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Operating Expenditure Forecasting Methodology

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Note: *Where indicator symbol ☼# is used (# referring to version number) it indicates a change/addition was introduced to that specific point in the document. If the indicator symbol ☼# is used in a section heading it means the whole section was added/changed.*

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1 DOCUMENT SECURITY

The Operating Expenditure Forecasting Methodology contains information that is the property of the Queensland Electricity Transmission Corporation (Powerlink). This report contains information that has commercial value to Powerlink. It qualifies as Confidential Information under the National Electricity Rules (NER), and is not a public document.

The NER provides that Confidential Information:

- must not be disclosed to any person except as permitted by the NER;
- must only be used or copied for the purpose intended in this report (namely the determination of an operating expenditure allowance for Powerlink's transmission network); and
- must not be made available to unauthorised persons.

2 DOCUMENT PURPOSE

This document describes the approach Powerlink adopts to prepare its operating expenditure forecast. This document only pertains to the forecasting of operating expenditure on Powerlink's prescribed transmission network.

3 OPERATING EXPENDITURE FRAMEWORK

Powerlink undertakes the management of its assets through implementation of an Asset Ownership/Asset Management/Service Provision business model (AO/AM/SP). Powerlink considers this business model and philosophy associated with it is an essential element in managing the complex, and sometimes conflicting, environment in which Powerlink provides its transmission services, including the management of operation and maintenance arrangements. The business model separates corporate governance functions, from the purchasers of goods and services, and from the providers of those services. Each function has accountabilities as follows:

- *Asset Ownership (AO)* – provides ownership functions such as corporate governance and financing;
- *Asset Management (AM)* – ensures the network is managed to cost effectively deliver network services to the required standards over the long term; and
- *Service Provision (SP)* – comprising network service providers which deliver network services such as planning, operation and maintenance to achieve the asset management requirements, and corporate service providers such as accounting, administration and human resources management.

Due to the size and geography of Powerlink's network, a service provision regime that meets the expectations of responsiveness and capability throughout the entire length and breadth of the network is required. Three service delivery regions (southern, central and northern) are in place with a service provider responsible for maintenance services within each region. This established service delivery structure has a three-fold benefit of:

- *Commercially-competitive environment* – three areas of maintenance delivery allows comparison of performance, and to leverage a "best practice" approach;
- *Responsiveness* - having initial response teams located throughout the state; and

- *Technical depth* – throughout Queensland the accumulated "mass" of technical field knowledge ensures that all maintenance challenges can be dealt with.

Other functions, including specialised aerial maintenance and network operations are centralised with a whole of state focus to achieve consistency of process and economies of scale in service provision.

This business model ensures that decisions relating to strategic asset management are integrated to allow the optimisation of whole of life approach to assets while being separate from the detailed resourcing and scheduling of the required services. This provides for the development of strategies that lead to efficient and effective operating expenditure management, and separates monitoring of the delivery of operating expenditure in line with technical requirements and budgets.

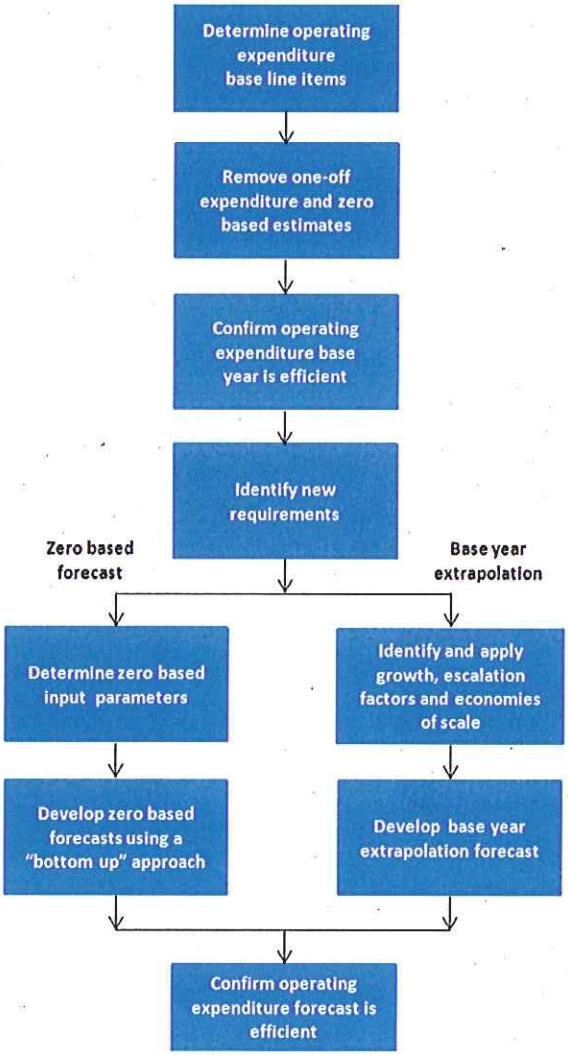
The segregation of the providers of goods and services, both internally and externally, provides increased accountability, greater visibility of performance, more focused management response and the opportunity to foster efficiencies through benchmarking and contestability of services (where appropriate).

4 OPERATING EXPENDITURE METHODOLOGY

Powerlink's operating expenditure forecasting methodology closely aligns with Powerlink's business model and treats the line items in each operating expenditure category separately so that appropriate aspects s uch as cost dr ivers, escalations and economies o f s cale c an be t aken i nto ac count. Powerlink applies both zero-based and extrapolation of base year forecasts to determine its forecast operating expenditure.

Figure 1 illustrates the Powerlink operating expenditure methodology. The individual components are expanded on in subsequent sections.

Figure 1 - Powerlink's operating expenditure methodology

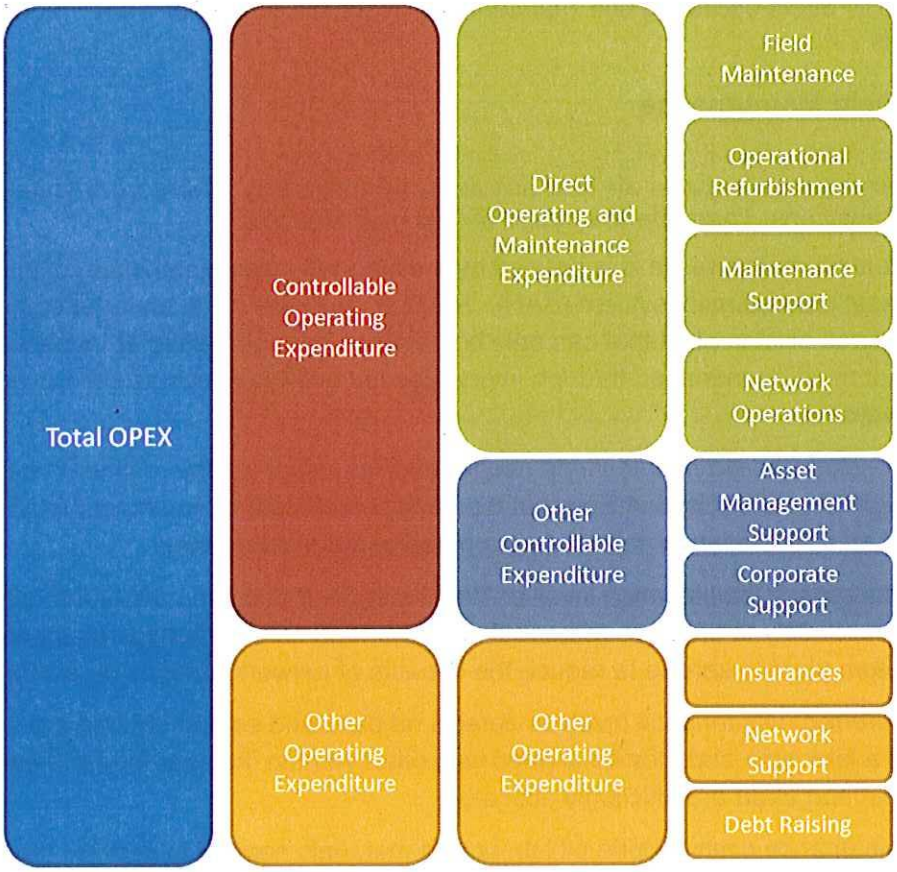


5 OPERATING EXPENDITURE COMPONENTS

Powerlink has maintained the same principles and operating expenditure philosophy since the mid-1990s, which aligns with the physical working business model in terms of how activities are actually undertaken. As shown in Figure 2, Powerlink manages and categorises its operating expenditure by reference to three major components:

- Direct Operating and Maintenance;
- Other Controllable;
- and Other Operating.

Figure 2 - Powerlink's operating expenditure components



Direct Operating and Maintenance Expenditure are those directly attributable to maintaining and operating the Powerlink transmission network. They include:

1. Field Maintenance performed by Maintenance Service Providers (MSPs);
2. Operational Refurbishment;
3. Maintenance Support including both Field Support (by MSPs) and Other Support (Powerlink support activities); and
4. Network Operations.

Other Controllable Expenditure includes the Asset Management (AM) support and Corporate support costs from various business units (including Network, Finance, Employee Relations and Planning) in Powerlink.

Other Operating Expenditure sits out side Powerlink's controllable operating expenditure and is subject to factors outside Powerlink's control, e.g. borrowing costs, financial markets, weather and power generation patterns. Insurance is included in this cost category.

6 DIRECT OPERATING AND MAINTENANCE EXPENDITURE

Directing Operating and Maintenance Expenditure is the largest operating expenditure component and relates to costs directly associated with maintaining and operating the network. The four elements of direct operating and maintenance costs are broken down for monitoring and forecasting purposes.

6.1 Field Maintenance

Field maintenance includes all field activities, performed by MSPs, to ensure plant can perform its required functions. There are four types of field maintenance:

1. *Routine maintenance* is is defined by maintenance plans implemented in Powerlink's corporate asset management system (SAP). Routine maintenance is undertaken because hidden failures exist in plant that can only be detected through testing or inspection or for equipment that must be managed through interval-based activities such as scheduled servicing and overhaul.
2. *Condition-based maintenance* usually evolves out of routine maintenance or an inspection regime, where it is identified that the condition of plant or equipment is such that action must be taken to avoid future defects (e.g. operating out of tolerance).
3. *Emergency maintenance* involves defects in plant or equipment that must be attended to immediately to preserve (personal or equipment) safety, manage environmental issues or return plant to service to reduce the impacts of network outages on customers.
4. *Deferred maintenance* involves defects on plant and equipment that are not urgent, undertaken at a later time and may be aligned with other work in the near future to ensure maintenance cost and effort are efficiently allocated.

Field maintenance costs include all labour and materials needed to perform the required maintenance tasks. As these activities are predominantly labour-based, labour cost increases have a significant impact.

6.1.1 Field Maintenance Components

6.1.1.1 Routine Work Units

A work unit is a standard representation of routine work effort estimated at 8 hours. Work units provide a means of expressing the effort required for a task, irrespective of the type or location of asset being maintained. Each routine maintenance task is allocated a specified number of work units which are the same in all regions irrespective of where the task is being undertaken. Collectively, work units directly reflect the amount of planned maintenance required for a specific number of assets.

6.1.1.2 Routine Work Unit Rate

A work unit charge rate is determined by asset class, region and service provider to reflect the required competencies, asset density and travel requirements for routine maintenance of the various plant types in the various locations around the network. Therefore, the cost of performing routine maintenance is the product of the number of work units by the chargeable rate, which is used for budgeting, costing and payment to the MSPs.

6.1.1.3 Routine Maintenance Plan

Powerlink develops a routine maintenance plan for items of plant and equipment forming part of the transmission network assets based on Reliability Centred Maintenance (RCM). This enables Powerlink to develop a forward projection of the routine maintenance requirement through a forecast of work effort contained in each maintenance task (defined by work units). An 8-year routine maintenance forecast is developed which enables a base reference of work effort for existing assets. An increase in the assets to be maintained resulting from new assets being added to the network increases the requirement for work units above the reference for the existing asset base. The resulting forecast work unit plan is then coupled with the work unit charge rate producing an 8-year routine maintenance cost forecast.

6.1.1.4 Non Routine Maintenance Modeling

The operating expenditure forecast models non-routine maintenance using categories consistent with Powerlink's Asset Management Maintenance Work Types Categories and governed by requirements consistent with the Reliability Centered Maintenance strategy.

Powerlink, as with all operating expenditure, annually reviews its non-routine maintenance expenditure to identify extraordinary expenditure items. This, along with benchmarking and regulatory initiatives, ensures an efficient level of non-routine maintenance.

Non-routine maintenance forecasts are developed using an efficient base year escalated forecast (incorporating network growth, non-labour and labour escalators). The use of individual line items ensures the application of appropriate escalators can be applied to each line item.

6.1.2 Field Maintenance Classification

Costs for all routine and non-routine maintenance is categorised under the four MSPs that deliver the work:

1. *Ergon North* – Ergon Energy's maintenance service group that service Powerlink's transmission network from Mackay to Cairns.
2. *Ergon South* - Ergon Energy's maintenance service group that service Powerlink's transmission network for Rockhampton and Gladstone.
3. *Network Field Services* – Powerlink's internal MSP used to provide maintenance services (including live substation function) on Powerlink's assets in southern Queensland.
4. *AeroPower* – Aerial inspection and helicopter based maintenance activities on Powerlink's high voltage transmission lines throughout Queensland.

These are further separated by the 5 major asset type categories:

1. *Substations* – High voltage electrical plant contained within the substation fence perimeter.
2. *Transmission Lines* – High voltage overhead and underground transmission network
3. *Secondary Systems* – non high-voltage equipment within the substation whose principle role is to control and monitor the high voltage plant.
4. *Communications* – telecommunication systems that enable operational communication between substation-to-substation, substation–to-control centre for data interrogation, remote monitoring and control of network assets.
5. *Land* – parcels of land or easements that are owned, managed or controlled by Powerlink for use for network infrastructure.

Powerlink periodically reviews the suitability of asset classification for maintenance purposes to ensure appropriate monitoring and governance.

6.2 Operational Refurbishment

Operational refurbishment involves activities that return an asset to its pre-existing condition or function, or activities undertaken on part of an asset to return that specific component to its pre-existing condition or function. These refurbishment activities do not involve increasing the capacity or capability of the plant, or extending its working life beyond original design (that would be capital replacement).

Operational refurbishments are typically quite extensive works performed only once or twice over an asset's life. Such work is preventative in nature, but is more extensive than maintenance which is frequently performed as part of ongoing condition-based maintenance. A project management approach is applied to operational refurbishments for both delivery effectiveness and cost efficiency.

Expenditure drivers for operational refurbishments are the age profile of assets (as a trigger), reliability considerations, compliance obligations, and design parameters of the plant and its sub-components. Assets nearing the end of their technical and economic life are assessed for replacement instead of refurbishment. Powerlink Operational Refurbishment projects are outlined in the Operational Refurbishment Plan. The Operational Refurbishment plan is a zero based plan.

6.3 Maintenance Support

6.3.1 Field Support

These are field-based activities performed by the MSPs which are not directly related to working on an item of plant. These are considered to be activities where the MSPs represent the asset management function in the field e.g. 'dial before you dig' enquires and Officer for Local Security. These activities are a combination of fixed fee and actual charges (based on hourly rates) and are highly labour driven.

Field support is split into labour and non-labour components based on historical actuals. For forecast modeling, applicable escalations are network growth (more assets to manage), labour cost increases and CPI (for non-labour costs such as travel/meals/accommodation). These escalations are offset by economy of scale factors.

6.3.2 Other Maintenance Support

Maintenance Support is non-field (non-MSP) based support for maintenance activities and primarily comprises the asset management functions for the maintain/operate phase of the asset life cycle such as maintenance strategy development, performance management and maintenance auditing. The labour and non-labour components are based on historical actuals and are significantly labour-based. Again, for forecast modeling, applicable escalations are network growth (more assets to manage), labour cost increases and CPI (for non-labour costs). These escalations are offset by economy of scale factors.

6.3.3 Direct charges

Direct charges are the costs 'directly' associated with owning and managing assets. These costs include council rates charges, water charges, electricity bills and permits. Modeling takes into account that these costs are directly related to the quantity of assets (network growth) and are impacted by external escalation factors (CPI).

6.4 Network Operations

These activities are the 'control centre' functions as well as those additional activities required to ensure the safe, reliable and efficient operational management of the Queensland transmission network. There are four main functions carried out within Network Operations:

- Real-time control room function – this is a 24-hour continuous requirement. Network operators provide the functions of network operation, coordination and switching sheet preparation for all plant outages;
- Off-line system security support – this function involves security analysis, including an ongoing need to perform contingency planning;
- Technical support for the Energy Management System (EMS) and SCADA systems – support functions such as EMS maintenance configuration, database management, hardware installation, software upgrade and maintenance; and
- Asset Monitoring – monitoring asset performance and condition, which includes response management, auditing network configurations and performing fault diagnosis.

As the network grows, digital technology infiltration continues to increase, the network access and coordination function will become more complex. Also, as the network operations activities are virtually completely a labour effort, labour cost increase is the dominant escalation factor. These escalations are offset by economy of scale factors.

7 OTHER CONTROLLABLE EXPENDITURE

Other controllable costs encompass activities and services integral to managing the network business but not directly related to maintaining or operating the actual network.

7.1 Asset Management Support

Asset Management (AM) Support are those operational activities required to support the strategic development and on going asset management of the network. AMS upport has five major sub-elements:

1. *Grid Planning*
   Grid planning includes forecasting future network demand, analysing future network capabilities, developing network augmentation plans, joint planning activities and the development of an Annual Planning Report.
2. *Project Support*
   Project Support includes costs associated with the initiation, approval and sponsorship of Powerlink's capital investment and also includes Powerlink's drawing and document management function.
3. *Network Customer and Regulatory Support*
   Network Customer and Regulatory Support costs includes Powerlink's Rules obligation to external customers, network pricing, public consultation and regulatory functions in addition to a corporate communication function to manage media liaison and government enquiries.
4. *IT Support*
   IT Support includes the costs associated with the future strategy development, planning and support of Powerlink's information technology infrastructure.
5. *Operational Support*
   Operational Support includes the costs associated with the development of strategies, policies and procedures for the operational aspects of Powerlink's network, the management of Powerlink's land assets (e.g. sites, leases, easements) as well as a research and development program to facilitate network improvements.

The AMS upport activities are similar in cost structure to other support functions where they are impacted by the network growth and are to a large extent labour-based. Network growth and labour cost increases are the significant escalation factors, with a small non-labour component. These are offset by economy of scale factors.

7.2 Corporate Support

Corporate Support encompasses the support activities required by Powerlink in order to ensure adequate and effective corporate governance. The two aspects of corporate support are:

1. *Corporate Support* – provision of business administrative services to support Powerlink's corporate operations. These activities are similar to other support functions in that they are impacted by the network growth and are to a large extent labour-based. Network growth and

labour cost increases are the significant escalation factors, with a small non-labour component. These are offset by economy of scale factors.

2. *Direct Corporate Support Charges* – The direct charges component of Corporate Support incorporates the costs associated with corporate governance and corporate support. These costs include internal and external audit fees and costs, subscriptions and fees, energy management, and building accommodation lease costs and associated outgoings. Modeling takes into account that these costs are directly related to the quantity of assets (network growth) and are impacted by external escalation factors (eg. CPI)
3. *Revenue Reset Costs* – These are costs associated with the preparation of Powerlink's Revenue Proposal and are not an ongoing expenditure during the period. Forecast Revenue Reset costs are based on the current revenue reset process budget costs and added into future years when Powerlink is required to undertake revenue reset activities.

8 OTHER OPERATING EXPENDITURE

Other Operating Expenditure is driven by exogenous events outside of Powerlink's control (e.g. borrowing costs). Currently, other operating costs comprise three categories:

8.1 Insurances

This covers both insurance premiums and costs for Powerlink's network and non-network assets and also a self-insurance allowance to provide cover for Powerlink's losses that cannot be insured. These allowances are determined using a zero-based methodology and are based on actuarial assessment of potential future losses.

8.2 Network Support

Network support refers to costs associated with non-network solutions used by Powerlink as a cost effective alternative to network augmentation. The forecasting of network support is undertaken on zero based methodology and is detailed in the Network Support Forecasting Methodology.

8.3 Debt Raising

Debt raising costs relate to costs incurred by an entity over and above the debt margin. These costs are encountered when new debt is raised or current lines of credit are renegotiated or extended.

9 EFFICIENT OPERATING EXPENDITURE BASE YEAR

A number of Powerlink's operating expenditure forecast categories are trended forward from a base year. Activities are undertaken periodically to ensure that the efficiency of Powerlink's operating expenditure is maintained. These are discussed further below.

9.1 Benchmarking

9.1.1 ITOMS

Powerlink participates in the International Transmission Operations and Maintenance Study (ITOMS) undertaken by the UMS Group as a means of comparing maintenance performance and practices within the transmission industry nationally and worldwide. The study recognises that cost and reliability cannot be considered in isolation, e.g. it would be easy to have a highly reliable network if cost was no object.

9.1.2 Ratio Analysis

Operating expenditure ratio analysis of macro network parameters provides a "sense check" of the operating expenditure efficiency of the transmission business. Powerlink adopts opex/RAB operating expenditure ratio measure as it reflects a number of the key factors influencing operating expenditure. To assess Powerlink's long term performance trends, opex/RAB is compared against other TNSPs.

9.2 Regulatory Incentives

Powerlink is subject to the AER's Efficiency Benefit Sharing Scheme (EBSS). The EBSS provides a continuous incentive to achieve efficiencies by allowing the TNSP to retain, for a fixed period, the difference (negative or positive) between its actual and forecast operating expenditure.

The EBSS incentive encourages TNSPs to closely monitor and reduce operating expenditure which is incurred. In this way, efficient operating expenditure costs are revealed.

9.3 Verifiable and Auditable Accounts

Powerlink's operating expenditure is audited annually. These audited accounts are used for long term forecasts and ensure that the most verifiable and recent data is available.

9.4 Removal of One-Off Items

Powerlink annually reviews its operating expenditure costs to identify items that are non-recurrent, outside the normal scope of providing operating expenditure and are not reflective of future expenditure requirements. These items are classified as "one-off" expenditures and should be removed from the base year for forecasting purposes.

For forecasting purposes, all elements of other operating expenditure categories are removed from the base year. These elements are forecasted using a zero-based methodology.

10 NEW REQUIREMENTS

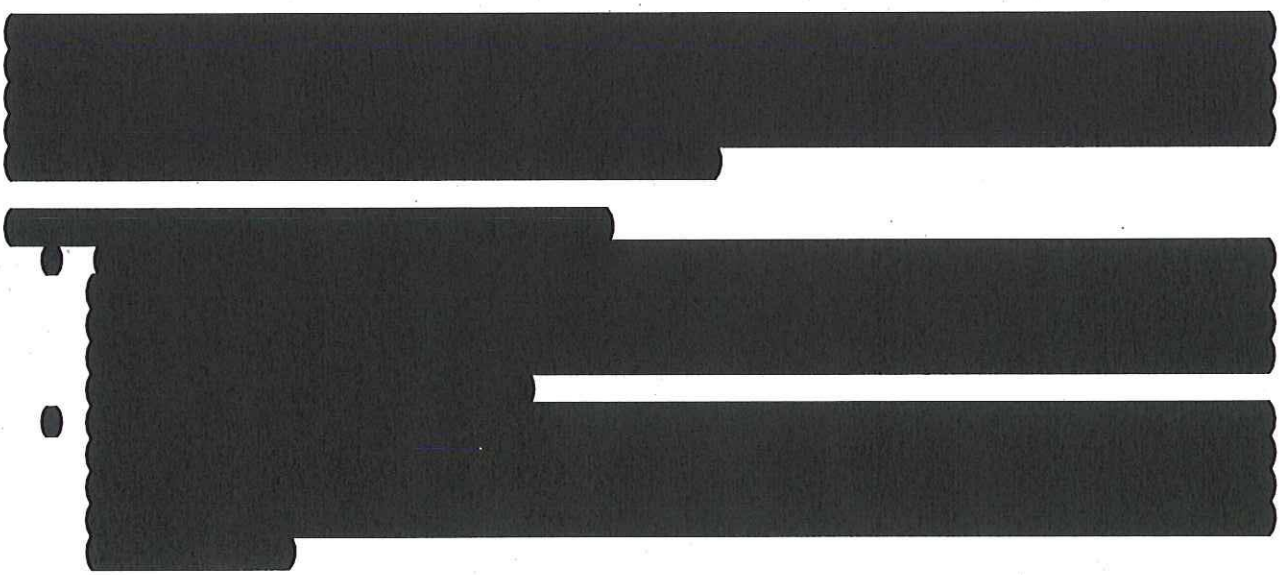
Powerlink's operating expenditure forecasts include expenditure associated with the meeting of new requirements efficiently. These costs constitute a necessary element of the operating expenditure forecasting process, to ensure that Powerlink can meet its anticipated future network requirements and is not unduly penalised for prudent changes to its scope and /or methods of operation and maintenance or additional responsibilities associated with compliance or other regulatory and statutory obligations.

11 GROWTH, ESCALATION AND ECONOMIES OF SCALE

Powerlink's forecast operating expenditure considers the change in network size as well as the impact of the prevailing labour and materials markets. Three escalation factors are used in calculating future operating expenditure by extrapolating from the base year efficient level.

11.1 Network Growth

As the transmission network grows, Powerlink faces increasing costs of operating and maintaining the network. Operating expenditure is directly related to the size of the transmission network, i.e. more network means additional equipment requiring field maintenance and a greater need for support roles. The network growth factor is expressed in terms of an annual rate of growth in operating expenditure resulting from the increase in the size of the transmission network.



11.2 Non-Labour Cost Growth Factor

Non-labour cost growth factors are applied to the non-labour component of each non zero-based line item.

Powerlink's operating expenditure non-labour costs reflect a wide range of costs and materials. These aspects relate to a variety of specific equipment and services and make it difficult to categorise and tailor appropriate escalations. Consequently, Powerlink uses a CPI as a conservative measure to reflect general price increases in the non-labour component of operating expenditure. These are adopted in forecasting operating expenditure and are consistent with the escalation previously approved by the AER for the non-labour component of operating expenditure.

11.3 Labour Cost Growth Factor

Labour cost increases are applied to the labour component of each non zero-based line item.

The labour cost escalation reflects economic pressures on the labour component of Powerlink's operating expenditure forecast. Powerlink's proposed operating expenditure labour cost escalation takes into consideration Powerlink's existing enterprise bargaining agreement and labour costs impacts of its key service providers, as well as the impact of labour escalations.

Powerlink adopts the Queensland Electricity Gas Water (EGW) Average Weekly Ordinary Time Earnings (AWOTE) for skilled labour and the Queensland Business Services AWOTE for general labour for the purpose of estimating Powerlink's labour cost increases. This is consistent with the labour escalators used to estimate capital expenditure forecasts. These reflect the reasonable rate increase forecast to be experienced in the electricity supply industry.

12 APPLICATION OF GROWTH, ESCALATION AND ECONOMIES OF SCALE

Powerlink's operating expenditure forecast is developed to treat the major components (and the line items within those components) separately to ensure that the appropriate forecasting methodology, cost drivers, economies of scale can be taken into account. Powerlink uses both base year extrapolation and zero based forecasting methodologies to arrive at its operating expenditure forecast.

12.1 Base year extrapolation

Figure 3 illustrates the application of the operating expenditure escalators to the base year.

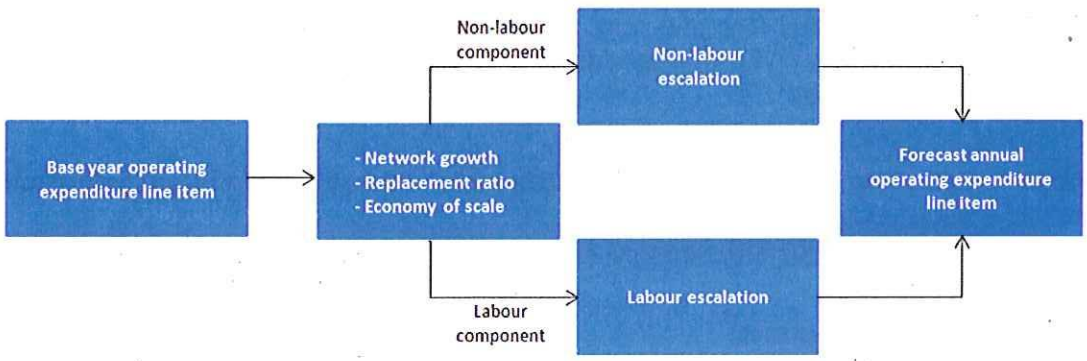


Figure 3 - Application of operating expenditure escalators

[redacted]

12.2 Zero based

For some line items, extrapolations of base year forecasts do not reasonably reflect future recurrent operating expenditure requirements. These line items require a different approach to the base year extrapolation model and are subject to a zero based forecasting approach, e.g. insurances, operational refurbishment and network support.

The zero based forecasts are often more complex and forecast annual expenditure from the "bottom up" taking into account relevant factors.

12.3 Summary of Operating Expenditure Methodologies

A summary of the forecast approach adopted for each category in Powerlink's operating expenditure forecasting methodology are outlined in Table 1. Some categories are modelled using both base escalated and zero based forecasts, e.g. field maintenance forecasts routine maintenance using a zero base methodology and condition-based, corrective and deferred maintenance using a base extrapolated methodology.

Table 1: Operating expenditure - base extrapolated and zero based forecasting methodology

Operating expenditure category	Base extrapolated	Zero based
Field Maintenance	✓	✓
Operational Refurbishment		✓
Maintenance Support	✓	
Network Operations	✓	
Asset Management Support	✓	
Corporate Support	✓	✓
Insurances		✓
Network Support		✓
Debt Raising		✓

13 EFFICIENCY OF FORECAST OPERATING EXPENDITURE

To determine the relative efficiency of Powerlink's forecast operating expenditure, ratio analysis benchmarking (as outlined in Section 9.1) is undertaken to compare Powerlink's forecast performance with other NEM TNSPs.