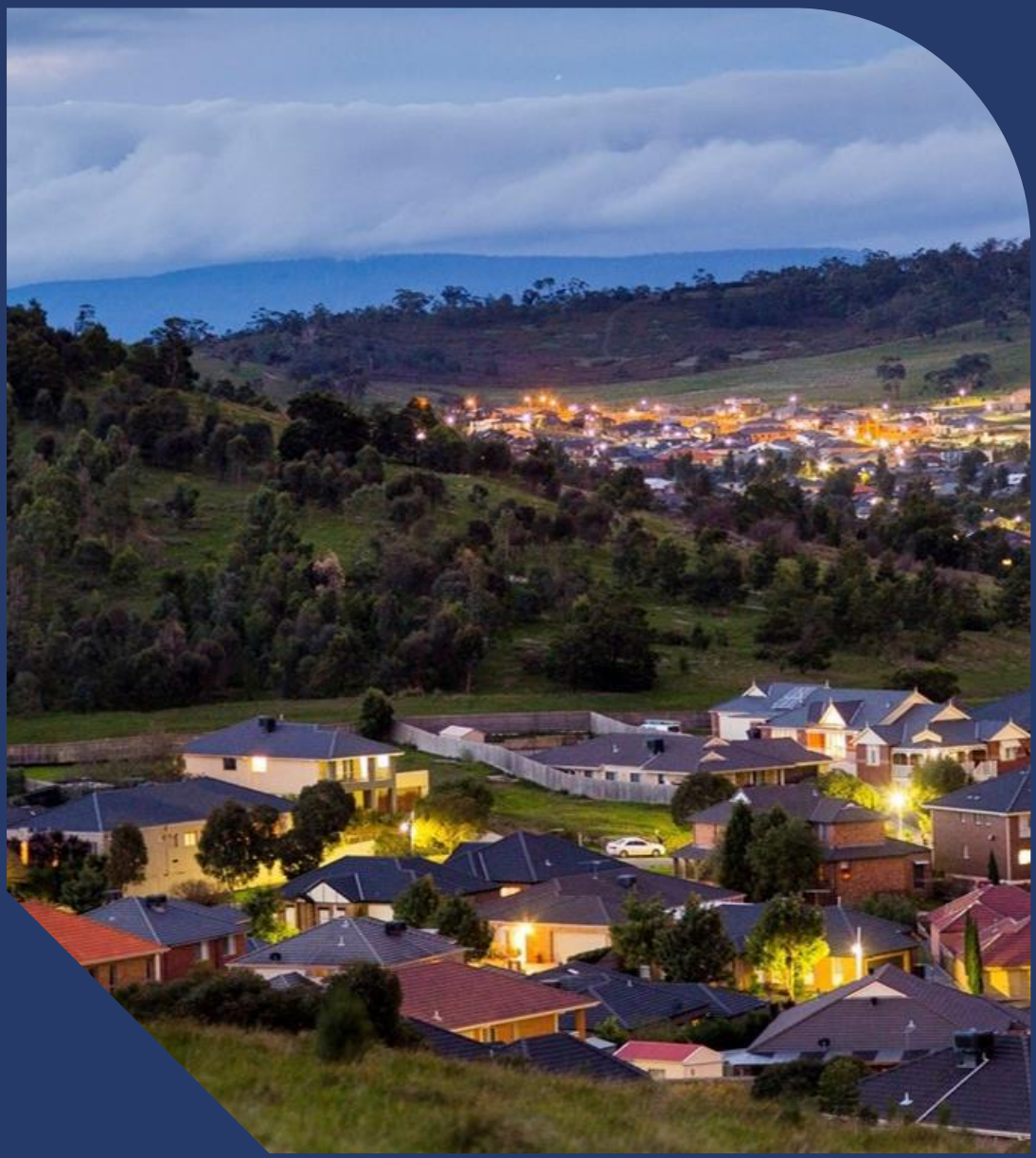
AusNet

Expenditure forecasting methodology

Electricity Distribution Price Review (EDPR) 2026-31

Friday, 28 June 2024



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1. Introduction

This Expenditure Forecasting Methodology sets out the methods that AusNet intends to use to forecast capital and operating expenditure in the 2026-31 Electricity Distribution Price Review (EDPR) Regulatory Proposal. This document has been prepared for the Australian Energy Regulator (AER) in accordance with the requirement of Clause 6.8.1A of the National Electricity Rules (NER).

This submission is intended to facilitate continued engagement with the AER and other stakeholders on AusNet's forecasting methodologies.

Given the period between the lodgement of this document and the Regulatory Proposal, coupled with ongoing and detailed customer engagement, new or refined forecasting techniques may be applied in addition to those outlined. These would be documented in detail in the Regulatory Proposal.

2. Overall approach and inputs

AusNet manages its electricity distribution network to achieve the National Electricity Objective (NEO) and the capital and operating expenditure objectives set out in the NER. These objectives guide efficient and prudent investment in the network consistent with meeting the long-term interests of consumers.

Expenditure is separated into capital expenditure (investing in new assets or extending the lives of existing assets) and operating expenditure (ongoing costs covering the maintenance and operation of the network).

This section describes the common aspects of the approach, including the input forecasts used in the development of both operating and capital expenditure forecasts.

The remainder of the document sets out the methodologies for developing these forecasts.

2.1. Customer research and engagement

The voice of customers, heard through our research and engagement, is a core input into our plans. Our customer research and engagement approach for the upcoming EDPR builds on our:

- Participation in the 'New Reg' trial to form the 2022-26 revenue proposal. This was a joint initiative between the AER, ECA and ENA and through this trial a Customer Forum of 5 individuals with a mix of skills, tasked with representing the perspectives of our broader customers base, negotiated and agreed key components of a revenue proposal with AusNet. This involved deep and direct engagement between the Customer Forum and many of AusNet's core teams, including Regulation, Network Planning, Engineering, Digital and Customer Operations, and through this changed the culture of the organisation towards becoming more customer centric.
- Business as Usual engagement and research. We have a relatively mature 'BAU' engagement and research program involving:
    - **Research**—as an outcome of the Customer Forum process we established an embedded ongoing customer research function. Through this we monitor customer views and understand trends. A flagship piece of research we undertake every 6 months is Customer Sentiments, a survey of 300 residential and 100 business customers across our electricity and gas networks. This has been running since autumn 2021 and we use this to understand changing trends, sentiments and customer perspectives on emerging issues. This is complemented by our ongoing Customer Satisfaction research, which has been in place since 2019, and in-depth research employing a range of methodologies as needed. We see robust research as a critical input into our plans to ensure we understand the views of customers in a statistically significant way to validate the views expressed via engagement with a subset of customers.
    - **Engagement**—we have several cost BAU forums including the Customer Consultative Committee which has been running since 2016. This covers issues relevant to the whole of AusNet (not just electricity distribution) and comprises customer and industry advocates and engaged customers. We also have a Developer Consultative Committee (DCC) and Innovation Advisory Council (IAC), as well as issue specific forums as the need arises (such as community drop-in sessions in Euroa; and the Energy Resilience Community Fund Advisory Panel).

Research and Engagement programs specific to the EDPR process are described below.

Customer research

Our two flagship research projects for the EDPR are:

- **Segmentation –** In early 2023 we analysed smart meter data from over 680,000 residential customers to group usage patterns into customer segments. We then undertook an online survey of 3,263 of these customers to better understand attitudes and behaviours of customers behind each of the segments. This was complemented by 25 qualitative interviews and usage diaries to delve even deeper to build understanding of the segments. This was an innovative study as it married hard, smart meter data with customer research, to enable a rich picture of factors driving different usage patterns with the statistic vigour to enable actual decisions to be made based on this study. A webinar was run to share the learnings. It was attended by over 100 external stakeholders and is available here: Who are Night-time Water Warmers and how do they differ to Time Surfers? | Research | Community Hub (ausnetservices.com.au)

- **Quantifying Customer Values –** In late 2023 AusNet undertook a large-scale study to quantify the value customers place on a range of benefits that are not currently captured in investment decisions. This groundbreaking study is believed to be the largest of its type in the NEM and is the first time AusNet customers' values have been quantified at scale. The outcomes of this study will help us to balance trade-offs, ensure service improvements (or reductions) are aligned with customers' preferences and priorities, and make more holistic, customer-centric investments. The results of this survey were broadly communicated via a webinar, the first of the 'AusNet tomorrow' series, available here: AusNet Tomorrow Customer Insights Series | Research | Community Hub (ausnetservices.com.au)

In addition to these research projects, we have undertaken ad hoc topic specific research including on customer impacts following prolonged power outages, to inform various parts of the proposal.

Customer engagement

We have in place a very extensive customer engagement program that was codesigned with customer advocates in 2022. Our objectives are set out in Table 1.

Table 1: Customer engagement objectives

	Be evidence-based
	Focus on the "right" topics and be flexible
	Welcome open, honest and challenging conversations
	Allow for both broad and deep engagement
	Involve the right people in the right conversations and make it easy and practical for interested parties to engage
	Clearly demonstrate how customer and stakeholder input has shaped our plans and customer outcomes
	Help build participants' capacity to influence

Key features of the approach include:

- Establishing six topic-specific panels, comprising a mix of our customers, including regional customers, represented broadly in proportion to representation in our customer base.
- A Coordination Group, comprising the Panel leads and an independent Chair (Peter Eben, also the Chair of our CCC), tasked with assessing whether the proposal reflects and appropriately balances customer interests. They will write independent reports on our Draft and Final Revenue Proposal for submission to the AER.
- A series of workshops with over 120 customers to discuss various topics and trade-offs.
- Issue-specific engagement including resilience.
- Joint roundtable engagement with the other Victorian distributors, including on resilience, tariffs, fairness and the Framework and Approach paper.
- Large customer engagement through 1:1 discussions, which will be tailored discussions on issues of important to specific customers.
- Broad engagement over mid-late 2024 with a range of stakeholders, to test positions taken in the Draft Proposal.

Our Living Engagement plan, and other EDPR engagement material, are found here:

Electricity Distribution Pricing Review 2026-2031 Engagement | Community Hub (ausnetservices.com.au)

2.2. Asset management approach

Asset management decisions underpin investment programs and expenditure forecasts. A sound framework for asset management and investment decision making is fundamental to ensuring robust forecast expenditures. A mature asset management program can contribute to the following outcomes:

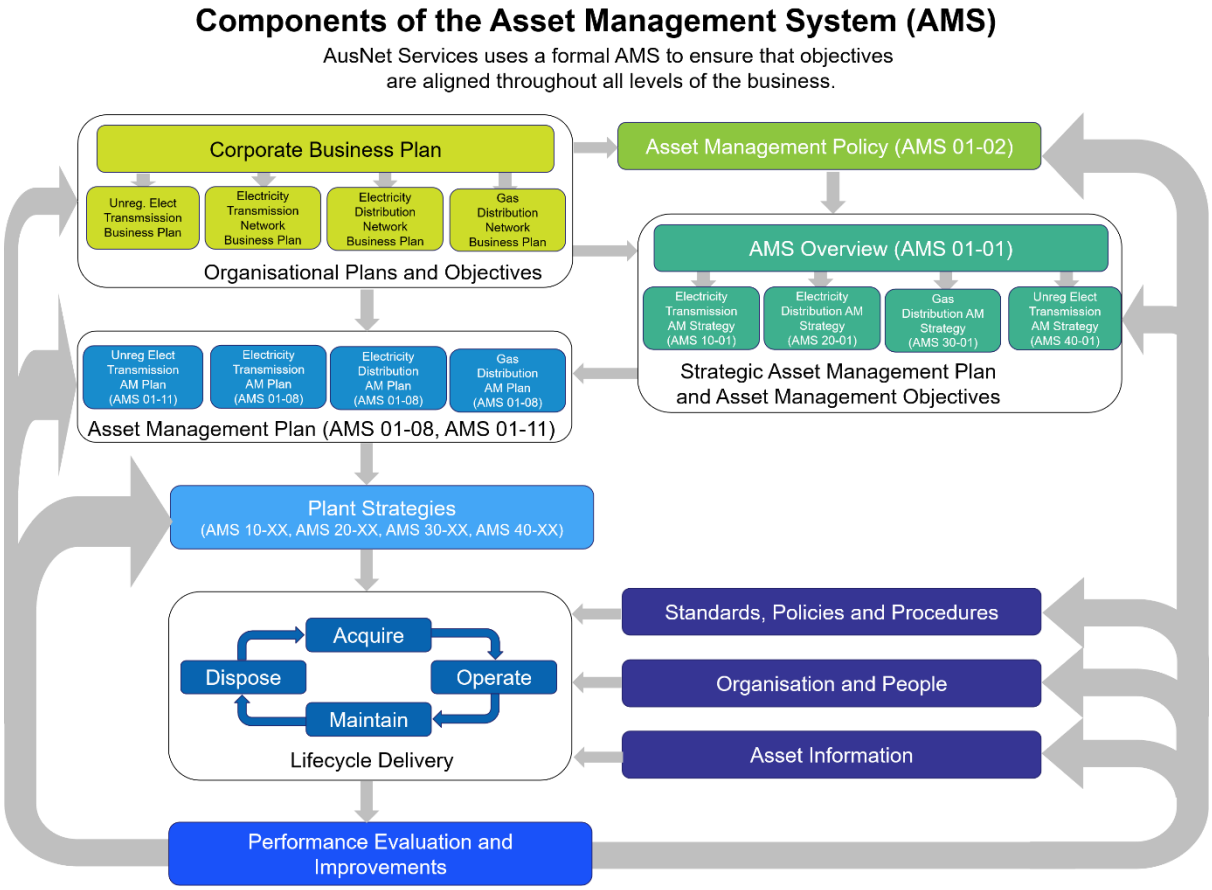
- Improved services and outputs
- Improved efficiency and effectiveness

- Informed asset investment decisions
- Managed risk
- Improved financial performance
- Demonstrated social responsibility
- Demonstrated compliance
- Enhanced reputation
- Improved organisational responsibility.

AusNet's asset management framework is informed by a regular assessment of the external business environment and AusNet's five-year business and financial plans. These plans influence the asset management policy and the development of asset management strategies. The five-year asset management plans are guided by the organisational plans and objectives and the asset management strategies and asset management objectives. These asset management plans identify the management of projects and programs of change and the application of standards to the life cycle of network assets. The framework is completed with monitoring and evaluation of performance to identify improvement opportunities throughout the entire asset management framework.

The elements of AusNet's asset management framework are shown in Figure 1.

Figure 1: Elements of Asset Management Framework



Asset Management standards

AusNet's ISO 55001 aligned asset management system interfaces with the integrated health, safety, environment and quality (HSEQ) management system and the risk management system. The integrated HSEQ management system is accredited to AS/NZS 4801, AS/NZS ISO 14001, AS/NZS ISO 9001. The Risk Management System is designed to comply with AS ISO 31000. Two Electricity Safety Management Schemes and a Gas Safety Case also interface with this asset management system.

These management systems are an integral part of the AusNet management framework providing instruction and support across all areas of operation by providing processes and procedures for functions from planning to customer requirements.

2.3. Key inputs

Views of our customers

As outlined above, AusNet has invested in a very extensive customer research and engagement program, building on business-as-usual, to ensure its distribution revenue proposal for the 2026-31 regulatory period reflects the diverse needs and preferences of its customer base.

This is critically important in this early phase of the energy transition. Understanding customer behaviour and how it may change over time, regarding trends such as gas electrification, electric vehicle usage, investing in solar panels and batty storage, will all impact the maximum and minimum demand that the network must manage.

We also need to understand customer preferences regarding core network services. Our research indicates customer willingness to pay for reliability is currently higher in our network than the AER's Value of Customer Reliability indicates, and reliability is increasingly important to customers as they become more dependent on a single source of energy. The customer impact of more severe weather events, due to climate change, increasing the frequency of prolonged power outages also needs to be understood and addressed.

AusNet's expenditure forecasting techniques have been improved to incorporate greater customer research in the estimations, including through its Customer Segmentation results informing the demand forecast, and the Quantifying Customer Values results informing economic business cases (the extent of this is still under development). Qualitative research and engagement have also shaped our proposal, impacting the mix of solutions proposed (for example, for resilience) and whether to pursue with a specific investment, and to what degree (for example, investment to address worst served feeders).

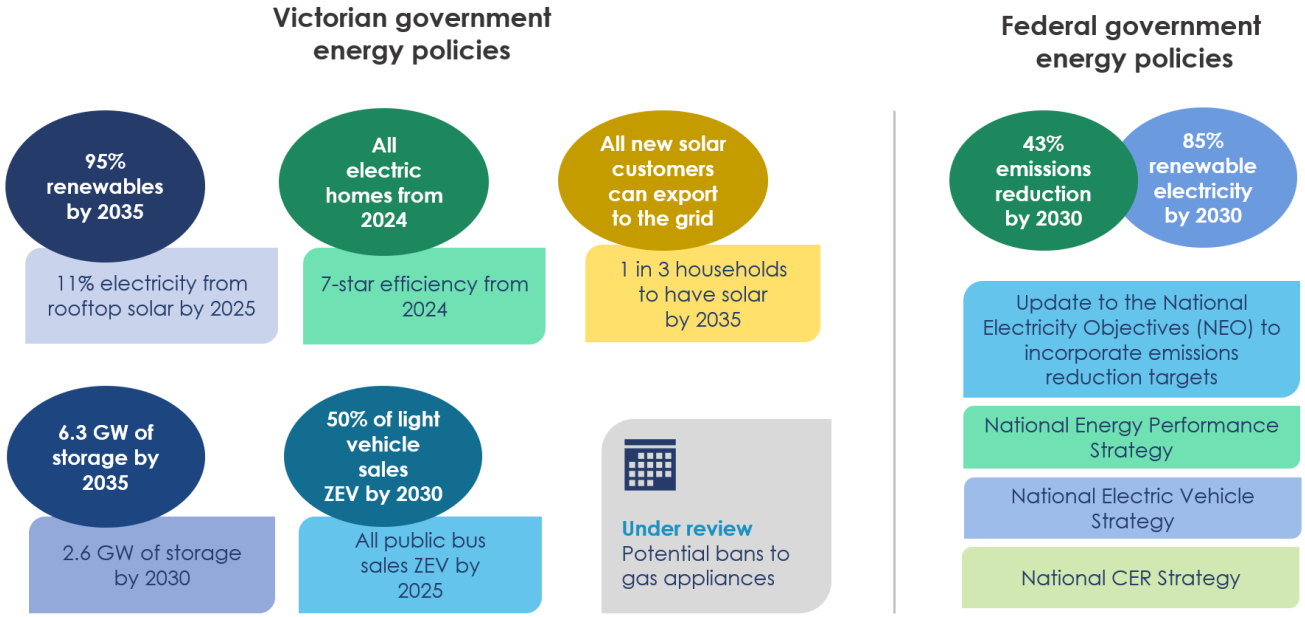
Government policy objectives

Australia is currently undergoing a significant energy transition towards renewable energy and electrification of gas and transport. State and federal policies play a key role in setting the direction of this transition, in the form of stated policy objective, such as renewable electricity targets, as well as direct interventions like the ban on gas appliances in new homes that require permits in Victoria from 1 January 2024.

Figure 2 below summarises some key energy policies at the time of writing (June 2024).

Our regulatory proposal is heavily influenced by these policies—the policies set the direction of our proposal and government targets are incorporated in forecast of customer behaviour and technologies in our network (e.g., electric vehicles, all electric homes, EV charging stations etc). We work closely with our customers and stakeholders on the most efficient and effective ways to deliver on stated policy objectives.

Figure 2: Summary of state and federal government energy policies, June 2024



Where government policies have resulted in new regulations or licence conditions, we are required to meet compliance with the new regulations (covered below).

Regulatory compliance obligations

AusNet's expenditure forecasts incorporate costs associated with meeting our regulatory compliance obligations. These include compliance obligations in the National Electricity Rules and various jurisdictional regulatory instruments including the Electricity Distribution Code of Practice, administered by the Victorian Essential Services Commission. This includes a range of important customer protection measures which ensure we are acting in the best interests of our customers, including those that are most vulnerable, such as life support customers.

Safety obligations

AusNet's capital and operating expenditure forecasts incorporate the costs associated with meeting required safety standards, regulations and processes, contained in AusNet's licence, regulatory, reliability, security and safety obligations. Electricity is an essential service, delivered through networks that are regulated monopolies. Delivery of electricity also involves significant safety risks. Hence, expenditure forecasts must include sufficient funds to comply with these obligations and efficiently manage safety risk associated with asset failure. For example, key obligations for AusNet's distribution network include:

- Electricity Safety Act (Part 10) requires AusNet Services to "design, construct, operate, maintain and decommission its supply network to minimise the hazards and risks to the safety of any person arising from the supply network; and
- Victorian Safety Legislation and Safety obligations set out in AusNet Services' Electricity Safety Management Scheme (ESMS) as approved by Energy Safe Victoria (ESV).

It is possible that there may be changes to the obligations between now and submission in January 2025. If changes do occur, AusNet will engage with the AER and other stakeholders on any changes to its expenditure forecasting methodology and/or forecasts themselves.

Forecasts of customer numbers and demand

A portion of the expenditure forecast for the 2026-31 regulatory period will be informed by forecasts of new customers and peak and minimum demand. These are important determinants to capital expenditure—demand driven augmentation, connection enablement upgrades, CER integration investment, connections, and metering—and operating expenditure—demand management and growth trend. Figure 3 explains how AusNet forecasts customer numbers and peak and minimum demand.

Figure 3: Customer number and demand forecasting methodology

Customer numbers

- Customer forecasts are developed at the feeder and zone substation level.
- Residential customer number forecasts are based on the latest Victorian Government's Victoria in Future (VIF) five-yearly forecasts of population, using the 'Victoria in Future Small Areas' data set.
- Large customers are estimated using a relationship between commercial and residential customers on each feeder, with a linear projection of the relationship based on the residential customer number forecast. New types of commercial customers, e.g., public electric vehicles charging stations, are based on publically available data source or actual enquiries with the business.

Demand forecasting methodology

- Demand forecasts are prepared at terminal station, zone substations and distribution feeder and transformer levels. The forecasts are prepared for 10%, 50% and 90% Probability of Exceedance (POE) conditions, for both maximum and minimum demands, at different seasons during the year.
- The key inputs into the demand forecasting methodology include historical and forecast customer numbers and rooftop PV capacity, historical and forecast estimates of electrification trends (e.g., transport electrification or electric vehicles and gas electrification), connected embedded generation, as well as observed maximum and minimum demand trends. Majority of the non-historical inputs into the demand forecast are indpendently sourced, largely from the Australian Energy Market Operator's (AEMO) Integrated System Plan (ISP) inputs and assumptions.
- Demand modelling is carried through complex simulations, including 1,000 different scenarios for weather and calendar impacts, to determine maximum and minimum demands for each scenario by season and different POE.
- The demand forecasts are finalised by applying post-model adjustments, e.g., block loads, to modelled outputs.

Recent improvements in demand forecasting approach

- AusNet's approach to demand forecasting is evolving over time, to capture new data sources and observed changing customer trends.
- During 2022, AusNet carried out an extensive Customer Segmentation study, using 12-month smart meter usage data from all residential customers. This data was then incorporated into demand forecasting where appropriate, e.g., to estimate the impact of gas electrification on evening peaks, replacing an outaged conservative estimate used in the past.

2.4. Other key inputs

Figure 4 illustrates other key inputs that influence the expenditure forecasts.

Figure 4: Other inputs in the expenditure forecasting process

Reliability preferences (VCR)	• AEMO's current VCR will be applied in the Revenue Proposal and will be revised by the AER by end of 2024. Economic modelling is applied to determine the appropriate point at which to invest in the network given price/ reliability trade-offs
Customer willingness to pay	• The findings of our QCV study (described in section 2.1) include alternative, AusNet-specific VCR values and willingness to pay measures for a range of service level outcomes. Depending on how they are applied, these values may influence our expenditure forecasts
Unit rates and cost estimates	• Unit rates are based on recent actual project costs or current tendered rates • Discrete project cost estimates reflect industry best practice methodologies and tools (e.g. Expert Estimator) and are informed by recent project costs
Cost escalators	• Applied to input (labour and materials) prices. AusNet intends to apply inflation to determine materials prices and engage an external consultant to determine labour prices.

3. Operating expenditure

3.1. Overview

Operating expenditure (opex) is expenditure on the maintenance and operation of the network. The opex program is generally recurrent in nature and the composition of costs does not significantly change year on year except for extreme weather events which can drive material GSL payment and emergency response costs. Due to climate change these events are increasing in their frequency and severity. Figure 5 demonstrates opex breakdown per category.

Figure 5: Opex breakdown per category

Network maintenance	Network operations
•Routine inspection and maintenance •SCADA/Network control maintenance •Advanced Metering Infrastructure (AMI) cost •Condition-based maintenance •Other standard control services •Emergency maintenance.	•Network operating costs •Customer service •IT •Non-network alternatives costs •Billing & revenue collection •Regulatory •Licence fee •Insurance •Guaranteed Service Level (GSL) payments

3.2. Forecasting method

AusNet will forecast opex using the base-step-trend methodology, which is consistent with the AER's Expenditure Forecast Assessment guidelines. The guidelines set out the forecasting approach and AusNet is forecasting the inputs into this model. As depicted in Figure 6 below:

- A base year of opex is first selected that is considered representative of efficient costs. Adjustments to remove non-recurrent costs or to account for changes in accounting treatments may be necessary.
- A rate of change is then applied to the base year to account for real input prices, output growth and productivity, which are drivers of opex trends.
- Proposed step changes or costs forecast using a bottom-up methodology are then added. Step changes reflect changes in regulatory obligations or an opex/capex trade-off.

Figure 6: Operating expenditure forecasting process

3.3. Base year

We expect that 2022-23 will be used to determine base year efficient costs. A full year of audited actual data for this year will be available when the Regulatory Proposal is lodged in January 2025. The 2022-23 base year reflects an efficient starting point for forecasting opex because:

- The opex incentive scheme (EBSS) ensures that AusNet and its customers are rewarded for minimising opex and, provided the base year is efficient, are financially indifferent to the choice of base year.
- Actual expenditure in 2022-23 is less than the allowed expenditure, demonstrating opex efficiencies gained by AusNet.

- The AER's 2023 benchmarking report shows that AusNet is an efficient firm with an opex efficiency score above the 0.75 benchmarking comparator score that is used to determine the most efficient DNSPs (under the AER's preferred approach to addressing capitalisation differences). At the time of Regulatory Proposal submission, the 2024 benchmarking report will be the latest available (incorporating 2022-23 data) and it is expected to show that AusNet remains one of the most efficient DNSPs.

3.4. Rate of change

The rate of change refers to the incremental operating costs that are expected to change over the regulatory period. This is a result of input changes, such as productivity, prices, and outputs in the form of network size. Consequently, base year opex will be adjusted annually for this rate of change to determine expenditure requirements for each year of the regulatory period:

- Examining historical trends to identify drivers of opex growth forms a key element of the opex forecast. The AER's rate of change formula in its Expenditure Assessment Guideline includes the following drivers: output, real price, and productivity changes. AusNet expects to adopt these drivers to forecast the rate of change.
- Output growth (network size) – expected changes in customer numbers, ratcheted maximum demand and circuit length. This driver is calculated using internal forecasts built-up from public data (e.g., AEMO and Victorian Government forecasts) and historical trends/ experience.
- Real price change – includes movements in both labour escalation and material costs. AusNet will source labour escalation forecasts from an independent expert.
- Productivity factor – improvements in productivity are expected over time due to efficiency and transformation initiatives. The productivity factor set by the AER, which we intend to apply, is 0.5%.

3.5. Step changes

Step changes are other costs not captured in base opex or the rate of change that are required for forecast opex to meet the opex criteria. The AER outlines that step changes are only required for additional opex if it is for compliance with regulatory obligations representing a change in scope, major external factors demonstrated to not be captured in the trend growth, or to provide an efficient capex/opex trade-off that delivers greater input efficiency.[1] Our forecast may also include step changes relating to new or improved service levels, where demonstrated to offer net benefits and/or supported by our customers.

3.6. Bottom-up forecasts

There are some exceptions where alternative methodologies other than simple trending are used to forecast opex. Likely cost categories to be included are:

- Debt raising costs – AusNet expects to adopt the method the AER uses which is derived by applying a benchmark debt raising unit rate to the debt portion of the RAB
- Innovation – some costs may be included for innovation projects. This will be forecast based on a bottom up build and will reflect the outcomes of our consumer engagement on an innovation allowance.
- GSL Payments – this forecast will be based on the average of most recent five years of historical expenditure. The data will account for the changes in the scheme in July 2021 which includes the introduction of Major Event Day (MED) payments.

[1] AER (2022) Better Regulation, *AER expenditure forecast assessment guideline - distribution -August 2022*, pg. 24-27, 1 August, Expenditure forecast assessment guideline - distribution (aer.gov.au)

4. Capital expenditure

4.1. Overview

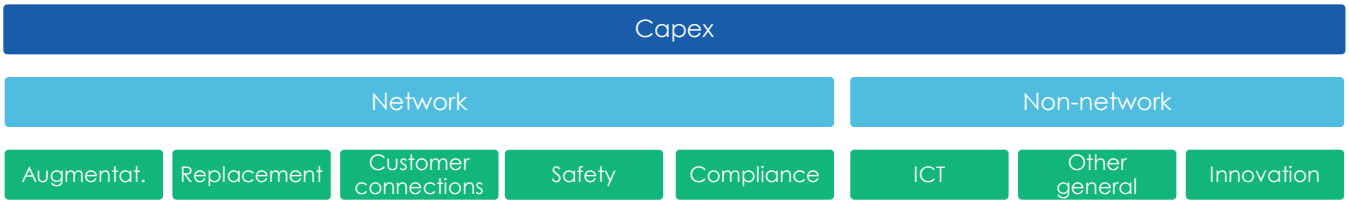
Capital expenditure (capex) is expenditure used to acquire, install, upgrade and/ or refurbish physical assets. Assets include network assets (poles, wires, and transformers) and non-network assets (such as ICT systems, vehicles, property, industrial buildings, or equipment.). The approach used to develop AusNet's capex forecast for regulatory purposes is consistent with the approach for budgetary, planning and governance processes used in the running of the business.

For the 2026-31 regulatory period, we are anticipating a significant step up in augmentation investment to manage strong growth in peak demand and new expenditure drivers (e.g., resilience, integration of large-scale generation), in addition to condition-based asset replacement and installation of equipment to reduce the risk of bushfire. This section outlines the general process AusNet uses to forecast capex and the individual categories that comprise the total bottom-up capex program.

4.2. Capex categories

In the Regulatory Proposal capex will be reported using several different categories. For the purposes of forecasting, AusNet classifies its capex into different groupings as shown in Figure 7. Additional classifications are also made within each of these broad categories for a more granular analysis.

Figure 7: Components of capital expenditure

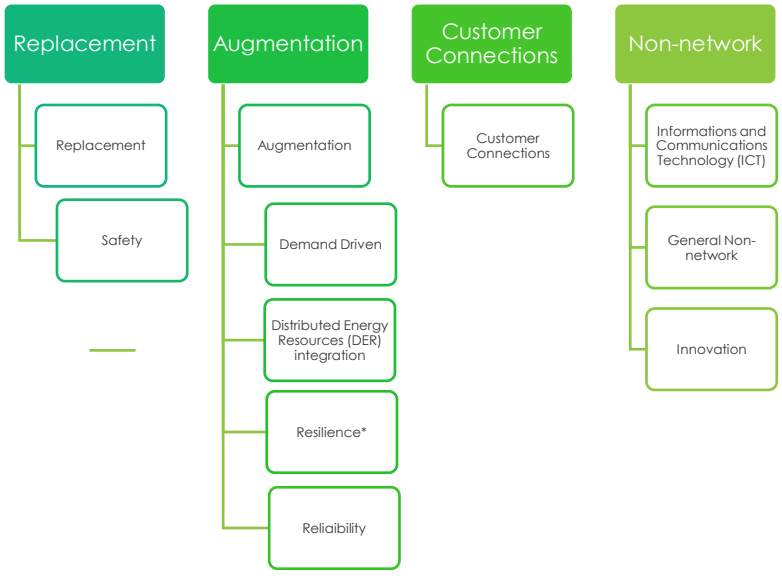


Guidelines comparison

The AER's Expenditure Forecasting Assessment (EFA) Guideline identifies four main subcategories of capital expenditure. For the most part, these categories align closely to AusNet's existing forecasting categories. The exception is the Safety category, which is demonstrated in Figure 8.

The EFA Guideline does not explicitly address the intended treatment of safety related expenditure. Previously the AER has agreed that safety expenditure could be appropriately allocated under either augmentation or replacement, depending on the nature of the program.

Figure 8: Mapping EFA Guideline Capex subcategories to AusNet categories



* Some resilience expenditure (e.g. pole replacement) may be classified as repex.

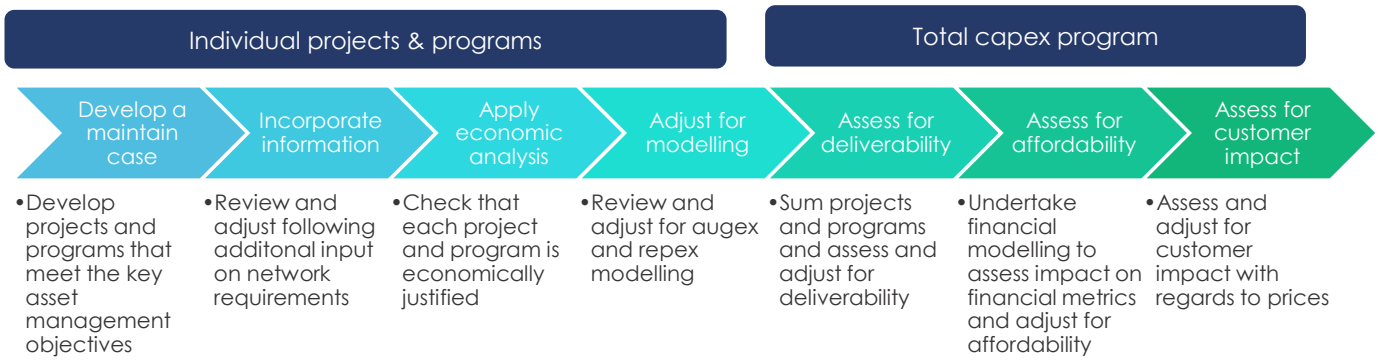
4.3. Network capex forecasting overview

The objectives of the AusNet capital expenditure program for the 2026-31 regulatory period, which are generally aligned with the key asset management objectives, are to:

- meet customer and demand growth, including expected demand from electrification of transport and gas
- comply with regulatory obligations
- maintain or, in the case of poorly served areas where upgrades can be justified, improve reliability
- maintain or improve network resilience
- efficiently integrate large-scale generation and CER
- maintain or, in the case of the highest bushfire risk areas, improve safety.

For each capex category, bottom-up forecasts are produced to calculate expenditure. Each methodology is relevant to the nature of the relevant capex determinant. The methodology involves forecasting expenditure for each project and then applying a top-down assessment to arrive at the overall estimated amount.

Figure 9: Network capital expenditure forecasting process



This process in Figure 9 ensures that AusNet determines a capex forecast that is both prudent and efficient.

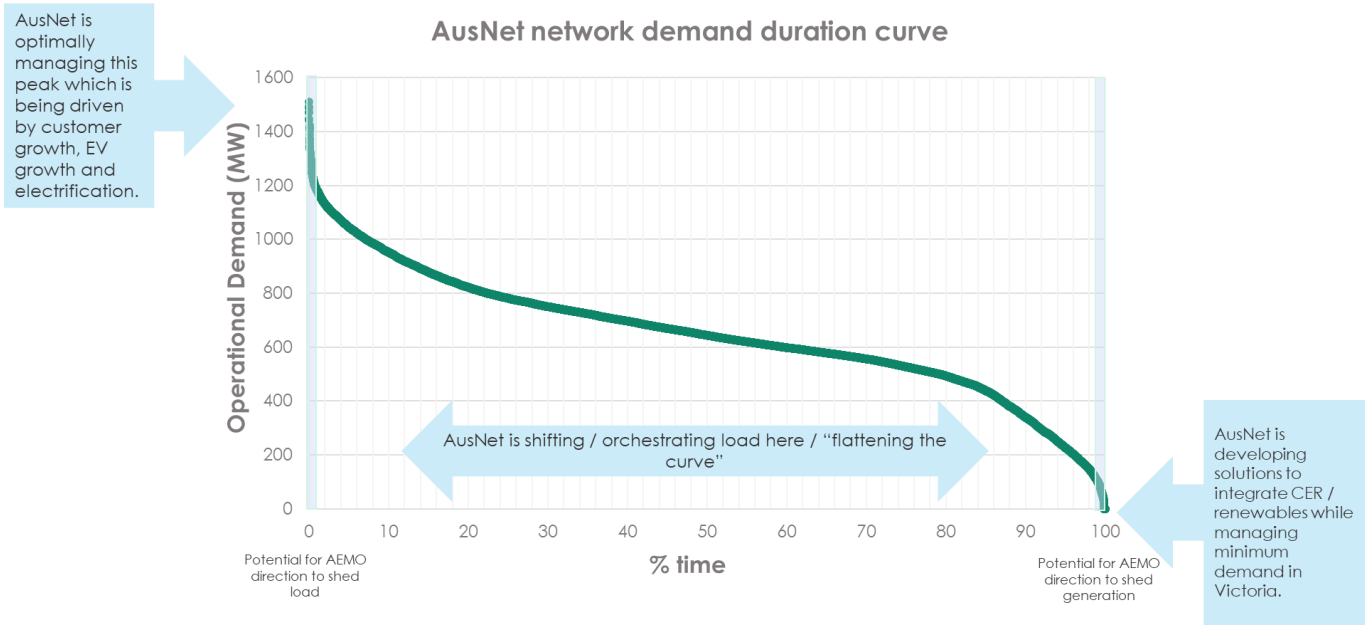
Managing maximum and minimum demand challenges

Historically, networks have needed to plan for forecast increases in maximum (peak) demand. However, with the increasing penetration of rooftop solar, and other larger wind and solar farms that are increasingly connecting to the distribution network, there is an increasing challenge for networks to manage both maximum demand but also declining minimum demand.

Distributors are increasingly playing a role of managing two extremes ends of the spectrum of demand, needing to maintain the network for two-way flows across the different parts of the network (low and high voltage). Two-sided network management requires more dynamic management of the network voltage profile, especially at the low voltage level and therefore more sophisticated strategies to manage power quality for customers.

Figure 10 demonstrates the demand duration curve and the need to manage both ends of the spectrum.

Figure 10: Demand duration curve and need to manage both ends of the spectrum



Source: AusNet.

4.4. Augmentation

Augmentation via the construction of network assets to enlarge the network, or increase its capacity, is required to manage the following:

- capacity constraints in the distribution network due to growth in maximum demand
- power quality and voltage compliance
- where it is economic, enabling additional consumer energy resources exports.

The augmentation expenditure forecast will provide for the following outcomes:

- ensures that the network can meet customer demand
- maintaining asset utilisation rates at efficient levels and lowest whole-of-life cost
- meeting safety, reliability and security of supply regulatory obligations.

Demand driven

Figure 11 outlines the two major components of our demand driven augmentation expenditure forecast.

Figure 11: Components of AusNet's demand driven augmentation forecast

Demand driven augex (excluding LV)	LV network augex
•Zone substations •Sub-transmission •Distribution feeders	•SWER augmentation •Distribution substation augmentation

AusNet's forecasting methods for demand driven augmentation expenditure (excl. augex on the low voltage network) are set out in Table 2. The forecasting approach for LV augex utilises a model that holistically assesses demand-driven augmentation in the LV network alongside voltage compliance and CER enablement (they are interrelated).

Demand driven augex (excluding LV)

Table 2 summarised the capital expenditure forecasting method for demand driven augex, excluding LV network augex.

Table 2: Capital expenditure forecasting method for demand driven augex (excluding LV)

	Description
Establish the baseline risk	• The baseline risk is the risk of do-nothing. • For demand driven augmentation expenditure projects, the baseline risk is entirely comprised of supply risk. • We calculate supply risk (also called expected unserved energy or EUE) using a probabilistic planning approach – this means that the calculation of supply risk is weighted by the probability of the outage occurring. • To establish the baseline risk of do-nothing, we multiply the supply risk (kWh) by the VCR ($ per kWh).
Formulate options	• We formulate our options by treating network and non-network solutions on equal footing.
Quantify & compare options vs. baseline risk	• The benefits attributable to each option is the amount by which it can reduce the monetised baseline risk (or monetised supply risk).
Select preferred option	• We calculate the Net Present Value for each option, and we undertake sensitivity testing across key assumptions – e.g., discount rate and costs. • The option with the highest NPV is the preferred option, as it delivers the highest societal benefit.
Determine optimal timing	• We determine the optimal timing of the preferred option by undertaking an annualised cost analysis, which charts the benefits against the annualised cost. • The optimal year is the year in which benefits exceeds annualised cost.

Demand driven augmentation on the LV network

The forecasting methodology for demand driven augmentation in the LV network (including SWER and distribution substations) is part of a broader LV network modelling approach, which forecasts expenditure for voltage management, demand driven augmentation (largely due to electrification of gas and transport) and enablement of exports from consumer energy resources (CER). At the high level, the LV network modelling methodology is as follows:

- Assesses the hosting capacity of the low voltage (LV) network at the start of regulatory period.
- Establishes demand and curtailment profiles of customers and their CER, using inputs such as usage profiles (from the AusNet's Customer Segmentation study), estimated system size, estimated system generation, percentage of customer on flexible export v static export limits, distribution substation level maximum and minimum data, and other factors.
- Accounts for efficient network voltage management requirements, efficient integration of peak demand growth and efficient integration of CER exports. Efficiency of voltage management is determined using the value of reduced consumption and the AER's customer export curtailment value (CECV), the efficiency of peak demand growth integration is determined using a value of customer reliability (VCR), and the efficient CER export capacity is assessed using the CECV. At the time of writing, AusNet is awaiting AER's guidance on how to integrate the value of emissions reduction into the model.
- Costs and characteristics of credible options are then assessed, ranking projects to develop a program of works of the most economically viable projects.

Integration of generation

Large scale renewable generation

AusNet has received increasing connection requests for large scale renewable generation and storage to our sub-transmission (66kV) network, as a close alternative to transmission network connections. However, only a portion of the proposed generation connections can be accommodated by the existing assets, and the output of the connected generation would have to be curtailed during peak generation due to the existing constraints of the network.

AusNet has created a market model using an AEMO ISP regional model, updated to include AusNet 66kV sub transmission assets to identify locations for network augmentation that will efficiently unlock generation connections. This analysis takes into consideration the locations of our connections pipeline.

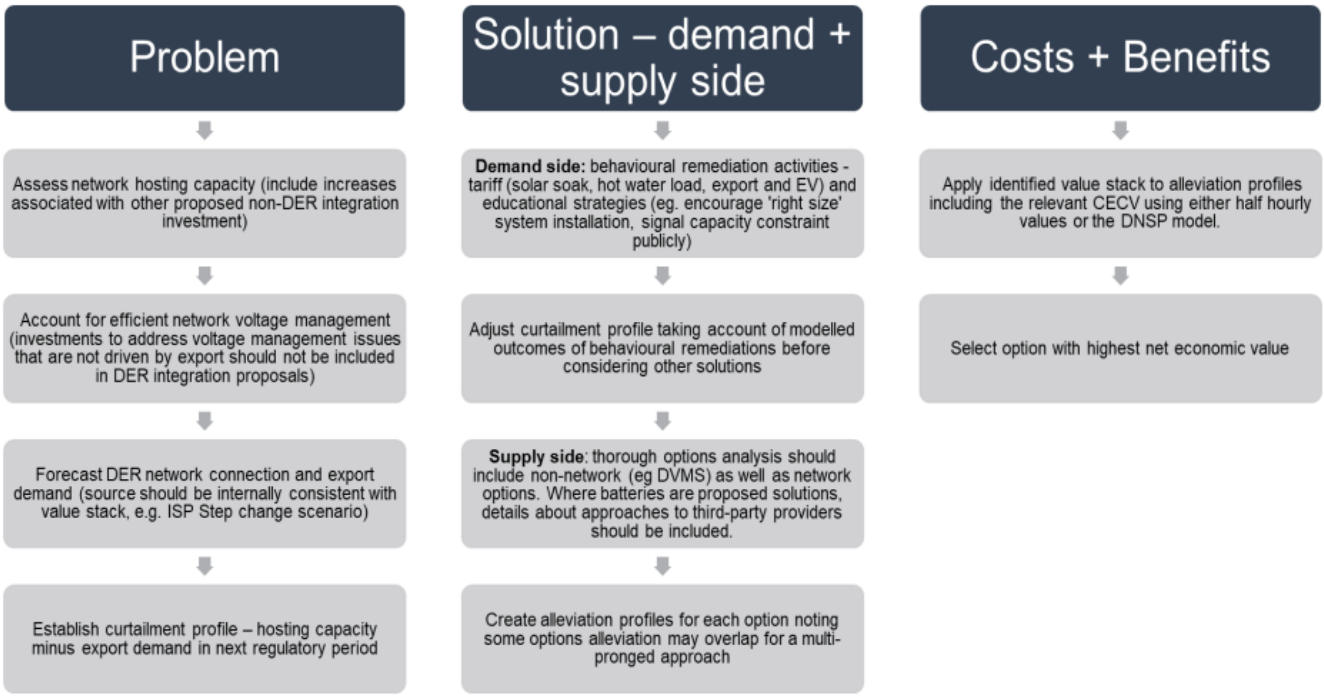
Our assessment of these projects also considers:

- The emissions reduction unlocked by the connection of renewables to the system; and
- Reliability benefits (avoided unserved energy risk) quantified using the VCR.

Consumer energy resources and exports

Our approach to forecasting consumer energy resources (CER) and export enablement expenditure is aligned with the AER's distributed energy resources (DER) integration expenditure guidance note. The AER's proposed process for the development of CER/DER integration expenditure shown in Figure 12.

Figure 12: AER's process for developing CER/DER integration investment proposals



Source: AER, DER integration expenditure guidance note, June 2022, p. 5.

As highlighted in the 'Demand driven augmentation in the LV network' section, our forecasting methodology for CER enablement is part of a model that also forecasts voltage management and demand driven augmentation in the LV network. By taking a holistic approach to LV investment forecasting, our approach ensures the key considerations in the AER's process for developing CER/DER integration investment proposals are captured.

Resilience and reliability

Resilience expenditure

Determining capital expenditure for resilience programs involves a comprehensive assessment of solutions designed to address the challenges posed by extreme weather. Resilience projects primarily comprise capital expenditure programs, although some operational expenditure solutions may also be feasible. Our assessment utilises a top-down approach which involves quantifying the impacts of climate change and outages caused by extreme weather events across our network area to identify the risks to our network and therefore the opportunities for efficient resilience investments. The two primary categories of resilience investments are network hardening and non-network solutions.

Network hardening focus on upgrading existing infrastructure to withstand the impact of extreme weather events. Examples include:

- **Upgrading Pole Infrastructure:** upgrading existing poles with strengthened poles to withstand high winds, bushfires, and other environmental factors, reducing the likelihood of equipment failure and service interruptions.

- **Proactive Conductor Replacement:** the replacement of bare overhead conductors with underground cables or covered conductors. Replacement of overhead lines with more resilient alternatives can reduce network vulnerability to weather-related damage, minimising the risk of outages caused by power lines contacting tree branches, debris, wildlife or extreme weather conditions.
- **Additional Switching Architecture:** the addition of remote-controlled switching and reclosing equipment to segment the network to limit network disruptions to a smaller number of customers.

Non-network and operational solutions encompass measures aimed at enhancing resilience outside of traditional infrastructure upgrades. These solutions include:

- **Stand-alone Power Systems (SAPS):** These independent electricity systems provide dedicated power generation and storage capabilities, utilising renewable energy, to ensure a continuous power supply to individual customers, businesses, or critical infrastructure sites during outages. They are typically comprised of batteries, generators, and solar systems to provide off-grid power supply. SAPS provides additional benefits such as improved power quality and reliability for customers at the remote ends of the grid.
- **Battery Energy Storage System (BESS)**: BESS installations offer network support by storing energy during periods of low demand and supplying stored energy during peak demand, backup generation or for grid instability, contributing to system stability, backup energy and increased resilience to network interruptions. This solution is utilised to provide backup power to community resilience hubs and critical infrastructure customers, ensuring communities can continue to access essential supplies, such as clean drinking water and telecommunication services during extended power outages.
- **Emergency Response Vehicles (ERVs):** ERVs are equipped with mobile power generation, communications equipment, first aid and other critical support services, enabling rapid deployment to assist with restoration efforts in areas affected by outages or disasters. They also serve as a critical point of contact with customers or response personnel by acting as a mobile control centre for managing restoration efforts and engaging with communities.
- **Mobile Generation Equipment:** Portable generators, batteries and temporary power solutions can be deployed strategically to restore power supply to affected areas while repairs are underway. Expanding the distribution of mobile generators to additional depots throughout the network can reduce the time required for power restoration.
- **Hazard tree removal:** this option is an operational expenditure alternative which targets highly vegetated network areas and proactively removes considerable risk from trees and branches to mitigate the risk of interruptions resulting from vegetation related disruptions to powerlines.

AusNet evaluates projects based on their ability to deliver benefits to customers while ensuring that investments yield greater benefits than costs over the project's lifecycle. To prioritise investments, AusNet conducts thorough risk and benefit assessments of resilience projects, integrating historical performance data with climate projection modelling to identify areas at heightened risk of extreme weather events. By targeting investments in areas most susceptible to weather-related disruptions, AusNet aims to enhance the resilience and reliability of its distribution network, improving service quality, safety, and customer satisfaction.

Reliability expenditure

Recognising the increasing importance of reliable electricity supply through the transition, and the substantial differences in the level of reliability experienced across our customer base (i.e. between urban and rural customers), we are exploring opportunities to upgrade 'worst served' parts of our network.

The projects being assessed include network solutions (e.g. undergrounding, covered conductor, automatic circuit reclosers) and non-network options (e.g. SAPS). Similar to the approach applied for demand driven augex (described above), this assessment involves comparing the costs and benefits of the 'do nothing' option with solutions that would mitigate this baseline risk, to determine the most economic option. Potential overlaps and interactions with our resilience forecast are considered.

Our approach to assessing these projects also considers the findings of our QCV research, which demonstrates a willingness from our broader customer base to fund upgrades for worst served customers. Accordingly, our expenditure forecast for this category may reflect both projects found to be economic using traditional VCR inputs, as well as non-economic projects justified using other willingness to pay measures.

4.5. Replacement

Replacing poor condition assets is necessary to maintain network reliability, safety and risk. Managing the deterioration of assets over time is vital to maintaining reliability, safety and risk at the current levels. Replacement projects are generally initiated to address increased likelihood of plant failure resulting in an increased risk, considering a number of factors:

- aging profile of assets
- assessed asset conditions

- obsolescence
- consequence of failure
- safety risks and issues

AusNet has two types of condition-based replacement expenditure programs which are illustrated in Figure 1313:

- inspection Based Replacement. Applied to measurements of asset condition taken as part of our inspection cycles, which are governed by safety compliance obligations, e.g. poles, crossarms
- other (Risk Based) Programs, which apply to most other assets classes including conductors, pole top switches, distribution transformers, primary and secondary station assets, sub-transmission lines and communications assets.

Figure 13: Components of replacement forecast

Inspection based line assets	Other programs
•Forecast replacement volumes based on: •Asset profile •Asset condition •Consequence of failuire •Program costs forecast using unit rates	•Equipment fuiluire rates are obtained from asset health reports •Forecast replacement volumes based on: •Failuire rates •Consequence of failuire •Program cost forecast using unit rates

Where there are many assets at a single site assessed as being in poor condition, we assess whether a complex project can be economically justified, to leverage to efficiencies of a combined project rather than individual asset replacements. Those assets which are not considered complex projects but still classified as being in poor condition, undergo individual assessment for inclusion in replacement programs. For distribution line assets, the majority of replacement forecasts are based on historical replacement rates combined with asset age and condition information to forecast future volumes. For zone substation assets, a risk-based assessment, similar to the approach used in the economic assessment process for augmentation and complex replacement projects, is undertaken. The safety, supply, environmental, collateral damage and reactive replacement risks are calculated in line with the deterioration of the asset condition over time to determine the economic timing for replacement to address the risks.

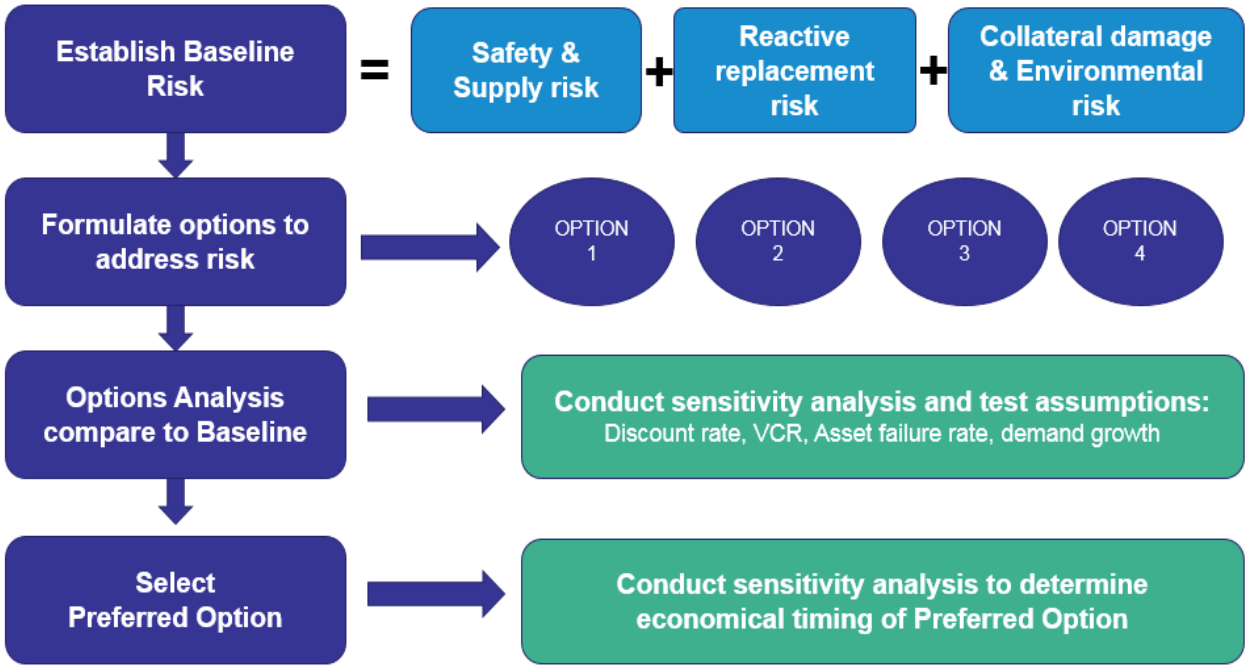
AusNet assesses the condition of assets and applies a condition score. The condition scoring framework is based on:

- test results
- inspection and maintenance observations
- defect and working order information.

The condition score is then used as an input into an assessment process to determine network risks.

Figure 14 shows the overview of AusNet economic analysis process of selecting preferred replacement options. The options available typically range from a full rebuild to selective asset replacement.

Figure 14: Economic analysis process



As part of our consumer engagement program, we are engaging on alternative replacement expenditure proposals, to demonstrate implications of trading off between price and reliability. This may also include the effects of alternative VCRs develop through our QCV research project (described in section 2.1).

4.6. Customer connections

Customer connection expenditure is the costs associated with connecting new customers to the shared electricity network at the customer's request. We forecast gross customer connections expenditure as well as net customer connections expenditure, which is the gross expenditure net of customer contributions.

The forecast gross customer connections expenditure is the product of customer volumes and connection unit rates:

- Customer growth is forecast for each of the residential, small business, commercial and industrial categories (see section 2.3).
- For most categories, we forecast unit rates using our service delivery partners' current unit rates or analysis of actual project costs based on similar connection types.
- For categories where the average cost per connection fluctuates due to complexity and relative size of projects undertaken (e.g., complex residential connections or larger commercial and industrial connections), we use a longer-term average unit rate in the forecast.

Capital contributions for connections are calculated in accordance with AusNet Services' Connection Policy which incorporates the requirements of both the National Electricity Charging Framework and AER's connection Charge Guideline. Customers may contribute toward the cost of a network extension, other network augmentation or direct connection assets required to enable the new connection or connection alteration to be made.

As part of the energy transition, we expect new types of technologies will be connecting to our network during 2026-31, without historical trends that can be reliably used to estimate future volumes or unit rates. These technologies include grid-scale batteries, public EV chargers and charging stations, generation and storage hybrid facilities, data centres (to name a few). There is high uncertainty in forecasting volumes and unit rate of these connections. For each of the named technologies, we have based our volumes forecast on actual connection enquiries (if applicable) and a desk top study of market trends, public investment roadmaps, and government subsidies. We have used the current unit rates of our service delivery partners to forecast unit rates.

4.7. Safety

The safety capital expenditure forecast is for programs required to manage and mitigate safety risks from the distribution network, and to meet compliance and regulatory obligations. The location of AusNet's electricity distribution network means that there is a high bushfire risk due to heavily vegetated areas it traverses. As a result, the majority of safety expenditure occurs in these areas. Safety programs either can be a result of company initiatives or mandated by the government.

AusNet is including the following safety expenditures:

- REFCL program
- Proactive SWER undergrounding and covered conductor
- Codified areas
- Expulsion Drop Out (EDO) fuse replacements
- Other minor programs

The Rapid Earth Fault Current Limiter (REFCL) program has been installed across hazardous network areas to reduce the risk of power line related bushfires. Accordingly, REFCL expenditure in 2026-31 will relate to augmentation needed to maintain REFCL compliance, as capacitance increases on our network due to load growth or increased undergrounding.

AusNet is proposing a continuation and potential acceleration of the proactive SWER undergrounding or replacement with covered conductor for the 2026-2031 regulatory period. This program was first introduced in the 2021-2026 regulatory period and is replacing 100 km of bare overhead SWER conductor with either underground cable or overhead Open Wire Covered Conductor (OWCC). This program has been proposed to address recommendations of the 2009 Victorian Bushfires Royal Commission. Potential acceleration of this program would see forecast volumes increase to 200 km for the 2026-2031 period, with unit rates reflecting those being experienced on the current in flight project.

A bottom-up approach is used for the estimates of bushfire safety programs (codified areas and EDO fuse replacements) expenditure forecasts. Forecast expenditures are derived by multiplying volumes by the unit rates. Volumes are based on the functional scope of works and historical asset audits. Unit rates are based on recent actual costs or tendered rates of projects.

We are also exploring and assessing new and innovative technologies to maintain and/or reduce bushfire safety risk, which may have implications for our expenditure forecasts if investment in these technologies offers net benefits to customers.

4.8. Compliance

Table 3 outlines our forecasting methodology for compliance capital expenditure programs including investment to manage our Under Frequency Load Shedding obligations (but excluding voltage compliance). As highlighted in the 'Demand driven augmentation in the LV network' section, our forecasting methodology for voltage management is part of a model that also forecasts CER enablement and demand driven augmentation in the LV network.

Table 3: Forecasting methodology for compliance capital expenditure programs

Identify the compliance requirements & gaps	Develop feasible options to address the compliance gaps	Select the preferred option
• Review our obligations and compliance requirements • Review our current performance • Identify the gaps to achieve compliance	• Develop feasible options to address the obligations and compliance gaps • Undertake a cost analysis of each feasible option	• Select the lowest cost option as the preferred option

4.9. Non-network capex

Non-network expenditure includes both information and communication technology (ICT) capabilities and other categories. ICT expenditure is required for lifecycle management of various software and hardware systems to maintain service levels, as well as non-recurrent investments to deliver new or improved service levels valued by our customers (e.g., improvements to customer experience and communications, better outage response and restoration times).

Digital expenditure

Digital expenditure is forecast using the following steps:

- Assess the current performance of information and communication technology systems and infrastructure to inform to what extent the existing systems and infrastructure can be utilised to support the asset management approach
- Bottom up discussion with business and technology architects and delivery leads to develop scope, key objectives, and drivers influencing the requirement for the programs
- Consideration of different options to achieve the objectives of the program and analysis of their relative costs, benefits and risks (this can include emerging technologies and trends that can be both effectively and efficiently applied)
- Identification of any economies of scale or scope which may exist between programs
- Engagement with customers and stakeholders on price and service level trade-offs for non-recurrent investments that would deliver new or improved services
- Top down view to ensure that the technology strategy investment portfolio represents prudent expenditure for the upcoming period, relative to AusNet Services' previous expenditure and also benchmarked against other comparable distribution businesses. This includes the application of AusNet Services' ICT cost allocation methodology, in recognition that AusNet Services is a multi-utility regulated business.

We have ensured that costings across different programs of work have been consistently developed, for example, through using industry standard labour rates and applying consistent costing methodologies.

General non-network

General non-network expenditure includes other categories such as: vehicles, non-operational buildings, tools and test equipment and capitalised leases

Vehicles expenditure includes the costs associated with the purchase and replacement of new and existing vehicles. The forecast will be based on a bottom-up approach with trend analysis applying a top-down examination of estimates of the number of field staff, age, and condition of the vehicle. The forecast will assume a substantial share

of end-of-life vehicles are replaced by EVs by 2031, recognising the emission reduction, operating and other, intangible benefits these offer.

Expenditure in the buildings category is made up primarily of property and corporate buildings that facilitate efficient delivery of network services. The forecast will be based on a bottom-up approach of the use and condition of the buildings as well as acquisitions of land where this offers network and customer benefits.

Other non-network expenditure relates to the associated equipment required to support the network construction and maintenance programs, along with the furniture and fittings component of the non-operational buildings program. The forecast for the components is expected to reflect historical expenditure levels.

Capitalised leases are also included in this expenditure category, reflecting an accounting change that came into effect in 2019 which does not allow for operating leases.

Innovation

All distributors are provided with the Demand Management Innovation Allowance (DMIA), the methodology of which is determined by the AER.

AusNet is forecasting additional innovation expenditure beyond the DMIA. The methodology for forecasting innovation expenditure includes determining the future state for the business, assessing current capabilities, and identifying any gaps where innovation may be required to get to the future state. The potential innovation requirements are then assessed against the following guiding principles, originally co-designed with the Customer Forum for the 2021-26 proposal, and further supported by customers and stakeholders for the 2026-31 proposal:

1. Seek to deliver benefits to customers
2. Are driven by customer needs and expectations
3. Can be understood by customers
4. Represent strategic innovation
5. Involve collaboration with other partners e.g. industry, academic and other
6. Customers are willing to pay, and
7. The project would not be funded under the regulatory framework.

For the projects that meet the guiding principles, the preferred pipeline of projects is co-designed with AusNet's Innovation Advisory Committee.

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