
Replace IPC neutral connection	$40,623	$40,623	$40,623	$40,623	$40,623	$44,316	$44,316	$48,009	$48,009	$51,702
Replace surge arrestor conductor	$22,869	$22,869	$22,869	$22,869	$22,869	$22,869	$22,869	$26,680	$26,680	$30,492
Replace surge diverter	$37,619	$37,619	$37,619	$37,619	$37,619	$37,619	$41,380	$45,142	$45,142	$48,904
Replace Fuse or Fuse base	$7,366	$7,366	$7,366	$7,366	$7,366	$7,366	$8,418	$8,418	$9,470	$9,470
Replace LV Link	$53,092	$53,092	$53,092	$53,092	$53,092	$56,632	$56,632	$60,171	$63,711	$70,790
Replace Service Cable UGOH Assembly	$52,240	$52,240	$52,240	$52,240	$52,240					
Replace Service Pothead	$19,325	$19,325	$19,325	$19,325	$19,325					
Replace HV Link	$19,720	$19,720	$19,720	$19,720	$19,720	$23,663	$23,663	$27,607	$31,551	$35,495
Replace LV Pothead	$28,784	$28,784	$28,784	$28,784	$28,784					
Replace Service Fuse Holder/Cartridge	$105,222	$105,222	$105,222	$105,222	$105,222	$110,483	$113,640	$122,058	$128,371	$136,789
Support Structures	**$6,036,602**	**$6,838,214**	**$7,992,424**	**$8,713,875**	**$8,713,875**	**$9,536,602**	**$11,338,214**	**$15,992,424**	**$18,713,875**	**$18,713,875**
Project	**$0**	**$0**	**$0**	**$0**	**$0**	**$3,500,000**	**$4,500,000**	**$8,000,000**	**$10,000,000**	**$10,000,000**
Woden to Waniassa 132kV Line wood pole replacement project (condition based only)						$3,500,000	$4,500,000			
Bruce to City East 132kV Line wood pole replacement project								$8,000,000	$10,000,000	$10,000,000
Reactive Replacement	**$432,759**	**$432,759**	**$705,197**	**$705,197**	**$705,197**	**$432,759**	**$432,759**	**$705,197**	**$705,197**	**$705,197**
Replace distribution pole	$160,322	$160,322	$160,322	$160,322	$160,322	$160,322	$160,322	$160,322	$160,322	$160,322
Unplanned Transmission Pole Replacements - Target Woden Wanniassa TL	$272,437	$272,437	$544,874	$544,874	$544,874	$272,437	$272,437	$544,874	$544,874	$544,874
Refurbishment	**$585,875**	**$585,875**	**$585,875**	**$585,875**	**$585,875**	**$585,875**	**$585,875**	**$585,875**	**$585,875**	**$585,875**
Transmission Tower cleaning and restore Galvanization (full tower body)	$270,000	$270,000	$270,000	$270,000	$270,000	$270,000	$270,000	$270,000	$270,000	$270,000

EXPENDITURE CATEGORY	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30	FY 30-31	FY 31-32	FY 32-33	FY 33-34
Defective polymeric insulators replacement on (CA-GI & GI-TH2)	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
Reinforce distribution pole	$115,875	$115,875	$115,875	$115,875	$115,875	$115,875	$115,875	$115,875	$115,875	$115,875
Replacement	**$5,017,968**	**$5,819,580**	**$6,701,353**	**$7,422,804**	**$7,422,804**	**$5,017,968**	**$5,819,580**	**$6,701,353**	**$7,422,804**	**$7,422,804**
Replace distribution pole (Planned Age)	$4,809,672	$5,611,284	$6,493,057	$7,214,508	$7,214,508	$4,809,672	$5,611,284	$6,493,057	$7,214,508	$7,214,508
Replace Timber Batten	$84,227	$84,227	$84,227	$84,227	$84,227	$84,227	$84,227	$84,227	$84,227	$84,227
Install/Replace Pole Cap	$32,127	$32,127	$32,127	$32,127	$32,127	$32,127	$32,127	$32,127	$32,127	$32,127
Install/Replace Wild Life Cover	$91,943	$91,943	$91,943	$91,943	$91,943	$91,943	$91,943	$91,943	$91,943	$91,943
Reliability and Power Quality Improvements	**$340,562**	**$681,124**	**$681,124**	**$804,562**	**$804,562**	**$340,562**	**$681,124**	**$681,124**	**$804,562**	**$804,562**
Reliability and Quality Improvements Distribution	**$340,562**	**$681,124**	**$681,124**	**$804,562**	**$804,562**	**$340,562**	**$681,124**	**$681,124**	**$804,562**	**$804,562**
Project	**$340,562**	**$681,124**	**$681,124**	**$804,562**	**$804,562**	**$340,562**	**$681,124**	**$681,124**	**$804,562**	**$804,562**
EN24 LV Circuits OH Program (NZ45 - Augex)	$232,000	$464,000	$464,000	$696,000	$696,000	$232,000	$464,000	$464,000	$696,000	$696,000
EN24 Intellirupter Reliability Program	$108,562	$217,124	$217,124	$108,562	$108,562	$108,562	$217,124	$217,124	$108,562	$108,562

GLOSSARY

TERM	DEFINITION
AAC	All Aluminium Conductor
ABC	Air Bundled Cable
ACSR	Aluminium Conductor Steel Reinforced
ACT	Australian Capital Territory
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AMS	Asset Management System
AS	Australian Standards
BOP	Bushfire Operations Plan
CAPEX	Capital Expenditure
CCA	Copper Chrome Arsenate
ENSMS	Electricity Network Safety Management System
FSA	Formal Safety Assessment
HDC	Hard Drawn Copper conductor
HV	High Voltage
IPC	Insulation Piercing Clamp
LiDAR	Light Detection and Ranging
LV	Low Voltage
NEM	National Electricity Market
NER	National Electricity Rules
OH	Overhead
OPEX	Operational Expenditure
PVC	Polyvinyl Chloride
RCM	Reliability Centred Maintenance
RMU	Ring Main Unit
SCADA	Supervisory Control And Data Acquisition
UV	Ultraviolet
XLPE	Cross-linked Polyethylene

REFERENCE DOCUMENTS

DOCUMENT NAME	DOCUMENT NUMBER	VERSION	PUBLISH DATE
Asset Management Strategy	PO0746	10	14/08/2020
Asset Management Objectives	PO0744	5	07/10/2018

VERSION CONTROL

VERSION	DETAILS	RELEASE DATE
0.1	Initial Draft for internal review	7 October 2022
1.0	Release for regulatory proposal EN 2024–29.	19 January 2023

DOCUMENT CONTROL

DOCUMENT OWNER	PUBLISH DATE	REVIEW DATE
Group Manager Network Services	19 January 2023	19 January 2025