TasNetwork Combined Forecasting Methodology

Regulatory Control Period: 1 July 2019 to 30 June 2024

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Tasmanian Networks Pty Ltd (ACN 167 357 299)

Authorisations

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Responsibilities

This document is the responsibility of the Revenue Reset Team, Tasmanian Networks Pty Ltd, ABN 24 167 357 299 (hereafter referred to as "TasNetworks").

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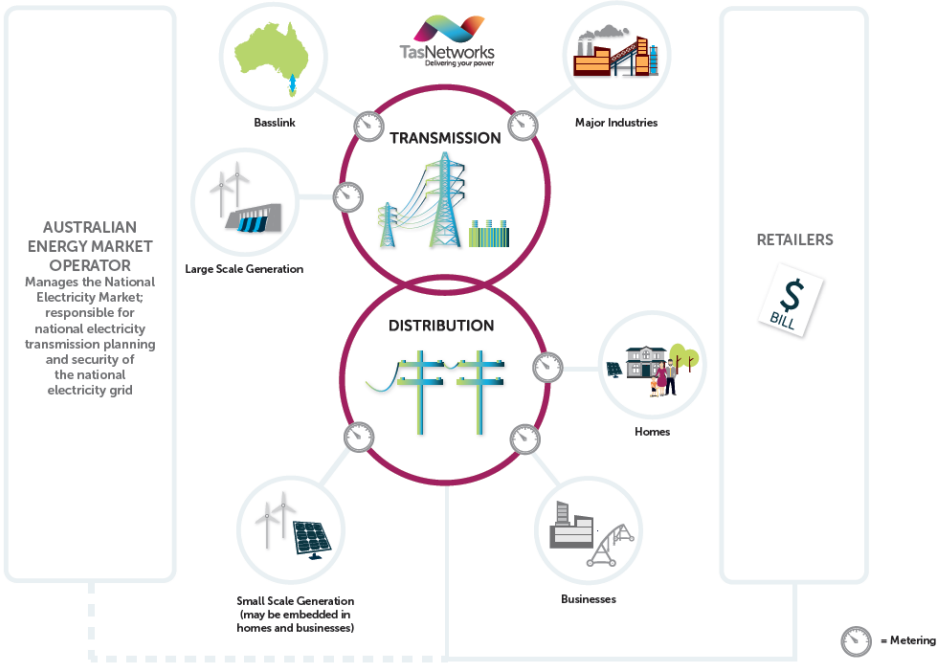
1 Introduction

Tasmanian Networks Pty Ltd (TasNetworks) is a State Owned Corporation that commenced operations on 1 July 2014 by bringing Tasmania's electricity distribution and transmission networks into one network business.

We own, operate and maintain the network that delivers electricity to more than 280,000 households, businesses and organisations on mainland Tasmania. Our core business is providing safe, reliable and efficient electricity transmission, distribution and telecommunication services in a national market. Our role in the electricity supply chain and our customer service relationships are shown below.

TasNetworks' customer service relationships



The Australian Energy Regulator (**AER**) is responsible for regulating the revenues that we earn, in accordance with the National Electricity Rules (**the Rules**). The AER will shortly commence a review that will determine our revenues for the five year period commencing on 1 July 2019. As part of the review process, we are required to lodge this submission to explain how we intend to forecast our expenditure requirements in the forthcoming review. If our forecasting approach is amended in our Regulatory Proposal[1], which will be lodged in January 2018, we will explain how and why it has changed.

The primary purpose of this document is to engage with the AER on our expenditure forecasting methodologies and thereby support the AER's subsequent assessment of our expenditure forecasts.

[1] Strictly speaking, we are required to submit a 'Revenue Proposal' in relation to transmission services and a 'Regulatory Proposal' in relation to distribution services. For convenience, we will refer to our submission as our 'Regulatory Proposal.'

This submission will also assist customers and stakeholders in understanding our forecasting approach and engaging in the review process.

We have previously adopted individual expenditure forecasting methodologies for our transmission and distribution activities, which have been subject to separate AER reviews. From 1 July 2019, however, the AER will review our transmission and distribution activities together, thereby recognising that we operate as one business. We welcome and support this development.

As one business, subject to a combined AER review, it is appropriate to develop a common forecasting methodology that only distinguishes between transmission and distribution where it is necessary to do so. In developing our common forecasting methodology, we have built on our earlier forecasting methodologies for transmission and distribution, which were accepted by the AER. This Forecasting Methodology meets TasNetworks' obligations under Chapters 6 and 6A of the Rules.

We have also developed a common cost categorisation that reflects how we operate and will assist the AER, customers and stakeholders in better understanding our business and cost drivers. The cost categorisation also allows easy mapping to the Regulatory Information Notices framework.

The remainder of this document is structured as follows:

- section 2 provides an overview of our approach to consulting with our customers and meeting the Rules requirements;
- section 3 provides an overview of our asset management and investment governance framework;
- sections 4 and 5 describe our proposed capital and operating expenditure forecasting methodologies respectively; and
- section 6 sets out brief closing comments.

2 Meeting our customers' needs and the Rules requirements

Our objective is to ensure that our forecast expenditure addresses our customers' needs, complies with the Rules and is approved by the AER. In particular, the Rules require that we propose operating and capital expenditure forecasts that achieve each of the following objectives:

- meet the expected demand for regulated services[2] over the regulatory period;
- comply with all applicable regulatory obligations or requirements associated with the provision of regulated services;
- maintain the quality, reliability and security of supply of regulated services (or otherwise satisfy an applicable regulatory obligation); and
- maintain the reliability, safety and security of the transmission and distribution system through the supply of regulated services.

The AER must accept our total expenditure forecasts if the AER is satisfied that the forecasts reasonably reflect:

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

Our expenditure forecasts must also comply with the following cost allocation principles:

- expenditure must be properly allocated to the relevant category of network services[3] in accordance with the principles and policies set out in our Cost Allocation Methodology (**CAM**); and
- expenditure must not include any amounts relating to a contingent project[4].

In addition to ensuring that we comply with these Rules requirements, it is essential that our expenditure plans reflect our customers' price and service preferences. We are striving to ensure customers are integral to our planning and investment processes, and hence our expenditure plans. We are also conscious that we can play a key role in managing electricity prices by finding better ways of delivering the service outcomes that our customers expect.

We have undertaken significant consumer engagement activities during our most recent transmission and distribution reviews. This engagement has enabled us to much better understand our customers' preferences and concerns. We have undertaken a range of activities to gather feedback, and to understand the issues that are important to our customers. The key messages

[2] 'Prescribed transmission services' in relation to transmission and 'standard control services' in relation to distribution.
[3] In accordance with the requirements of clauses 6A.6.7(b)(2) and 6.5.7.b(2) of the Rules.
[4] As determined by the AER in accordance with clauses 6A.8.1(b) and 6.6A.1(b) of the Rules.

emerging from the customer engagement are summarised below.

From a Distribution customer perspective the common themes were:

- maintain the same level of reliability at the same cost – don't want prices to rise;
- more education and awareness needed about TasNetworks' role in the supply chain and how pricing works;
- offer personalised services and more customer choice;
- timely communications through the use of multiple methods – doesn't matter that the power is out, just want to know for how long; and
- better metering to allow data analysis to show comparisons if customers change tariffs.

From a Transmission direct connect customer perspective the common themes were:

- Load customers:
  - sustained low cost is important for future forecasting and future viability;
  - greater risk to business if power is interrupted and although reliability is good, this is still a key focus;
  - keen to see TasNetworks demonstrate benefits and efficiencies resulting from the investment in technology;
  - positive feedback received in regards to how costs have remained stable over the past few years; and
  - engaging with customers before making investment decisions which may impact their price has been appreciated so they can decide on business risk.
- Generation customers:
  - supporting renewable energy at the lowest cost while ensuring energy security is maintained is important.

Our forecasting methodologies will ensure that our customers' feedback is reflected in our plans. We will continue to engage with customers and stakeholders as we approach the forthcoming review to ensure that we remain focused on their issues and priorities.

In developing our forecasting methodology, we have taken on board customer feedback that we need to improve the way we communicate with stakeholders on how we are innovating and embracing new technology. Given this feedback, we have introduced a new capital expenditure category called 'innovation', which covers both network and non-network activities. By introducing this new cost category, it will provide further impetus and focus on company-wide initiatives to embrace technology change and drive innovation – and a mechanism to communicate these initiatives to our customers and stakeholders.

3 Asset management and investment governance

At TasNetworks, we manage our assets in a way that satisfies the national electricity objective, and therefore serves the long term interests of our customers. We operate under a Statement of Expectations issued by our shareholders, the Tasmanian Treasurer and the Minister for Energy. This statement reinforces our obligations to customers under the national regulatory framework. It also notes that we are expected, amongst other things, to[5]:

- deliver the lowest sustainable prices for regulated services to our customers;
- ensure an appropriately safe, reliable and secure electricity supply is provided for customers; and
- minimise operational and capital expenditure outlays through improved operational efficiency and asset management strategies.

We continue to work hard to strengthen our asset management, risk management and expenditure governance frameworks. We seek continual improvement in our asset management capability through a five-step asset management process model, which focuses on:

1. gathering and synthesising accurate data on our assets and their condition;
2. improving our analysis to support more efficient decision-making;
3. prioritising our activities and producing efficient works programs that coordinate activities and optimise resources across reactive maintenance, routine maintenance and construction;
4. managing the delivery of the work programs; and
5. delivering the programs efficiently.

Our asset management processes and systems ensure that network risks and costs are analysed and optimised across network activities and programs including reliability assessment, network augmentation, customer connections, asset replacement, asset operation, and asset maintenance. In turn, the consideration of risks and costs underpins our forecasts of efficient operating and capital expenditure. A brief overview of our approach to expenditure budgeting and governance is provided below.

In formulating our capital and operating expenditure budgets, projects in the capital works program and operating and maintenance work plan are considered together to optimise cost and timing. Specifically, we consider the interaction between our planned projects and programs of work, and we optimise the overall work program having regard to considerations including risk, overall cost, timing, and availability of cost effective resources.

This optimisation may result in us combining some projects into complex projects, and timing the work so that customer constraint costs, network availability, and delivery priority are considered

[5] Clause 4.2, paragraphs (i) to (iii).

and balanced efficiently. It may also result in some projects or programs being reduced to ensure that customer, shareholder and business requirements are met. Our forecasting methodology recognises this optimisation process by applying a 'top down' discipline to initial forecasts that are developed on a 'bottom up' basis.

Our operating and capital expenditure forecasting, budgeting and delivery processes are supported by a well developed Gated Investment Process Framework[6]. The framework ensures that our expenditure program is optimised and managed to achieve the most effective and efficient use of our capital and operating resources. The capital investment review team oversees the application of and compliance with the framework.

As noted in section 2, an integral element of our expenditure governance process is the work we undertake with our customers to ensure that their needs and priorities are reflected in our planning. We value the feedback we receive from our customers, and our customer engagement process is a key input to developing our expenditure forecasts. Our approach to customer engagement is continuing to develop, as we reflect the 'voice of the customer' in our decision making.

We will provide full details of our asset management, associated risk management and expenditure governance frameworks in our Regulatory Proposal.

[6] TasNetworks Gated Investment Process Framework, 2016.

4 TasNetworks' capital expenditure forecasting methodology

4.1 Key drivers

Capital investment in the Tasmanian electricity network is driven by a range of factors, which can be broadly summarised as:

- new customer and generator connections;
- the requirement to meet mandatory compliance obligations including technical, safety, physical security and environmental obligations;
- the requirement to meet reliability and quality of supply standards;
- managing the condition and reliability of assets;
- meeting the preferences expressed by our customers in terms of service standards, and any trade-off between the price and standard of services; and
- the impact of load and generation changes, including changes in generation patterns or changes in connection arrangements which require increases in the network capacity.

These drivers are central to the development of our expenditure forecasts.

4.2 Key variables and assumptions

The following are key variables and assumptions that are expected to underpin our capital expenditure forecasts:

- We will assess the demand forecasts, together with existing and forecast generation sources to identify emerging issues in the network.
- We will meet our compliance obligations, including those relating to reliability requirements, physical security, safety, environment and other matters. The impact of known regulatory changes on our future capital expenditure requirements will be reflected in the expenditure forecasts.
- Our investment evaluation is supported by well-documented project and program scopes and good estimating practices that reflect efficient costs and therefore provide a reasonable basis for projecting future capital expenditure costs.
- We will apply an estimate of forecast labour and non-labour escalation rates and inflation for the forthcoming regulatory control period.
- We will provide a forecast productivity improvement factor and cost savings which assume that our operating environment, including external factors beyond our control, will be conducive to achieving the anticipated improvements.

- We may undertake further refinement of the forecast volumes and costs at the category level if the consolidated forecast (or the price/service outcomes flowing from the forecast) are inconsistent with customer, corporate, workforce capability or regulatory expectations.

A number of these assumptions are discussed further below.

4.2.1 Forecast Demand and Generation

Network development needs and the optimal timing of solutions may be sensitive to rates of load growth and generation developments in different areas of Tasmania. We work with our customers and AEMO to understand the range of possible inputs and future developments. Our network development plans and capital expenditure will incorporate sensitivity analysis as appropriate.

4.2.2 Compliance obligations

We must meet a range of compliance obligations. In particular, our Regulatory Proposal will be based on a works program planned to meet the requirements specified in the Rules and Tasmanian electricity supply industry law and regulations.

4.2.3 Investment evaluation summaries

We prepare investment evaluation summaries; including scopes and supporting information for each program and project included in the future capital expenditure works program where materiality thresholds are met, to allow estimation of future project costs. The scopes and unit prices / or estimates are based on historical data and reasonable assumptions about future requirements, given the best information available to us at the time.

4.2.4 Real Cost Escalators

We will assess the likely changes in labour, materials and contractor costs over the regulatory control period. The cost escalators (if any) will be determined based on market data and economic analysis. We usually engage external technical experts to provide advice on this matter.

4.2.5 Forecast productivity improvement factor and cost savings

Our forecast will reflect the expected capital expenditure efficiency gains. Details of these expected gains will be provided in our Regulatory Proposal.

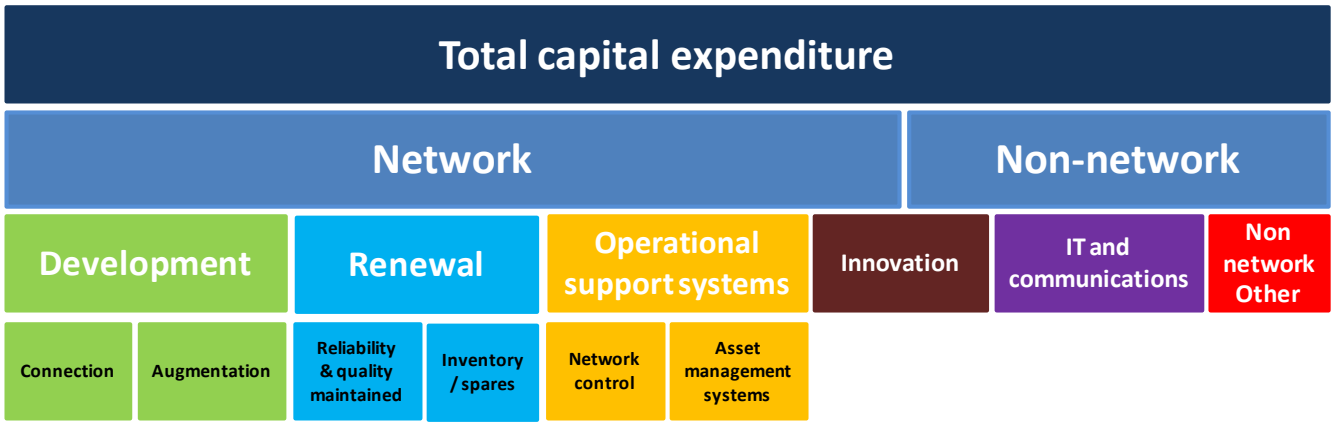
4.3 Capital expenditure categories

The Rules require us to present our expenditure forecasts with reference to *well accepted categories of expenditure*[7]. As a practical matter, we also recognise that our forecasts should be presented in a manner that assists the AER, customers and stakeholders in the review process. In particular, we seek to present information in a manner that our customers and stakeholders can readily understand. We must also prepare information in accordance with the AER's requirements, including its Regulatory Information Notices.

[7] As required by Schedules S6.1.1(1) and S6A.1.1(1) of the Rules.

Our capital expenditure forecasts are typically determined at an expenditure category level and aggregated, and then subject to a 'top down' review. As already noted, we apply a common set of capital expenditure categories across distribution and transmission activities, as shown in the figure below.

Figure 1: TasNetworks' capital expenditure categories



The table on the following page defines each of the capital expenditure categories.

Table 1: Categories of capital expenditure

Category	Sub-category	Definition
Network		
Development	Connection	Works to either establish new customer connections or to modify existing connections to our network.
	Augmentation	Works to enlarge the system or to increase its capability to transport electricity.
Renewal	Reliability and quality maintained	Works to replace or refurbish network assets in order to maintain reliability and quality of supply or meet regulatory obligations and compliance requirements.
	Inventory/spares	Network assets acquired to enable timely response to asset failures in accordance with our network performance requirements and good electricity industry practice.
Operational support systems	Network control	Works required to create or replace operational support systems which are required for efficient operation of the system including SCADA.
	Asset management systems	Works required to create, replace or improve asset management business processes, business systems, and associated tools and software.
Innovation	Investments in new technology that facilitate the efficient achievement of the capital expenditure objectives specified in the National Electricity Rules, in accordance with our Innovation Strategy. Innovation expenditure may include network or non-network assets	
Non-network		
IT and communications	Works to develop and maintain corporate IT capacity and to improve the functionality of IT systems to support business needs in line with good electricity industry practice.	
Non network Other	Works to procure, replace or upgrade non-system assets including land, buildings, vehicles and minor assets in line with business needs.	

Our total capital expenditure is derived by aggregating expenditure forecasts developed for each category of expenditure.

At each stage of the forecasting process we begin by considering our customers' feedback and preferences, in addition to our regulatory and legal obligations. Each forecast is also subject to a 'top down' check and validation process to ensure that the forecast is reasonable. The validation process includes comparisons with historic expenditure and, where appropriate, applies the AER's 'Repex' and 'Augex' models to relevant work programs or projects.

Sections 4.4 to 4.10 set out the methodology used to derive these forecasts.

4.4 Development capital expenditure

The Development expenditure category comprises:

- Connection capital expenditure; and

- Augmentation capital expenditure.

4.4.1 Connection capital expenditure

This category consists of capital expenditure resulting directly from the connection of new customers to the transmission or distribution network, or changes to existing connections, where the associated activities are primarily due to meeting the specific requests of customers. We receive funding directly from some customers (up-front) towards their connection, in accordance with our distribution services customer connection policy.

It should be noted that new generation connections to the transmission network are classified as 'negotiated services' and are excluded from the AER's revenue determination. It should be noted that some augmentation of the shared transmission network may also be undertaken as part of this connections and considered a prescribed service.[8]

Our forecasting methodology for Connection capital expenditure is summarised below:

Step 1 Forecast customer numbers by connection type:

- industrial (transmission connections only and accounting only for committed projects);
- irrigation;
- commercial;
- residential; and
- subdivision.

Step 2 Identify current unit / project costs based on the cost of undertaking similar recent investments.

Step 3 Determine expenditure by multiplying volumes (programs of work and individual projects) in step 1 by unit costs in step 2.

Step 4 Validate the expenditure forecast by comparing our historical and forecast expenditure.

4.4.2 Augmentation capital expenditure

Augmentation capital expenditure is associated with the construction of network assets to ensure that there is sufficient capacity to transport electricity from where it is generated to meet our customers' electricity demand and / or improve the security of the network. This expenditure relates to capital works that will provide sufficient network capacity to deliver the following outcomes:

- compliance with regulatory obligations to meet reliability, security and quality of supply standards; and

[8] Transmission Connection and Planning Arrangmeents Final Determination 23 May 2017, AEMC final rule change

- reliability and security of supply outcomes that meet customers' needs, by maintaining asset utilisation rates at appropriate levels, at the lowest whole of life cost.

If appropriate augmentation work is not undertaken customers will face increased risk of load shedding, either because there is insufficient network capacity at peak times or as a result of asset failure. For the transmission network, capacity issues may also arise as a result of changes in generation patterns, driven by increases in large scale renewable generation and small scale embedded generation.

Maximum demand forecasts are an essential input to identify emerging issues and develop early strategies to address them. Our intention is to develop the network in a prudent manner to deliver an effective and efficient, least-cost, secure and reliable network.

Power quality compliance is particularly challenging, partly due to the rapid increase in embedded generation. The management of power quality therefore requires specific capital investment, particularly for monitoring localised performance and upgrading feeders, transformers and voltage regulators where required.

We consult regularly with our customers on emerging network issues and potential solutions. Amongst other things, the Annual Planning Report summarises the performance of the transmission and distribution networks, the existing and potential future issues for the networks, and the potential network and non-network solutions to the issues. The Annual Planning Report invites customers and other industry participants to provide feedback and information on potential solutions to issues. We hold forums with customers across Tasmania to explain the key points of the Annual Planning Report. We will also consult with specific customer groups that may be affected by a particular project.

Our forecasting method for augmentation capital expenditure comprises the following steps:

Step 1 Identify network issues

Undertake network analysis and utilise consumer consultation input to identify areas with network capacity issues.

For the transmission network, this analysis typically includes:

- analysis of real time system performance (including load flows and system security);
- modelling of system performance for the transmission system during and after contingent events (including load flows and system security for a range of load and generation scenarios); and
- assessment of the adequacy of the networks performance and capacity to meet future obligations.

For the distribution network, the analysis may consider:

- High voltage network reinforcement to improve the performance of the poorest performing reliability communities and worst performing feeders;
- Capacity constraints on high voltage and low voltage feeders, which may be addressed through reinforcement or load transfers;
- Measures to reduce the risk or impact of outages by, for example, improving operational flexibility;
- Upgrades to distribution transformers to address capacity issues; and
- Measures to address worst served customers on low voltage feeders, installation of control stations and installation of bird diverters.

Step 2 Establish a 'needs' case

Each project is developed following a detailed analysis of the 'needs' case, and a cost-benefit analysis of the feasible options. The options analysis will include a consideration of credible, non-network alternatives.

Depending on the timing of action and the magnitude of the potential expenditure, we will also conduct a Regulatory Investment Test (RIT) (known as the RIT-T for transmission projects or RIT-D for distribution projects) as part of the forecasting process.

Step 3 Project selection and validation

The cost benefit analysis in stage 2 determines the preferred solution, which may be 'do nothing'; or a network project/program or a non-network alternative.

Depending on the nature of the augmentation, the forecast expenditure will reflect

- the required work volume multiplied by the unit cost; or

- project/program estimates based on the cost of undertaking similar recent investments and/or design estimates.

The proposed augmentation expenditure is subject to a 'top down' review, which will consider historic expenditure; portfolio efficiencies and benchmarking analysis. Where appropriate, the proposed projects/programs are also validated against the AER's Augex model.

4.5 Renewal capital expenditure

This expenditure category comprises;

- Reliability and Quality Maintained; and
- Inventory/spares.

4.5.1 Reliability and Quality Maintained capital expenditure

The key Reliability and Quality Maintained expenditure drivers are:

- asset condition and risk;
- asset performance;
- spares availability and product support;
- technical obsolescence;
- compliance with regulatory obligations relating to safety, network reliability and security, quality of supply and environmental performance; and
- physical security.

We use our asset management system and asset information to identify the potential need for network renewal expenditure. As noted in section 3, our asset management system enables us to manage network assets by balancing cost, risk and performance in the delivery of a reliable and quality service to our customers. An overview of our asset management system is provided in our Strategic Asset Management Plan.

Risk is a principal driver of expenditure within the Reliability and Quality Maintained category. Risk management approaches for each asset class are detailed in the specific overarching asset management plans. We have comprehensive condition assessment and performance monitoring regimes in place for selected asset classes that provide us with a detailed understanding of the condition and performance of our assets.

We apply a combination of bottom up and top down forecasting techniques, which vary depending on the asset class.

Step 1 Determine the forecast volume of work to meet requirements.

The volume forecast for replacement capital expenditure is derived and verified through the following methods:

- asset-specific condition assessment;
- asset life and failure rate modelling;
- trending of historical volumes;
- reliability centred maintenance; and
- benchmarking/validation.

The choice of forecasting technique depends on the nature of the asset and the quality of available data. For example, for transmission and zone substation transformers, which are high cost, critical assets, a more sophisticated forecasting technique is warranted. For other assets, such as service line replacements, extrapolation of historic trends is appropriate. The choice and application of forecasting technique also has regard to previous practice and the accuracy or otherwise of those forecasts.

In each case, we conduct a benchmarking/validation approach, which has regard to the historic volumes, benchmarking information, and where appropriate, the AER's repex model. In all cases, a 'bottom up' assessment is combined with a 'top down' review to ensure that the forecasts are robust.

Step 2 Determine the appropriate unit cost/ project costs, having regard to historic costs and expected changes over the forthcoming regulatory period.

Step 3 Determine expenditure by multiplying volumes in step 1 by unit costs in step 2, or complete project estimates for specific individual projects and programs.

Step 4 Complete options analysis for projects and programs based on the cost of undertaking similar recent investments. This enables a preferred solution and associated project estimate to be determined.

4.5.2 Inventory/spares

The availability of spare assets and spare parts (together with adequate product support from manufacturers) has a significant impact on network performance, particularly in the event of asset failure. We maintain a comprehensive inventory of spare assets (principally,circuit breakers, current transformers, voltage transformers, spare relays) to enable us to respond rapidly and efficiently to asset failures or unforeseen rapid deterioration in the condition of critical assets.

In addition, we evaluate the need for acquisition of strategic spares on a 'bottom up', case-by-case basis. All material expenditure on strategic spares is supported by a business case, including NPV and cost / benefit analysis and is approved in accordance with our gated investment framework.

Our evaluation of strategic spares procurement decisions is conducted in accordance with the principles underpinning the Regulatory Investment Test - that is, we seek to procure and hold spares only when doing so is expected to deliver a net benefit to our customers. Our approach is also consistent with the principles underpinning our asset management system, which seeks to balance cost, risk and performance in the delivery of safe and reliable network services.

4.6 Operational Support Systems capital expenditure

The Operational Support Systems expenditure category includes expenditure covering Network Control Systems and Asset Management Systems.

4.6.1 Network Control capital expenditure

Network Control investment includes replacement, installation and maintenance of Network Control (including system control and data acquisition (**SCADA**)) hardware, software and associated systems. This includes costs associated with the provision of appropriate information gathering, information management and information analysis hardware, software and systems to allow us to provide network services efficiently.

The Network Control category also includes the systems that collect data for asset management purposes and provide the capability for monitoring and remote operation of the power system. Related Network Control technologies include system-related telecommunications, operational systems, operational technology security and cyber security systems specific to the network.

Network Control expenditure also includes protection and control assets that are critical to maintaining the safety and reliability of the network. Network Control assets monitor and operate plant and detect network faults. Network Control assets have a natural physical life, as well as an economic and technological support life. Electronic microprocessors provide the basis for modern protection and control assets such as remote terminal units, relays, and reclosers, while older protection assets use electro-mechanical or solid state technologies.

Investment requirements for general and minor assets associated with this category are often driven by the economic life cycles, condition and performance of those assets. To identify the potential need for Network Control investment we use our asset management system. Details of our asset management system are provided in our Strategic Asset Management Plan.

Our technology strategy together with our asset management plans and strategies inform the forecast scope of efficient Network Control capital expenditure. We will manage the network and supporting Network Control assets to deliver operational and capital efficiency outcomes and ensure alignment with regulatory obligations. We apply a ‘bottom up’ and ‘top down’ forecasting approach for Network Control expenditure as follows:

Step 1 Needs identification

To forecast Network Control capital expenditure, we have regard to:

(i) life cycle refresh programs

Determine investment requirements based on the four to five year life cycle refresh programs having regard to:

- vendor and market support;
- security challenges;
- incident and problem data;
- current and prevailing technology standards; and

- cost versus the benefits of upgrade versus replacement.

(ii) Project expenditure

Determine whether new investment is warranted to address an identified business need. The resulting proposed expenditure would need to be soundly based, with benefits clearly identified.

Step 2 Cost analysis

Identify unit and project costs based on recent actual costs, verified by vendor quotes and market data where available. The output from this step is a 'bottom up' forecast of our capital expenditure requirements.

Step 3 Validation

Test/validate the 'bottom up' capital expenditure forecast, with reference to a 'top down' assessment based on historic capital expenditure and trend analysis. Any increase in capital expenditure must be explained with reference to a specific driver or business case.

4.6.2 Asset Management Systems capital expenditure

Asset Management Systems investment includes replacement, installation and maintenance of relevant asset management business processes, business systems, and associated tools and software. This includes costs associated with the provision of appropriate asset information gathering, asset information management and asset information analysis applications to enable us to provide efficient asset management services.

Investment in relevant systems is also required to:

- strengthen our asset condition and geographical information;
- enhance our risk management and asset analysis tools;
- renew our operational systems to extract the optimum capacity and life from our assets; and
- to progress our smart distribution grid development program.

Asset Management Systems capital expenditure includes the costs associated with:

- **Asset management information system –** the primary system that supports the strategic, tactical and lifecycle management of network assets, including asset risk management, asset condition monitoring, asset performance management and outage management; and
- **Geographic Information Systems management** – these systems support the geographic representation of network and is the source of truth for the electrical connectivity model.

Our asset management policies, plans and strategies in conjunction with our technology strategy inform the forecast scope of efficient Asset Management Systems capital expenditure. We use our Asset Management Systems to manage the network assets to deliver services that meet the needs and preferences of our customers, whilst minimising the total life cycle costs of service delivery.

We apply a 'bottom up' and 'top down' forecasting approach for Asset Management Systems

expenditure. In particular, we consider the refresh or life cycle costs, and also conduct a 'needs analysis'. Our approach is set out below:

Step 1 **Needs identification**

(i) Life cycle costs

To forecast operational support systems capital expenditure, we have regard to the life cycle refresh programs having regard to:

- vendor and market support;
- collecting and integrating accurate data on our assets and their condition;
- incident and defect data;
- current and prevailing as well as future technology standards; and
- cost versus the benefits of upgrade versus replacement verses enhance.

(ii) Project expenditure

For project expenditure, we determine whether new investment is warranted to address an identified business need. The resulting proposed expenditure would need to be evidence based, with benefits clearly identified.

Step 2 **Cost analysis**

Identify unit and project costs based on recent actual costs, verified by external quotes and industry market data where available. The output from this step is a 'bottom up' forecast of our capital expenditure requirements.

Step 3 **Validation**

Test/validate the 'bottom up' capital expenditure, with reference to a top down assessment based on historic capital expenditure and trend analysis. Any increase in capital expenditure must be explained with reference to a specific driver or business case.

4.7 Innovation

Customers recognise that significant benefits can be obtained by embracing technological change. As a consequence, customers have a strong expectation that TasNetworks will be innovative.

In response to customer feedback, and to ensure that we are leveraging off existing technologies and appropriately anticipating future developments, we have developed an innovation strategy.

The strategy sets out our innovation objectives and identifies projects that are aligned with their achievement. Our forecast innovation capital expenditure reflects the costs of delivering these projects. Each project is underpinned by detailed cost-benefit analysis.

TasNetworks forecasts projects and activities under incentive arrangements such as DIMIS/A and NICIPAP separately and in accordance with the relevant AER Guidelines.

4.8 Contingent projects

The capial expenditure forecasting identifies projects that meet the definition of contingent projects consistent with the Rules; those projects where scope, timing and costs are uncertain, that are highly dependant on particular triggers eventuating.

The contingent projects are flagged separately as part of the revenue proposal.

4.9 Non-network – IT and Communications capital expenditure

IT and Communication capital investment needs are determined in accordance with the identified priorities for information technology and ensuring alignment to our technology strategy. Our priorities are identified through a systematic approach that determines the infrastructure, platforms, systems and computing equipment required to support the delivery of network services, and to improve efficiency in providing business functions.

Our Technology Strategy and plans inform the forecast scope of IT and Communications capital expenditure. This expenditure relates to the following functions:

- Stakeholder management – these systems support the provision of information to our customers and stakeholders;
- Network management – systems supporting the management of the network, including responding to faults;
- Works management – these systems schedule and manage work programs and resources for network extensions, inspections, maintenance and construction;
- Information management – systems required to enable the effective and efficient management of large amounts of structured and unstructured information across the business; and
- IT management – this refers to IT capabilities enabling operations and supporting planning and management of the business, including managing applications, IT portfolio, infrastructure, architecture, security and IT services.

To develop our forecasts of IT and Communications capital expenditure, we adopt a similar approach to that described for Network Control. Our approach is set out below:

Step 1 Needs identification

To forecast IT and communications capital expenditure, we have regard to the life cycle refresh programs which drive capital expenditure. We determine life cycle driven investment requirements having regard to:

- the availaibility of vendor and market support;
- collecting and integrating accurate data on our assets and their condition;
- incident and defect data;
- prevailing and future technology standards; and

- the cost and benefits of different options including upgrading, replacing or enhancing existing IT and communications resources.

For client device expenditure projects, we identify the need for investment through internal business consultation and feedback from customers and other stakeholders regarding technological developments that could provide performance and operational efficiencies.

This technique is used for all other IT investment including investment required to maintain IT infrastructure systems, including hardware and software and application capability at existing levels of performance as well as new infrastructure and / or applications required to deliver a different level of capability and / or service.

Step 2 Cost analysis

This step involves identifying unit and project costs based on recent actual costs, verified by vendor quotes and market data where available. The output from this step is a 'bottom up' forecast of our capital expenditure requirements.

Step 3 Validation

We validate the 'bottom up' capital expenditure forecast with reference to a 'top down' assessment based on historic capital expenditure and trend analysis. Any increase in capital expenditure must be explained with reference to a specific driver or business case.

4.10 Non-network Other capital expenditure

This expenditure category includes:

- fleet;
- land and buildings; and
- tools and equipment.

The key drivers for investment are asset age and condition, the business environment and corporate strategy. All expenditure is supported by a business case, including NPV and cost / benefits analysis and is approved in accordance with our gated investment framework.

4.10.1 Fleet

Fleet expenditure needs are determined in accordance with the fleet management strategy and fleet capital program. The forecast is based on a bottom up view and top down approach from the business with regard to the replacement and investment needs in our vehicle fleet. The forecast is based on an assessment of the fleet's age and kilometres travelled, condition, estimated useful life, fleet size and resourcing requirements of the business.

4.10.2 Land and Buildings

The need for investment in Land and Buildings is based on the corporate facilities/property strategy. This plan identifies the land and property requirements to efficiently support the accommodation of staff (office and depot accommodation) and the overall property strategy. The property needs are aligned to the facility requirements to support the efficient delivery of network services.

4.10.3Tools and Equipment

This category includes other capital investment requirements to support the network, such as expenditure on tools and equipment. Forecasts are based on a bottom up build based on historic levels of expenditure. This category includes the acquisition and replacement of hand held tools and safety equipment.

Our forecasting approach is described below:

Step 1 We apply historic expenditure and trends, adjusted to reflect the following drivers:

(i) *Operational changes*

Historical trends are not an appropriate forecasting method if there is a known change in our operational circumstances. For example, a business decision to buy rather than lease fleet vehicles will have implications for our capital expenditure forecasts, and an offsetting adjustment to operating expenditure.

(ii) *Head-count*

It is appropriate to take account of investment requirements that are driven by employee head-count, for example accommodation and office furniture costs.

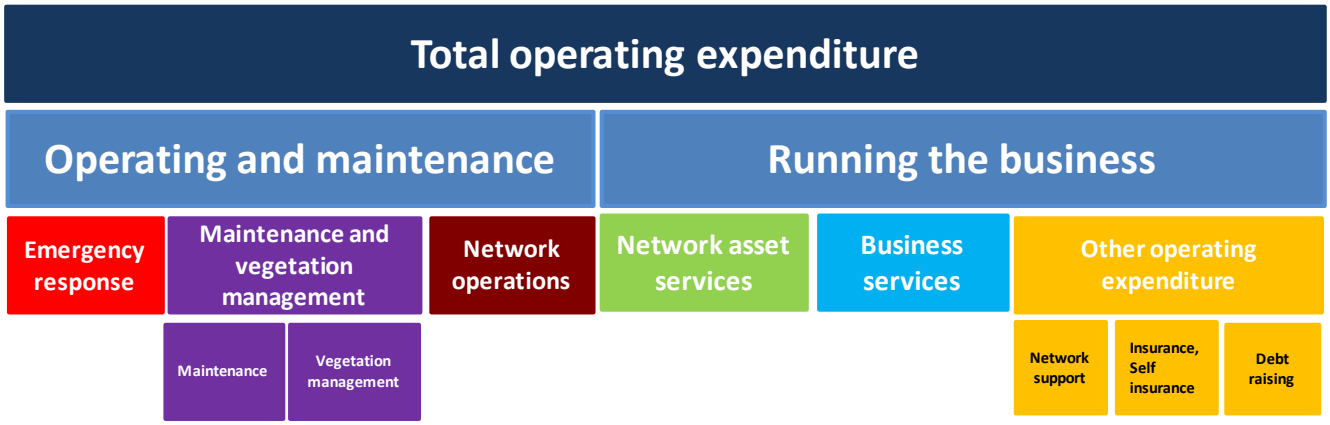
Step 2 We validate the forecasts with reference to industry benchmarks where possible.

5 TasNetworks' operating expenditure forecasting methodology

5.1 Operating expenditure categories

As noted in relation to capital expenditure, our operating expenditure forecasts will be presented by reference to well accepted categories, in accordance with the Rules requirements[9]. In addition, we have categorised expenditure as either 'Operating and Maintenance' or 'Running the business'. The latter category captures those essential activities and costs that, while not directly related to maintaining or operating the network, are essential support functions that an efficient business depends upon. Our cost categories for operating expenditure are illustrated in the figure below.

Figure 2: TasNetworks' operating expenditure categories



As is the case for capital expenditure, our operating expenditure categories are common across transmission and distribution. However, operating expenditure is somewhat different because our forecasting approach focuses on aggregate expenditure (using the 'base-step-trend' methodology), rather than the expenditure categories. Nevertheless, we are required to present forecasts for each operating expenditure category, and therefore common categories are also adopted for operating expenditure.

The table on the following page defines each of the operating expenditure categories.

[9] Schedules S6.1.2(1) and S6A.1.2(1) of the Rules.

Table 2: Categories of operating expenditure

Category	Subcategory	Definition
Operating and maintenance		
Emergency response	Includes operations and maintenance activities associated with emergency response, including unplanned (corrective) maintenance.	
Maintenance and vegetation management	Maintenance	Includes operations and maintenance functions associated with condition assessment and any maintenance activities that can be scheduled.
	Vegetation management	Includes operations associated with vegetation management.
Network operations	Includes the functions of managing the real-time operation of the Tasmanian power system and distribution network. This includes planned outage security analysis, power system incident analysis, assessment of power system against the technical limits, , preparation of switching sheets, coordination of field switching activities and technical support for the network operations and control system.	
Running the business		
Network asset services	Includes all of the functions associated with: • asset strategy, customer management, network planning, project initiation, regulation and compliance; and • providing engineering and asset services, management of field operating and maintenance contracts, environment and safety management, asset condition monitoring and analysis, works planning and coordination.	
Business services	Includes the functions of accounting, administration, audit, business planning, corporate governance, corporate IT, facilities management, finance, human resources, legal, office of chief executive officer and company secretary, and public relations.	
Other operating expenditure	Network support	Is the cost of procuring alternatives to network capital expenditure, such as generation support during peak periods.
	Insurance, Self insurance	The cost of insurance premiums; deductables; uninsured losses; and the actuarial value of self-insured risks.
	Debt raising	Benchmark allowance for debt raising costs.

5.2 Overview of operating expenditure forecasting methodology

Our operating expenditure forecasting methodology essentially follows the base-step-trend approach adopted by the AER in its recent revenue decisions.

Under the operating expenditure forecasting methodology:

- actual, audited operating expenditure is used as a starting point (or 'base year') for projecting future recurrent operating expenditure requirements; and
- certain operating expenditure items - referred to here as 'Other' operating expenditure - are forecast separately and included in the total operating expenditure forecast.

Our methodology comprises the following three steps.

- **Step 1 -** Derive and verify the recurrent operating expenditure forecast as follows:

  (a) commence with actual operating costs for the base year

  (b) adjust the base year cost by deducting:

    (i) non-recurrent operating expenditure items;

    (ii) any other categories of expenditure which are not reflective of future expenditure requirements and which should therefore be subject to a zero-based (bottom-up) forecast; and

    (iii) the actual costs of the 'Other' operating expenditure items that are to be subject to separate forecasts in Step 2;

  (c) add the forecast cost of step changes;

  (d) scale up the sub-total of the adjusted base year cost and forecast step change costs annually by using applicable growth factors which reflect the increase in operating expenditure requirements driven by growth of the business;

  (e) add to that scaled-up sub-total the forecast non-recurrent operating expenditure for items (i) and (ii) deducted in step (b). These forecasts are derived using zero-based cost estimates for each year of the forthcoming period;

  (f) scale up the total obtained in step (e) annually by using applicable labour and non-labour escalation factors (if required) to derive the unadjusted forecast of operating expenditure for the forthcoming regulatory period; and

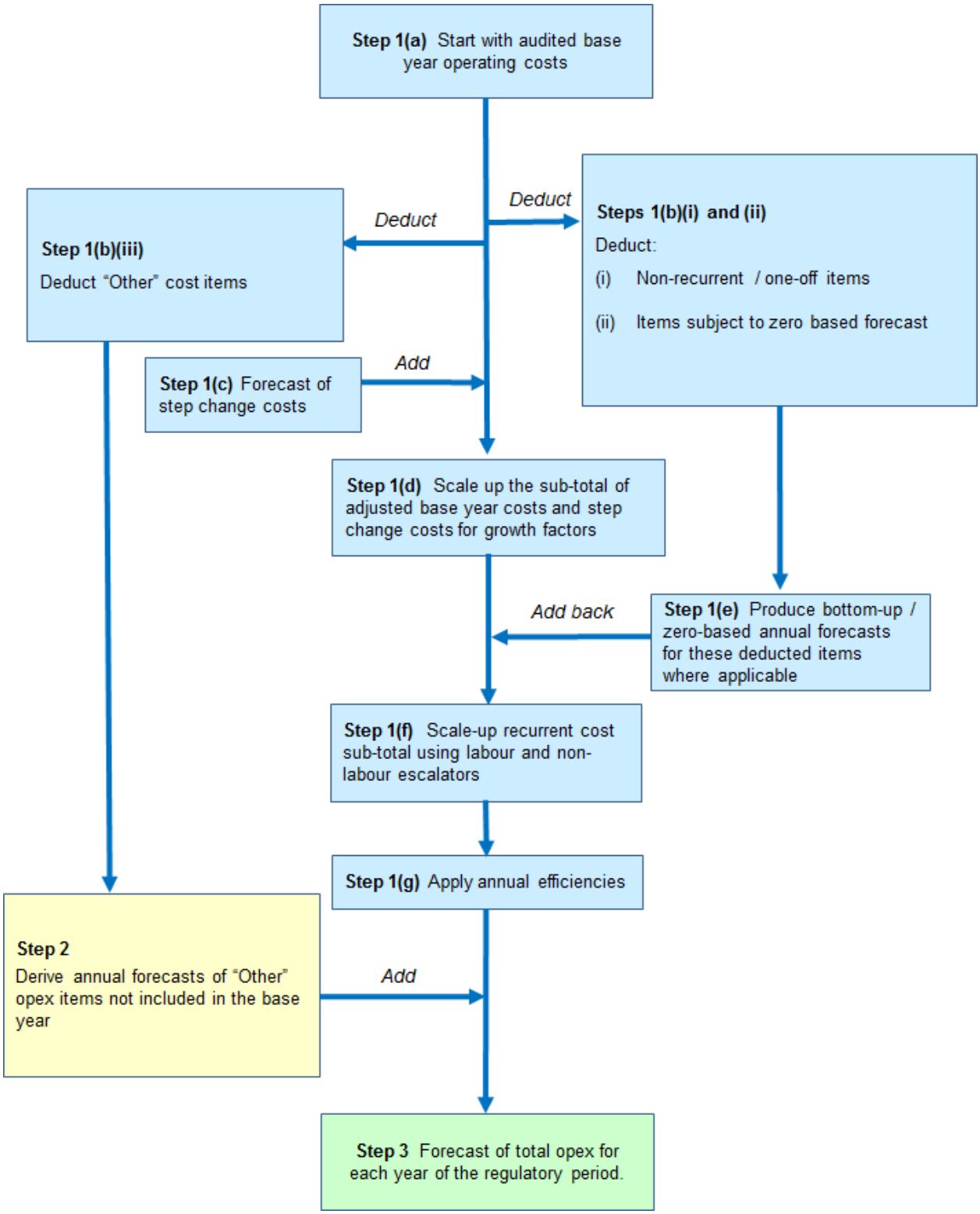
  (g) reduce the total obtained in step (f) by an annual productivity target to derive the productivity-adjusted forecast of total operating expenditure.

- **Step 2 -** Include the forecast for 'Other' operating expenditure elements. A forecasting methodology which reflects the relevant drivers is adopted for each element.

- **Step 3 -** Derive the total operating expenditure forecast as follows: Recurrent operating expenditure and 'Other' operating expenditure annual forecasts are summed to provide the total operating cost forecast for each year of the regulatory period.

Our operating expenditure forecasting methodology is illustrated in the figure below.

Figure 3: TasNetworks' operating expenditure forecasting methodology



5.3 Key variables and assumptions

A number of variables and assumptions will underpin our operating expenditure forecasts. The following points summarise the information that we expect to provide in our Regulatory Proposal to support our operating expenditure forecasts:

- evidence to demonstrate that the base-year costs are efficient, and therefore provide a reasonable basis for projecting future operating expenditure requirements;
- the cost impact of asset growth on operating expenditure, and the assessed growth factor that will be applied;
- an estimate of labour and non-labour operating expenditure input escalation rates for the forthcoming regulatory period;
- a forecast productivity improvement factor and cost efficiencies, which we expect to achieve taking into account our operating environment, including external factors beyond our control;
- our asset management plans and strategies, which provide a key input that drives the forecast scope of field operations and maintenance expenditure; and
- details of any known or expected regulatory changes that may affect our future operating expenditure requirements.

Further information on the efficient base year, asset growth scaling factors and labour and non-labour escalation rates is provided below.

5.3.1 Efficient base year

An audited financial year willbase year for determining the recurrent expenditure component of the operating expenditure forecast. This will be the most recent financial year for which audited financial accounts are available.

It is instructive to benchmark our operating expenditure against our own past performance and our peers. We expect that benchmarking studies will support the view that the financial year selected is an appropriate basis from which to forecast operating expenditure. In addition, we will have regard to the AER's recent decisions for other network companies, which examined the efficiency of the base year expenditure. Our objective is to ensure that our proposed base year expenditure is accepted by the AER as efficient.

5.3.2 Asset growth scaling factors

It is appropriate for our operating expenditure forecast to take into account the cost impact of network growth. In broad terms an increase in the size of our network creates a growing demand for operating and maintenance services. Given the requirements of clause 6.5.6(c)(3) of the Rules, it is important to take account of the increase in the network when developing our operating expenditure forecast.

As noted in recent AER decisions, asset growth does not result in a one-for-one increase in operating expenditure. This is because network businesses are able to realise the benefits of economies of scale, where marginal costs are lower than average costs. The extent of scale economies differs across expenditure categories. We use available evidence, along with our experience and judgement in developing estimates of the growth scaling factors for each expenditure category.

5.3.3 Labour and non-labour escalation rates

5.3.3.1 Labour escalation

Labour costs have the potential to significantly affect our operating expenditure. We usually engage an independent economic forecaster to provide forecasts of real unit labour cost movements for the purpose of preparing the Regulatory Proposal.

5.3.3.2 Non-labour escalation

Non-labour operating components may be assumed to increase in line with the CPI. However, this matter will be considered further in the Regulatory Proposal.

5.4 Forecasting step changes

Forecasts of costs associated with step changes will be prepared on a 'bottom-up' basis. Typically, step changes are required if the base year opex is not sufficient to:

- comply with a new or changed regulatory obligation, which represents an increase in scope; or
- deliver an efficient opex/capex trade-off, which provides a more efficient mix of inputs.

In addition to these typical cases, there may be other reasons why the base year opex is inadequate.

5.5 Top-down assessment of total forecast

We apply a top-down assessment of the total opex forecast obtained using the methodology outlined in section 5.2. The purpose of the assessment is to test and verify that the forecast reasonably reflects:

- the efficient costs of achieving the operating expenditure objectives set out in the Rules;
- the costs that a prudent operator would require to achieve the operating expenditure objectives; and
- a realistic expectation of the demand forecast and cost inputs required to achieve the operating expenditure objectives.

We expect to apply benchmarking in our top-down assessment of the total operating expenditure forecast.

6 Closing comments

This document provides an overview of the methodologies that we propose to use to prepare the forecasts of our operating and capital expenditure that will form part of our Regulatory Proposal for the regulatory control period commencing on 1 July 2019. It is provided to the AER in accordance with clauses 6.8.1A and 6A.10.1B of the Rules.

We consider that the forecasting methodologies set out in this submission will deliver expenditure forecasts that comply with the Rules requirements and provide a reasonable forecast of efficient costs to operate and maintain Tasmania's electricity network. Our Regulatory Proposal will set out expenditure forecasts based on these methodologies.

We welcome feedback on these methodologies from any interested party.