Expenditure Forecasting Methodology

Transmission Revenue Reset for the Regulatory Control Period beginning 1 April 2022

ISSUE/AMENDMENT STATUS

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1 Introduction

The purpose of this document is to set out the methodologies that AusNet Services intends to use to prepare its expenditure forecasts for the Transmission Revenue Review (TRR) for the regulatory period beginning 1 April 2022, which is to be submitted to the Australian Economic Regulator (AER) by 31 October 2020. This document is a requirement of the National Electricity Rules (NER) under clause 6A.10.1B, which was introduced by the AEMC in November 2012.

The AEMC explained the intended purpose and scope of this document in the following terms:

> The Commission accepts that responsibility for developing a NSP's proposal should remain with the NSP. This includes the development of an expenditure forecast in a manner that the NSP views as appropriate. It is the AER's role to assess the NSP's proposal using any tools it views as appropriate. Nevertheless, it remains important for the AER to receive information which enables it to effectively assess a NSP's proposal and be aware of how the NSP plans to forecast its expenditure.
>
> […]
>
> The Commission views the early engagement with NSPs, as well as broader industry engagement in developing the guidelines, as beneficial. It will potentially save time and effort for both parties once the regulatory process has commenced.[1]

In November 2013, the AER published its Expenditure Forecast Assessment Guideline, which explains the AER's approach to assessing whether a TNSP's expenditure forecasts satisfy the Rules requirements, and the information the AER requires for the purpose of that assessment. The AER's explanatory statement that accompanies the Expenditure Forecast Assessment Guideline made the following observations regarding the AER's assessment of a TNSP's forecasting methodology:

> We consider a good expenditure forecasting methodology should reflect the principles set out in section 5.5 and result in forecast expenditure that is accurate and unbiased.[2]

The AER's principles referred to in the above excerpt are:

- Validity;
- Accuracy and reliability;
- Robustness;
- Transparency;
- Parsimony; and
- Fit for purpose.

AusNet Services has developed its forecasting methodology for the forthcoming TRR in accordance with these principles. In addition to notifying the AER of our forecasting methodology, this document explains how customer input is being taken into account in developing our expenditure plans. It also explains how our plans will be subject to benchmarking to ensure that AusNet Services' forecast expenditure satisfies the rule requirements in relation to efficiency and prudency.

AusNet Services does not expect its expenditure forecasting methodologies to be amended in its Revenue Proposal. However, if a change proves to be necessary, a detailed explanation for the change will be provided in the Revenue Proposal.

[1] AEMC, Rule Determination, National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012; National Gas Amendment (Price and Revenue Regulation of Gas Services) Rule 2012, 29 November 2012, p. 108.

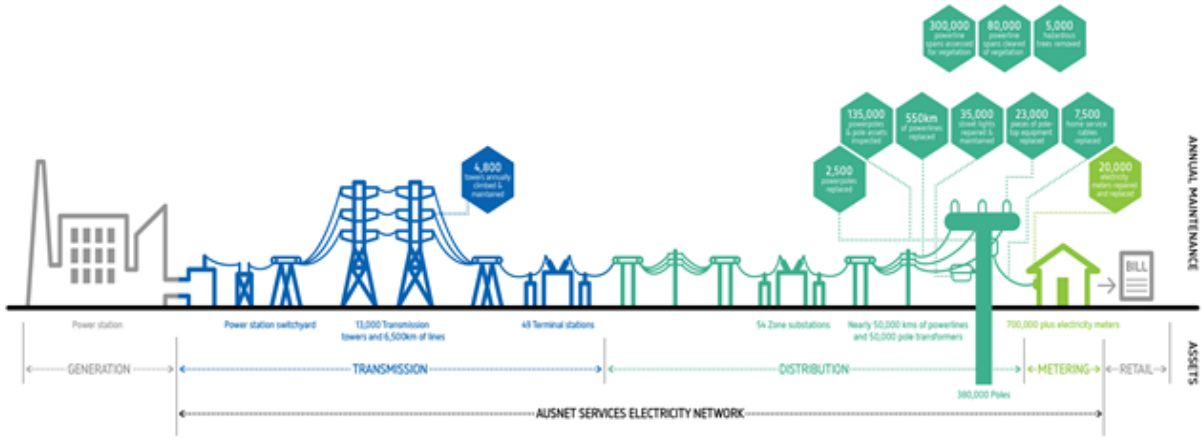
[2] AER, Better Regulation, Explanatory Statement Expenditure Forecast Assessment Guideline, November 2013, p. 81.

2 Transmission Arrangements in Victoria

2.1 Introduction

AusNet Services' transmission network operates at 500kV, 330kV, 275kV, 220kV and 66kV and includes those assets between the 'point of connection' with generators and distribution companies illustrated in the figure below.

Figure 1 – Facilities and Assets in the Victorian Electricity Transmission Network



AusNet Services' electricity transmission network includes more than 6,500 kilometres of transmission lines that transport electricity from power stations to electricity distributors and large customers.

Our TRR proposal will outline the planned projects, work programs and revenue we require to maintain and operate a safe, reliable and efficient transmission network that meets the long term needs of our customers and the wider community. This approach is consistent with the National Electricity Objective and the operating expenditure objectives and capital expenditure objectives in the NER. In preparing our expenditure plans, AusNet Services ensures that it complies fully with its legislative and regulatory obligations.

Expenditure is separated into capital expenditure (establishing new assets or extending the life of existing assets) and operating expenditure (ongoing costs). The methodologies for developing these forecasts are explained in chapters 3 and 4. The purpose of this chapter is to provide important background information on the major changes occurring within the energy system, the transmission arrangements in Victoria – which are unique in Australia – and AusNet Services' approach to asset management, which affects both capital and operating expenditure.

2.2 Energy system transformation

Australia's energy sector is undergoing an unprecedented transition to a lower carbon future. As traditional coal-fired generators retire, significant investment is taking place in alternative, renewable sources of generation such as large-scale wind and solar generation, supported by storage (such as batteries or pumped storage).

Historically, the generation mix in Victoria has predominantly been comprised of brown coal- and gas-fired generation, but this picture is changing. Traditional coal-fired generation in the Latrobe Valley, such as Hazelwood Power Station, is being replaced by renewable generation in other parts of the state. Existing renewable capacity is now comparable with coal, whilst proposed projects indicate the significant changes that are taking place, with solar and wind generation accounting for the majority of proposed projects.

While the changing generation mix is an important part of transitioning to a lower carbon future, it is also creating challenges for the transmission network. For example, wind and solar farms are most productive in windy and sunny regions, such as north-west Victoria. This has led to many generator connection applications far from the strong transmission backbone and interconnectors in areas which are in a relatively "weak" parts of the network.

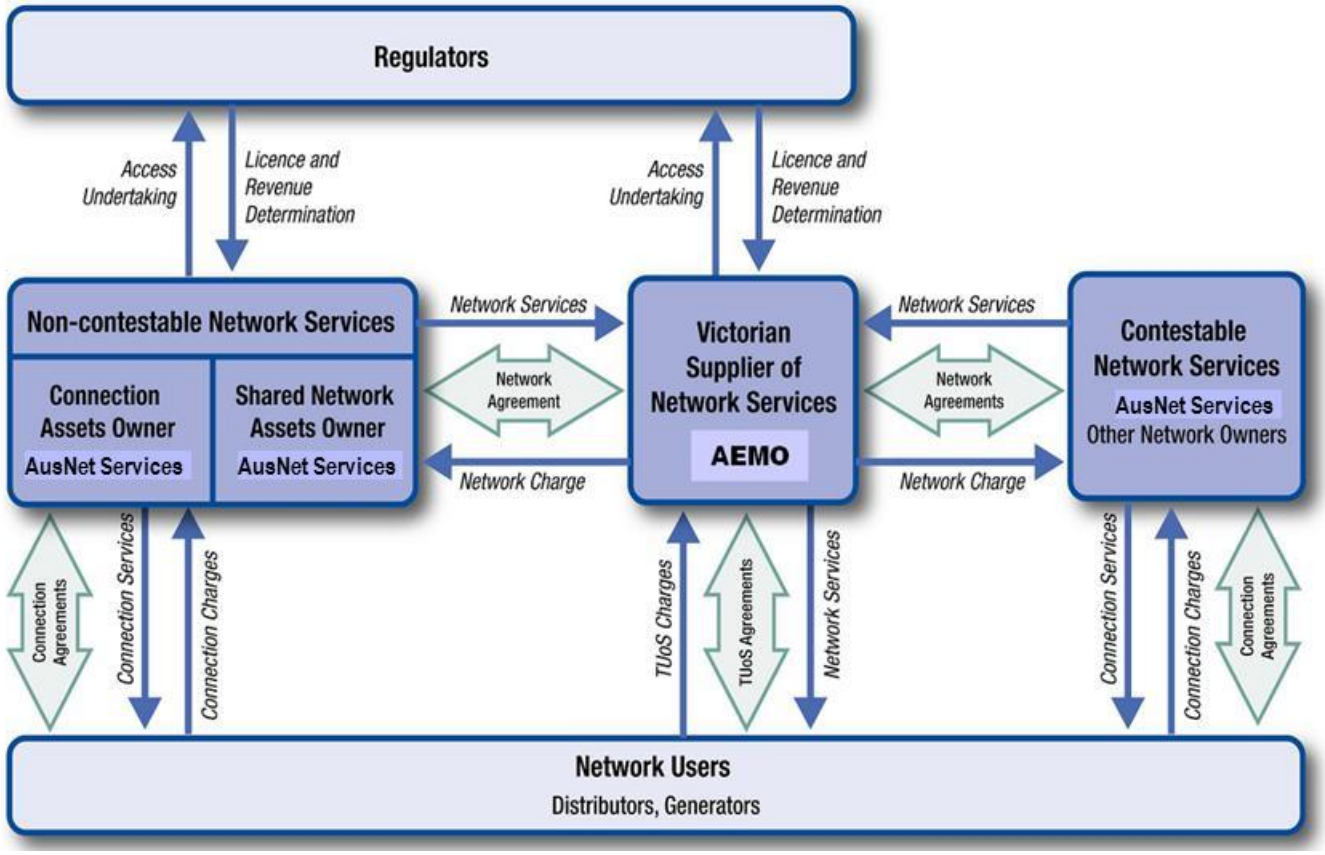
In the absence of more transmission investment, as generation on strong parts of the network such as the Latrobe Valley closes, the overall effect can be a less reliable and stable energy system. It can also result in situations where lack of transmission capacity means the lowest cost sources of new generation are unable to supply power to customers.

These are complex challenges to address. To understand and plan for the changes occurring throughout the energy system, AEMO publishes an Integrated System Plan (ISP) every two years. The ISP identifies which transmission upgrades are needed to allow new electricity generation to connect and reduce total (transmission and generation) costs for consumers, while maintaining a secure system.

2.3 Victorian planning arrangements

In Victoria, the transmission network planning functions are separated from network ownership and operation. These arrangements differ from other NEM jurisdictions, where planning and responsibility for augmentation is not separated from the incumbent transmission company (although independent planning oversight occurs in South Australia). The relationships between these parties and the regulators are shown in the figure below. These arrangements have implications for the definition of prescribed services, which are subject to the revenue cap.

Figure 2 – Institutional Arrangements for Victorian Transmission



Source: AusNet Services

The responsibilities of the parties within the Victorian arrangements for electricity supply are set out in Victorian legislation, the licences, guidelines and codes administered by the Essential Services Commission and Victorian derogations in Chapter 9 of the National Electricity Rules (NER). Together these describe the model for the procurement and provision of transmission services in Victoria.

The planning roles of AEMO and connected parties are summarised below.

2.3.1 Australian Energy Market Operator as planner and procurer of augmentations

Established on 1 July 2009, following the merger of VENCorp and NEMMCO, AEMO is a non-profit organisation responsible for planning and procuring augmentations on the shared transmission network. Its responsibilities include:

- procuring bulk shared network services from AusNet Services and other providers;
- providing transmission use of system services to transmission customers (including administering transmission pricing); and
- planning and requisitioning augmentation to the shared transmission network, to ensure existing and expected demand is met.

AEMO applies a probabilistic planning approach to reliability, whereby the costs of an improvement in reliability are compared with the assessed benefits of that improvement under different scenarios. In this way, every investment decision is made with regard to the degree of reliability that can be economically justified. An explicit value of customer reliability is a key input into this process.

To ensure consistency and minimise total costs to customers, AusNet Services and AEMO conduct joint planning to identify the most efficient and economic solutions to maintaining network reliability and security and accommodating growth. This includes consideration of overlaps between replacement and upgrade projects, as well as the ongoing need for existing assets operated and maintained by AusNet Services.

2.3.2 Connected Parties

In Victoria, parties connected to the transmission network are responsible for the planning and augmentation of their connection assets. Therefore, the five Victorian distribution businesses are responsible for planning and directing the augmentation of those facilities that connect their distribution systems to the shared transmission network. The Victorian distributors plan and direct the augmentation in a way that minimises costs to customers, taking into account distribution and transmission losses that occur within the transmission connection facilities.

Other connected parties (major consumers or generators) are responsible for their own connection planning, although they can choose to delegate this task to a distributor.

In the event that a new connection or an augmentation of an existing connection is required, the connected parties must consult with and meet the reasonable technical requirements of AEMO, AusNet Services and other affected parties.

Each year the Victorian distributors publish the Transmission Connection Planning Report that assesses the network planning criteria, the risks of lost load and options for meeting forecast demand.

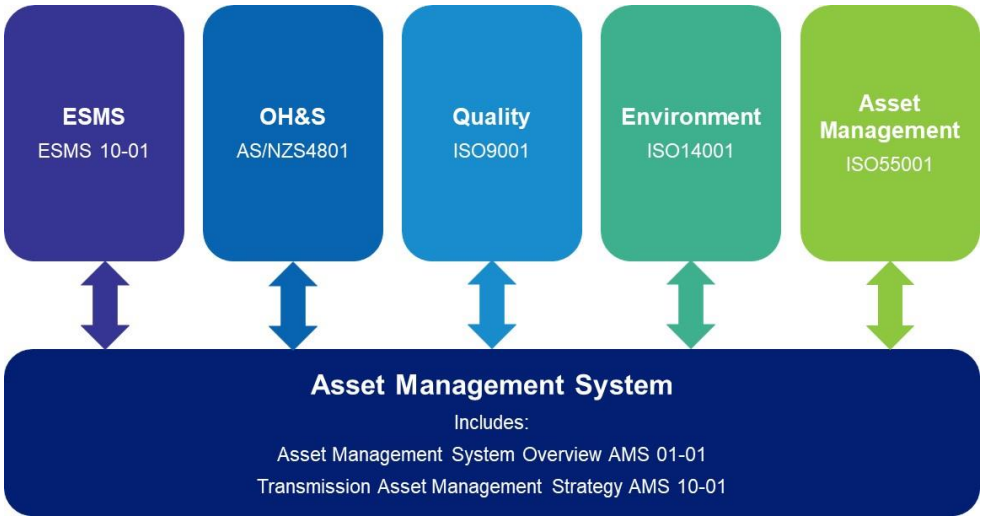
This document deals with how AusNet Services forecasts expenditure to replace transmission assets and maintain a safe and reliable transmission network. However, the wider challenges explained in section 2.2 and the network upgrades planned to address them do heavily impact on and interact with our own plans. In particular, the full benefits expected from the significant planned investment in new transmission interconnectors will not be realised without reliable existing transmission networks within each jurisdiction. Now more than ever, it is crucial to balance prudent and efficient investment to maintain reliability and safety with customer concerns around energy affordability.

2.4 Asset management system

AusNet Services is committed to providing a safe, efficient and reliable transmission network. In addition to our Electricity Safety Management Scheme (ESMS), which is approved by Energy Safe Victoria, AusNet Services maintains quality assurance over its Asset Management System through certification to AS/NZS 4801 – Occupational Health & Safety Management Systems, ISO 9001 – Quality Management Systems, ISO 14001 – Environmental Management System and ISO 55001 – Asset Management Systems.

The figure below depicts these policies, processes, procedures and standards, which together define our strategic objective of providing our customers with a safe and reliable electricity supply.

Figure 3 – Asset Management System Certification and Approval



AusNet Services' asset management policies, processes, procedures and practices provide important context for the expenditure plans and forecasts for the forthcoming regulatory period. In particular, the Asset Management System (AMS) aims to stabilise the risks associated with the electricity transmission network. Asset risk is expressed as the probability of asset failure (determined using asset condition data) multiplied by the impact of that failure on network safety, reliability and availability. This approach to asset management establishes an economic basis for evaluating investment decisions, which is discussed in further detail in Chapter 3.

AusNet Services was the first transmission company in Australia to obtain PAS 55[3] certification for its AMS. In early 2014 AusNet Services asset management practices were certified to ISO 55001, the internationally recognised successor to PAS 55. The adoption of ISO 55001 enables an organisation to achieve its objectives through the effective and efficient management of its assets. It is applied where physical assets are a critical factor in achieving business objectives and its application provides assurance that those objectives can be achieved consistently and sustainably over time. Organisations can get their asset management systems certified to ISO 55001 in a similar manner to other management systems, such as ISO 9001 and ISO 14001.

Certification demonstrates robust and transparent asset management policies, processes, procedures, practices and a sustainable performance framework. Certification is an indicator that AusNet Services remains an effective, efficient and competent asset manager able to demonstrate an industry leading approach to asset management.

2.5 Customer and stakeholder engagement

2.5.1 Value of Customer Reliability

AusNet Services' expenditure plans for the forthcoming regulatory period are underpinned by the AER's Value of Customer Reliability (VCR). The VCR represents the value consumers place on having a reliable electricity supply. The VCR was recently reviewed and updated by the AER in December 2019. In developing the values, the AER surveyed over 9,000 residential and business customers of various sizes and industries across eastern and south-eastern Australia and the Northern Territory. The VCRs developed by the AER are specific to climate zones and locations (regional or urban). We have used the latest VCR in developing our network investment plans, reflecting customers' current preferences regarding both price and reliability.

[3] British Standards Institute Publicly Available Specification PAS 55-1 Part 1: Specification for the optimized management of assets

2.5.2 TRR Customer Advisory Panel

To assist us in understanding customer preferences and concerns and reflecting these in our plans, a Transmission Revenue Reset Customer Advisory Panel was established in March 2019. The purpose of the Customer Advisory Panel is to provide feedback and advice on:

- Electricity customers' needs, issues and services and how these should be addressed or incorporated in our plans; and
- The findings and insights obtained through our Customer Experience Program.

Because we can talk and listen directly to all our transmission customers around one table – supplemented by consumer advocates and other stakeholders - we consider that a Customer Advisory Panel is an effective means of engagement on our transmission network plans. This will be supplemented by targeted deep dive sessions that we plan to run this year, prior to submission of our Revenue Proposal. These will be open to all interested stakeholders to attend.

The organisations represented on the Customer Advisory Panel are shown below. The membership reflects the diversity of customers and stakeholders that depend on the transmission network, including both customers that directly engage with the network and residential and commercial customers that do not.

Table 1 – Customer Advisory Panel Members and their Organisations

Organisation	Member type
St Vincent de Paul	Consumer advocate
Energy Users Association of Australia	Consumer advocate
Air Liquide	Direct connect customer
Ai Group	Consumer advocate
United Energy	Distributor
BlueScope Steel	Direct connect customer
Hydro Tasmania	Generator
Energy Consumers Australia	Consumer advocate
Jemena	Distributor
CitiPower/Powercor	Distributor
Alcoa	Direct connect customer

2.5.3 Customer Experience Program

Our company-wide Customer Experience Program is an important part of our move towards becoming a more customer-centric organisation. This is an ongoing program to improve customer experience. We have appointed Customer Service Benchmarking Australia (CSBA) as the independent research agency to conduct qualitative interviews with our transmission customers, some of which are also represented on the Customer Advisory Panel.

The purpose of these annual interviews is to gather feedback on how we engage with our transmission customers and how this could be improved. We are also interested in understanding our customers' current perceptions of affordability and reliability.

2.5.4 Direct Transmission Customers

As a transmission business, AusNet Services' direct customers are those parties whose facilities are connected to the shared transmission network – namely, generators, distributors and large users. AEMO is also a major

stakeholder, as AEMO acts as the provider of transmission use of system services in Victoria, and is responsible for planning and procuring new shared transmission network capacity, as well as connecting generators and customers to the shared transmission network.

AusNet Services liaises regularly with these customers on matters such as service performance, new works, and operational matters including issues relating to planned and unplanned outages. To assist with this, we recently established a team of dedicated customer relationship managers to provide a direct contact point for large users and proactively address customer concerns and issues. Regular meetings are now held.

Direct customers are also represented on the TRR Customer Advisory Panel and engaged with as part of the Customer Experience Program.

The table below summarises the scope and method of engagement with these groups.

Table 2 – Summary of Engagement with Transmission Customers

Customer	Issues for Engagement	Engagement Method
Victorian distribution businesses	New connections. Major connection augmentation projects. Community and stakeholder plans to manage delivery of projects.	Meetings on major projects (as required). Representation on Customer Advisory Panel Customer Experience Program
Generators	Connection to the transmission network. Connection charging. Outage planning for works at connection points.	Liaising in relation to charges, connection agreements and outages. Representation on Customer Advisory Panel Customer Experience Program
Directly connected consumers	Connection to the transmission network. Connection charging. Outage planning for works at connection points.	Liaising in relation to charges, connection agreements and outages. Representation on Customer Advisory Panel Customer Experience Program
AEMO	Connection to the transmission network. Shared network augmentation planning and projects. Planned and unplanned disruption issues. Development of the Network Capability Incentive Parameter Action Plan (NCIPAP).	Liaising in relation to connection agreements, system operation, outages and transmission augmentations. Meetings on major projects (as required). Invited to attend Customer Advisory Panel meetings Customer Experience Program

2.5.5 End-use Consumers

While not being direct customers of the transmission network, residential and commercial customers ('end use consumers') are increasingly interested in the cost and quality of electricity transmission services. To ensure these customers' views are reflected in our transmission network plans, we have considered the findings of the extensive end use customer research we conducted as part of developing our Regulatory Proposal for our electricity distribution network. The interests of end-use consumers are also represented by several members of the Customer Advisory Panel.

2.6 AER's assessment guideline

The AER's expenditure forecast assessment guideline provides an explanation of how the AER intends to assess whether forecast expenditure satisfies the NER requirements. For example, in relation to replacement capital expenditure, the AER explains its approach in the following terms:

> Replacement capex is typically incurred to address deterioration of assets, including works driven by reliability deterioration or as a result of an assessment of increasing risk. This type of capex is closely related to maintenance opex, so we will expect TNSPs to identify and explain potential work and efficiency trade-offs between these two expenditure categories.
>
> We will likely assess the level of forecast replacement capex by:
>
> - analysing information supporting the TNSP's building block proposal
> - benchmarking the TNSP's forecast capex with historical expenditure and/or the expenditure of other TNSPs
> - replacement expenditure modelling
> - detailed project review.[4]

AusNet Services welcomes the AER's guidance on its assessment approach. AusNet Services will ensure that its Revenue Proposal provides the AER with sufficient information to enable it to conduct its assessment in accordance with its guidelines. The expenditure forecasting methodologies described in this document provide the first step in this process. The detailed application of these methodologies, together with the supporting analysis and models, will be provided to the AER and other stakeholders in the Revenue Proposal.

[4] AER, Better Regulation, Expenditure Forecast Assessment Guideline for Electricity Transmission, November 2013, p. 18.

3 Capital Expenditure Forecasting

3.1 Objectives

AusNet Services' objectives are to ensure that its forecast capital expenditure complies with the NER and promotes the NEO. The relevant NER provisions are summarised below.

Clause 6A.6.7 requires AusNet Services to propose a total forecast capital expenditure for the relevant regulatory control period which it considers is required in order to achieve each of the following capital expenditure objectives:

- meet the expected demand for prescribed transmission services over the period;
- comply with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services;
- maintain the quality, reliability and security of supply of prescribed transmission services; and
- maintain the reliability, safety and security of the transmission system through the supply of prescribed transmission services.

The AER must accept the total forecast of capital expenditure if it is satisfied that it reasonably reflects the following capital expenditure criteria (capex criteria):

- the efficient costs of achieving the capital expenditure objectives;
- the costs that a prudent operator in the circumstances of the relevant TNSP would require to achieve the capital expenditure objectives; and
- a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives.

At a high level, therefore, AusNet Services' forecasting methodology is focused on identifying an overall program of capital work that will prudently and efficiently maintain the quality, reliability and security of supply of prescribed network services. This approach reflects both the NEO and the capital expenditure objectives and criteria in the NER.

In broad terms, AusNet Services relies on the following robust planning and governance processes to drive capital expenditure forecasts that comply with the NER requirements:

- Asset management practices, which deliver an optimal balance between quality, safety, reliability and security of electricity supply with price and efficient investment for the long-term interests of consumers.
- Asset replacement planning, based on a risk-based economic evaluation, is used to ensure the efficient timing of network investment.
- Investment decision-making practices are supported by a robust project governance framework, which incorporates continuous improvement to ensure projects are delivered at lowest efficient cost.

In addition to replacement capital expenditure, the forecasts must also include non-network capital expenditure, which comprises buildings and property, vehicles, other and IT. This category of capital expenditure provides essential support to the business.

3.2 Group 3 assets

AusNet Services' network capital expenditure forecast relates only to the replacement of shared transmission network assets and transmission connection assets, and excludes any expenditure to augment the transmission system. As explained in chapter 2, AEMO is responsible for planning the augmentation of the shared transmission network in Victoria, and the five Victorian distribution businesses have responsibility for planning the augmentation of transmission connections to their distribution networks.

In planning network replacements, AusNet Services will consult with AEMO and the Victorian distributors in relation to future network and transmission connection augmentations, in order to ensure that asset replacement and capacity augmentation works are optimised, and all opportunities for cost synergies are identified.

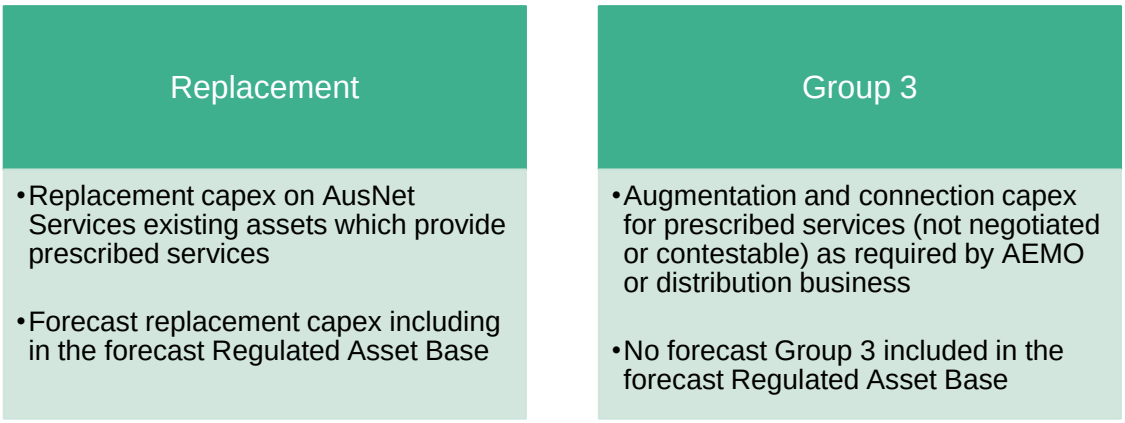
During any regulatory control period, AEMO or a distribution business may request that AusNet Services augments the transmission network or distribution connection service. Although these assets provide prescribed transmission services, they sit outside the regulated asset base and are governed by commercial contracts until the subsequent revenue determination, when they are rolled into the regulated asset base. AusNet Services refers to the assets that provide these services as 'Group 3 assets'.

At each revenue reset, Group 3 assets completed since the last revenue reset are rolled into the regulated asset base for the first time. The purpose of this process is to recognise those investments undertaken in the previous regulatory control period and ensure that AusNet Services earns an appropriate regulated return. These new additions to the regulated asset base are subject to the same rules regarding depreciation and escalation as other assets that provide prescribed transmission services. The regulatory arrangements governing the roll-in of these assets are set out in NER 11.6.21(c).

Given the roll-in process, the forthcoming Revenue Proposal will relate only to the provision of prescribed services as at 31 December 2019, being the practical cut-off date for the roll-in of existing Group 3 assets. Accordingly, the expected costs and revenues associated with the provision of any prescribed services above the level being provided as at 31 December 2019 will be excluded from the forthcoming revenue cap.

The figure below shows the different regulatory approach to replacement capital expenditure and Group 3 assets. Specifically, AusNet Services' forecast replacement capital expenditure is included in the regulatory asset base and remunerated through the revenue cap. As explained above, however, Group 3 assets are remunerated through commercial contracts initially and subsequently rolled into the regulated asset base.

Figure 4 – Replacement and Group 3 Capital Expenditure



Operating expenditure associated with the growth of the asset base due to Group 3 roll-ins will be forecast as part of the Revenue Proposal (discussed in chapter 4 of this document).

3.3 Overview of forecasting methodology

This section provides an overview of AusNet Services' capital expenditure forecasting methodology, which comprises replacement and non-network capital expenditure.

AusNet Services forecasting approach for replacement capital expenditure has two stages:

- Stage 1: Project based evaluation (bottom up); and
- Stage 2: Aggregation and efficiencies (top down).

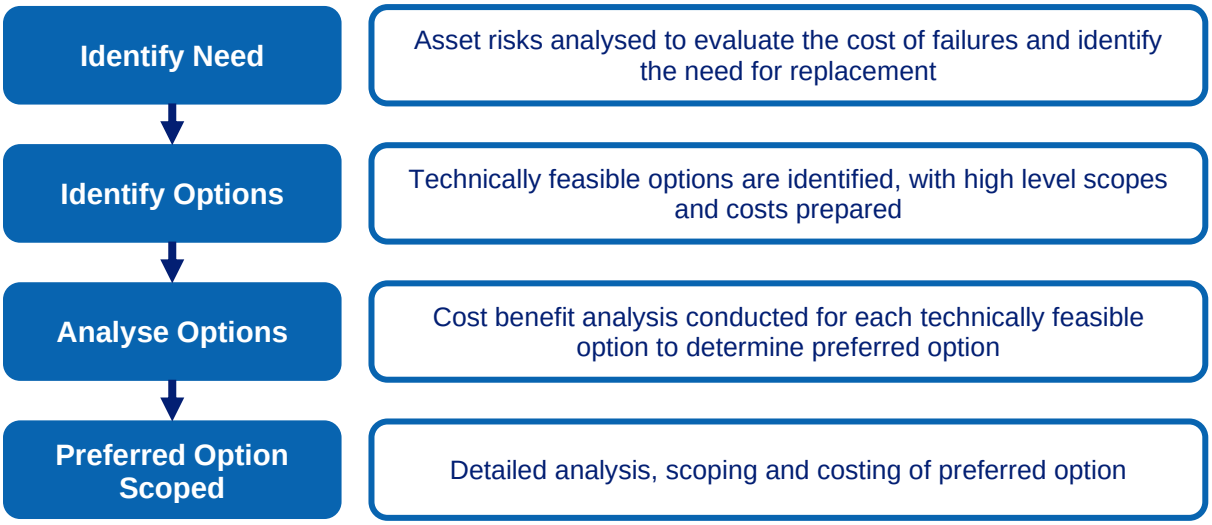
Each of these stages is described in turn. This section concludes with a description of AusNet Services forecasting methodology for non-network capital expenditure.

3.3.1 Project based evaluations

AusNet Services seeks to deliver optimal electricity transmission network performance at efficient cost by ensuring that all decisions to replace or maintain network assets are economically justified and appropriately consider all relevant criteria. The relevant criteria include safety, demand for network services, market impact, performance and condition of network assets, reliability and security of supply, technological advancements, the changing nature of generation and demand and the impacts of climate change on network assets.

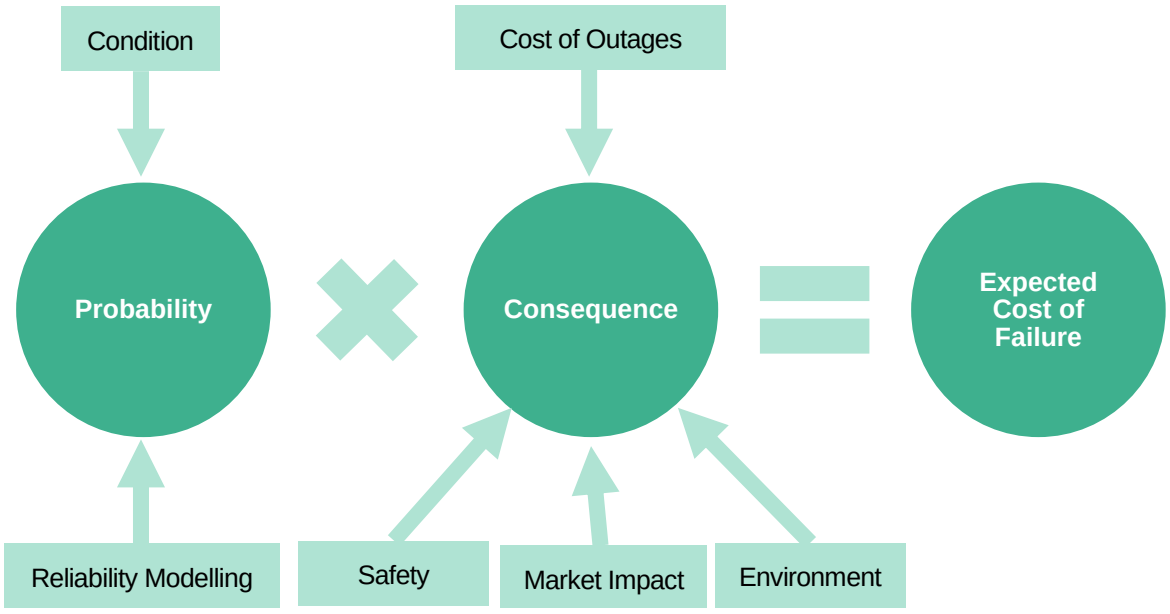
The figure below depicts the process for determining a project-based replacement decision.

Figure 5 – Project Estimates and the Bottom Up Forecast



The first step in the process is to evaluate the need for an asset replacement. This assessment is based on asset class modelling that identifies those assets that present the highest risk, based on asset condition and consequences of failure. This approach is an economic evaluation, which focuses on the expected cost of failure, as depicted in the figure below.

Figure 6 – Economic Evaluation Method



The next step is to examine the technically feasible options to address the identified risk. The costs and benefits (in terms of avoiding the expected costs of asset failure) of each option are examined. Any relevant feedback from stakeholders is taken into account in the evaluation process. The option that delivers the maximum net benefit, in Net Present Value (NPV) terms, is the preferred option.

Once the preferred option has been selected a detailed project scope and detailed project cost can be estimated. AusNet Services employs a detailed technical scope of works (refined from the preferred option) and current unit costs for installing the assets. This resulting cost estimate is the most likely cost of the project

and assumes the scope of work will not change during the detailed design and construction phases. The cost estimate does not capture likely changes in unit costs, but accounts for the expected cost of various project contingencies (estimated using Monte Carlo analysis).

The economic timing of the preferred option is established by comparing the annualised total cost of the selected option with the annual incremental benefits. S-curves model the cash flow of generic project types that are representative of the projects typically undertaken. Under this evaluation approach, the economic timing is identified as the point in time at which the annual incremental benefits just exceed the annualised cost. The economic timing reflects by when the preferred option must be implemented.

Sensitivity studies around the discount rate, VCR, asset failure rate and demand scenarios are conducted to test the robustness of the economic evaluation. This ensures that the proposed replacement capital expenditure is economic under a range of reasonable scenarios.

3.3.2 Aggregation and top down review

While project based evaluations underpin the replacement capital expenditure forecasts, a number of other factors are taken into account in developing a forecast for total replacement expenditure. In particular, a number of synergies and savings may become apparent as bottom up forecasts are aggregated. For example:

- Minor replacement works may be included in a major replacement project to attain synergies in project design, project management and project establishment costs.
- Project based replacements may be combined with AEMO's shared network augmentation requirements or the distributors' connection augmentation needs.
- Project timing is reviewed so that projects with highest expected cost of failure are addressed more quickly, while lower risk projects may be deferred.

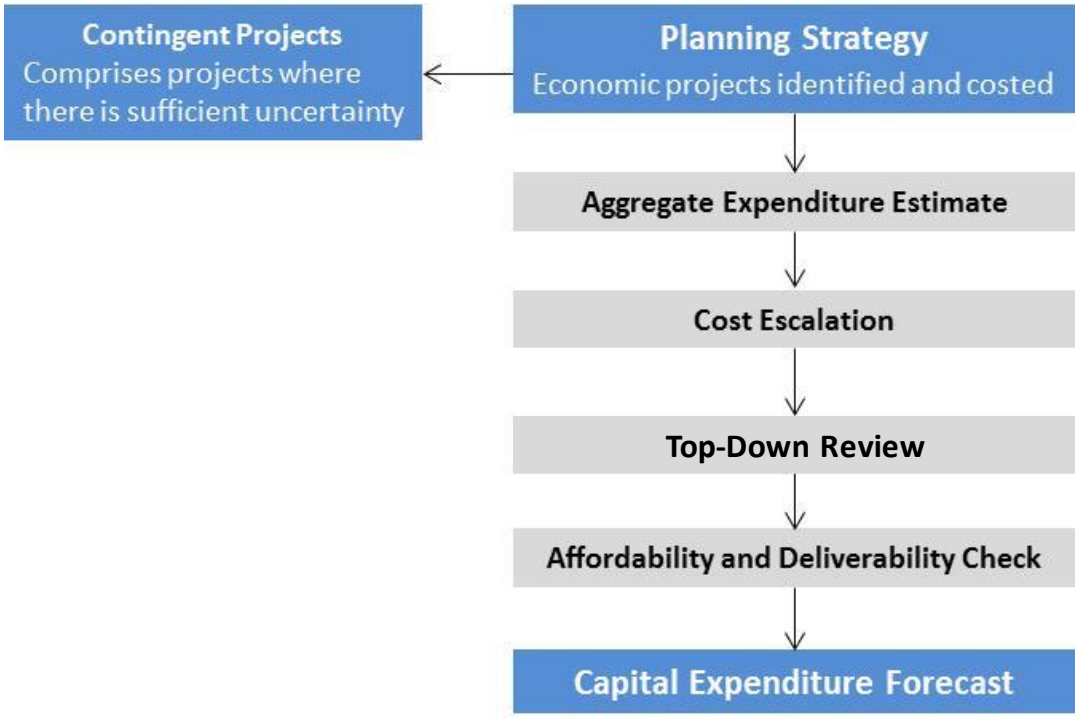
Where these savings are identified, they are reflected in the total replacement capital expenditure forecast.

In addition, the aggregation process also requires additional steps to ensure that the forecasts satisfy the NER requirements, including:

- The identification of contingent projects, which are projects that may not proceed in the forthcoming regulatory period;
- The application of consistent cost escalation assumptions for labour and material costs over the forthcoming regulatory period; and
- A review of the affordability and deliverability of the total replacement capital expenditure forecasts.

The figure below shows how the economic projects identified and costed on a bottom up basis (from stage 1) are subject to a series of adjustments and checks to determine the total forecast replacement capital expenditure.

Figure 7 – Capital Expenditure Forecasting Methodology



AusNet Services' assumptions and inputs to the forecasting methodology are discussed in section 3.4.

3.3.3 Non-network capital expenditure

In addition to replacement capital expenditure, AusNet Services must also forecast its non-network capital expenditure requirements. With the exception of corporate ICT systems, capital expenditure on non-network assets is generally recurrent in nature, which reflects the economic life cycles of each asset type. ICT expenditure is forecast based on AusNet Services' corporate ICT strategy. New or changed regulatory obligations, such as emerging cyber security requirements, can also influence the ICT forecast.

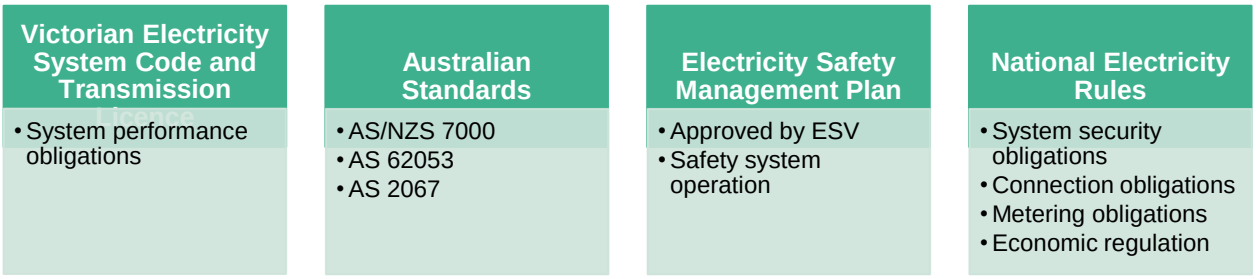
3.4 Assumptions and inputs

The key assumptions and inputs underpinning AusNet Services' capex forecast are outlined below.

3.4.1 Compliance with Laws, Codes and Standards

AusNet Services must comply with all applicable regulatory and legislative requirements. These requirements, which are summarised in the figure below, are key inputs to the forecasting methodology.

Figure 8 – Applicable Compliance Instruments



AusNet Services is also required to comply with health and safety, environmental and security obligations which impact on the design and operation of the network. These obligations and the related internal standards cover matters such as:

- safe access for work on towers;
- management of fire hazards;
- changes to the Occupational Health and Safety Act 2004 requiring additional reviews of safety issues at the design stage of a project and additional liability (and therefore cost) for designers;
- management of various pollutants and environmental effects (oil discharge, noise and greenhouse gas emissions); and
- physical security.

In addition, Clause 98 of the Victorian Electricity Safety Act 1998 imposes the following requirements on AusNet Services:

> A major electricity company must design, construct, operate, maintain and decommission its supply network to minimise as far as practicable –
>
> (a) the hazards and risks to the safety of any person arising from the supply network;
>
> (b) the hazards and risks of damage to the property of any person arising from the supply network; and
>
> (c) the bushfire danger arising from the supply network

These obligations have a substantial bearing on the level of forecast capital expenditure that will be incurred by AusNet Services in the provision of prescribed transmission services over the forthcoming regulatory control period. Pursuant to NER 6A.6.7(2), AusNet Services' capital expenditure forecast includes the forecast costs of complying with all applicable regulatory obligations or requirements associated with the provision of prescribed transmission services.

3.4.2 Demand Forecasts

Terminal station demand forecasts are used to assess load at risk under transformer or other asset outage conditions, and that assessment forms part of the economic evaluation of AusNet Services' asset replacement investment decisions.

AusNet Services uses the AEMO Transmission Connection Point Forecasts. This forecast, which was most recently released in November 2019, is AEMO's electricity maximum demand forecasts (active and reactive power) at transmission connection point level, over a 10-year outlook period. Sensitivity analysis for a number of input assumptions as well as demand forecast are used for the major stations projects to ensure that the replacement capex forecast is robust.

3.4.3 Value of Customer Reliability

As discussed in section 2.5.1, we will adopt the updated VCRs released by the AER in December 2019 in preparing our capital expenditure forecasts. The previous update was carried out by AEMO in 2014. The VCR's developed by the AER are generally similar to those published in 2014.

3.4.4 Asset condition reports

As already noted, asset condition is an important input in developing our replacement capital expenditure forecasts.

AusNet Services measures asset condition with reference to an asset health index, on a scale of 1 to 5. The 1 to 5 range of the index is consistent across all asset types and relates to the expected remaining asset life. The table below provides a simple explanation of the range of asset health assessments.

Table 3 – Asset Health Reporting

Health Index	1	2	3	4	5
Description	As new	Signs of wear	Starting to deteriorate	Deteriorating	Advanced deterioration

Various techniques are used to measure the health of different types of assets. The table below provides an overview of the condition assessment methods used for major asset types.

Table 4 – Condition Assessment Methods

Asset Type	Condition Assessment Methods
Transformers	Offline electrical testing Dissolved gas analysis SF_6 analysis
Power Cables	Visual inspection of cable joints for signs of corrosion
Insulators	Visual inspection for degradation
Circuit Breakers	Gas and oil sampling Offline electrical testing SF_6 analysis
Switchgear	Visual inspection for corrosion Thermal imaging
Conductors	Visual inspection for corrosion

AusNet Services will be relying on asset condition assessments to determine efficient capital expenditure requirements for the forthcoming regulatory period.

3.4.5 Failure risk ratings

Asset failure risk information flows from AusNet Services' Reliability Centred Maintenance (RCM) asset management techniques, which centre on asset condition (rather than age) to guide optimal replacement timing. This approach takes into account performance requirements and actual failure data to assign failure rates to individual network assets or classes of assets.

Failure Mode Effect Criticality Analysis (FMECA) based on historical asset performance data is undertaken to determine typical root causes of functional failures, and the resulting effects these causes have on key performance measures including network safety, reliability and availability. Asset condition data collected using the methods shown in Table 4 is used to determine dynamic time-based probability of failures and the remaining service potential of the asset in that lifecycle phase.

As illustrated in Figure 6 of Section 3.3.1, this probability of failure derived from the asset condition is multiplied by the consequences of failure to determine the expected cost of the failure, or the asset failure risk.

The consequences considered include:

- Loss of supply (using VCR, as per Section 3.4.3)
- Market impact
- Safety
- Environmental

In 2018 AusNet Services, in collaboration with other Victorian electricity networks, conducted a review of the methodology used to quantify safety risk, to ensure alignment with industry best practice. This review led to

several improvements and refinements to this methodology, which are now reflected in the models used by AusNet Services to determine the economic timing for asset replacement projects.

The safety impact is estimated using the value of statistical life published in the Australian Government's *Best Practice Regulation Guidance Note Value of Statistical Life*, a probability of consequence value to account for the fact that not every asset failure results in someone being injured, and a disproportionality value to account for the expectation of the community that more should be spent on reducing safety risks.

The environmental impact is valued based on historical environmental clean-up costs and a probability of consequence factor.

As noted in relation to asset condition assessments, AusNet Services will be relying on the accuracy of the failure risk ratings to determine the efficient capital expenditure requirements for the forthcoming regulatory period.

3.4.6 Unit rates and S-curves

The unit rates to derive project estimates will be established from internal standard costs, which will reflect the best available actual data. Forecast cost escalators will be applied to project estimates.

S-curves will be used to define the profile and timing of expenditure over the term of a major capital project. The S-curves applied by AusNet Services will reflect actual historic experience.

3.4.7 Cost escalators

Cost escalators for labour and materials will be applied after initial project estimates have been determined. When applying cost escalators, we will consider the most appropriate measures of cost escalation for the following inputs:

- Labour (internal);
- Labour (external);
- Materials, including aluminium, copper, steel, crude oil, construction costs;
- General labour and site labour.

The escalators will be supported by independent reports from suitably qualified consultants in combination with information that specifically relates to AusNet Services (such as Victorian-specific labour market factors).

The same escalators will be used in developing the operating expenditure forecast.

3.4.8 Capex efficiency

AusNet Services has a strong culture of continuous improvement when delivering its capital programs. As discussed in section 3.3.2, in preparing our forecast we will conduct a top down review to assess whether it is appropriate to include a portfolio-level saving.

3.4.9 Capex/opex trade-offs

AusNet Services recognises the importance of optimising capital and operating expenditure in order to minimise total asset life cycle costs. The objective of minimising asset life cycle costs is embodied in AusNet Services' Asset Management Strategy. AusNet Services' Revenue Proposal will explain how the forecast operating and capital expenditure interlink and describe any capex-opex trade-offs that are inherent in the expenditure forecasts.

3.4.10 Deliverability

AusNet Services tests its preliminary capital expenditure forecasts against deliverability considerations prior to finalising its forecasts. Specifically, AusNet Services considers:

- The funding implications of the proposed capital expenditure in the context of its commitments in relation to AusNet Services' electricity and gas distribution businesses; and
- The deliverability of the proposed program, in terms of resource requirements and scheduling of works.

3.4.11 Benchmarking

To the extent possible, AusNet Services will benchmark its capital and operating expenditure forecasts to undertake a top-down assessment of its forecasts and validate that these comply with the NER requirements. Where appropriate, bottom-up benchmarking using the AER's repex model will also be undertaken to validate the efficiency of elements of the capital expenditure forecast.

4 Operating Expenditure Forecasting

4.1 Objectives

As noted in relation to capital expenditure, AusNet Services' objective is to ensure that its forecast operating expenditure complies with the NER and promotes the NEO. The equivalent NER provisions relating to operating expenditure are set out in NER 6A.6.6.

4.2 Base-step-trend approach

The AER's expenditure assessment guideline explains that it prefers a 'base-step-trend' approach to assessing most operating expenditure categories. However, when appropriate, the AER may assess some operating expenditure categories using other forecasting techniques, such as by applying an efficient benchmark.

The base-step-trend approach commences by establishing an efficient base year, which is the starting point for estimating future operating expenditure requirements. The following process is applied to the base year:

- A trend or 'rate of change' is applied to reflect future changes in input costs, growth and productivity.
- Step changes may be added (or subtracted) for any other costs not captured in the base operating expenditure or the rate of change.
- Other costs that were excluded from the base year are incorporated.

AusNet Services proposes to adopt a 'base-step-trend' forecasting approach for operating expenditure. As explained the next section, the application of this approach has been adapted to reflect AusNet Services' particular circumstances and cost categories.

4.3 Operating expenditure methodology

For the purposes of forecasting operating expenditure, AusNet Services categorises expenditure as either controllable or non-controllable.

There are two main categories of controllable operating expenditure for AusNet Services' regulatory reporting purposes:

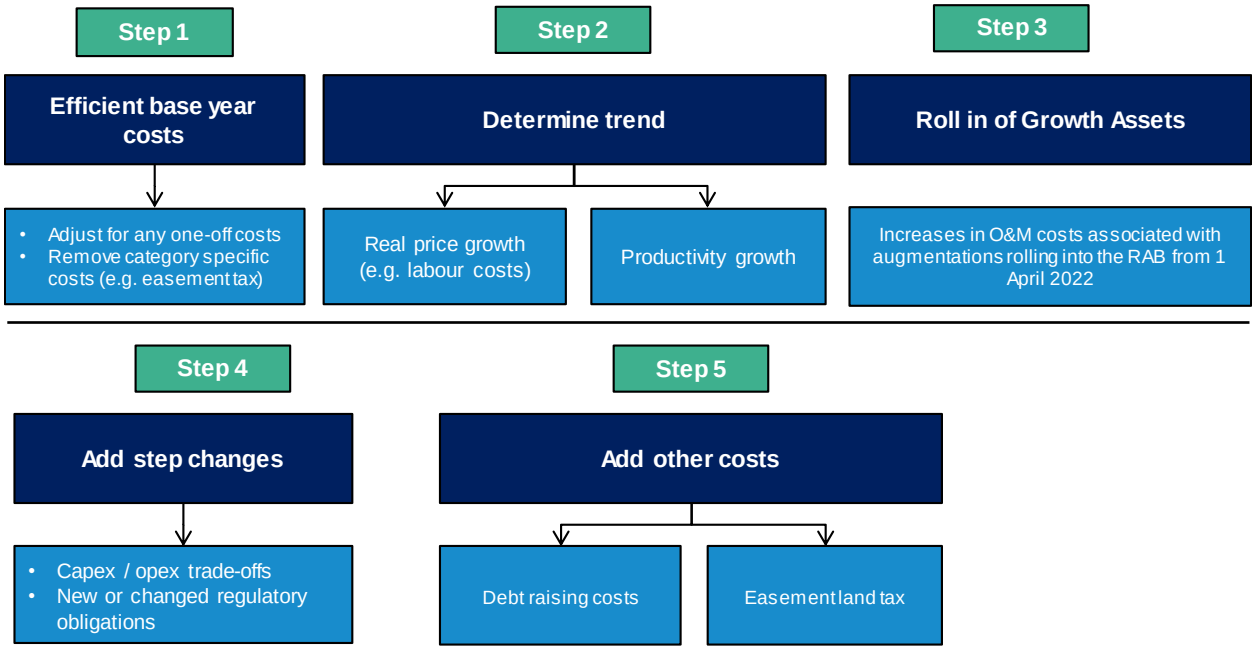
- Maintenance and operations – system recurrent costs directly attributable maintaining and operating the transmission network including maintenance and other costs such as insurance and taxes; and
- Corporate support – non-system recurrent costs that encompass activities and services which are not directly related to maintaining or operating the network including finance, Information Technology (IT) and Human Resources (HR).

The majority of controllable operating and maintenance expenditure will be forecast by applying cost escalators to a base year. The base year must be appropriately adjusted for the costs of one-off events in that year and scoped so that new functions or increased activities (e.g. to meet future compliance obligations or asset growth) are taken into consideration.

In addition to the controllable operating expenditure described above, AusNet Services also incurs non-controllable costs such easement land tax. These costs items must also be included in the forecast operating expenditure.

The figure below illustrates the forecasting methodology described above, which comprises five steps.

Figure 10 – Overview of Operating Expenditure Forecasting Methodology



Each step in the forecasting methodology will require a number of assumptions and inputs. AusNet Services' Revenue Proposal will provide a comprehensive explanation of each step and the basis for the resulting forecast. In the following section, AusNet Services highlights the issues that will be addressed in detail in the Revenue Proposal.

4.4 Assumptions and inputs

4.4.1 Step 1 – Efficient base year

The AER's assessment guideline explains its approach to assessing the efficiency of the base year in the following terms:

> The 'revealed cost' approach is our preferred approach to assessing base opex. If actual expenditure in the base year reasonably reflects the opex criteria, we will set base opex equal to actual expenditure for those cost categories forecast using the revealed cost approach. We will use a combination of techniques to assess whether base opex reasonably reflects the opex criteria. We will likely assess base year expenditure exclusive of any movements in provisions that occurred in that year.
>
> We intend to not rely on the expenditure of a particular base year when we identify material inefficiencies in that expenditure. In this case, we may adjust the base year or substitute an appropriate base year. When determining whether to adjust or substitute base year expenditure, we will also have regard to whether rewards or penalties accrued under the EBSS will provide for the TNSP and its customers to fairly share efficiency gains or losses.[5]

AusNet Services' Revenue Proposal will provide the AER with detailed information demonstrating the efficiency of the proposed base year.

4.4.2 Step 2 – Determine trend

As noted in relation to the forecast capital expenditure, AusNet Services will rely on a suitably qualified independent expert to forecast labour cost escalators for the forthcoming regulatory period. In relation to material cost escalators, the operating expenditure includes a wide range of costs ranging from field costs (protective clothing, minor tools, fuel and oil, fees and tolls, etc) to back-office costs (postage, freight and

[5] AER, Better Regulation, Expenditure Forecast Assessment Guideline for Electricity Transmission, November 2013, p. 22.

transport, cleaning, hospitality, office supplies, etc). Given the general nature of these costs, AusNet Services is likely to assume that these costs will increase at the same rate as CPI.

The overall rate of change to apply to the opex forecast is likely to include a productivity adjustment (based on an industry average) and the cost escalators determined in step 2.

These proposed adjustments will be explained in detail in AusNet Services' revenue proposal.

4.4.3 Step 3 – Roll in of Group 3 assets

As discussed in section 3.2, Group 3 assets will be rolled into the RAB at the commencement of the forthcoming regulatory control period. The growth in the asset base necessitates a commensurate increase in operating expenditure, associated with the on-going maintenance of these assets.

4.4.4 Step 4 – Step changes

A step change arises where business conditions change such that future recurrent operating expenditure will differ from historic levels, including new regulatory obligations or where operating expenditure can be efficiently substituted for capital expenditure. AusNet Services will provide evidence regarding the efficient cost of any step changes in its Revenue Proposal. AusNet Services will also demonstrate that the costs arising from the step change are not accounted for elsewhere in the operating expenditure forecast.

4.4.5 Step 6 – Other costs

AusNet Services will forecast each of the non-controllable cost elements (easement land tax and debt raising costs) by adopting a forecasting approach that is appropriate for each element.

5 Closing comments

This document has provided an overview of the methodology that AusNet Services proposes to use to prepare the forecasts of its operating and capital expenditure that will form part of its Revenue Proposal for the regulatory control period commencing on 1 April 2022. This document has been prepared in accordance with clause 6A.10.1B of the Rules.

AusNet Services considers that the forecasting methodologies set out in this submission will deliver expenditure forecasts that comply with the Rule requirements and, where possible, reflect customer views and concerns. AusNet Services' Revenue Proposal will set out the company's expenditure forecasts that result from the application of the methodologies described in this submission.