Better Regulation

Expenditure Forecast Assessment Guideline for Electricity Distribution

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1 Overview of the Guideline

The National Electricity Rules (NER) require the Australian Energy Regulator (AER) to develop and publish Expenditure Forecast Assessment Guidelines.[1] This document is our Expenditure Forecast Assessment Guideline for electricity distribution.

1.1 Introduction

Distribution network service providers (DNSPs) must provide, with their regulatory proposals, a document complying with the Guideline or—if we deviate from the Guideline—the framework and approach (F&A) paper.[2] The NER allow us to require a DNSP to resubmit its regulatory proposal if it does not comply with the Guideline.[3]

The NER require DNSPs and the AER to engage on a DNSP's expenditure forecasting methodology to ensure that both the AER and the DNSP are aware, in advance, of the information the AER requires to assess the DNSP's proposal. The Guideline must specify:[4]

- the approach the AER proposes to use to assess the forecasts of operating expenditure (opex) and capital expenditure (capex) that form part of the regulatory proposals DNSPs
- the information the AER requires for the purposes of that assessment.

Many of the techniques and their associated data requirements are common to expenditure assessments under the NER and our annual benchmarking reports. We must consider these benchmarking reports when assessing regulatory proposals.

1.2 Structure of the Guideline

This Guideline sets out:

- our task and general assessment approach under the regulatory framework
- our assessment techniques
- our approach to assessing capex and opex
- the information we require for expenditure assessment.

1.3 Transitional issues

The NER require us to indicate how (if practicable) we will deal with transitional issues if a guideline indicates we may change our regulatory approach in future distribution determinations.[5] While this Guideline indicates we may change our assessment approach in some ways, we do not consider transitional issues arise as a result.

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1 NER, clause 6.2.8(a)(1).
2 NER, clause 6.8.2(c2).
3 NER, clause 6.9.1.
4 NER, clause 6.4.5(a).
5 NER, clause 6.2.8(d).

1.4 Process for revision

The AER may amend the Guideline from time to time in accordance with the requirements of the NER.[6] We will review and amend the Guideline as we consider appropriate. A version number and an effective date of issue will identify every version of the Guideline.

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6 NER, clauses 6.2.8(e), (f).

2 Assessment approach

This section outlines our task under the regulatory framework and our general assessment approach given these requirements. It then explains the regulatory techniques we intend to use for expenditure assessment. The explanatory statement for this Guideline considers these matters in detail.

2.1 The AER's task

The National Electricity Law (NEL) requires us to perform our economic regulatory functions in a manner that will or is likely to contribute to the achievement of the national electricity objective (NEO).[7] The NEO is:[8]

> …to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to—
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system.

In essence, the NEO places an overarching requirement on the AER to make distribution determinations that will deliver efficient outcomes to the benefit of consumers in the long term. The revenue and pricing principles support the NEO and ensure a framework for efficient network investment exists, irrespective of how the regulatory regime and the industry evolve.[9] We must take the revenue and pricing principles into account whenever we exercise discretion in making those parts of a regulatory determination relating to direct control network services.[10]

The incentive based regulatory framework aims to facilitate the NEO and the revenue and pricing principles by ensuring DNSPs are appropriately incentivised to provide, and are compensated for providing, electricity services efficiently so that consumers receive the level of service they expect at the lowest long run cost. It does this by rewarding DNSPs for maintaining service standards while spending less in a regulatory control period than the expenditure allowance that we determine. For this reason, we must consider whether DNSPs are responding to incentives and providing distribution services efficiently.

The NER set out specific requirements to ensure we assess and determine expenditure proposals in accordance with the NEL, and hence give effect to the NEO. When we make a distribution determination, we must decide whether or not we are satisfied that a DNSP's proposed total capex forecast and total opex forecast reasonably reflect the capex criteria and opex criteria (collectively, the expenditure criteria). These criteria are:[11]

(1) the efficient costs of achieving the capex and opex objectives

(2) the costs that a prudent operator would require to achieve the capex and opex objectives

(3) a realistic expectation of the demand forecast and cost inputs required to achieve the capex and opex objectives.

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7 NEL, section16(1)(a).
8 NEL, section 7.
9 Second reading speech, National Electricity (South Australia) (New National Electricity Law—Miscellaneous Amendments) Amendment Bill 2007, Parliament of South Australia, Hansard of the House of Assembly, 27 September 2007, p. 965.
10 NEL, section 16(2)(a)(i).
11 NER, clauses 6.5.6(c), 6.5.7(c).

When considering whether forecasts reasonably reflect the expenditure criteria, we must have regard to the capex and opex factors (collectively, the expenditure factors).[12]

If satisfied, we must accept the DNSP's forecast.[13] If we are not satisfied, we must not accept the forecast[14] and estimate a total forecast that we are satisfied reasonably reflects the expenditure criteria.[15] That is, we must either amend the DNSP's estimate or substitute it with our own estimate. Whether we accept a forecast or do not accept it, we must provide reasons for our decision.[16]

2.2 Proposed general approach

For both capex and opex proposals, we propose to apply the same general approach to assess a DNSP's forecasts. This general approach enables us to either accept the DNSP's proposal or not accept it and substitute it with an alternative estimate.[17] In doing so, the NER require that we will examine the DNSP's proposal and other relevant information.[18] The propose-respond framework necessitates that we commence our assessment with the DNSP's proposal.[19] However, if we do not accept that a DNSP's proposal reasonably reflects the expenditure criteria, the DNSP's proposal is not a constraint to determining a substitute.[20]

We will typically compare the DNSP's total forecast with an alternative estimate that we develop from relevant information sources. To calculate this alternative estimate we will consider a range of assessment techniques. Some of our techniques will assess the DNSP's forecast at the total level; others will assess components of the DNSP's forecast. Our estimate is unlikely to exactly match the DNSP's forecast. However, by comparing it to the DNSP's forecast, we can form a view as to whether or not we consider the DNSP's forecast reasonably reflects the expenditure criteria.

Therefore, if a DNSP's total capex or opex forecast is greater than the estimates we develop using our assessment techniques, and there is no satisfactory explanation for this difference, we will form the view that the DNSP's estimate does not reasonably reflect the expenditure criteria. In this case, we will substitute our own estimate that does reasonably reflect the expenditure criteria. If our estimate demonstrates that the DNSP's forecast reasonably reflects the expenditure criteria, we will accept the forecast.[21] Whether we accept a DNSP's forecast or do not accept it, we will provide the reasons for our decision.[22]

When we develop alternative estimates as a means of assessing a DNSP's proposal, we will generally develop an efficient starting point or underlying efficient level of expenditure. We then adjust this for changes in demand forecasts, input costs and other efficient increases or decreases in expenditure, allowing us to construct a total forecast that we are satisfied reasonably reflects the expenditure criteria.

For recurrent expenditure, we prefer to use revealed (past actual) costs as the starting point for assessing and determining efficient forecasts. If a DNSP operated under an effective incentive

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12 NER, clauses 6.5.6(c), 6.5.7(c)
13 NER, clauses 6.5.6(c), 6.5.7(c), 6.12.1(3)(i), 6.12.1(4)(i).
14 NER, clauses 6.5.6(d), 6.5.7(d)
15 NER, clauses 6.12.1(3)(ii), 6.12.1(4)(ii).
16 NER, clause 6.12.2.
17 NER, clauses 6.5.6(c), 6.5.6(d), 6.5.7(c), 6.5.7(d), 6.12.1(3) and 6.12.1(4).
18 For example, NER, clause 6.11.1(b).
19 AEMC, *Rule determination*, 29 November 2012, pp. 111–112.
20 Clause 6.12.3(f) of the NER has previously constrained our discretion in developing a substitute, but this clause no longer exists.
21 NER, clauses 6.5.6(c), 6.5.7(c).
22 NER, clause 6.12.2.

framework, actual past expenditure should be a good indicator of the efficient expenditure the NSP requires in the future. The ex-ante incentive regime provides an incentive to improve efficiency (that is, by spending less than the AER's allowance) because DNSPs can retain a portion of cost savings made during the regulatory control period. However, the incentive to spend less than our allowance must not be to the detriment of the quality of the services the DNSP supplies.

Consequently we apply various incentive schemes (such as the efficiency benefit sharing scheme (EBSS), the service target performance incentive scheme (STPIS) and the capital expenditure sharing scheme (CESS)) to provide DNSPs with a continuous incentive to improve their efficiency in supplying electricity services to the standard demanded by consumers.

While we examine revealed costs in the first instance, we must test whether DNSPs have responded to the incentive framework in place. That is, we must determine whether or not the DNSP's revealed costs are efficient. For example, whether the DNSP's past performance was efficient relative to its peers and whether the DNSP has improved its efficiency over time. For this reason, we will assess the efficiency of base year expenditures using our techniques, beginning with economic benchmarking and category analysis, to determine if it is appropriate for us to rely on a DNSP's revealed costs.

We rely on revealed costs for opex to a greater extent than for capex because we consider opex is largely recurrent. Past actual expenditure may not be an appropriate starting point for capex given it is largely non-recurrent or 'lumpy', and so past expenditures or work volumes may not be indicative of future volumes. For non-recurrent expenditure, we will attempt to normalise for work volumes and examine per unit costs (including through benchmarking across DNSPs) when forming a view on forecast unit costs.

Other drivers of capex (such as replacement expenditure and connections works) may be recurrent. For such expenditure, we will attempt to identify trends in revealed volumes and costs as an indicator of forecast requirements.

At the time of developing this guideline, capex is not currently subject to an incentive scheme like the EBSS. This means that although past actual expenditures and volumes may indicate a particular DNSP's likely future expenditure, we cannot presume it is efficient. The CESS may mitigate this issue to some extent. Consequently, and given the presence of non-recurrent expenditures, our assessment approach is typically more involved for capex than for opex. It may be necessary to review individual, or groups of, projects and programs to inform our opinion on total forecast capex.

Our approach for both opex and capex will place greater reliance on benchmarking techniques than we have in the past. We will, for example, use benchmarking to assist us in determining the appropriateness of revealed costs. We will also benchmark DNSPs across standardised expenditure categories to compare relative efficiency.

2.2.1 Assumptions

Our general approach assumes that:

- the efficiency criterion and the prudence criterion in the NER are complementary
- past actual expenditure was sufficient to achieve the expenditure objectives in the past.

Efficiency and prudence are complementary

We consider that the notion of efficient costs complements the costs that a prudent operator would require to achieve the expenditure objectives. Prudent expenditure is that which reflects the best course of action, considering available alternatives. Efficient expenditure results in the lowest cost to consumers over the long term. That is, prudent and efficient expenditure reflects the lowest long term cost to consumers for the most appropriate investment or activity required to achieve the expenditure objectives.

Past expenditure was sufficient to achieve objectives

When we rely on past actual expenditure as an indication of required forecast expenditure, we assume that the past expenditure incurred by the DNSP was sufficient for it to achieve the expenditure objectives. That is, the DNSP's past expenditure was the amount required to manage and operate its network at that time, in a manner that achieved the expenditure objectives.

When we make this assumption, expenditure forecasts need to account for changes to the assumed efficient starting point expenditure. Accounting for such changes (including in demand, input costs, regulatory obligations and productivity) ensures the DNSP receives an efficient allowance that a prudent operator would require to achieve the expenditure objectives for the forthcoming regulatory control period.

2.2.2 Common approaches

When considering whether capex and opex forecasts reasonably reflect the expenditure criteria, we apply certain assessment approaches and use a variety of assessment techniques. Some of the approaches are specific to capex or opex. Sections 3 and 4 provide further detail on our assessment approaches for capex and opex. Others are common to capex and opex assessment. For example, for both capex and opex, we will always consider whether:

- forecasts are supported by economic justification and supporting information that demonstrates forecasts are prudent and efficient
- related party margins impact on forecast expenditure
- adjustments are required for real price escalation
- adjustments are required for increases or decreases in efficient expenditure (step changes).

Economic justification for forecast expenditure

Without adequate economic justification, we are unlikely to determine forecast expenditure is efficient and prudent. By economic justification, we mean that a DNSP must demonstrate that it is making expenditure decisions under a quantitatively-based economic framework consistent with minimising the long run cost of achieving the expenditure objectives.

Related party margins

We propose to use a two stage approach to assess related party contracts and margins. The first stage is an initial filter that we will use to determine if it is reasonable to presume a contract reflects prudent and efficient costs. In assessing whether a contract passes this 'presumption threshold', we consider two questions:

- Did the DNSP have an incentive to agree to non-arm's length terms at the time the contract was negotiated (or at its most recent renegotiation)?
- If yes, was a competitive open tender process conducted in a competitive market?

If a DNSP has no incentive to agree to non-arm's length terms or obtains a contract through a competitive tender process, we consider it reasonable to presume that the contract price reasonably reflects prudent and efficient costs and is consistent with the NEL and NER. However, if we have cause to consider that there were deficiencies in the tender process or that the supplier market is not workably competitive, we will move away from the presumption and conduct further detailed examination, and benchmarking.

The second stage is when the incentive for non-arm's length terms exists and the contract was not competitively tendered. In these circumstances, we cannot presume that costs within such agreements are efficient. We will investigate the contractual arrangements in more detail. Key considerations will likely include:

- Is the margin efficient? The forecast costs incurred via the outsourcing arrangement are efficient if the margin above the external provider's direct costs is efficient. We consider a margin is efficient if it is comparable to margins earned by similar providers in competitive markets.
- Are the DNSP's historical costs efficient? We will benchmark the DNSP's historical costs against those of other DNSPs to form a view on whether the DNSP's historical costs are efficient and prudent.

To assist with assessing related party margins, we require DNSPs to assign costs arising from contracts into our cost categories. DNSPs already engaged in related party contracts must provide us with expenditures including and excluding margins. DNSPs will need to demonstrate the efficiency of costs under these contracts.

Real price escalators

Labour price changes

Our preferred approach to assessing labour price changes over the forecast period is to use the wage price index (WPI) published by the Australian Bureau of Statistics (ABS). The labour price measure should be consistent with the treatment of forecast productivity change. The net impact of labour price changes and labour productivity should reflect the pure price change. For opex, we will apply a single productivity measure in the forecast rate of change that accounts for forecast labour productivity changes (see section 4.2).

We will also analyse the past performance of DNSPs' labour price forecasters when determining the appropriateness of DNSPs' labour price forecasts.

Materials price changes

We expect DNSPs to provide evidence in their regulatory proposals of the materials costs they paid. DNSPs must demonstrate the proposed approach they chose to forecast materials cost changes reasonably reflected the change in prices they paid for materials in the past such that we can determine whether DNSPs' forecasts are reliable. DNSPs should also explain why future price changes will be consistent with past price changes. Without this evidence it is unlikely we will be satisfied that the forecasts proposed produce unbiased forecasts of the costs the DNSPs will pay for materials.

Step changes

Our approach is to separately assess the prudence and efficiency of forecast cost increases or decreases associated with new regulatory obligations and capex/opex trade-offs. For capex/opex trade-off step changes, we will assess whether it is prudent and efficient to substitute capex for opex or vice versa.

For step changes arising from new regulatory obligations, we will assess (among other things):

- whether there is a binding (that is, uncontrollable) change in regulatory obligations that affects their efficient forecast expenditure
- when this change event occurs and when it is efficient to incur expenditure to comply with the changed obligation
- what options were considered to meet the change in regulatory obligations
- whether the option selected was an efficient option—that is, whether the DNSP took appropriate steps to minimise its expected cost of compliance from the time there was sufficient certainty that the obligation would become binding
- when the DNSP can be expected to make the changes to meet the changed regulatory obligations, including whether it can be completed over the regulatory period
- the efficient costs associated with making the step change
- whether the costs can be met from existing regulatory allowances or from other elements of the expenditure forecasts.

We will assess changes in regulatory obligations in the context of the core category they affect, which will ensure consistency across DNSPs. Accordingly, DNSPs must allocate step changes arising from regulatory obligations to our expenditure categories (for example, augmentation, replacement, vegetation management).

We will not allow step changes for any short-term cost to the DNSP of implementing efficiency improvements in expectation of being rewarded through expenditure incentive mechanisms such as the EBSS. We expect DNSPs to bear such costs and thereby make efficient trade-offs between bearing these costs and achieving future efficiencies.

2.3 Assessment process

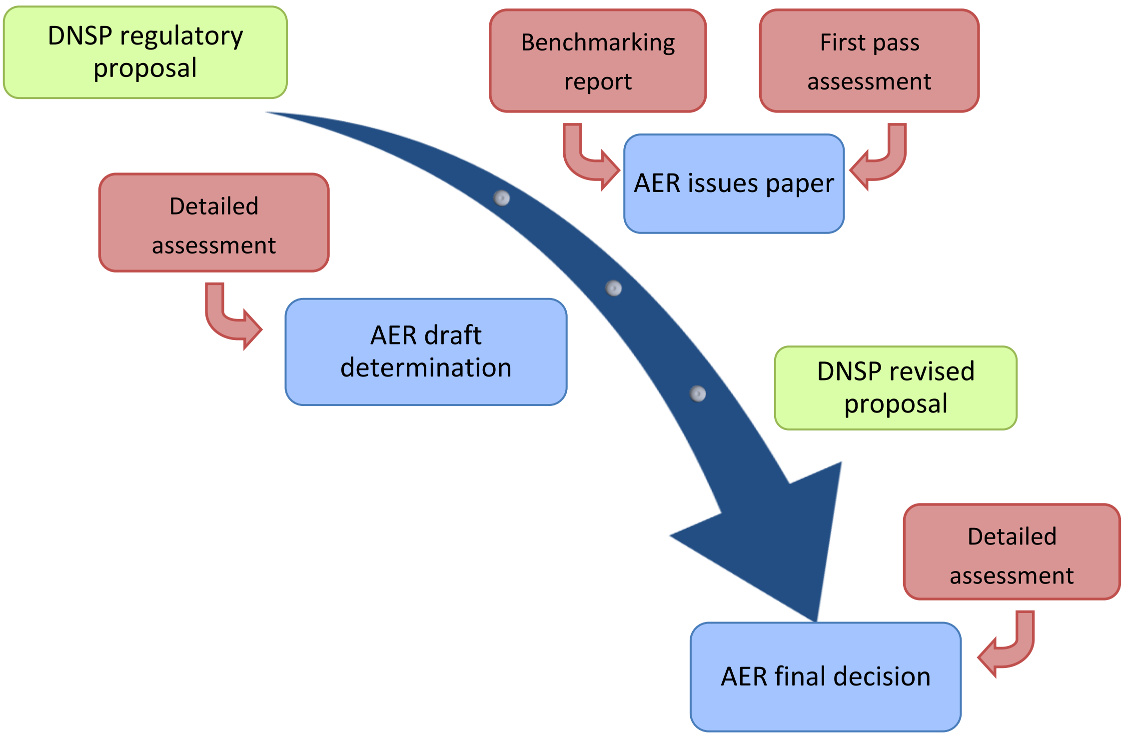
When we assess expenditure, we will typically follow a filtering process. That is, we will apply high level techniques in the first instance and apply more detailed techniques as required. For example, we must publish an issues paper early in the process.[23] This will likely involve a 'first pass' assessment, which will indicate our preliminary view on the DNSP’s expenditure forecasts.

For this first pass assessment, we will likely use high level techniques such as economic benchmarking and category analysis to determine relative efficiency and target areas for further review. We will, however, also use these techniques beyond the first pass assessment.

[23] NER, clause 6.9.3.

The first pass assessment will indicate the extent to which we need to investigate a DNSP's proposal further. Typically, we will apply predictive modelling, trend analysis and governance or methodology reviews before using more detailed techniques such as cost benefit analysis and project or program reviews. While we intend to move away from detailed techniques such as project review, we are likely to rely on them in some cases, such as to assess certain types of capex. Figure 2.1 indicates a typical assessment process.

Figure 2.1 Typical assessment process



2.4 Assessment techniques

When we assess capex and opex forecasts, we will use a number of assessment techniques to form a view on the reasonableness of the forecast. Our assessment techniques may complement each other in terms of the information they provide. This holistic approach gives us the ability to use all of these techniques, and refine them over time. The extent to which we use each technique will vary depending on the expenditure proposal we are assessing, but we intend to consider the inter-connections between our assessment techniques when determining total capex and opex forecasts. We typically would not infer the findings of an assessment technique in isolation from other techniques.

When considering which techniques are the most appropriate for determining allowances that reasonably reflect the expenditure criteria, we may consider the assessment principles in section 2.5. Equally, when deciding the extent to which we rely on a DNSP's forecasting techniques, we may need to consider these principles. This section explains our assessment techniques, which are:

- benchmarking (economic techniques and category analysis)
- methodology review
- governance and policy review

- predictive modelling
- trend analysis
- cost benefit analysis
- detailed project review (including engineering review).

2.4.1 Benchmarking

We will incorporate benchmarking into our expenditure assessment. Benchmarking compares standardised measurements from alternative sources. We will apply several types of benchmarking.

Economic benchmarking

Economic benchmarking applies economic theory to measure the efficiency of a DNSP's use of inputs to produce outputs, having regard to operating environment factors. It will enable us to compare the performance of a DNSP with its own past performance and the performance of other DNSPs. We will apply a range of economic benchmarking techniques, including (but not necessarily limited to):

- multilateral total factor productivity
- data envelopment analysis
- econometric modelling.

Category level benchmarking

We will benchmark across DNSPs by expenditure categories on a number of levels including:

- total capex and total opex
- high level categories (drivers) of expenditure (for example customer driven capex or maintenance opex)
- subcategories of expenditure.

We may benchmark further at the following low levels:

- unit costs associated with given works (for example, the direct labour and material cost required to replace a pole)
- unit volumes associated with given works (for example, kilometres of conductor replaced per year).

Aggregated category benchmarking

In addition to detailed category benchmarks we are likely to use aggregated category benchmarks, which capture information such as how much a DNSP spends per kilometre of line length or the amount of energy it delivers. We intend to improve these benchmarks by capturing the effects of scale and density on DNSP expenditures.

2.4.2 Methodology review

We will assess the methodology the DNSP utilises to derive its expenditure forecasts, including assumptions, inputs and models. We will assess whether the DNSP's methodology is a reasonable basis for developing expenditure forecasts that reasonably reflect the NER criteria.

We expect DNSPs to justify and explain how their forecasting methodology results in a prudent and efficient forecast, so if a methodology (or aspects of it) do not appear reasonable, we will require further justification from the DNSP. If we are not satisfied with further justification, we will adjust the methodology such that it is a reasonable basis for developing expenditure forecasts that reasonably reflect the NER criteria.

2.4.3 Governance and policy review

We will use governance reviews, usually as a holistic assessment of a DNSP's internal processes compared with industry best practice. We typically review processes including governance, strategic planning, risk management, asset management and prioritisation. A favourable governance review will not of itself satisfy the AER that a DNSP's proposed expenditure reasonably reflects the expenditure criteria. A governance review may, however, indicate a DNSP's likely overall efficiency and areas for further analysis.

2.4.4 Trend analysis

We will use trend analysis to forecast future expenditure levels on the basis of historical information. In particular, we will apply this technique for the base-step-trend opex assessment described in section 4. However, trend analysis is also useful for capex assessment where expenditure categories exhibit relatively consistent levels of expenditure over time.

2.4.5 Predictive modelling

We will use statistical analysis and econometric modelling to help determine the expected efficient costs over the regulatory control period associated with the demand for distribution services associated with different categories of works.

The two models we developed and intend to use for this purpose are the repex model (condition based modelling to forecast asset replacement activities) and the augex model (asset utilisation modelling to forecast network augmentation requirements).

2.4.6 Cost benefit analysis

We will assess whether forecast expenditure is expected to be the lowest cost option relative to other options in net present value terms. This technique indicates (all else being equal) the relative efficiency of the different options. Cost benefit analysis is a technique that we will likely use to assess, and expect DNSPs to submit in support of, forecast projects and expenditures in general. For example:

- expenditure decisions for groups of assets that materially affect forecast expenditure (typically set out in asset management plans and justified via a business case)
- expenditure decisions for individual projects or programs that materially affect forecast expenditure (typically justified via a business case).

2.4.7 Detailed project review (including engineering review)

In some circumstances, we will undertake detailed review (including engineering review) of certain project and program expenditure. Usually, detailed review involves 'drilling down' to specific projects or programs of work when further scrutiny is required. We may target specific areas for assessment, or sample projects or programs at random.

Such detailed reviews will likely focus on specialised technical areas (for example augmentation requirements given demand forecasts and network capacity) and will often be undertaken with the assistance of subject matter experts (for example, engineers that specialise in the area concerned). Typically, the scope and form of detailed project and program reviews will be informed by other techniques described in this section, including category level benchmarking and economic benchmarking.

2.5 Assessment principles

We have a number of assessment techniques available to us. Depending on the assessment technique, we may be able to use it to assess expenditure in different ways—some that may be more robust than others. We may consider assessment principles when we need to form a view on the level of reliance we should place on assessment techniques, a DNSP's forecasting methodology (or both).

While the principles are matters that we consider could be relevant in a comparison of alternative assessment techniques or forecasting methods, they do not limit the matters to which we could have regard. Other matters could arise in the context of a particular determination that we consider are relevant. Conversely, we may not consider that all of the principles are relevant, so we will not necessarily have regard to each of them when considering the appropriateness of a technique or forecasting methodology.

Further, the principles are not—and cannot be—additional to the NER requirements. The principles exist to provide some reassurance to NSPs and stakeholders of the rigour and transparency that we apply when we exercise discretion.

Validity

Overall, we consider a technique must be valid, otherwise it is not useful. That is, it must be appropriate for what we need it to assess. In our case, this is typically efficiency (or inefficiency). We consider valid techniques should account for time, adequately account for factors outside the control of DNSPs and (where possible) use reliable data. Generally, we will not be in a position to satisfy ourselves whether a technique is appropriate until after we receive data or information to test it.

Accuracy and reliability

We consider a technique is accurate when it produces unbiased results and is reliable when it produces consistent results. In our view, objective techniques (based on actual data) are inherently more accurate than subjective techniques (based on judgement); they are less susceptible to bias and therefore others can judge them fairly. Reliable techniques should produce similar results under consistent conditions. In some cases, techniques may require testing and calibration for us to be satisfied of their accuracy and reliability.

Robustness

Robust techniques remain valid under different assumptions, parameters and initial conditions. However, we also consider robust techniques must be complete. A technique that is lacking in some material respect cannot be robust.

Transparency

A technique that we or stakeholders are unable to test (sometimes referred to as a 'black box') is not transparent because it is not possible to assess the results in the context of the underlying assumptions, parameters and conditions. In our view, the more transparent a technique, the less susceptible it is to manipulation or gaming. Accordingly, we take an unfavourable view of forecasting approaches that are not transparent.

Parsimony

Multiple techniques may be able to provide the same information, but to varying degrees of accuracy and with varying degrees of complexity. We will typically prefer a simpler technique (or one with fewer free parameters) over more complex techniques, if they measure equally against other principles. Where possible, we intend to move away from assessment techniques that draw us and stakeholders into unnecessary detail when there are alternative techniques. We reiterate that our role is to assess total capex and opex forecasts. The NER do not require us to assess individual projects.

Fitness for purpose

We consider it is important to use the appropriate technique for the task. No technique that we or DNSPs rely on can produce a perfect forecast. However, the NER does not require us to produce precise estimates. Rather, we must be satisfied that a DNSP's forecast (or our substitute forecast) reasonably reflects the expenditure criteria. Accordingly, we will consider fitness for purpose in this context.

3 Capital expenditure assessment approach

The AER intends to assess forecast capital expenditure (capex) proposals through a combination of top down and bottom up modelling of efficient expenditure. Our focus will be on determining the prudent and efficient level of forecast capex. We will generally assess forecast capex through assessing: the need for the expenditure; and the efficiency of the proposed projects and related expenditure to meet any justified expenditure need. This is likely to include consideration of the timing, scope, scale and level of expenditure associated with proposed projects. Where businesses do not provide sufficient economic justification for their proposed expenditure, we will determine what we consider to be the efficient and prudent level of forecast capex. In assessing forecasts and determining what we consider to be efficient and prudent forecasts we may use a variety of analysis techniques to reach our views.

Assessment of capex forecasts may include explicit consideration of capex productivity change through time based on the NSP's historical capex productivity changes. We may also benchmark historical capex productivity changes with other firms.

For businesses to show their proposal is efficient and prudent, we generally expect the proposal to demonstrate the overall forecast expenditure will result in the lowest sustainable cost (in present value terms) to meet the legal obligations of the DNSP. Where businesses claim higher levels of investment are efficient relative to those required to meet their legal obligations, for example due to market benefits, the proposal should demonstrate the investment is the most net present value positive of viable options.

We will likely use top down economic benchmarking techniques to compare a DNSP's performance with that of others. We will consider, for example, whether the DNSP is improving productivity and efficiency relative to its past performance and to other DNSPs. Once we know a DNSP's change in productivity over time, we can drill down into greater detail to examine what is driving the change.

We will also examine the volumes and costs applicable to drivers of capex. This means we will split capex into high level, standardised subcategories that we consider should reflect primary drivers of capex. These subcategories will likely be:

- replacement capex
- augmentation capex
- connection and customer driven works capex
- non-network capex.

The sections below detail our likely assessment approach specific to each driver. We may further disaggregate these drivers into standardised lower level subcategories. Disaggregated expenditure data will allow us to understand how particular categories of expenditure affect the total capex forecast and the different cost drivers with respect to these categories.

By considering expenditure at the category level, we can examine the prudence and efficiency of a DNSP's proposed expenditure in these categories. We will use standardised category data to facilitate direct comparison with other DNSPs and use this to help us to form a view on whether the total forecast capex reasonably reflects the capex criteria. Standardised category data should help us identify and scrutinise different operating, legal and environmental factors that affect the amount and cost of works performed by DNSPs, and how these factors may change over time.

We will require a range of data to support our assessment of total forecast capex. We expect DNSPs to submit regulatory proposals that include:

- economic analysis demonstrating the forecast expenditure is prudent and efficient. This should include documentation and underlying data sufficient to support the economic analysis
- reasons for costs for given expenditure categories and types of work differing from their historical expenditure
- explanations of trade-offs between capex and opex expenditure that show that the choices chosen (for example to undertake a capex IT program to reduce opex) are prudent and efficient. Firms will also need to demonstrate these choices are fully accounted for in capex and opex forecasts.

Section 5 further details the information we will require to assess total forecast capex.

3.1 Replacement capex

Replacement capex is typically incurred to address deterioration of assets, including works driven by reliability deterioration or as a result of an assessment of increasing risk. This type of capex is closely related to maintenance opex, so we will expect DNSPs to identify and explain potential work and efficiency trade-offs between these two expenditure categories.

We will likely assess the level of forecast replacement capex by:

- analysing information supporting the DNSP's building block proposal
- benchmarking the DNSP's forecast capex with historical expenditure and/or the expenditure of other DNSPs
- replacement expenditure modelling
- detailed project review.

A key input into the analysis will be the outputs from modelling the condition or age-based replacement rates of assets. This approach will estimate the efficient volumes and cost of replacement works required during each year of the regulatory control period, and to target more detailed project reviews. Age-based replacement expenditure modelling typically involves consideration of:

- the DNSP's historical and forecast mean standard lives of different asset categories
- the change over time in the distribution of different categories of the DNSP's assets.

3.2 Augmentation capex

Augmentation capex is typically triggered by a need to build or upgrade network assets to address changes in demand for distribution services or to maintain quality, reliability and security of supply in accordance with legislated requirements.[24]

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[24] Asset replacement driven by economic condition will be classed as replacement capex for the purposes of expenditure reporting and forecast assessment. This applies irrespective of any upgrade to the asset above the modern equivalent asset that may be done when assets are replaced at the end of their economic lives.

Assessment of augmentation capex may involve investigating a DNSP's capital governance framework and augmentation forecasting methodology. We may also conduct detailed review of projects and infer the findings from such reviews to other projects. We also expect to model various cost measures (for example, the cost per mega volt ampere (MVA) of capacity) for different types of augmentation projects. We may then consider these modelled costs when determining the prudent and efficient level of augmentation expenditure.

When we assess augmentation capex, we typically consider a DNSP's demand forecasts, the proposed projects and programs to meet forecast demand and the associated forecast capex.

We will also assess augmentation capex which are not triggered by demand. Other triggers of augmentation capex include voltage control issues, and net market benefits. Our assessment of such capex may also incorporate modelling of cost measures for such projects, and detailed engineering reviews.

3.2.1 Demand forecasts

We must form a view about whether a DNSP's demand forecasts are realistic. To form this view, we will assess whether a DNSP's demand forecast exhibits principles of best practice demand forecasting. The explanatory statement discusses common elements of the principles of best practice demand forecasting.

In assessing demand forecasts against these principles, we will likely examine:

- global and spatial peak demand in megawatt (MW) and MVA. We will likely examine various types of demand data including:
  - raw (historical) peak demand
  - weather corrected peak demand at different probabilities of exceedance (PoE)
  - coincident peak demand
  - non-coincident peak demand
  - power factors
  - coincidence factors
- the relationship between any PoE demand forecasts used as an input into the capex forecasts and 10 per cent and 50 per cent PoE demand forecasts
- the model(s) the DNSP used to derive the demand forecasts, and any inputs into these models such as:
  - economic indicators and forecasts
  - temperature measures and forecasts.

3.2.2 Proposed projects and programs

When considering the proposed projects and programs to meet forecast demand and the associated forecast capex, we will likely have regard to:

- the network constraints that require rectification due to demand forecasts including those related to capacity (MVA) and voltage
- any regulatory investment test undertaken by the DNSP in relation to the proposed works
- the options considered to meet the forecast demand, including non-network alternatives and demand side participation
- the previous methods used by the DNSP or other DNSPs to meet demand growth of a similar nature, and the costs associated with these works, bearing in mind that better approaches might have become available.

3.3 Connections and customer-initiated works capex

Connections and customer-initiated works capex typically relates to cost of connecting customers to the network and other customer--related works. We intend to use a combination of techniques to assess forecast connection and customer-initiated works capex. Specifically, we may benchmark costs per customer, use a detailed engineering assessment of service costs and/or use trend analysis to assess the reasonableness of both unit costs and overall expenditure. We expect categories of expenditure to be set out within RIN templates to generalise large volumes of works and allow a streamlined consistent assessment of expenditure. Expenditure and volume data will be collected for the following categories of connections and customer-initiated works:

- Simple and complex connections
- Metering activity by meter type
- Public lighting works for major and minor roads
- Fee-based and quoted services

We also expect to ask DNSPs to report expenditure for categories of services to allow a comparison of the service standards between DNSPs across jurisdictions of the NEM. As such, we will collect the following information to describe the scale and scope of customer-initiated works:

- Volume and total spend on transformers used in complex connections
- Capacity added (km) and MVA added for customer connections
- Volume of connections in CBD, urban and rural locations for customer connections
- Volume of underground and overhead connections
- Volume of single and multi-phase connections and meter installationsVolume of meters which are direct connect and voltage transformer connected
- Volume of cabling, poles installed and light type used for public lighting works
- Average days to perform LV residential connections and rectification/installation of public lighting works
- Volume of GSL breaches and customer complaints, and total payments made for GSL breaches.

3.4 Non-network capex

Non-network capex is primarily for activities not directly associated with the distribution network. We will likely assess non-network capex by disaggregating it into the following subcategories:

- IT and communications
- vehicles
- plant and equipment
- buildings and property
- other.

Where possible we may assess non-network expenditure that is more recurrent separately to less recurrent expenditure. We may also examine total expenditure (capex and opex combined) when assessing different categories of non-network capex.

As we have done in the past, we expect to assess SCADA and network control (network) expenditure in this category.

3.5 Ex-post review

In some circumstances, we must conduct an ex-post review of capex.[25] This includes a review of capex overspends when they occur. We will use the same techniques to conduct an ex-post assessment as we do to assess forecast capex. The Capital Expenditure Incentive Guideline discusses ex-post review in further detail.

3.6 Assessment of deferrals under the Capital Expenditure Sharing Scheme

The AER may examine capex deferrals that occurred over the regulatory period to determine if Capital Expenditure Sharing Scheme (CESS) payments should be adjusted for material deferrals. Given this, we may develop expenditure forecasts, particularly forecast work volumes related to major projects and programs of works, in a manner that will assist with the examination of deferrals at the end of the regulatory period. The Capital Expenditure Incentive Guideline discusses the CESS in further detail.

[25] NER, clauses S6.2.1(g), S6.2.2A.

4 Operating expenditure assessment approach

We prefer a 'base-step-trend' approach to assessing most opex categories. However, when appropriate, we may assess some opex categories using other forecasting techniques, such as an efficient benchmark amount. We will assess opex categories forecast using other forecasting techniques on a case-by-case using the assessment techniques outlined in section 2.4. We will also assess whether using alternative forecasting techniques in combination with a 'base-step-trend' approach produces a total opex forecast consistent with the opex criteria.

Using the base-step-trend assessment approach, we will assess forecast opex in year t as:

$$Opex_t = \prod_{i=1}^{t}(1 + rate\ of\ change_i) \times \left(A_f^* - efficiency\ adjustment\right) \pm step\ changes_t$$

where:

- $rate\ of\ change_i$ is the annual percentage rate of change in year i
- A_f^* is the estimated actual opex in the final year of the preceding regulatory control period
- $efficiency\ adjustment$ is the difference between efficient opex and deemed final year opex
- $step\ changes_t$ is the determined step change in year t.

Under this assessment approach the product of the annual rates of change accounts for changes in real prices, output growth and productivity in the forecast regulatory control period. The addition of step changes accounts for any other efficient costs not captured in base opex or the rate of change.

4.1 Base opex

The 'revealed cost' approach is our preferred approach to assessing base opex. If actual expenditure in the base year reasonably reflects the opex criteria, we will set base opex equal to actual expenditure for those cost categories forecast using the revealed cost approach. We will use a combination of techniques to assess whether base opex reasonably reflects the opex criteria. We will likely assess base year expenditure exclusive of any movements in provisions that occurred in that year.

We intend to not rely on the expenditure of a particular base year when we identify material inefficiencies in that expenditure. In this case, we may adjust the base year or substitute an appropriate base year. When determining whether to adjust or substitute base year expenditure, we will also have regard to whether rewards or penalties accrued under the EBSS will provide for the DNSP and its customers to fairly share efficiency gains or losses.

We will likely apply all of our assessment techniques to identify the presence of material inefficiencies in the chosen base year, and in choosing an alternative. Section 6 details the information we will require to assess base opex.

The EBSS requires an estimate of actual opex for the final year, which we do not typically know at the time of the final determination. Expressing estimated final year expenditure in the following form allows the DNSP to retain incremental efficiency gains made after the base year through the EBSS carryover. To the extent the assumption is incorrect the DNSP will still retain incremental efficiency gains but they will be retained through the opex forecast rather than EBSS carryovers. The same estimate will be used to calculate carryovers under the EBSS. Accordingly, we will estimate final year expenditure to be equal to:

$$A_f^* = F_f - (F_b - A_b) + \text{non-recurrent efficiency gain}_b$$

where:

- A_f^* is the best estimate of actual opex for the final year of the preceding regulatory control period
- F_f is the determined opex allowance for the final year of the preceding regulatory control period
- F_b is the determined opex allowance for the base year
- A_b is the amount of actual opex in the base year
- $\text{non-recurrent efficiency gain}_b$ is the non-recurrent efficiency gain in the base year.

We will likely apply all of our assessment techniques outlined in section 2.4 above to identify the presence of material inefficiencies in the chosen base year, and in determining an alternative.

4.2 The rate of change

We will assess opex for the forecast regulatory control period by applying an annual rate of change for each year of the forecast regulatory control period. The annual rate of change for year t will be:

$$\text{Rate of change}_t = \text{output growth}_t + \text{real price growth}_t - \text{productivity growth}_t$$

4.2.1 Output growth

Forecast output growth is the forecast annual increase in output. The output measures used should be the same measures used to forecast productivity growth. The output measures should:

- align with the NEL and NER objectives
- reflect services provided to customers
- be significant.

If the productivity measure includes economies of scale then forecast output growth should not be adjusted for economies of scale.

4.2.2 Real price growth

Forecast real price growth is the forecast annual increase in the real price of inputs. The real price measures used should be the same measures used to forecast productivity growth.

If the productivity measure includes labour productivity then real price growth should not be adjusted to remove labour productivity.

4.2.3 Productivity

In assessing forecast productivity, we will likely consider (but may not be limited to):

- forecast output growth
- forecast changes in DNSP specific business conditions
- forecast technological change
- how close the DNSP under consideration is to the efficient frontier in our benchmarking analysis
- historical productivity performance
- any difference between industry average productivity change and the rate of productivity change at the efficient frontier.

4.3 Step changes

Step changes may be added (or subtracted) for any other costs not captured in base opex or the rate of change that are required for forecast opex to meet the opex criteria.

We will assess step changes in accordance with section 2.2 above. Step changes should not double count costs included in other elements of the opex forecast:

- Step changes should not double count the costs of increased volume or scale compensated through the output measure in the rate of change.
- Step changes should not double count the cost of increased regulatory burden over time, which forecast productivity growth may already account for. We will only approve step changes in costs if they demonstrably do not reflect the historic 'average' change in costs associated with regulatory obligations. We will consider what might constitute a compensable step change at resets, but our starting position is that only exceptional events are likely to require explicit compensation as step changes. Similarly, forecast productivity growth may also account for the cost increases associated with good industry practice.
- Step changes should not double count the costs of discretionary changes in inputs. Efficient discretionary changes in inputs (not required to increase output) should normally have a net negative impact on expenditure.

If it is efficient to substitute capex with opex, a step change may be included for these costs (capex/opex trade-offs).

5 Information requirements

This Guideline must specify our information requirements for expenditure assessment. The regulatory information notice (RIN) issued in advance of a DNSP lodging its regulatory proposal will specify the exact information we require. In general, however, we require all the data that facilitate the application of our assessment approach and our assessment techniques. However, we will not require a DNSP to provide information relating to other DNSPs. The following sections indicate (at a high level) our likely information requirements for capex and opex.

5.1 Capex techniques

We will require a range of information from DNSPs to enable our assessment of different categories of expenditure applying different assessment techniques. This information will include:

(1) expenditure split by key capex driver (high level expenditure category), namely:

- (a) replacement
- (b) augmentations
- (c) connections and customer driven works
- (d) non-network

(2) expenditure split by subcategory under each high level expenditure category, including specific plant or asset components, as well as into labour, materials, contractor and other costs

(3) methods of calculating, and calculations of any allowances for real cost escalation.

For assessing expenditure by high level expenditure category or subcategory, we will require information on:

(1) forecast expenditure overall and by key asset category supported by forecasts of volumes and unit costs for key expenditure works categories

(2) the methodology the DNSP used to develop the expenditure forecasts

(3) economic analysis demonstrating the efficiency and prudency of all material forecast capital expenditure, including:

- (a) key decisions contained in asset management plans, or likely to be made as a result of the plans
- (b) demonstration that any material change in expenditure relative to historic expenditure levels is efficient and prudent (for example, any step changes)

(4) governance plans relating to capital expenditure and evidence where they have or have not been followed. Where governance plans have not been followed DNSPs should explain why and the expected impact on expenditure as a result.

(5) planning and strategy documentation for key capex categories and activities (including asset management plans)

For assessing replacement capex, we will require the above information, plus specific data for modelling, including:

(1) the total quantum of assets added and disposed of in recent years, as well as forecast for the regulatory control period, by key asset category

(2) the average value of assets added in each category for each regulatory year

(3) the age distribution of assets by key asset category

(4) the expected mean and standard deviation of asset lives by key asset category

(5) the expected costs associated with replacing assets in each category

(6) data justifying historic and forecast replacement activities, such as condition and risk assessments, as well as safety, reliability and performance information.

For assessing augmentation capex, we will require the above information, plus specific data for modelling, including:

(1) demand forecasts of the DNSP, the models underpinning these demand forecasts and the following demand forecasting data:

  (a) global and spatial peak demand at different probabilities of exceedance (PoE) in MW and MVA including:

    (i) coincident peak demand

    (ii) non-coincident peak demand

    (iii) power factors

    (iv) coincidence factors

  (b) the relationship between any PoE demand forecasts used as an input into the capex forecasts and the 10 per cent and 50 per cent PoE demand forecasts

  (c) the model or models that the DNSP used to derive the demand forecasts and any inputs into these models.

  (d) a full explanation of the calculation and/or selection of inputs into any models and of any assumptions made.

(2) specific data on augmentation expenditure required as a result of forecast increases in demand or due to other reasons or constraints including:

  (a) issues that the augmentation is required to address, which may include:

    (i) capacity constraints

    (ii) voltage constraints

    (iii) load movement

(iv) security

(v) operational efficiency

(vi) compliance with regulations

(b) projects with positive net market benefits

(c) historical and forecast information on the various segments of the DNSP’s network related to demand, utilisation and augmentation cost. This information may include:

(i) voltage, and primary type of area supplied by the segment (CBD, urban, or rural)

(ii) maximum demand at each network segment (historical and forecast)

(iii) various measures of capacity at each network segment

(iv) current utilisation of assets in the network segment

(v) utilisation thresholds of assets in the network segment

(vi) capacity factors

(vii) capacity unit costs

(d) historical and forecast costs associated with the unit cost of key augmentation inputs, by category of augmentation. This information may include the costs of:

(i) transformers

(ii) switchgear

(iii) safety

(iv) line works including conductors and insulators

(v) civil works.

(e) how the proposed expenditure relates to any contingent projects under NER clause 6.6A.1, projects subject to any regulatory investment tests under NER clause 5.17, as well as in relation to the DNSP's long term network planning

(f) evidence that the DNSP has considered non-network alternatives in its planning processes.

For assessing connections and customer driven works expenditure, we will require the information on forecast volumes and costs for a number of standardised categories of works.

For assessing non-network expenditure, we will require the information on forecast volumes and costs for a number of standardised categories of works.

5.2 Opex techniques

For assessing opex , we will require information on:

(1) the methodology the DNSP used to develop the expenditure forecasts

(2) planning and strategy documentation for key opex categories and activities

(3) economic analysis demonstrating the efficiency and prudency of all material forecast operating and maintenance expenditure, including:

  (a) key decisions contained in asset management plans, or likely to be made as a result of the plans

  (b) demonstration that any material change in expenditure relative to historic expenditure levels is efficient (for example, any step changes)

(4) information explaining why any material difference in benchmark costs for key work categories relevant to other DNSPs is efficient.

We will require all information that will enable us to conduct a base-step-trend assessment of a DNSP's expenditure proposal. This includes:

(1) identification of all recurrent expenditure

(2) the proportion of forecast opex increases or decreases associated with:

  (a) real price changes

  (b) output growth changes

  (c) productivity.

(3) identification of all non-recurrent expenditure

(4) identification movement in provisions

(5) identification of and justification for any step changes

(6) methods of calculating and calculations of any allowances for real cost changes

(7) methods of calculating and calculations of any allowances for output growth changes

(8) methods of calculating and calculations of any allowances for productivity changes.

We will also require a range of information from DNSPs to enable our assessment of base year expenditure applying different assessment techniques. This information will include:

(1) expenditure split by each opex and maintenance activity, namely:

  (a) routine and non-routine maintenance

  (b) emergency response

  (c) vegetation management

  (d) network overheads

(e) corporate overheads.

(2) expenditure split by driver as well as into labour, materials, contractor and other costs.

For assessing opex on maintenance, we will require the above information, plus information on:

(1) expenditure on work activities, separated into routine and non-routine expenditures

(2) supporting data explaining the volume of activities undertaken in the current regulatory control period, including:

   (a) intervals for regular or planned inspections and maintenance

   (b) changes in the number and types of asset being serviced

   (c) changes in the actual or identified condition of assets, including age data, failure rates and failure modes

   (d) impacts arising from changes to legal and regulatory obligations

   (e) other changes including changed approaches to risk management and condition monitoring.

For assessing emergency response expenditure, we will require the above information, plus information on:

(1) expenditure separated into severe weather events-related, other, and total

(2) supporting data explaining the volume of activities undertaken in the current regulatory control period, including:

   (a) changes in the numbers and types of assets being serviced (for asset failures)

   (b) changes in the actual or identified condition of assets (for asset failures)

   (c) detailed information on the failure rates and modes by asset types (for asset failures)

   (d) relationships with reported reliability outcomes (for example, SAIDI and SAIFI).

For assessing vegetation management expenditure, we will require the above information, and information on:

(1) expenditure separated into tree trimming, inspection and audit activities

(2) supporting data explaining the volume of activities undertaken in the current regulatory control period, including:

   (a) for each defined 'vegetation management area' of the network

      (i) annual expenditure on major vegetation management activities

      (ii) length (in kilometres) of overhead conductor

      (iii) number of maintenance spans

(iv) proportion of that area in urban and rural regions

(b) data on fire starts and outages due to vegetation contact

(c) impact of new or changing legal and regulatory obligations

(d) information on audit outcomes (for example, compliance and non-compliance with standards)

For assessing network overheads, we will require the above information, and information on:

(1) expenditure separated into major cost subcategories, for example:

(a) network management

(b) network monitoring and control

(c) network system operations.

(2) supporting data explaining the scale and cost of work undertaken in these subcategories undertaken in the current regulatory control period.

For assessing corporate overheads, we will require the above information, and information on:

(1) expenditure separated into major cost subcategories, for example:

(a) human resources

(b) CEO office

(c) legal.

(2) supporting data explaining the workload of each of these activities undertaken in the current regulatory control period, including:

(a) information that quantifies the size and complexity of the business

(b) the number of employees

(c) new or changed legal or regulatory obligations.

For both network and corporate overheads, we will also require information on:

(a) supporting data explaining if and how the reporting of these overhead costs affects information presented for the other categories of capex and opex:

(b) full details of the DNSP's cost allocation policies and practices. We require this information in addition to the DNSP's approved cost allocation method and at a level of detail to enable us to reproduce allocations of all overhead costs to direct cost categories.

(c) details of the DNSP's capitalisation policies and practices. We require this information at a level of detail to enable us to reproduce amounts of overhead costs capitalised or expensed to direct cost categories.

5.3 Economic benchmarking techniques

For assessment using economic benchmarking techniques, we will require:

(1) the costs and quantities of the DNSP's inputs, which incorporate:

   (a) overhead lines

   (b) underground cables

   (c) transformers and other capital

   (d) opex

   (e) regulated asset base parameters including depreciation and return on investment

(2) data on outputs, including:

   (a) customer numbers

   (b) energy delivered

   (c) maximum demand

   (d) system capacity

   (e) quality of services

   (f) revenues

(3) operating environment factors such as:

   (a) network characteristics including customer density, energy density and demand density

   (b) terrain factors including bushfire risk, the rural proportion of networks, standard vehicle access and vegetation management difficulty.

We will require DNSPs to provide these data annually on an ongoing basis.

Glossary

This Guideline uses the following definitions.

Term	Definition
AER	Australian Energy Regulator
CAM	Cost Allocation Method
CBD	Central Business District
DNSP	Distribution Network Service Provider
EBSS	Efficiency Benefit Sharing Scheme
Guideline	Expenditure Forecast Assessment Guideline for electricity distribution
IT	Information Technology
MVA	Megavolt ampere
MW	Megawatt
NEL	National Electricity Law
NEO	National Electricity Objective
NER	National Electricity Rules
NSP	Network Service Provider
PoE	Probability of Exceedance
RIN	Regulatory Information Notice
SCADA	Supervisory Control and Data Acquisition