28 November 2013

Mr Andrew Reeves
Chair
Australian Energy Regulator
GPO Box 520
Melbourne
Victoria 3001

Dear Mr Reeves

LODGEMENT OF EXPENDITURE FORECAST METHODOLOGY

I am writing to inform the AER of the methodologies Endeavour Energy proposes to use to prepare our forecasts of operating expenditure and capital expenditure that form part of our regulatory proposal commencing on 1 July 2015.[1] Our Expenditure Forecasting Methodology statement is attached.

Since we are not required to submit our regulatory proposal until May 2014, not all details of our forecast methods for capital expenditure and operating expenditure can be finalised at the current time. The forecasting method therefore can only be described at the high level in terms of the approaches we intend to use for forecasting. Full details of these methods will be included in our proposal as required by the National Electricity Rules.

Nevertheless, the forecasting method statement serves an important role in the distribution determination process for Endeavour Energy and the AER as it is intended to be the starting point on the early engagement between us on two integral elements of our revenue requirement, being forecast capital expenditure and forecast operating expenditure. We are confident that our statement fulfils this objective and would greatly assist the AER in deciding on the information it needs to assess our proposed forecast capital and operating expenditure.

Should you require further information, please contact Mr Rod Howard, Chief Operating Officer, on (02) 9853 6701.

Yours faithfully

Vince Graham

Vince Graham
Chief Executive Officer

[1] As required by clause 6.8.1A of the National Electricity Rules

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Expenditure Forecasting Methodology

1. Overview

Clause 6.8.1A of the National Electricity Rules (NER) requires Endeavour Energy to inform the AER of the methodology we propose to use to prepare the forecasts of operating expenditure and capital expenditure that form part of our regulatory proposal for the regulatory control period 1 July 2015 to 30 June 2019.[1] Endeavour Energy is required to provide this 'forecast methodology statement' to the AER 19 months before the expiry of the transitional regulatory control period, i.e. by 30 November 2013.[2]

We understand that the purpose of providing this forecasting methodology statement is to provide a 'starting point' in the early engagement between Endeavour Energy and the AER on the forecasting methodology we proposes to use; so as to assist the AER in preparing for its assessment of Endeavour Energy's proposed operating and capital expenditure forecasts.[3]

Nevertheless, given that we are not required to lodge our regulatory proposal for the subsequent regulatory control period until May 2014, not all elements or details of our forecast operating expenditure and capital expenditure methodology can be finalised at the time of lodging this statement. Therefore, by necessity, this statement can only provide an overview of the methodologies we propose to adopt in forecasting our operating and capital expenditure that form part of our regulatory proposal to be submitted in May 2014. Full details of these methodologies, including key variables and key assumptions, will be included in our regulatory proposal, as required by clauses S6.1.1 and S6.1.2 of the NER.

It might be possible, though unlikely, that we may have to amend our proposed approach and forecasting methodology to cater to changes in our circumstances from the time of lodging this statement and the lodgment of our regulatory proposal. However, these changes, if required, are not anticipated to be significant. We will advise the AER as soon as practicable if changes to our proposed approach and methodology are required. We outline our forecasting methodologies for operating and capital expenditure below

1.1 Factors influencing our forecasting approach

Changes in Endeavour Energy's operating environment since the AER's determination for the 2009/10–2013/14 regulatory period will have a discernible impact on future operating and capital expenditure requirements. These changes stem from a number of key events including:

- The NSW Government's decision to reform the NSW distribution businesses to deliver cost and efficiency savings to assist electricity consumers;
- Introduction of Projects Challenge and Compete to ensure average network price increases do not continue to rise;
- The sale of Endeavour Energy's (then Integral Energy) retail business; and
- The requirement on Endeavour Energy to evaluate and submit a new Cost Allocation Method (CAM).

1.2 Customer focus and objectives

To ensure that our network is managed to meet the needs and expectations of our customers, Endeavour Energy has developed a significant consumer engagement program which focuses on encouraging the community to have a significant say in the way we operate. We have undertaken customer engagement research with residents and businesses which confirmed customers place a high value on price stability. This research builds on Endeavour Energy's experience, adding insight to the type of relationship and benefits needed to successfully operate as a network services business. Our customer and stakeholder engagement strategy ensures that customers will continue to play an active role in informing network investment. To this end, the outcomes of this research have been assessed and will be incorporated in Endeavour Energy's

[1] This is the indicative regulatory control period which will be confirmed in Endeavour Energy's regulatory proposal to be submitted in May 2014.
[2] Clause 6.8.1A as modified by clause 11.56.4(o) for Endeavour Energy. Normally, a DNSP is required to submit this statement 24 months before the expiry of a distribution determination.
[3] AEMC 2012, Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services, Final Position Paper, 29 November 2012, Sydney, page 110.

2014-19 regulatory proposal where appropriate, incorporating what we have learnt from customers into what we need to achieve as a business. We are preparing our proposal on the basis of delivering the following customer priorities:

- Safety – by continuously improving our safety performance;
- Price – striving to contain average increases in customers' distribution network electricity bills at or below CPI; and
- Reliability – by ensuring the ongoing reliability, security and sustainability of the network.

Customer feedback is an integral part of the process that determines our revenue. Written submissions can be provided to Endeavour Energy at PO Box 811, Seven Hills NSW 1730. If you would like to provide brief comments, please see our Facebook page, Your Power, Your Say.

2. Forecasting Methodology – Operating expenditure

This section outlines the background, method and assumptions we will use to develop the operating expenditure (opex) forecasts underpinning the 2014/15–2018/19 AER submission.

2.1 Our approach to forecasting operating expenditure

To comply with the NER and to ensure that the nature of each cost category is appropriately accounted for in preparing the total forecast opex, we approach the development of the total forecast opex as follows:

- The ***base step trend 'revealed cost' approach*** will be applied to the majority of Endeavour Energy's network maintenance activities, other operating costs and direct and indirect overhead forecast opex. This approach utilises an adjusted 2012/13 base year to forecast expenditure. We will forecast opex at the ***category*** or ***activity level***, where appropriate.
- Other operating expenditure (including non-network alternative programs, self-insurance and debt raising costs) will be forecast using ***benchmark costs*** or ***individual project forecasts*** where appropriate.

For the ***activity level*** forecasts, we will firstly develop forecast unit costs for the identified network maintenance activities using a trend based on 1 to 3 years of historical costs (inclusive of saving initiatives) which will be applied to the future Network Maintenance plan volumes for the 2014/15–2018/19 regulatory period to determine the Network maintenance operating expenditure forecasts.

In regards to the ***category level*** forecasts, we will use the actual opex for the 2012/13 financial year (which is inclusive of saving initiatives) for the relevant operating expenditure categories as the base year opex to develop the 2014/15–2018/19 regulatory period forecast. This financial year is the fourth year of the current regulatory period and will be used because it is the latest actual opex data available at the time of preparing the forecast.

2.2 Overview of systems and costing principles

Endeavour Energy's costs are recorded based on the following hierarchy of costs.

Cost element	Description
Organisation unit	Defined by the organisational structure / responsibility centre (E.g. Network Operations, Information Communications & Technology, Finance & Compliance).
Activity	A major grouping of work performed which feeds up to the information requirements of the organisation (E.g. Distribution Substation Maintenance, Street Lighting or Corporate Services for operating expenditure).
Sub-activity	An additional breakdown of the Activity (e.g. Fault and emergency repairs, condition based maintenance, training for operating expenditure and industrial and commercial, asset relocations and major projects for capital expenditure).
Expense element	Categorisation of expenses such as labour, materials and contractors. Expense elements are initially recorded by transaction and are then aggregated and categorised for regulatory, financial and summary purposes.

2.3 Operating Expenditure Cost Drivers

Costs are allocated on a causal basis and are as follows:

- **Direct Network Costs** – These are the operating costs associated with activities within the network functional areas that are directly attributed to the services to which they support, based on direct relationships between the activity or sub-activity category and the service category (i.e. Standard Control Service, Alternative Control Service or Unregulated).
- **Direct Network Overhead Costs** – The remaining network operating costs that cannot be allocated directly are network overheads and are allocated to service categories based on a non-causal allocator. Network overheads are allocated on a pro rata basis, based on the proportions of the direct allocation of direct network costs to each service category.
- **Indirect Overhead Costs** – Corporate overheads and shared business unit costs are allocated to the network business by a combination of causal factors relative to the nature of the expense type e.g. call volumes to call centre etc. Where a causal basis cannot be determined overheads are allocated on the basis of the weighted value of costs attributed to distribution and non-distribution services. The network business's share of corporate overheads are then allocated to the relevant service categories using a similar approach as with network overheads, i.e. allocated on a pro rata basis, based on the proportions of the direct or specific allocation of network costs to each service category.

The above method was deemed to be the most reasonable as it relies on analysis of the actual activities and sub activities of work in regards to the service classification relationships.

2.4 Forecasting Approach

Cost categories forecast using the base-step trend 'revealed cost' approach

Operating expenditure groups	Cost category	Base-step trend 'revealed cost' approach	
		Activity level	Category level
Network maintenance	Vegetation		✓
	Transmission Substation Maintenance	✓	
	Distribution Substation Maintenance	✓	
	Transmission Mains Maintenance	✓	
	Distribution OH & UG Mains Maintenance	✓	
	OLI/GLI		✓
	System Access / Switching		✓
Operation and business support	Network Divisions Overheads or other operating expenditure		✓
	Corporate Divisions Overheads		✓

Other operating expenditure, including non-network alternative programs, self-insurance and debt raising costs are forecast using benchmark costs or individual project forecasts, where appropriate.

2.5 Cost Categories

Our total forecast opex comprises of the following broad groups. These are:

a) Network maintenance operating expenditure;
b) Operation and business support operating expenditure – including unregulated and alternative control services operating expenditure; and
c) Other operating expenditure.

Network maintenance operating expenditure

Network maintenance operating expenditure is incurred to ensure that our fixed assets continue to provide their predetermined service capacity and quality and achieve their useful life. Our network maintenance operating expenditure is made up of the following activity and sub activity cost category combinations, reflecting the activities we undertake to maintain our network:

Activity	Description
Vegetation	Work associated with the maintenance and management of vegetation in relation to Endeavour Energy's electrical reticulation system, which includes tree trimming, ground line clearing and process management/administration.
Transmission Substation Maintenance	Activities include the inspection & investigation, preventative & condition based maintenance, faults & emergencies repair of Endeavour Energy's Transmission and Zone Substations.
Distribution Substation Maintenance	Work associated with the inspection & investigation, preventative & condition based maintenance, faults & emergencies repair of Endeavour Energy's Distribution Ground & Pole Substations.
Transmission Mains Maintenance	Activities include the inspection & investigation, preventative & condition based maintenance, faults & emergencies repair of Endeavour Energy's overhead & underground transmission mains reticulation process.
Distribution OH & UG Mains Maintenance	Work includes the inspections & investigation, preventative & condition based maintenance, faults & emergencies repair of Endeavour Energy's overhead and underground distribution mains reticulation process.
OLI/GLI	Work associated with the inspection, investigation, and testing of poles and associated equipment
System Access / Switching	Switching activities for all voltage levels both planned and unplanned, and emergency response to make the network safe. This does not include fault & emergency repairs performed by field staff.

Each of the above activities is flagged as being a network maintenance activity (i.e. directly attributable to a service).

An activity is a major grouping of work performed which feeds up to the information requirements of the organisation and the sub activity (listed in the following table) is an additional breakdown of the activity being performed.

Sub Activity	Description
Condition Based Maintenance	Work associated with all minor non-urgent corrective repairs on Endeavour assets such as transmission/zone substation equipment, towers, poles, cables & lines, as identified through the inspection process or due to a fault.
Fault and Emergency Repairs	Work associated with the unscheduled maintenance or repair / replacement of major defective components associated with Endeavour assets and equipment e.g. through storm and fire damage.
Inspection and Investigation	Work associated with the cyclic or periodic inspection, investigation or examination of Endeavour assets, equipment and associated structures & fittings.
Preventative Based Maintenance	Work associated with routine scheduled maintenance on Endeavour Energy's assets such as on transmission/zone substations equipment, underground cables, poles etc. as defined by Maintenance Standards or industry regulations and guidelines.
Operating Refurbishment	Work encompassing the refurbishment of assets which does not extend the assets useful life beyond the original expected life, and which does not increase the functionality, capacity or value of that asset.

The above network maintenance activity and sub activity combinations drive the allocation of the underlying costs to the RIN categories listed below.

RIN Category	Description of costs in RIN category
Network Operating Costs	The main areas of expenditure include network operations activities such as supply interruptions and network control, networks divisional operating expenditure, marketing, and customer service.
Inspection	Routine asset inspection and condition monitoring activities include field and aerial inspection of overhead distribution assets (poles, pole top structures, conductors, substation structures, transformers, high and low voltage switchgear, and other distribution electrical equipment), powerline to ground and vegetation clearances, thermography of powerline and substation structures, and non-destructive testing of power transformers and switchgear.
Maintenance & Repair	Covers all maintenance & repair activities on network assets and includes maintenance and repair of distribution powerline equipment, damaged or inoperable switchgear fuse replacement, distribution and zone substations, and customer service mains.
Vegetation Management	The majority of vegetation management work is generated and undertaken in one of two ways: • a systematic and regular program of vegetation clearance work carried out on power lines based on a prescribed cutting cycle ('Cyclic vegetation clearance'); and • 'spot cutting' of defects arising from annual aerial patrols carried out to remove higher risk, individual incursions of vegetation into the clearance envelope.

RIN Category	Description of costs in RIN category
Emergency Response	This area covers fault and emergency repair and restoration of supply for planned and unplanned interruptions caused by events such as storms, equipment failures, acts of vandalism, and vehicle collisions. On notification of a customer supply interruption, Endeavour Energy dispatches field employees to deal with the fault.
Network Maintenance Operating Costs	Other distribution maintenance costs predominantly include field training costs.
Customer Service	The costs of providing the following services to distribution customers: • Facilitating the reporting to the Distribution Business of distribution faults and safety hazards, and complaints about the quality and reliability of supply. • Responding to queries on new connections, disconnections and reconnections. • Responding to queries on improving power factor or load factor.
Other Operating Costs	This category includes all other costs that are incurred, for example operating small tools and equipment.

Operation and business support operating expenditure

This operating expenditure group comprises of expenditure associated with directly or indirectly supporting the operation of Endeavour Energy's network system. The organisational structure is comprised of the following Divisions:

Category	Division	Description of Division
Network Divisional organisation units – **Direct Costs or Indirect Network Overhead Costs**	Network Operations	Responsible for activities associated with Network Connections, System Control and the network operational regions of North, Central & South.
	Network Development	Responsible for activities associated with Capital Programs, Major Projects, Project Development, Network Maintenance and the Portfolio Management Office.
	Chief Engineer	Manages the activities associates with Primary Systems, Secondary Systems, Network Data & Performance, Network & Asset Planning, Electrical Safety & Authorisations and Technical Training.
Shared organisational units – **Corporate Overhead Costs**	Chief Operating Officer	Responsible for the leadership management of Endeavour Energy and accountable to the Chief Executive Officer of Networks NSW.
	Finance & Compliance	Responsible for Financial Control, Commercial & Decision Support, Governance, Risk & Compliance, Network Regulation, General Counsel, PMO & Corporate Planning and Finance Transactions & Services (e.g. Payroll, Accounts Payable, Network Billing and Accounts Receivable).

Category	Division	Description of Division
	Information, Communications & Technology	Manages activities relating to the operation and maintenance of various IT technologies and telecommunication systems required for the effective operation Endeavour's infrastructure and day to day operations.
	Health, Safety & Environment (HS&E)	Activities include HS&E System & Reporting, Health Services & Injury Management, Safety & Environmental Services and HS&E Assurance & Improvements.
	People & Services	Responsible for Internal Audit, Property & Fleet, Employee Relations, HR Operations, Procurement & Logistics, Corporate Affairs and Customer Service.

Other operating expenditure

These are operating expenditure relating to non-network alternatives, self-insurance and debt raising costs.

2.6 Forecasting methods

Base-step trend 'revealed cost' approach

Activity level forecasts

We will forecast opex at the activity level for cost categories where the key driver is the volume of work undertaken. Firstly we will develop forecast unit costs for the identified network maintenance activities using a trend based on 1 to 3 years of historical costs (inclusive of our efficiency programs and reforms) which are applied to the future Network Maintenance plan volumes for the 2014/15–2018/19 regulatory period to determine the Network maintenance operating expenditure forecasts.

In order to derive unit costs for each of the Network Maintenance services identified, we will use the following methodology:

- Review 1 to 3 years of applicable historical data to identify which work orders or activities relate to each of the network maintenance activities identified. These historical work orders will be extracted for 2010/11, 2011/12 and 2012/13; and then
- Based on the applicable costs, we will calculate an average hourly rate for each of the 3 years. These hourly rates will be converted to real $2012/13 and we will then forecast the average hourly rate using a trend based on the 3 years of average hourly rates; and then
- The average hourly rate forecast for each year of the 2014/15–2018/19 regulatory period will be applied to the average time and volumes of network maintenance activities in the Network Maintenance Plan for the 2014/15–2018/19 regulatory period.

The volume of network maintenance activities in the Network Maintenance plan for the 2014/15–2018/19 regulatory period will be determined from network maintenance activities undertaken in the 2009/10–2013/14 regulatory period, the forecast works in the Capital Plan and the current and forecast asset base.

As noted, the forecasts under the volume trend method will be reflective of our efficiency programs and reforms, this means the unit rates will be reflective of the Projects Challenge, Project Compete and Network Reform programs. These efficiency programs and reforms have identified operational improvements across a number of business processes within Endeavour Energy that will result in one-off or ongoing savings and deferred or avoided costs.

Category level forecasts

We will forecast opex at the category level for opex categories that are recurring activities based on total network size. We will use the actual opex for the 2012/13 financial year (which is inclusive of saving initiatives and reforms) as the starting or base year opex in developing the 2014/15–2018/19 regulatory period forecast. This financial year is the fourth year of the current regulatory period and is used because it is the latest actual opex data available at the time of preparing the forecast.

The base step trend method involves the selection of 2012/13 as the nominated base year which will be escalated and adjusted as appropriate to derive a forecast that best reflects the opex requirements of the forthcoming period.

The base year method uses the following inputs to develop the forecast opex:

- The base year opex, adjusted to remove one-off or non-recurrent costs;
- Forecast saving initiatives from Endeavour Energy's cost reduction strategies;
- Forecast savings initiatives from Networks NSW efficiency programs;
- Impact of change factors on forecast costs; and
- Real cost escalators.

Other operating expenditure forecasts

Other operating expenditure will be forecast using a combination of benchmark costs and individual project forecasts where appropriate. Self-insurance and debt raising costs will be set using benchmarks. We will adopt the AER's method for the calculation of debt raising costs. That is, debt raising costs will be calculated by applying a benchmark debt raising unit rate to the debt portion of our regulated asset values. Non-network alternatives will be forecast on an individual project basis identified based on network need. Self-insurance costs will be developed with reference to benchmark actuarial assessments for cost categories that are best managed through self-insurance.

Real cost escalators

We have escalated our forecast opex to reflect the expected real change in costs over the 2014/15–2018/19 regulatory period based on cost types (labour, contracted labour and materials). We have applied real cost escalators for each cost type using market data or economic analysis.

3. Forecasting Methodology – Capital expenditure

This section outlines the background, method and assumptions we will use to develop the capital expenditure (capex) forecasts underpinning the 2014/15–2018/19 AER submission.

3.1 Our approach to forecasting capital expenditure

Our total capex forecasts for the 2014/15–2018/19 regulatory period will be based on the sum of:

- **System capex** – This expenditure reflects our capex requirements for assets used to convey electricity through our network. We have three categories of system capex expenditure:
    - Growth (augmentation) capex;
    - Replacement capex;
    - Reliability capex; and
    - Demand and network operating management capex.
- **Non-system capex** – This category includes expenditure which supports the operation of the regulated network system (not directly related to the construction or replacement of system assets). This category includes:
    - Land and buildings;
    - Fleet;
    - Plant and equipment; and
    - Information and Communications Technology (ICT).

We have used a combination of bottom-up and top-down approaches to forecast the individual capex categories where appropriate.

3.2 Capex categories

Our total forecast capex is comprised of system and non-system capex. Within each, there are a number of capex categories, as shown in the table below.

Capex category	Description
System Capex	
Growth (Augmentation)	We augment the network to connect new customers, and ensure that the capacity of the network is adequate to meet the forecast demand. Additional capacity is installed to provide back up supply in the event of faults where the risk of non-supply is considered to justify the cost associated with the additional capacity. There are two key drivers of investment: • New customer connection – This includes connection of new customers to the network which necessitates augmentation of the shared network in existing network areas. • Reinforcement – where the aggregate demand from new and existing customers in an area necessitates augmentation of the shared network (either at the distribution system and/or sub-transmission system level). Our growth capex for the upcoming regulatory period is impacted particularly by the need to service growth in demand in the greenfield development areas of Sydney's North West and South West Growth Centres.

Asset Renewal /Replacement	We invest in the renewal and replacement of assets when the condition of the asset indicates that the continued safe and reliable operation of the existing asset is no longer economically viable. There are a number of regulatory obligations that drive our investment including public safety, workplace safety, and environmental legislation. The key drivers of investment are: • Degradation in the condition of assets on the network, generally as a result of the asset's age and environmental factors • Safety Environmental or other asset related risks.
Reliability	We invest to ensure compliance with reliability performance targets set out in legislative and administrative requirements, and in particular ensure that customers connected to the worst performing parts of the network receive at least the minimum specified levels of reliability. The main driver of investment in this capex category is our performance against reliability targets.
Demand and network management capex	Investment in demand management programs, the distribution monitoring and management systems and operational technology pilots.
Non-system capex	
Non-system capex	This capex category includes investment in assets to support our network and corporate functions. Our non-system capex primarily relates to: • Information and communications technology (ICT) • Plant and equipment, and • Land and buildings.

3.3 Forecasting approach

We forecast capital expenditure to achieve the objectives outlined in our network strategy through developing individually documented plans. The Strategic Asset Management Plan is the key tool used by Endeavour Energy to ensure that the individual program expenditures are integrated in such a way as to obtain the maximum network benefit in an efficient and sustainable manner. The key steps in our annual capex forecasting process are depicted in the figure below. This annual process is a rolling 10 year forecast. We will also use this process for developing the five year capex forecasts for the 2014/15–2018/19 regulatory period, therefore the regulatory process is part of our business as usual processes.

The development of the individual asset management plans involves identifying and forecasting required capital works required in the capex categories based on network need. Investment needs across the network are identified using detailed engineering analysis of the network, current asset and network condition reports, spatial demand forecasts, regulatory obligations and requirements and identified customer concerns. Once a particular network constraint is identified, project options to address the network need are developed. At this stage we consider a number of options including non-network alternatives and opex substitution possibilities.

Forecast costs are then calculated for each project option. For the majority of capex categories, we use a 'bottom up' method to derive the forecast capex. Our bottom up method generally utilizes:

- Historical unit costs
- Volumes based on historical experience and network need
- Current labour and contractor rates
- Current material and equipment costs.

We have used a 'top-down' approach to forecasting some capex categories. Forecast work in these categories is generally constant in scope from year-to-year or related to network growth and is forecast at a high level.

The yearly capital works plan underlying the capex forecasts is determined through the Strategic Asset Management Plan. This sets priorities and summarises the required investment in our network to maintain the ongoing capability of the network. Specific high value projects to address network needs are selected using our Network Investment Options process. As part of this process we consider all the feasible options to address the network needs, and select the option which is least cost, or maximises the benefits in net present terms. This process aligns with the RIT-D planning process and guidelines.

As part of the Networks NSW reform program, a new Investment Governance Process has been instituted to review and rationalise our forecast program. A prioritisation model is being used for all network projects and programs. This model uses an algorithm based on an assessment of risks and provides a ranking outcome for the proposed capex projects. This prioritisation is used to finalise the capital works program for each year based on an acceptable level of risk. This process ensures that the capex program is efficient and prudent, and meets our objective of keeping prices as low as possible.

3.4 Forecasting methods

The table below summarises our forecast methodology for each of our capex categories in developing the individual asset management plans.

Capex category		Description
System Capex		
Growth capex	Sub-transmission augmentation	Forecast constraints in the sub-transmission network are identified using the 10 year spatial peak demand forecasts. The demand forecasts are input into the network model for each forecast year to identify any constraint conditions in the network. Constraint conditions are determined based on the security criteria set out in the jurisdictional licence conditions. Once network constraints have been identified, options to address these constraints are developed, including non-network alternatives and possibilities for opex substitution. We have used a bottom-up approach to forecast the costs of proposed augmentation projects based on historical unit rates and the latest labour, contractor (if applicable) and equipment rates.
	Distribution system augmentation	Forecast constraints in the distribution system are identified by applying the individual zone sub-station demand forecasts to the feeder loading in each zone. Constraint conditions are determined based on the security criteria set out in the jurisdictional licence conditions. Once network constraints have been identified, options to address these constraints are developed, including non-network alternatives and possibilities for opex substitution. We have used a bottom-up approach to forecast the costs of proposed augmentation projects based on historical unit rates and the latest labour, contractor (if applicable) and equipment rates.

Capex category		Description
	New customer connections	Growth in customer numbers is used to estimate the number of new connections required and the associated augmentation expenditure. We have used a top-down approach to forecast augmentation requirements associated with new customer connections. These forecasts are based on an analysis of historical expenditure and historical and forecast customer growth rates and demand.
Replacement capex		Replacement capex is undertaken according to the Strategic Asset Renewal Plan. The key drivers of this capex category are the asset condition and changes in regulatory requirements (e.g. changes to Australian Standards or safety requirements). We use a combination of top-down and bottom-up approaches to forecast the expenditure for this capex category. Replacement of high value, low volume assets (such as sub-transmission transformers) are determined using stringent replacement criteria outlined in the Strategic Asset Renewal Plan. The forecast replacement costs of these assets is developed using a bottom-up build based on historical unit rates and current equipment costs and labour rates. Replacement of low value, high volume assets (e.g. poles) is forecast using a top-down approach. The forecasts are based on an average replacement value per year, accounting for network/asset growth and changes in regulatory requirements. The veracity of the bottom up forecast developed in this manner is tested by comparison against a top down forecast of renewal expenditure. Endeavour Energy utilises a modeling tool similar to the AER's REPEX model that considers the age profile of the various asset categories to develop a high level forecast of asset replacement expenditure.
Reliability capex		The need for reliability capex is identified from our performance against the mandated targets in the jurisdictional licence conditions (e.g. SAIDI targets). We regularly report and monitor the reliability performance of our network at a feeder level. We identify specific locations where the network does not meet the reliability performance standard using these reports and develop location specific responses. The reliability capex forecasts are developed using a bottom up approach based on the location specific responses identified through the performance monitoring process, historical unit costs and current equipment costs and labour rates.
Demand and network management capex		This capex category covers a variety of capex programs and projects, including: • Demand management programs • Distribution Management System • Distribution, Sub-transmission and Feeder monitoring • Pilots of operational technology Specific programs are identified on an as-needs basis and costs are forecast using a bottom-up approach.

Capex category	Description
Non-System Capex	
Land and Buildings	We forecast capex for land and buildings assets using a bottom up approach. The key drivers of expenditure in this category are the current asset condition and key changes in our business environment such as customer and staff numbers. The need for replacement, upgrades and new assets is determined in the field service centre strategy.
ICT	Expenditure in this capex category is a combination of maintaining current IT systems (including renewal and upgrades of hardware) and implementing new systems (e.g. new software). We forecast ICT expenditure using a combination of a top down approach based on historical expenditure for maintaining the current IT systems and a bottom-up forecast for new systems based on a demonstrated business need and in accordance with our ICT Investment Plan.
Fleet	Expenditure in this capex category is forecast using a bottom up approach. It relates to replacing and expanding Endeavour Energy's vehicle fleet. Expansion of the vehicle fleet is directly related to the number of staff employed in field-based roles and replacement is undertaken according to the vehicle condition and age.

3.5 Key inputs of forecast methods

This section identifies the key inputs into our capex forecasts, including demand forecasts, customer connection growth, costing programs of work and real cost escalation.

Spatial peak demand forecasts

Spatial peak demand forecasts are a key input in the development of forecast augmentation capex. We forecast maximum demand for each zone substation, utilizing a bottom up approach for both summer and winter peak periods. The demand forecasts are based on a combination of:

- Temperature corrected values from the previous year,
- Current and projected penetration rates of air conditioning; and
- Percentage of residential load at each zone substation.

Our forecasts incorporate new developments planned to occur on the network, new load increases expected from customer connection applications and load transfers from one zone substation to another. Loads that are supplied by embedded generators are also incorporated in the calculation of maximum demand forecasts.

Customer growth

Customer number forecasts are a key input to deriving our customer connection costs and LV augmentation investment. We have reviewed historical data on customer connections and used most recent data projections to forecast residential and non-residential customer connections.

The Endeavour Energy network supply area includes Sydney's growth areas, with a significant amount of Greenfield development in areas such as the North West and South West growth sectors. An understanding of the proposed developments gained from developers and planning authorities such as the Department of Planning and Infrastructure and local councils informs both our customer number forecast and our spatial peak demand forecast.

Costing programs of works

We have largely used historical costs to determine the expected costs of completing works, and have modified this where appropriate to reflect site specific factors. Historical unit costs, current labour and contractor rates and materials and equipment costs have been used to develop the bottom-up forecasts.

As part of our forecasting process we have proactively considered efficiencies in design scope and delivery costs. Indirect overhead costs are allocated to capex projects according to our cost allocation method approved by the AER.

Cost escalation

We have escalated our forecast costs to reflect the expected real change in costs over the 2014/15–2018/19 regulatory period based on cost types (labour, contracted labour and materials). We have applied real cost escalators for each cost type using market data or economic analysis.