DRAFT DECISION
TransGrid transmission determination
2018 to 2023

Attachment 7 – Operating expenditure

September 2017

AUSTRALIAN ENERGY REGULATOR

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Note

This attachment forms part of the AER's draft decision on TransGrid's transmission determination for 2018–23. It should be read with all other parts of the draft decision.

The draft decision includes the following documents:

Overview

Attachment 1 – Maximum allowed revenue

Attachment 2 – Regulatory asset base

Attachment 3 – Rate of return

Attachment 4 – Value of imputation credits

Attachment 5 – Regulatory depreciation

Attachment 6 – Capital expenditure

Attachment 7 – Operating expenditure

Attachment 8 – Corporate income tax

Attachment 9 – Efficiency benefit sharing scheme

Attachment 10 – Capital expenditure sharing scheme

Attachment 11 – Service target performance incentive scheme

Attachment 12 – Pricing methodology

Attachment 13 – Pass through events

Attachment 14 – Negotiated services

Contents

Shortened forms

Shortened form	Extended form
AARR	aggregate annual revenue requirement
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ASRR	annual service revenue requirement
augex	augmentation expenditure
capex	capital expenditure
CCP	Consumer Challenge Panel
CESS	capital expenditure sharing scheme
CPI	consumer price index
DMIA	demand management innovation allowance
DRP	debt risk premium
EBSS	efficiency benefit sharing scheme
ERP	equity risk premium
MAR	maximum allowed revenue
MRP	market risk premium
NEL	national electricity law
NEM	national electricity market
NEO	national electricity objective
NER	national electricity rules
NSP	network service provider
NTSC	negotiated transmission service criteria
opex	operating expenditure
PPI	partial performance indicators
PTRM	post-tax revenue model
RAB	regulatory asset base
RBA	Reserve Bank of Australia
repex	replacement expenditure
RFM	roll forward model
RIN	regulatory information notice

Shortened form	Extended form
RPP	revenue and pricing principles
SLCAPM	Sharpe-Lintner capital asset pricing model
STPIS	service target performance incentive scheme
TNSP	transmission network service provider
TUoS	transmission use of system
WACC	weighted average cost of capital

7 Operating expenditure

Operating expenditure (opex) is the operating, maintenance and other non-capital expenses incurred in the provision of network services. Forecast opex for prescribed transmission services is one of the building blocks we use to determine a service provider's annual total revenue requirement.

This attachment outlines our assessment of TransGrid's forecast opex for the 2018–23 regulatory control period.

7.1 Draft decision

Our draft decision is to not accept TransGrid's forecast opex of $947.7 million ($2017–18).[1] We are not satisfied it reasonably reflects the opex criteria.[2] Instead, we consider our alternative estimate of $873.0 million ($2017–18) meets the criteria.[3] This is 7.9 per cent lower than TransGrid's proposal. The main reasons why we have determined a lower forecast opex are:

- we included a lower forecast rate of change to account for forecast growth in prices, output and productivity
- we included part of the proposed licence compliance step change but did not include the proposed step change for off-easement risk management
- we included a lower category specific forecast for debt raising costs.

TransGrid's forecast opex and our draft decision are set out in Table 7.1.

Table 7.1 TransGrid's proposed opex and our draft decision ($ million, 2017–18)

	2018–19	2019–20	2020–21	2021–22	2022–23	Total
TransGrid's proposed opex	185.1	186.7	189.2	192.0	194.6	947.7
AER draft decision	172.9	173.9	174.6	175.4	176.3	873.0
Difference	**–12.2**	**–12.8**	**–14.7**	**–16.7**	**–18.3**	**–74.7**

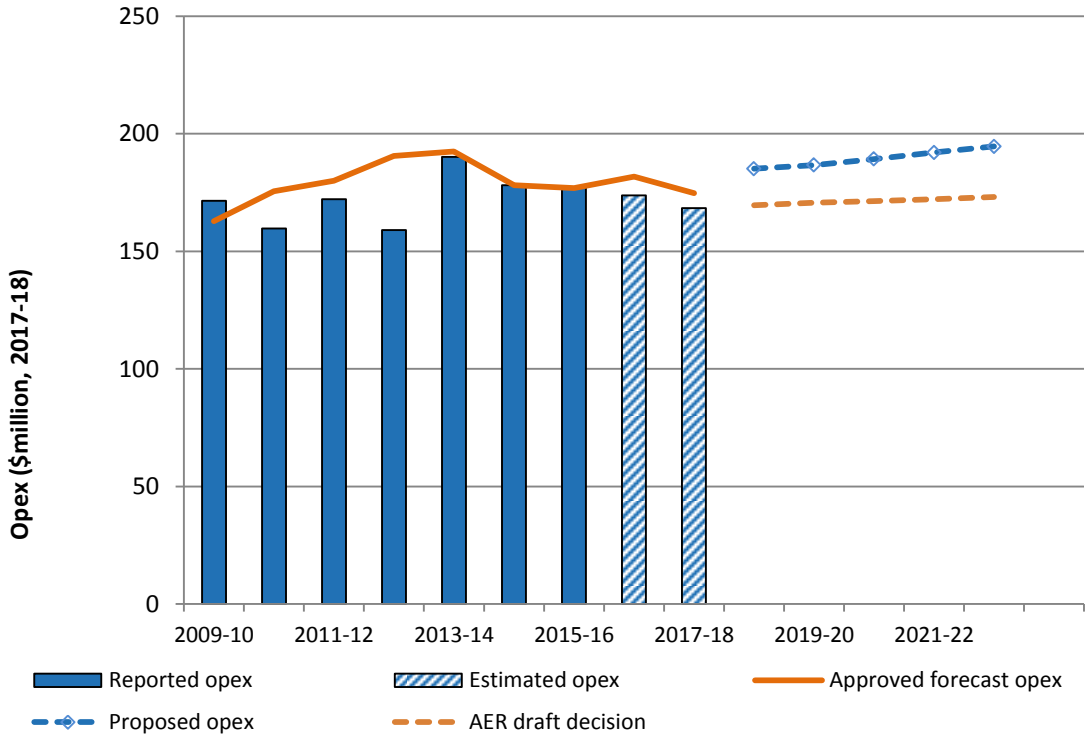
Source: TransGrid, *Revenue proposal*, *Post tax revenue model (PTRM)*, 31 January 2017; AER analysis

Note: Includes debt raising costs. Numbers may not add up to total due to rounding.

Figure 7.1 compares the opex forecast we approve in this draft decision to TransGrid's proposal, the forecast we approved for 2014–18 and TransGrid's actual opex in that period.

1 Includes debt raising costs.
2 NER, cl. 6A.6.6(c).
3 Includes debt raising costs.

Figure 7.1 Our draft decision compared to TransGrid's past and proposed opex ($ million, 2017–18)



Source: TransGrid, *Regulatory accounts 2009–10 to 2015–16;* TransGrid, *Economic benchmarking RIN response 2006 to 2015;* AER, *TransGrid 2009–14, PTRM, Tribunal varied*; AER, *TransGrid 2014–18 Final decision PTRM*, TransGrid, *Proposed reset RIN*, 31 January 2017; AER analysis.

Note: Includes debt raising costs and movements in provisions.

7.2 TransGrid's proposal

TransGrid proposed total opex of $947.7 million ($2017–18) for the 2018–23 regulatory period.[4] On an annual basis, TransGrid's proposed opex is 8.7 per cent more than its actual and estimated opex for the 2014–18 regulatory control period.[5] The biggest driver of this increase is its proposed step change to manage the bushfire risks posed by trees outside transmission easements that could touch conductors if they fall (off-easement risk management).[6]

In figure7.2 we separate TransGrid's proposed opex into the different elements that make up its forecast.

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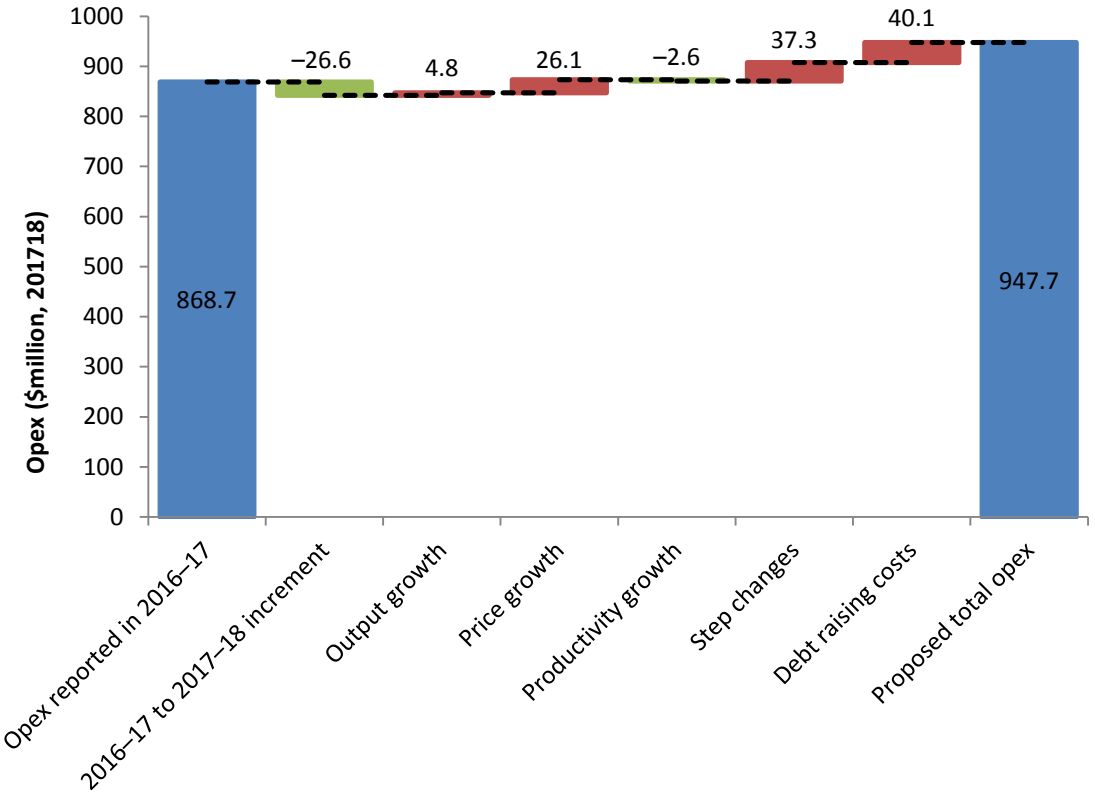
4 TransGrid, *Revenue proposal*, 31 January 2017, p. 132; Includes debt raising costs.

5 Opex for 2016–17 to 2017–18 is estimated only. We have not received regulatory accounts for those years.

6 TransGrid, *Revenue proposal*, 31 January 2017, p. 137.

Figure7.2 TransGrid's opex forecast ($ million, 2017–18)



Source: AER analysis; TransGrid, *Revenue proposal*, PTRM, 31 January 2017

Note: Excludes movements in provisions.

We describe each of these elements below:

- TransGrid used estimated opex for 2016–17 as the base to forecast opex.[7] Its estimated expenditure for 2016–17 would lead to base opex of $868.7 million ($2017–18) over the 2018–23 regulatory control period.[8] TransGrid noted that it would update its estimate of opex for 2016–17 with its audited actual opex for that year in its revised proposal.[9]
- To forecast the increase in opex between the base year and the last year of the current regulatory control period (that is, between 2016–17 and 2017–18), TransGrid:
    - made an efficiency adjustment to the base year of –$6.6 million ($2017–18)
    - added forecast price and output growth.

  This decreased TransGrid's total opex forecast by $26.6 million ($2017–18).

7 TransGrid, *Revenue proposal*, January 2017, p. 129.

8 This amount excludes debt raising costs.

9 TransGrid, *Revenue proposal*, January 2017, p. 129.

- TransGrid included forecast labour price growth of $26.1 million ($2017–18).
- TransGrid included forecast output growth of $4.8 million ($2017–18) to which it applied economies of scale. The economies of scale reduced its opex forecast by $2.6 million (2017–18).
- TransGrid proposed one step change for off-easement risk management. This increased its total opex forecast by $37.3 million ($ 2017–18).
- TransGrid included a category specific forecast for debt raising costs of $40.1 million ($2017–18). TransGrid did not adopt our method of recognising only the transaction costs of issuing bonds and excluding refinancing and liquidity costs.[10]

These resulted in total opex forecast of $947.7 million ($2017–18) for the 2018–23 regulatory control period.[11]

TransGrid noted in its initial revenue proposal that it was subject to an operator's licence for the first time from 7 December 2015. However, it stated that it would provide a fully justified compliance cost estimate at a later date due to uncertainty as to what was required for compliance.[12] On 5 July 2017, TransGrid proposed a step change of $14.4 million ($2017–18) for compliance with the conditions in the licence.[13]

7.3 Assessment approach

Our role is to form a view about whether a business' forecast of total opex is reasonable. Specifically, we must form a view about whether a business' forecast of total opex 'reasonably reflects the opex criteria'.[14] In doing so, we must have regard to each of the opex factors specified in the NER.[15]

If we are satisfied the business' forecast reasonably reflects the criteria, we accept the forecast.[16] If we are not satisfied, we substitute the business' forecast with an alternative estimate that we are satisfied reasonably reflects the opex criteria.[17] In making this decision, we take into account the reasons for the difference between our alternative estimate and the business' proposal, and the materiality of the difference. Further, we consider interrelationships with the other building block components of our decision.[18]

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10 TransGrid, *Revenue proposal*, 31 January 2017, pp. 140–142.
11 This excludes the step change for compliance with licence conditions that TransGrid proposed on 5 July 2017.
12 TransGrid, *Revenue proposal*, 31 January 2017, p. 153.
13 TransGrid, *Brief to AER on new compliance requirements UPDATE*, July 2017.
14 NER, cl. 6A.6.6(c).
15 NER, cl. 6A.6.6(e).
16 NER, cl. 6A.6.6(c).
17 NER, cll. 6A.6.6(d) and 6A.14.1(3)(ii).
18 NEL, s.16(1)(c).

The *Expenditure forecast assessment guideline* (the Guideline) together with an explanatory statement set out our intended approach to assessing opex in accordance with the NER.[19] We published the Guideline and the associated explanatory statement in November 2013 following an extensive consultation process with service providers, network users, and other stakeholders.[20] While the Guideline provides for greater regulatory predictability, transparency and consistency, it is not mandatory. The approach set out in the Guideline does not bind us or anyone else. However, if we make a decision that departs from the Guideline, we must state our reasons.[21]

We apply the assessment approach outlined in the Guideline to develop our estimate of a business' total opex requirements (our alternative estimate). Our alternative estimate serves two purposes. First, it provides a basis for testing whether a business' proposal is reasonable. Second, we can use it as a substitute forecast if we determine a business' proposal does not reasonably reflect the opex criteria.

Below we further explain the principles that underpin this approach and provide a high-level overview of the 'base–step–trend' methodology.

7.3.1 Incentive regulation and the 'top-down' approach

A key feature of the regulatory framework is that it is based on incentivising networks to be as efficient as possible. We apply incentive-based regulation across the energy networks we regulate, including electricity transmission networks. More specifically for opex, we rely on the efficiency incentives created by both ex ante revenue regulation and the 'efficiency benefit sharing scheme' (EBSS).

Incentive regulation is designed to prevent network businesses from exploiting their natural monopoly position by setting prices in excess of efficient costs.[22] It also provides an incentive for network businesses to minimise costs. The intention of incentive regulation is to align the commercial goals of the business to the objectives of the regulatory regime—especially the long term interests of consumers (the NEO).[23]

The Productivity Commission explains:[24]

> Under incentive regulation, the regulator forecasts efficient aggregate costs over the upcoming regulatory period (of usually five years), which it uses to set a revenue allowance for that period. The business makes higher profits if it reduces costs below those forecast by the regulator. In doing so, the business reveals the efficient costs of delivering the service, which would then influence the regulator's determination in the next period. Accordingly, incentive

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19 NER, cl. 6A.5.6.

20 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013; AER, *Expenditure forecast assessment guideline*, *Explanatory statement*, November 2013.

21 NER, cl. 6A.2.3(c).

22 Productivity Commission, *Electricity Network Regulatory Frameworks, volume 1, No. 62*, 9 April 2013, p. 188.

23 Productivity Commission, *Electricity Network Regulatory Frameworks, volume 1, No. 62*, 9 April 2013, p. 188.

24 Productivity Commission, *Electricity Network Regulatory Frameworks, volume 1*, *No. 62*, 9 April 2013, p. 27.

regulation encourages efficiency while reducing the risks that networks use their monopoly positions to set unreasonably high prices.

This incentive-based regulatory framework partially overcomes the information asymmetries between the regulated businesses and us, the regulator.[25] Compared to the regulated businesses, we are at an information disadvantage to identify specific inefficiencies they have or their true efficient costs. However, we need to make judgements about 'efficient' costs as the regulator.[26]

The 'revealed cost approach' and economic benchmarking are the two main tools we use to overcome these limitations.

Incentive regulation encourages regulated businesses to reduce costs below forecast levels and ‘reveal’ their efficient costs in doing so. The information revealed by the businesses allows us to develop better expenditure forecasts over time. Revealed opex reflects the efficiency gains made by a business over time. As a network business becomes more efficient, this translates to lower forecasts of opex in future regulatory periods, which means consumers also receive the benefits of the efficiency gains made by the business. Incentive regulation therefore aligns the business’ commercial interests with consumer interests.

Benchmarking a network business against others in the National Electricity Market (NEM) provides an indication of whether revealed opex can be adopted as 'base opex' (section 7.3.2.1) and, if not, what our alternative estimate of base opex should be. We may make a negative adjustment to the business’ revealed opex if we find it is operating inefficiently.

Our approach is to assess the business’ forecast opex over the regulatory control period at a total level, rather than to assess individual opex projects or programs. To do so, we develop an alternative estimate of total opex using a ‘top-down’ forecasting method, known as the ‘base–step–trend’ approach.[27]

Incentive regulation is designed to leave the day-to-day decisions to the network businesses.[28] It allows the network businesses the flexibility to manage their assets and labour as they see fit to achieve the opex objectives in the NER,[29] and more broadly, the National Electricity Objective (NEO).[30] This is consistent with the requirement that we consider whether *the total* opex forecast, and *not* the individual forecast opex components, reasonably reflects the opex criteria.[31]

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25 Productivity Commission, *Electricity Network Regulatory Frameworks, volume 1, No. 62*, 9 April 2013, p. 189.

26 Productivity Commission, *Electricity Network Regulatory Frameworks, volume 1, No. 62*, 9 April 2013, p. 190.

27 A 'top-down' approach forecasts total opex at an aggregate level, rather than forecasting individual projects or categories to build a total opex forecast from the 'bottom up'.

28 Productivity Commission, *Electricity Network Regulatory Frameworks, volume 1, No. 62*, 9 April 2013, pp. 27–28.

29 NER, cl. 6A.6.6(a).

30 NEL, s. 7.

31 NER, cl. 6A.6.6(c).

We do not determine what activities a network business should undertake or how much it should spend on particular categories of opex. This is not our role. As stated by the Productivity Commission: [32]

> …focus on detail is counter to the conceptual underpinnings of incentive regulation. The intention of the framework is to limit monopoly pricing… while leaving it to businesses, not the regulator, to work out the minutiae of input and output decision-making in any given regulatory period.

Our decision does not set the business' actual operating budget over the regulatory control period. We assess whether opex *in aggregate* is sufficient to satisfy the opex criteria, not increases or decreases of individual opex activities. We do not determine what opex activities a network business should undertake or how much it should spend on particular categories of opex. It is for the business to decide which suite of projects and programs it should undertake to deliver services to its customers while meeting its obligations.

The Australian Energy Market Commission (AEMC) supports this view of our role as the economic regulator. It stated: [33]

> The key feature of economic regulation of [distribution network service providers] in the NEM is that it is based on incentives rather than prescription…
>
> Importantly, under [incentive-based regulation], funding is not approved for [distribution network service providers'] specific projects or programs. Rather, a total revenue requirement is set, which is based on forecasts of total efficient expenditure. Once a total revenue is set, it is for the [business] to decide which suite of projects and programs are required to deliver services to consumers while meeting its regulatory obligations…

7.3.2 Base–step–trend forecasting approach

As a comparison tool to assess a business' opex forecast, we develop an alternative estimate of the business' total opex requirements in the forecast period, using the base–step–trend forecasting approach.

If the business adopts a different forecasting approach to derive its opex forecast, we assess the basis for those differences.

There are three broad stages to the base–step–trend approach, as summarised in figure 7.3.

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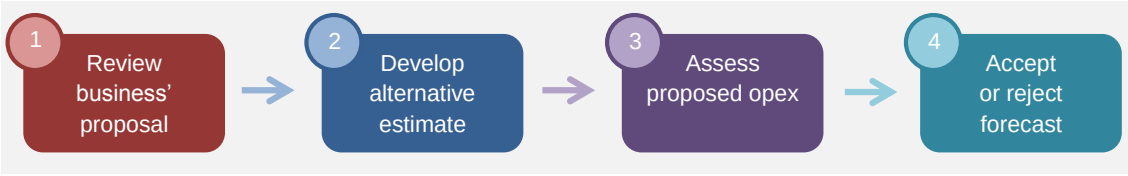
[32] Productivity Commission, *Electricity Network Regulatory Frameworks*, *volume 1, No. 62*, 9 April 2013, pp. 27–28.

[33] AEMC, *Contestability of energy services, Consultation paper*, 15 December 2016, p. 32.

Figure 7.3 Our opex assessment approach



1. Review business' proposal

We review the business' proposal and identify the key drivers.

2. Develop alternative estimate

Base

We use the business' opex in a recent year as a starting point (revealed opex). We assess the revealed opex (e.g. through benchmarking) to test whether it is efficient. If we find it to be efficient, we accept it. If we find it to be materially inefficient, we may make an efficiency adjustment.

Trend

We trend base opex forward by applying our forecast 'rate of change' to account for growth in input prices, output and productivity.

Step

We add or subtract any step changes for costs not compensated by base opex and the rate of change (e.g. costs associated with regulatory obligation changes or capex/opex substitutions).

Other

We include a 'category specific forecast' for any opex component that we consider necessary to be forecast separately.

3. Assess proposed opex

We contrast our alternative estimate with the business' opex proposal. We identify all drivers of differences between our alternative estimate and the business' opex forecast. We consider each driver of difference between the two estimates and go back and adjust our alternative estimate if we consider it necessary.

4. Accept or reject forecast

We use our alternative estimate to test whether we are satisfied the business' opex forecast reasonably reflects the opex criteria. We accept the proposal if we are satisfied.

If we are not satisfied the business' opex forecast reasonably reflects the opex criteria we substitute it with our alternative estimate.

7.3.2.1 Base opex

If we find the business is operating efficiently, our preferred methodology is to use the business' historical or 'revealed' costs in a recent year as a starting point for our opex forecast.

We do not simply assume the business' revealed opex is efficient. It may include an ongoing level of inefficient expenditure. We use our benchmarking results[34] to test whether the business is operating efficiently.

We consider revealed opex in the base year is generally a good indicator of opex requirements over the next period because the level of *total opex* is relatively stable from year to year. This reflects the broadly predictable and recurrent nature of opex.

A business may experience fluctuations in particular categories of opex, and the composition of total opex can change, from year to year. While many operation and maintenance activities are recurrent and non-volatile, some opex projects follow periodic cycles that may or may not occur in any given year, and some opex projects are non-recurrent.

Even if disaggregated opex categories have high volatility, the total opex varies to a lesser extent because new or increasing components of opex are generally offset by decreasing costs or discontinued opex projects. Further, we expect the regulated business to manage the inevitable 'ups and downs' in the components of opex from year to year—to the extent they do not offset each other—by continually re-prioritising its work program, as would be expected in a competitive market.

We also note that any volatility of total opex from year to year does not typically impact our choice of the appropriate base year. A consequence of the operation of the EBSS is that the forecast revenues (specifically forecast opex and EBSS rewards and penalties) are largely uninfluenced by the choice of base year. For example, although using a base year with unusually high opex would typically result in an increased opex forecast, a lower EBSS reward (or a greater penalty) would offset this increase.

If the business has demonstrated its ability to satisfy its obligations and service demand using its revealed costs, any further adjustments to base opex risk introducing bias into the forecast—including through bottom-up type assessments.[35] We therefore carefully scrutinise any such proposed adjustments.

7.3.2.2 Rate of change

We trend base opex forward by applying our forecast 'rate of change'. We estimate the rate of change by forecasting the expected growth in input prices, outputs and productivity. We consider that the rate of change takes into account almost all drivers of opex growth.

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[34] AER, *Annual benchmarking report—Electricity transmission network service providers*, November 2016.

[35] AER, *Expenditure forecast assessment guideline, Explanatory statement*, November 2013, pp. 71–75.

We forecast input price growth using a composition of labour and non-labour price changes forecasts. Labour costs represent a significant proportion of a transmission business' costs.[36] To determine the input price weights for labour and non-labour prices, we have regard to the input price weights of a prudent and efficient benchmark business. Consistent with incentive regulation, this provides the business an incentive to adopt the most efficient mix of inputs throughout the regulatory control period.

We forecast output growth to account for annual increase in output. The output measures used should be the same measures used to forecast productivity growth.[37] Productivity measures the change in output for a given amount of input. If the output measures differ from the productivity measures, they would be internally inconsistent and we cannot compare them like for like.

The output measures we typically use for transmission businesses are energy delivered, ratcheted maximum demand, weighted entry and exit connections and circuit length. We do not typically adjust forecast output growth for economies of scale because we account for these in our forecast of productivity growth.

Our forecast of productivity growth represents our best estimate of the shift in the industry 'efficiency frontier'.[38] We generally base our estimate of productivity growth on recent productivity trends across the industry. However, if we consider historic productivity growth does not represent 'business-as-usual' conditions we do not use it to forecast future productivity growth.

7.3.2.3 Step changes and category-specific forecasts

Lastly, we add or subtract any components of opex that are not adequately compensated for in base opex or the rate of change, but which should be included in the forecast total opex to meet the opex criteria.[39] These adjustments are in the form of 'step changes' or 'category-specific forecasts'.

Step changes

Step change costs included in the total opex forecast are subject to the EBSS.

Step changes should not double count costs included in other elements of the total opex forecast. As explained in the Guideline, the costs of increased volume or scale should be compensated for through the output growth component of the rate of change and it should not become a step change.[40] In addition, forecast productivity growth may account for the cost of increased regulatory obligations over time—that is, 'incremental changes in obligations are likely to be compensated through a lower productivity

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36 AER, *Expenditure forecast assessment guideline, Explanatory statement*, November 2013, p. 49.
37 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 23.
38 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 24.
39 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 24.
40 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 24.

estimate that accounts for higher costs resulting from changed obligations.'[41] Therefore, we consider only new costs that do not reflect the historic 'average' change as accounted for in the productivity growth forecast require step changes.[42]

To increase its maximum allowable revenue, a regulated business has an incentive to identify new costs not reflected in base opex or costs increasing at a greater rate than the rate of change. It has no corresponding incentive to identify those costs that are decreasing or will not continue. Information asymmetries make it difficult for us to identify those future diminishing costs. Therefore, simply demonstrating that a new cost will be incurred—that is, a cost that was not incurred in the base year—is not a sufficient justification for introducing a step change. There is a risk that including such costs would upwardly bias the total opex forecast.

The test we apply is whether the step change is needed for the opex forecast to achieve the opex objectives in the NER.[43] Our starting position is that only exceptional circumstances would warrant the inclusion of a step change in the opex forecast because they may change a business' fundamental opex requirements.[44] Two typical examples are:

- a material change in the business' regulatory obligations
- an efficient and prudent capex/opex substitution opportunity.

We may accept a step change if a material 'step up' or 'step down' in expenditure is required by a network business to prudently and efficiently comply with a new, binding regulatory obligation that is not reflected in the productivity growth forecast.[45] This does not include instances where a business has identified a different approach to comply with its existing regulatory obligations that may be more onerous, or where there is increasing compliance risks or costs the business must incur to comply with its regulatory obligations. Usually when a new regulatory obligation is imposed on a business, it will incur additional expenditure to comply. The business may be expected to continue incurring such costs associated with the new regulatory obligation into future regulatory periods; hence, an increase in its opex forecast may be warranted.

We expect the business to provide evidence demonstrating the material impact the change of regulatory obligation has on its opex requirements, and robust cost–benefit analysis to demonstrate the proposed step change expenditure is prudent and efficient to meet the change in regulatory obligations.[46] We stated in the explanatory statement accompanying the Guideline:[47]

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41 AER, *Expenditure forecast assessment guideline, Explanatory statement*, November 2013, p. 52.

42 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 24.

43 NER, cl. 6A.6.6(a).

44 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 24.

45 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 11.

46 AER, *Expenditure forecast assessment guideline, Explanatory statement*, November 2013, pp. 51–52; AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 11.

47 AER, *Expenditure forecast assessment guideline, Explanatory statement*, November 2013, p. 52.

> [Network services providers] will be expected to justify the cost of all step changes with clear economic analysis, including quantitative estimates of expected expenditure associated with viable options. We will also look for the [Network services providers] to justify the step change by reference to known cost drivers (for example, volumes of different types of works) if cost drivers are identifiable. If the obligation is not new, we would expect the costs of meeting that obligation to be included in revealed costs. We also consider it is efficient for [Network services providers] to take a prudent approach to managing risk against their level of compliance when they consider it appropriate (noting we will consider expected levels of compliance in determining efficient and prudent forecast expenditure).

We will consider cost estimates incorporated in the relevant Regulatory Impact Statement (RIS). Governments generally require a RIS to justify any new regulation, or amendments to existing regulations that is likely to impose a measurable impact on businesses, community organisations and/or individuals.

By contrast, proposed opex projects designed to improve the operation of the business, which we consider as discretionary in the absence of any legal requirement, should be funded by base opex and trend components, together with any savings or increased revenue that they generate—rather than through a step change. Otherwise, the business would benefit from a higher opex forecast and the efficiency gains.[48]

We may also accept a step change in circumstances where it is prudent and efficient for a network business to increase opex in order to reduce capital costs. We would typically expect such capex/opex trade-off step changes to be associated with replacement expenditure.[49] The business should provide robust cost–benefit analysis to clearly demonstrate how increased opex would be more than offset by capex savings.[50]

In the absence of a change to regulatory obligations or a legitimate capex/opex trade-off opportunity, we would accept a step change under limited circumstances. We would consider whether the costs associated with the step change are unavoidable and material—such that base opex, trended forward by the forecast rate of change, would be insufficient for the business to recover its efficient and prudent costs. We would also consider whether the business would continue to incur the costs of a proposed step change in future regulatory periods.

Category specific forecasts

A category specific forecast is a forecast of an opex item or activity that we assess and forecast independently from base opex, and is not subject to the EBSS.

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48 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 11.

49 AER, *Expenditure forecast assessment guideline, Explanatory statement*, November 2013, p. 74.

50 AER, *Expenditure forecast assessment guideline, Explanatory statement*, November 2013, p. 52.

A category specific forecast may be justified if 'the future path of the expenditure category is of such a magnitude that the observed historical stability of total opex is likely to change as a result of expected changes to the relevant opex category.'[51] In other words, a category specific forecast may be justified if, as a result of including a specific opex category in the base opex, total opex becomes so volatile that it undermines our assumption that total opex is relatively stable and follows a predictable path over time.

We may also use category specific forecasts to avoid inconsistency or double counting within our determination. We have typically included category specific forecasts for debt raising costs, the demand management incentive allowance (DMIA) and guaranteed service levels (GSL) payments. There are specific reasons for forecasting these categories separately from base opex. For example, we forecast debt raising costs separately to provide consistency with the forecast of the cost of debt in the rate of return building block of allowable revenue. For DMIA, we forecast these costs separately because we fund them through a separate building block.

Absent such exceptions, we expect that base opex, trended forward by the rate of change, will allow the business to recover its prudent and efficient costs. Again, the business has demonstrated its ability to operate prudently and efficiently at that level of opex while meeting its existing regulatory obligations, including its safety and reliability standards. We consider it is reasonable to expect the same outcome looking forward. Some costs may go up, and some costs may go down—so despite potential volatility in the cost of certain individual opex activities, total opex is generally relatively stable over time. As we stated above in relation to step changes, a business has an incentive to inflate its total opex forecast by identifying new and increasing costs, but not declining costs. Consequently, there is a risk that providing a category specific forecast for opex items identified by the business may upwardly bias the total opex forecast. By applying our revealed cost approach consistently and carefully scrutinising any further adjustments, we avoid this potential bias.

Minimising the number of costs forecast on a category specific basis also helps to simplify our expenditure assessments and allows for greater consistency across our regulatory determinations. This promotes regulatory certainty, and allows consumers and other stakeholders to more readily engage in our regulatory processes. A core objective of our *Stakeholder engagement framework* is to make our assessment approach and decisions accessible to a wide ranging audience.[52]

7.3.3 Interrelationships

In assessing TransGrid's total forecast opex we took into account other components of its revenue proposal, including:

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[51] Frontier Economics, *Opex forecasting method: A report prepared for TransGrid*, December 2014, p. 8.

[52] AER, *Stakeholder engagement framework*, 31 October 2013, p. 1; AER, *AER network revenue determination engagement protocol*, Version 1.0, September 2015, p. 3.

- the EBSS carryover—the level of opex used as the starting point to forecast opex (the final year of the current period) should be the same as the level of opex used to forecast the EBSS carryover. This consistency ensures that the business is rewarded (or penalised) for any efficiency gains (or losses) it makes in the final year the same as it would for gains or losses made in other years.
- the operation of the EBSS in the 2014–18 regulatory control period, which also provided TransGrid an incentive to reduce opex in the 2016–17 base year
- the impact of cost drivers that affect both forecast opex and forecast capex. For instance, forecast labour price growth affects forecast capex and our forecast of forecast price growth used to estimate the rate of change in opex
- the approach to assessing the rate of return, to ensure there is consistency between our determination of debt raising costs and the rate of return building block
- concerns of electricity consumers identified in the course of its engagement with consumers.

7.4 Reasons for draft decision

Our draft decision is to not accept TransGrid's total opex forecast of $947.7 million ($2017–18) for the 2018–23 regulatory control period.[53] We are not satisfied TransGrid's total opex forecast reasonably reflects the opex criteria.[54]

Our alternative estimate of total opex is $873.0 million ($2017–18), which we consider reasonably reflects the opex criteria.[55] This is $74.7 million ($2017–18) or 7.9 per cent lower than TransGrid's forecast.

Table 7.2 presents the components of our alternative estimate compared to TransGrid's proposal. It shows that the key differences are:

- we included a lower rate of change to account for forecast growth in prices, output and productivity ($15.5 million, $2017–18)
- we included part of the proposed licence compliance step change but did not include the proposed step change for off-easement risk management ($29.5 million, $2017–18)
- we included a lower category specific forecast for debt raising costs ($24.2 million, $2017–18).

[53] Includes debt raising costs.
[54] NER, cl. 6A.6.6(c).
[55] Includes debt raising costs.

Table 7.2 Our alternative estimate compared to TransGrid's proposal ($ million, 2017–18)

	TransGrid	Our alternative estimate	Difference
Based on reported opex in 2016–17	868.7	862.9	–5.8
2016–17 to 2017–18 increment	–26.6	–26.4	0.2
Output growth	4.8	2.7	–2.0
Price growth	26.1	15.0	–11.0
Productivity growth	–2.6	–5.0	–2.4
Step changes	37.3	7.8	–29.5
Category specific forecasts (DRC)	40.1	15.8	–24.2
Total opex	**947.7**	**873.0**	**–74.7**

Source: TransGrid, *Revenue proposal, Opex Model,* 31 January 2017; AER draft decision opex model.
Note: Numbers may not add up to total due to rounding.

We discuss the components of our alternative estimate below. Full details of our alternative estimate are set out in our opex model, which is available on our website.

7.4.1 Base opex

We have forecast a base opex amount of $862.9 million ($2017–18). Consistent with TransGrid's proposal, we have based this forecast on TransGrid's estimate of the opex it will incur in 2016–17.

Which year should we use as the base year?

We consider TransGrid's proposed base year of 2016–17 provides a reasonable basis for forecasting total opex. TransGrid considered 2016–17 to be the most relevant year for forecasting purpose because it will be the first full year of operations under TransGrid's new ownership and as such reflects the efficient forward looking costs of the business under its new regulatory regime.[56] TransGrid's estimate of its 2016–17 opex is similar to the opex reported in previous years and we agree that TransGrid's expenditure drivers in 2016–17 are likely to reflect those in the forecast period.

As such, we relied on TransGrid's proposed base year expenditure in our alternative estimate. We will update TransGrid's base year expenditure with actual information in our forecast when it becomes available.

[56] TransGrid, *Revenue proposal*, 31 January 2017, p. 129.

Is base year opex efficient?

TransGrid is subject to the incentives of an ex ante regulatory framework, including the application of the EBSS. Typically, where a service provider is subject to these incentives, we are satisfied there is a continuous incentive for a service provider to make efficiency gains and it does not have an incentive to increase its opex in the proposed base year.

We had regard to our transmission benchmarking results in deciding to use TransGrid's estimate of opex in 2016–17 as a starting point for our opex forecast. Our benchmarking indicates that TransGrid is operating relatively efficiently when compared to other service providers in the NEM. In contrast to electricity distribution networks, our benchmarking of transmission networks is relatively new and relies on a limited data set. It is limited by the small sample size of transmission businesses in the NEM—among other things. Having considered the results of our benchmarking, and the limitations of it, we are satisfied that TransGrid's estimate of its opex in 2016–17 is not materially inefficient.

Movements in provisions

We typically assess base year expenditure exclusive of any movements in provisions. This ensures we base our alternative estimate on the actual costs incurred by the business, and not provisions the business set aside for liabilities it has yet to pay out.

The estimate of 2016–17 opex that we used for base opex did not include any movements in provisions. We will update this estimate to reflect the actual opex incurred when we receive TransGrid's regulatory accounts. When we do this update, we will exclude movements in provisions.

Estimate of final year opex

We forecast opex by applying our forecast rate of change to our estimate of opex in the final year of the current control period, in this case 2017–18. We need to estimate this because we do not know it at the time we make our decision. Consistent with the Guideline, we have estimated 2017–18 opex to be equal to:[57]

$$A^*_{2017\text{–}18} = F_{2017\text{–}18} - (F_b - A_b) + non - recurrent\ efficiency\ gain_b$$

Where:

- $A^*_{2017\text{–}18}$ is the best estimate of actual opex for 2017–18
- $F_{2017\text{–}18}$ is the allowed opex forecast for 2017–18
- F_b is the allowed opex forecast for the base year
- A_b is the amount of actual opex in the base year

[57] AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 23.

- $non-recurrent\ efficiency\ gain_b$ is the non-recurrent efficiency gain in the base year.

TransGrid did not apply this formula to estimate 2017–18 opex. Instead, it estimated final year opex by applying its forecast rate of change directly to base year opex (2016–17).[58] It also estimated efficiency savings of 4 per cent in 2017–18 when it took wage growth and output growth into account.[59] TransGrid considered its approach generates a more accurate estimate of final year opex, which becomes the starting point for its opex forecast.[60]

One of the opex factors we must have regard to when assessing the service provider's opex forecast is whether the opex forecast is consistent with the EBSS.[61] There is an important link between the EBSS and the opex forecast. Under our Guideline approach, the level of opex used as the starting point to forecast opex (the final year of the current period) should be the same as the level of opex used to calculate the EBSS rewards and penalties. This consistency ensures that the business is rewarded (or penalised) for any efficiency gains (or losses) it makes in the final year in the same way as it would for gains or losses made in other years.

TransGrid's proposed approach implies that it will incur an efficiency loss in the final year of the current regulatory period (2017–18), compared to our previous forecast. However, TransGrid assumed it would not make an efficiency gain or loss in 2017–18 when it calculated its EBSS reward. By estimating higher opex in 2017–18 in its opex forecast than in the EBSS, TransGrid has proposed EBSS rewards for efficiency gains that it would not pass on to consumers through its opex forecasts.

In our alternative opex forecast, we have adopted TransGrid's estimate of 2017–18 opex. The Guideline provides us with flexibility to adjust the final year estimate so it is consistent with that used to calculate EBSS carryovers. This enables the EBSS to provide a continuous incentive, which is in the long-term interest of consumers.

TransGrid's estimate of final year opex in its opex model is $168.4 million ($2017–18). We have recalculated this amount using our estimate of inflation for 2017–18. Using our estimate of inflation, TransGrid's estimate of 2017–18 opex is $167.3 million ($2017–18). We are satisfied with this estimate as long as the EBSS reflects this same estimate. Applying the final year equation, this equates to a *non-recurrent efficiency gain* in the base year of $1.7 million ($2017–18).[62]

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58 TransGrid, *Revenue proposal*, January 2017, p. 132.

59 TransGrid, *Revenue proposal*, January 2017, p. 145.

60 TransGrid, *Revenue proposal*, January 2017, p. 132.

61 NER, cl. 6A.6.6(e)(8).

62 $non\text{-}recurrent\ efficiency\ gain = A_f^* - F_f + (F_b - A_b) = 167.3 - 175.1 + (182.0 - 172.6) = 1.7\ (\$\ \text{million}, 2017\text{-}18)$

7.4.2 Rate of change

Once we estimate opex in the final year of the current period, we apply a forecast annual rate of change to forecast opex for the 2018–23 regulatory control period.

We have used a forecast average annual rate of change of 0.51 per cent to derive our alternative estimate. This is lower than TransGrid's forecast of 1.2 per cent. We compare both forecasts in table 7.3.

Table 7.3 Forecast annual rate of change in opex (per cent)

	2018–19	2019–20	2020–21	2021–22	2022–23
TransGrid proposed					
Input price growth	0.76	0.90	1.21	1.38	1.36
Output growth	0.00	0.09	0.52	0.41	0.07
Productivity growth	0.00	0.05	0.28	0.22	0.04
Rate of change	**0.76**	**0.94**	**1.46**	**1.57**	**1.39**
AER draft decision					
Input price growth	0.53	0.59	0.60	0.69	0.73
Output growth	0.13	0.22	0.04	–0.02	0.03
Productivity growth	0.20	0.20	0.20	0.20	0.20
Rate of change	**0.46**	**0.61**	**0.44**	**0.48**	**0.55**

Source: AER analysis; TransGrid, *Revenue proposal*, Opex model, 31 January 2017.

Note: The rate of change = (1+ price growth) × (1+ output growth) × (1– productivity growth) – 1.
The rate of change is reported year-on-year. Numbers may not add due rounding.

Our forecast rate of change is different to TransGrid's because it used a different approach to forecast input price, output and productivity growth.

7.4.2.1 Forecast price growth

We forecast real average annual price growth of 0.63 per cent (or $15.0 million ($2017–18) over five years). We are not satisfied TransGrid's proposed average annual price growth of 1.12 per cent reasonably reflects the increase in prices a prudent and efficient service provider would require to meet the opex objectives.

To forecast price growth we have used a weighted average of forecast labour price growth and non-labour price growth.

To forecast labour price growth, we have used the average of the most up-to-date NSW utilities wage price index (WPI) forecasts from Deloitte Access Economics (DAE).

In contrast, TransGrid relied on Australian private utilities WPI forecasts from BIS Shrapnel.[63] We discuss our reasons for using the NSW public and private WPI index rather than the Australian private only index below.

To forecast non-labour price growth, both we and TransGrid have applied the forecast change in the CPI.[64]

We have also applied different labour and non-labour weights than TransGrid did to forecast price growth. We have applied benchmark input price weights of 62 per cent and 38 per cent for labour and non-labour, respectively. By contrast, TransGrid used average firm specific weights of 71 per cent for labour and 29 per cent for non-labour.[65]

The benchmark input price weights we have applied reflect the efficient mix of labour services and other costs required to provide network services. This approach is consistent with the revenue and pricing principles, as it provides regulated network businesses with effective incentives in order to promote economic efficiency.[66] We consider:

- using a network business' actual input price weights distorts the incentive to use the most efficient mix of labour and non-labour inputs
- our benchmark input price weights are still appropriate
- using different input price weights to forecast price growth and to forecast productivity growth yields a biased opex forecast.

We discuss these points in more detail below.

We have also considered TransGrid's reasons for applying its actual input price weights. TransGrid relied on legal advice from Herbert Smith Freehills.[67] Herbert Smith Freehills submitted that:[68]

- our forecast opex will not reflect a realistic expectation of the cost inputs to achieve the opex objective if we do not consider TransGrid's actual cost inputs
- our benchmark weights are out-dated and not relevant.
- our benchmark weights reflect a one size-fits-all approach.

The WPI for the NSW utilities sector reflects a realistic expectation of labour price growth

As stated earlier, we have used forecast growth in the public and private WPI for the NSW utilities industry to forecast labour price growth. Our forecasts of labour price

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63 TransGrid, *Revenue proposal*, 31 January 2017, p. 134.
64 TransGrid, *Revenue proposal*, 31 January 2017, p. 135.
65 TransGrid, *Revenue proposal*, *Opex model*, 31 January 2017
66 NEL, s. 7A(3).
67 Herbert Smith Freehills, *TransGrid—Operating expenditure*, 23 January 2017.
68 Herbert Smith Freehills, *TransGrid—Operating expenditure*, 23 January 2017, pp. 4–5.

growth reasonably reflect a realistic expectation of the labour price growth faced by a prudent and efficient service provider in the 2018–23 regulatory control period. They take into account the pressures and constraints faced by public and private utilities employers in NSW. In addition, they reflect our standard approach to forecasting labour price growth. Many regulated network service providers (both distribution and transmission networks) also use forecast WPI growth for the relevant state utilities to forecast labour price growth in their regulatory proposals.[69]

TransGrid, however, used growth in the Australian private utilities WPI forecast by BIS Shrapnel to forecast labour price growth, rather than the public and private utilities WPI for NSW. BIS Shrapnel stated that state government wage restraints over the past six years have dragged down the increase in the WPI for the utilities sector.[70]

It is true that private and public utilities can face different employment pressures and constraints during periods of fiscal strain. While this may result in different labour cost outcomes over the short to medium term, we consider that these differences cannot persist indefinitely. Relying on the private utilities WPI to forecast labour price growth would not reflect a realistic expectation of labour costs required to achieve the opex objectives. This is because any wage differences between private and public utilities will influence future wage outcomes. More workers employed by the public utilities sector will seek to move to the private utilities sector, while fewer workers will seek to move the other way. This will impact the supply and demand for labour and the outcome of wage negotiations. BIS Shrapnel agreed with this view.

BIS Shrapnel stated:[71]

> With increased privatisation of electricity assets in New South Wales and ongoing state budget constraints, we are forecasting private WPI for the EGWWS sector to continue to grow at a faster pace the industry average. However, as state governments budget position improves over the medium to long-term, we expect them to relax their wage restrictions. As a result, we are forecasting wage increases awarded by publicly owned networks to slowly converge to those for the privately owned businesses.

Historical data published by the Australian Bureau of Statistics also reflect this convergence. Figure 7.4 illustrates growth in the Australian WPI for the utilities industry over the period June 1999 to June 2017. It shows that any differences between the private and public series do not persist and the series tend to follow the same trend.

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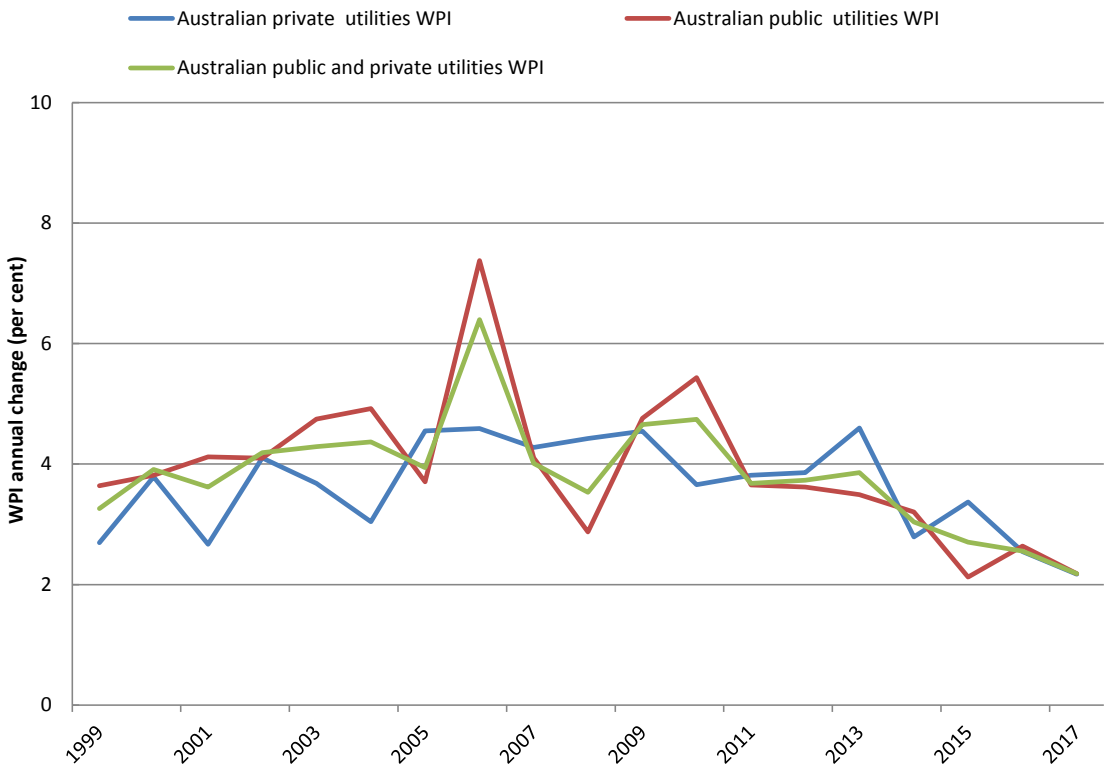
69 AusNet Services - Access arrangement information 2018-2022 - 20161221 – Public, December 2016, p. 160; AusNet Services (electricity distribution), Revised proposal - Jan 2016, p. 4.14; United Energy - Regulatory Proposal - April 2015, p. 91; Australian Gas Networks (SA), Access arrangement information - July 2015, p. 121; Jemena Electricity Networks (Vic) Ltd, Attachment 08-02 operating expenditure forecasting method and base year efficiency - April 2015, p.13.

70 BIS Shrapnel, *Wage forecasts to 2023*, November 2016, p. 32.

71 BIS Shrapnel, *Wage forecasts to 2023*, November 2016, pp. 32–33.

Furthermore, using WPI for Australian private utilities, as TransGrid proposed, would lead to forecast labour costs that reflect a specific ownership structure. We do not consider that the efficient costs of a prudent firm need reflect a specific ownership.

Figure 7.4 Growth in Australian utilities WPI, June 1999 to June 2017



Source: ABS, *Wage price index*, Catalogue 6345.0, Table 9b;[72] AER analysis

Benchmark weights provide an incentive to use the most efficient mix of labour and non-labour inputs

The revenue and pricing principles require that we provide effective incentives to a regulated network business in order to promote economic efficiency.[73] It is important, in our revealed cost approach to forecast opex, that the past performance of a network business does not influence the rate of change used to trend forward the base year revealed opex. Forecasting the rate of change based on a network business' past performance, including its past input mix would not provide it an incentive to reveal its efficient costs. Using a network business' revealed input mix provides a disincentive to use less of an input that is increasing more rapidly in price because it would reduce the forecast rate of change.

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72 Australian Bureau of Statistics, http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6345.0Jun%202017?OpenDocument (accessed 4 September 2017).

73 NEL, s. 7A(3).

We note that TransGrid did not argue that our benchmark input price weights do not reflect the input mix of an efficient benchmark firm. It only submitted that our benchmark input price weights would not result in an accurate forecast that would reflect TransGrid's realistic input costs.[74] Using benchmark input weights does not necessarily infer or assume that TransGrid's revealed input mix is inefficient.

Our benchmark weights remain appropriate

We consider our benchmark input price weights remain appropriate at this stage. However, we recognise that, over time, the efficient input mix could change. The Pacific Economics Group (PEG) analysis that originally derived the weights was the most detailed attempt to identify a representative price index for NSP opex in Australia.[75] Economic Insights supported this view.[76]

However, TransGrid and Herbert Smith Freehills submitted that our benchmark weights are both out-dated and not relevant for TransGrid because PEG derived these weights using data from distribution network businesses.[77]

It is true that the PEG analysis only covered distribution networks businesses and PEG published the analysis in 2004. However, we consider that the resulting benchmark weights continue to reflect the efficient input mix of a prudent and efficient network provider and are relevant for transmission businesses. To confirm this, we have collected data from all the electricity transmission businesses in the NEM that will allow us to determine updated input price weights for a prudent and efficient benchmark transmission business. We are currently reviewing this data. We are doing this as part of our 2017 benchmark reporting for transmission businesses. TransGrid is part of this process.

We anticipate our 2017 benchmarking process will conclude prior to making our final decision for TransGrid. If further analysis that we do as part of this process suggests we should change our input price weights, we will consider this in our final decision.

Using different input price weights to forecast price growth and productivity growth yields a biased opex forecast

Our benchmark input price weights are consistent with the weights we have used to forecast productivity growth. As stated below, we have adopted Economic Insights' productivity growth, which relied on benchmark input price weights of 62 per cent for labour and 38 per cent for non-labour. Economic Insights advised that we use the

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74 Herbert Smith Freehills, *TransGrid—Operating expenditure*, 23 January 2017, p. 4.

75 Pacific Economics Group (PEG), *TFP Research for Victoria's Power Distribution Industry,* December 2004.

76 Economic Insights, Memorandum, *Review of AusNet Transmission arguments on the opex rate of change*, 9 January 2016, p. 3.

77 Herbert Smith Freehills, *TransGrid—Operating expenditure*, 23 January 2017, p. 5; TransGrid, *Revenue proposal*, January 2017, p. 134.

same specification of opex input prices to forecast the real price growth and productivity growth components of the rate of change to maintain logical consistency.[78]

We consider that adopting a different input price specification to forecast price than we have used to measure productivity growth would likely result in a biased opex forecast. Using a higher labour share of opex in our historical productivity analysis would have produced a higher partial productivity growth rate. This in turn would have increased forecast productivity growth in the rate of change formula.[79]

Our total opex forecast reflects a realistic expectation of the cost inputs

As part of its revenue proposal, TransGrid submitted legal advice from Herbert Smith Freehills that addressed the prescribed opex forecast in relation to the effect of wage changes. Herbert Smith Freehills suggested that:[80]

> A realistic expectation of input costs cannot be arrived at without considering TransGrid's actual labour costs and its share of operating expenditure relative to the materials and services component.

We consider that the opex criteria work together as a single overall requirement.[81] Prudency and efficiency are complementary. The Australian Competition Tribunal refers to them as a unified concept; and it has described them as a single 'prudent and efficient requirement'.[82]

In our view, this criterion is concerned with ensuring that there is a proper basis for estimating the cost inputs that a prudent and efficient service provider would incur over the forecast period. 'Prudent and efficient' costs can only be sensibly given meaning by reference to the demand forecast for the services the service provider provides and the realistic cost inputs that a prudent and efficient provider would require to achieve its opex objectives. The demand forecast and cost inputs referred to in this criterion are those of a prudent and efficient service provider operating that network. They are not the cost inputs, which result from a businesses' previous decision-making.

Accordingly, we disagree with an interpretation of this opex criterion that a forecast, which reflects a 'realistic expectation of cost inputs', must take account of past

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78 Economic Insights, Memorandum, *Review of AusNet Transmission arguments on the opex rate of change*, 9 January 2016, p. 2.

79 Economic Insights, Memorandum, *Review of AusNet Transmission arguments on the opex rate of change*, 9 January 2016, p. 5.

80 Herbert Smith Freehills, *TransGrid—Operating expenditure*, 23 January 2017, p. 4; NER cl. 6A.6.6(c)(3).

81 The Tribunal has applied the term in this fashion in at least the following matters: Application by Ergon Energy Corporation Limited (Non-system property capital expenditure) *(No 4) [2010] ACompT 12*; Application by EnergyAustralia and Others [2009] ACompT 8; Application by Ergon Energy Corporation Limited (Labour Cost Escalators) *(No 3) [2010] ACompT 11*; Application by DBNGP (WA) Transmission Pty Ltd *(No 3) [2012] ACompT 14*; Application by United Energy Distribution Pty Limited [2012] ACompT 1; Re: Application by ElectraNet Pty Limited *(No 3) [2008] ACompT 3* ; Application by DBNGP (WA) Transmission Pty Ltd *[2012] ACompT 6*

82 Application by ElectraNet Pty Limited *(No 3) [2008] ACompT 3* at 199; Application by Energy Australia and Others *[2009] ACompT 8* at 141, citing reports prepared by service providers and the NER from 2008.

discretionary decisions made by a service provider that bind the service provider, rather than reflecting the efficient costs that an objectively prudent operator would incur.

We consider that an appropriate application of the opex criteria involves us making an assessment about what objectively would be:

- the efficient costs of achieving the opex objectives, rather than the actual costs a service provider has spent or intends to spend
- the costs that a prudent service provider for that network would require, rather than the actual costs the actual service provider in question intends or is contractually obliged to provide given all their circumstances and past decision making
- a realistic expectation of the demand forecast, rather than the service provider's own demand forecast
- a realistic expectation of the cost inputs to achieve the objectives, rather than the actual cost inputs that the provider might incur, or have committed itself to spend money on, to achieve the opex objectives.

Benchmark weights reflect a one size-fits-all approach

Herbert Smith Freehills stated:[83]

> The AER's current approach of adopting a 62% weighting for all businesses is a 'one-size fits all' approach. This assumes that there is only one efficient weighting for the labour component. We are not aware of any evidence to support this. Not only will there be differences between businesses that will affect the trade-off between the labour, and plants and materials components of operating expenditure, but there is also nothing to suggest that different combinations of labour and plants and materials will not be equally efficient.

This reference to 'one-size fits all' misconstrues our approach, which is to determine an overall amount of opex that is prudent and efficient. As noted earlier, it is important to consider the interaction between price growth and productivity growth.[84] Two firms could adopt different opex input mixes with one firm utilising more labour than the other does. This firm would face higher input price growth if the price of labour increased more rapidly than the price of services. However, this does not necessarily mean that the opex of the firm that utilises more labour will increase more rapidly. This firm could achieve higher productivity growth because the labour it was directly employing was driving productivity growth. The other firm could face lower price growth because the price it paid for services reflected similar productivity growth and it did not directly employ the labour. This highlights the importance of using consistent opex weights in the price growth forecast and the productivity growth forecast. It appears that

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83 Herbert Smith Freehills, *TransGrid—Operating expenditure*, 23 January 2017, p. 5.

84 Economic Insights, *Memorandum, Review of AusNet Transmission arguments on the opex rate of change*, 9 January 2016, pp. 1–2.

TransGrid's proposal does not do that. Herbert Smith Freehills stated that 'there is also nothing to suggest that different combinations of labour and plants and materials will not be equally efficient' yet under TransGrid's proposed approach a higher labour weight will always yield a higher opex forecast.

In addition, each service provider is free to adopt whichever input mix it considers best. Our approach provides an incentive for it to do this. This is because, under our approach, a change in a service provider's input mix has no impact on its future opex forecasts. TransGrid's approach does not provide it an incentive to adopt the most efficient input mix because any change to its input mix will also change its opex forecast in future control periods. Instead, its approach would provide it an incentive to utilise more of the input that increasing more rapidly in price, even if it is not efficient to do so, because this will increase its future opex forecasts.

7.4.2.2 Forecast output growth

We have forecast average annual output growth of 0.1 per cent, which increased our alternative forecast opex by $2.7 million ($ 2017–18) over the five years. To do this, we applied our standard approach. TransGrid, however, proposed output growth of $4.8 million ($2017–18) using a different approach.[85]

We assume opex would reasonably increase with increases in output. The output measures and weights we have used to forecast TransGrid's output growth are consistent with those we use in our transmission benchmarking analysis.[86] The output weights account for the proportion of opex that is attributable to each of the four output measures:

- line length (28.7 per cent)
- energy throughput (21.4 per cent)
- ratcheted maximum demand (22.1 per cent)
- voltage-weighed entry and exit connections (27.8 per cent).

We have used TransGrid's forecasts of these outputs.[87] We consider they are reasonable because they assume:

- a modest increase in line length and energy throughput
- no increase in maximum demand
- few new entry and exit points.

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85 TransGrid, *Revenue proposal*, 31 January 2017, pp. 135, 137.

86 Economic Insights discusses the process for selecting the output specification in its economic benchmarking assessment of opex for the NSW and ACT electricity distributors; Economic Insights, *Economic benchmarking assessment of operating expenditure for NSW and ACT electricity TNSPs*, 10 November 2014, pp. 7–9.

87 TransGrid, *Reset RIN Regulatory templates consolidated*, January 2017, tables 3.4.1 to 3.4.3 and 3.5.1.

TransGrid's forecast output growth

TransGrid proposed output growth of $4.8 million ($2017–18).[88] Rather than using our output specification, it based its forecast on its forecast augmentation expenditure (augex). Specifically, it calculated output growth as commissioned augex as a proportion of the replacement value of the network. It estimated the replacement value of the network using a build-up of network component replacement costs.[89]

TransGrid then applied an economy of scale factor of 0.47 per cent.[90]

Table 7.4 TransGrid's network growth forecast

	2018–19	2019–20	2020–21	2021–22	2022–23
Replacement cost of network, $ million, 2017–18	13 089	13 157	13 212	13 221	13 571
Commissioned augex, $ million, 2017–18	11.7	68.3	54.7	9.2	350.3
Commissioned augex as per cent of network, per cent	0.1	0.5	0.4	0.1	2.6

Source: TransGrid, *Revenue proposal*, *Opex model*, 31 January 2017.

It considered this was a more accurate method and noted that we accepted a similar approach proposed by AusNet Services in our draft decision. TransGrid also stated Frontier Economics questioned our analysis in our recent decisions for transmission network service providers.[91]

We have four concerns with TransGrid's proposed approach to forecasting output growth:

1. TransGrid's forecasting approach is input based, not output based. In our assessment approach above, we say we will trend opex forward to account for growth in outputs. However, TransGrid has trended opex forward to account for growth in augmentation capex, which is an input. Further, in the Guideline we say output measures should reflect services provided to customers.[92]
2. TransGrid has provided no evidence to justify the relationship between the RAB and opex they have assumed. TransGrid used the percentage increase in its network growth measure to trend opex forward. However, it provided no evidence to show that a one per cent increase in its network growth measure will lead to a one per cent increase in opex times the economy of scale factor.

88 TransGrid, *Revenue proposal*, 31 January 2017, pp. 135, 137.
89 TransGrid, *Revenue proposal*, 31 January 2017, p. 137.
90 TransGrid, *Revenue proposal*, *Opex model*, 31 January 2017.
91 TransGrid, *Revenue proposal*, 31 January 2017, p. 135.
92 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 23,

3. TransGrid's approach is inconsistent with the output specification implicit in our productivity forecast. Had we used TransGrid's output specification to measure productivity, we would need a different productivity growth forecast that reflects the different output measure.
4. Frontier Economics' concern with our benchmarking analysis was limited to the econometrics Economics Insights used to determine the output weights.[93] Economics Insights responded that the results of its benchmarking analysis were not sensitive to the weights it used. [94] We also note that Frontier Economics did not show the results were sensitive to the weights.

Review of transmission economic benchmarking

We are currently reviewing our economic benchmarking of transmission network service providers, with a focus on refining our specification of outputs. We are doing this review as part of our 2017 annual benchmarking report.[95] We have consulted with stakeholders, including TransGrid, throughout this review. The main issues we are considering are:

- whether voltage-weighted connections should be replaced by the number of end-users
- whether the weights applied to the outputs should be updated
- whether capacity-related outputs (line length and ratcheted maximum demand) should be multiplied rather than added.

Our final opex decision will take the recommendations of this review into consideration. In particular, we will consider if we should forecast output growth using the number of end-users rather than voltage-weighted connections. We will also consider if we should update the weights we apply. We note, however, that our output growth forecast is not very sensitive to the weights we apply because each of the output measures is relatively stable. We are due to release our 2017 annual benchmarking report in November 2017.

7.4.2.3 Forecast productivity growth

We have included forecast productivity growth of 0.2 per cent per year in our alternative estimate. This decreased our alternative opex forecast by $5.0 million ($2017–18). Our opex productivity growth forecast reflects our best estimate of the shift in the productivity frontier.[96]

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93 The Frontier Economics report reviews the AER's 2016 TNSP economic benchmarking results.

94 We engaged Economic Insights to review the Frontier Economics (FE 2017) report submitted by TransGrid as part of its revenue proposal. Economic Insights, *Review of Frontier Economics report on TNSP economic benchmarking*, 4 July 2017, p. 4.

95 Australian Energy Regulator, https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/annual-benchmarking-report-2017-0/initiation.

96 AER, *Expenditure forecast assessment guideline*, *Explanatory statement*, November 2013, p. 65.

Our productivity growth forecast reflects our expectation of the productivity an efficient service provider in the transmission industry can achieve. It reflects historic industry opex productivity growth to the extent we consider past performance to be a good indicator of future performance under a business-as-usual situation. This assumes there will be no significant structural change in the electricity transmission industry for the 2018–23 period relative to the 2006–15 period used to measure historic productivity growth.

We based our opex productivity growth forecast of 0.2 per cent on analysis undertaken by our expert consultant, Economic Insights. We consider this reflects a reasonable expectation of the benchmark productivity that an efficient and prudent transmission network can achieve for the forecast period for the following reasons:

- Economic Insights recommended we apply 0.2 forecast productivity growth for a recent transmission determination.[97]
- As noted by Economic Insights, opex partial productivity trended up from 2006 to 2013 before falling in 2014 and 2015. There is some evidence that at least part of these recent falls reflect one-off events.[98]
- Measured productivity growth for the electricity transmission and gas distribution industries is positive for the 2006–15 period and are forecast to be positive.[99]

In comparison to our forecast of 0.2 per cent, TransGrid proposed no industry opex productivity growth.[100] It stated it based this forecast on independent productivity measures that indicated declining productivity for Australian utilities.

While TransGrid did not explicitly account for forecast productivity growth, it did apply economies of scale to its output growth, which reduced its opex forecast by $2.6 million ($2017–18). These proposed economies of scale equate to average forecast productivity growth of 0.1 per cent per year. Our productivity growth forecast captures economies of scale.

TransGrid also stated it built business specific future efficiency improvements into its base year forecast.[101]

Our measure of productivity growth remains appropriate

We consider the productivity growth forecast we have used remains an appropriate forecast of opex productivity for the electricity transmission industry. TransGrid,

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97 Economic Insights, *Memorandum: TNSP MTFP Results*, 29 April 2016, p. 5.

98 Economic Insights, *Memorandum: TNSP MTFP Results*, 29 April 2016, p. 5.

99 AER, *Annual benchmarking report (Transmission)*, November 2016, p. 18; Economic Insights, *The productivity performance of Victorian gas distribution businesses*, 15 June 2016, p. 20.

100 TransGrid, *Revenue proposal*, 31 January 2017, p. 129.

101 TransGrid, *Revenue proposal*, 31 January 2017, pp. 129–130.

however, raised three concerns with the productivity measure we use to forecast opex productivity growth.[102] We have considered each of these concerns.

First, TransGrid noted that we based our opex partial factor productivity measure for electricity transmission on data from only five transmission network service providers starting in 2005–06. It considered this to be a very small sample set over a relatively short period of time, and that, consequently, one-off circumstances could skew measured opex productivity growth.[103] As noted by Economic Insights, it is because of the small number of observations available for Australian transmission businesses that we only use index number methods for the economic benchmarking of transmission networks. However, the small number of observations does not affect the index number analysis in the same way that it does the econometric analysis.[104] We are satisfied that our data set is sufficient to forecast opex productivity growth using index number analysis.

Second, TransGrid noted that we updated our method for measuring opex multilateral partial factor productivity growth to reduce the effect of outlier observations. This change in approach changed what would have been a slightly negative industry opex productivity growth to slightly positive productivity growth. TransGrid stated that this suggested that there might be a number of reasonable methods that could be used that give materially different results.[105]

We outlined our reasons for our change of approach in our draft decision for AusNet Services transmission.[106] We consider this change in approach is appropriate to address concerns about the impact of outlier observations, concerns shared by TransGrid. The average annual growth rate method we previously used measures the growth rate between the first and last observations. The regression–based trend method we now use determines a line of best fit through all the data points. The average annual growth rate method is sensitive to outlier observations lying at either the start or the end of the data series. If changes in opex driving these outlier observations are one–off events then these observations may produce an average growth rate that is not reflective of the underlying trend change over the time period.

It is not unexpected that the change in approach led to a different outcome (which TransGrid itself described as a change from *slightly* negative industry opex productivity growth to *slightly* positive productivity growth). Had there been no change then the concerns about outlier observations would have been unfounded. Consequently, we consider the change in approach was an appropriate way to addressing concerns about outlier observations, a concern that TransGrid itself has raised.

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102 TransGrid, *Revenue proposal*, 31 January 2017, p. 143.

103 TransGrid, *Revenue proposal*, 31 January 2017, p. 143.

104 Economic Insights, *Review of Frontier Economics report on TNSP economic benchmarking*, Memorandum, 4 July 2017, p. 4.

105 TransGrid, *Revenue proposal*, 31 January 2017, p. 143.

106 AER, *AusNet Services transmission determination 2017–18 to 2021–22*, Draft decision, Attachment 7, July 2016, pp. 56–58.

Third, TransGrid noted concerns raised by Frontier Economics with the regression analysis Economic Insights used to derive our output weights.[107] Economic Insights has responded to each of these concerns.[108] Economic Insights noted that most of Frontier Economics' concerns relate to econometric issues. However, our benchmarking of electricity transmission networks uses index number methods, not econometric analysis. We limited the role of econometric estimation to calculating the output weights we used in the index number analysis. As noted by Economic Insights, the sensitivity of the index number productivity results to the output weights will depend on how closely related movements in output quantities are. As Frontier Economics itself noted, the correlations between the output quantities are all quite high so, all else equal, we would expect the index number productivity results to be insensitive to the estimated output weights.[109]

We note that we are currently reviewing our approach to the economic benchmarking of electricity transmission networks. We are trying to find practical ways to refine and further develop the analysis. The primary focus is to improve the specification and measurement of outputs. We are considering the views of all stakeholders in this process, including those of TransGrid. We will take into account the outcomes of this process in our forecast of both opex productivity growth and output growth in our final decision for TransGrid.

Alternative productivity growth measures are not fit for purpose

TransGrid considered three potential alternatives for measuring industry productivity growth:[110]

1. The Productivity Commission's found that multi-factor productivity for the utilities industry declined by 1.2 per cent per year between 1989–90 and 2014–15.[111]
2. NSW Trade and Investment found multi-factor productivity in the NSW utilities industry declined by 1.86 per cent between 1995 and 2013.[112]
3. Our measure of opex partial factor productivity for Australian distributors declined at a rate of approximately 1.8 per cent per annum between 2005–06 and 2014–15.[113]

We consider that all three of these productivity growth measures are less suitable for forecasting opex productivity growth for the electricity transmission industry than the measure we have used.

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107 TransGrid, *Revenue proposal*, 31 January 2017, p. 143.

108 Economic Insights, *Review of Frontier Economics report on TNSP economic benchmarking*, Memorandum, 4 July 2017.

109 Frontier Economics, *Review of the MTFP and MPFP analysis in the AER's 2016 Annual Benchmarking Report*, January 2017, p. 12.

110 TransGrid, *Revenue proposal*, 31 January 2017, pp. 143–145.

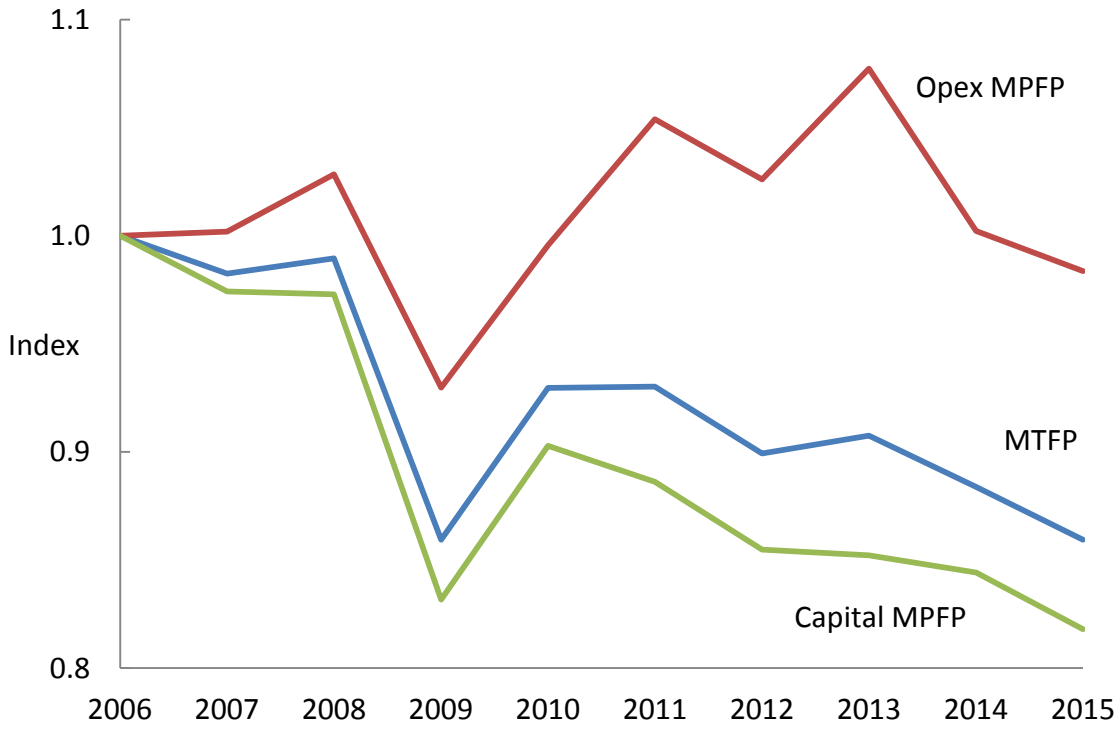
111 Productivity Commission, *Productivity update*, April 2016, p. 10.

112 David Buckland & Harley Smith, NSW Trade & Investment, *Productivity in NSW*, 18 September 2014.

113 AER, *Economic Insights DNSP benchmarking data file*, 7 November 2016, Series PPOpex,

We note that the first two measures considered by TransGrid are multi-factor productivity measures. Consequently they reflect both opex and capex productivity growth. Unlike our measure, they are not forecasts of opex productivity growth. In our benchmarking report, we considered total factor productivity performance as well as capex and opex partial factor productivity. As can be seen in figure 7.5 below, capex partial factor productivity performance heavily influenced total factor productivity performance. Consequently, we do not consider it appropriate to use a multi-factor productivity measure to forecast opex productivity growth.

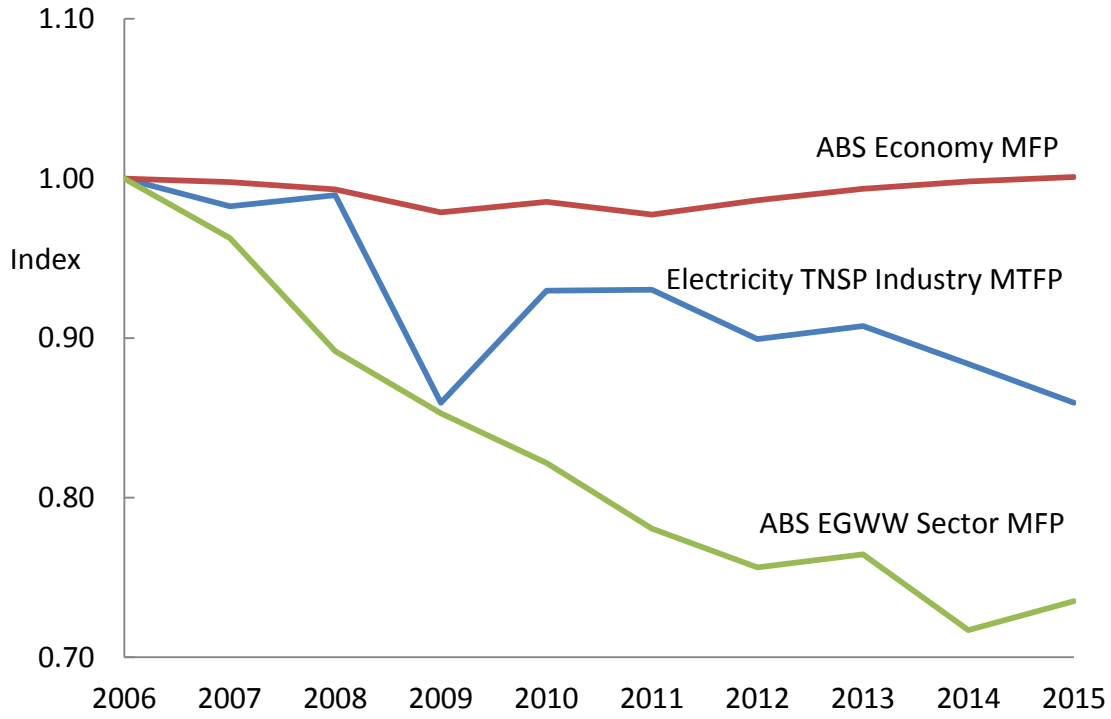
Figure 7.5 Opex, capital and total factor productivity



Source: AER's analysis; *Economic Insights TNSP economic benchmarking data file*s, November 2016.

Utilities that are not electricity transmission also influence the first two measures considered by TransGrid. In our benchmarking report, we also considered electricity transmission total factor productivity performance against multi-factor productivity performance in the wider utilities industry and the economy as a whole. As can be seen in figure 7.6 below, productivity performance in the electricity transmission industry has been better than the wider utilities industry.

Figure 7.6 Transmission, utilities and industry wide productivity



Source: AER's analysis; *Economic Insights TNSP economic benchmarking data file*s, November 2016

TransGrid noted that it discussed productivity growth with the TransGrid Advisory Council, and its members advised TransGrid that the alternative studies it has considered were not specific enough to TransGrid's industry. In particular, they contained water utilities whose outputs the reports may not have properly captured.[114] CCP also raised concerns about properly accounting for outputs when measuring productivity for the utilities industry.[115] We have similar concerns.

It is important to recognise that large capital investments and unfavourable climatic conditions have, in part, driven past multi-factor productivity performance in the utilities industry. For example, water utilities have attempted to ensure supply reliability by constructing water desalination plants. This has increased inputs without a corresponding increase in output. At the same time, lower rainfall has meant there has been less water being available to sell.[116] Thus outputs have decreased while inputs have increased, resulting in lower productivity.

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[114] TransGrid, *Revenue proposal*, 31 January 2017, p. 144.

[115] Consumer Challenge Panel Sub-Panel 9, *Response to proposals from TransGrid for a revenue reset for 2018–19 to 2022–23*, 12 May 2017, p. 65.

[116] Harley Smith, David Buckland, Matias Vaira and Niall Cummings, *Recent Productivity Trends in NSW*, 2015, p. 7.

Having considered these factors the authors of NSW productivity study TransGrid referred to expected that the measured fall in multi-factor productivity 'will be arrested (and potentially reversed) in the near future'.[117]

Consequently, the evidence available suggests that not only has the total factor productivity performance of transmission networks been better than the multi-factor productivity of the wider utilities industry but also that opex partial factor productivity growth has been better than total factor productivity growth. Consequently, we consider it important that we base forecast productivity growth on a measure of *opex* productivity, rather than multi-factor productivity. Further, it should also be specific to electricity transmission networks rather than the wider utilities industry.

Similarly, we do not think it is appropriate to use our measure of opex partial factor productivity for Australian distributors to forecast opex partial factor productivity for the transmission industry. As discussed above, we do not share TransGrid's concerns with our opex partial factor productivity measure. Consequently, we agree with the CCP that the transmission industry productivity analysis is more relevant to TransGrid than the distribution industry study.[118]

Proposed business specific future efficiency improvements

TransGrid also stated that it built business specific future efficiency improvements into its base year forecast.[119] Specifically, it forecast efficiency savings of 4 per cent in 2017–18 when it took wage growth and output growth into account.[120]

We have also included these forecast efficiency savings in our estimate of opex for 2017–18. Consistent with the approach outlined in the Guideline and EBSS, we have used the 2017–18 opex estimate to forecast opex for the 2018–23 regulatory control period. We have also used it to calculate efficiency gains and losses under the EBSS.[121] Treating these forecast efficiency savings in this way passes them on to networks users through forecast opex, but allows TransGrid to retain them for an additional five years through the EBSS rewards it will receive. In this way, we share the efficiency gains between TransGrid and network users.

Interactions with proposed step changes

TransGrid stated that using historical trends of industry productivity might not be a suitable way of forecasting productivity growth. It stated that new licence conditions pose additional constraints on how it can operate and will reduce opportunities that

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117 Harley Smith, David Buckland, Matias Vaira and Niall Cummings, *Recent Productivity Trends in NSW*, 2015, p. 7.

118 Consumer Challenge Panel Sub-Panel 9, *Response to proposals from TransGrid for a revenue reset for 2018–19 to 2022–23*, 12 May 2017, p. 65.

119 TransGrid, *Revenue proposal*, 31 January 2017, p. 129.

120 TransGrid, *Revenue proposal*, 31 January 2017, p. 145.

121 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, pp. 21–22; AER, *Efficiency benefit sharing scheme for electricity network service providers*, November 2013, p. 9.

could drive productivity in the future. TransGrid expected these constraints would continue to reduce its opportunities to achieve productivity gains in the future.[122]

We note that subsequent to submitting its revenue proposal TransGrid submitted that forecast opex should include a step change for these new licence conditions. We have considered the impact of these licence conditions on forecast opex in our step change assessment.

7.4.3 Step changes

The Guideline states that we may add (or subtract) step changes for any costs are not captured in base opex or the rate of change that are required for forecast opex to meet the opex criteria.[123] In the absence of a change to regulatory obligations or a legitimate capex/opex trade-off opportunity, we would accept a step change under limited circumstances.

TransGrid initially proposed a single step change of $37.3 million ($2017–18) to manage off-easement vegetation risk. This step change represents 4.1 per cent of TransGrid's opex forecast.

We have not included TransGrid's proposed step changes in our total opex forecast. We are not satisfied the proposed cost increases are required to arrive at a forecast of total opex that reasonably reflects the opex criteria.[124]

In addition, in its revenue proposal, TransGrid noted that it was subject to an operator's licence for the first time from 7 December 2015. Due to uncertainty as to what was required for compliance, TransGrid stated it would provide a fully justified cost estimate of ensuring compliance at a later date.[125] TransGrid provided its cost estimate on 5 July 2017.

We have included a step change of $7.8 million ($2017–18) that reflects the proposed cost increases that relate to the non-compliance issues set out in the Independent Pricing and Regulatory Tribunal's (IPART) 2015–16 audit review report.[126] We are not satisfied that the full amount proposed by TransGrid is required to forecast opex that reasonably reflect the opex criteria. When we make our final decision, we will likely take into account IPART's audit review for 2016–17. IPART is due to submit its finding on compliance during 2016–17 to the Minister by 31 October 2017.

7.4.3.1 Off-easement risk management

We have not included a step change of $37.3 million ($2017–18) for off-easement risk management in our total opex forecast as proposed by TransGrid. The step change

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122 TransGrid, *Revenue proposal*, 31 January 2017, p. 142.

123 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, p. 24.

124 NER, cl. 6A.6.6(c).

125 TransGrid, *Revenue proposal*, 31 January 2017, p. 153.

126 IPART, *Annual licence compliance report,* October 2016.

represents 4.1 per cent of TransGrid's opex forecast. We do not consider that a specific explicit increase in our alternative opex forecast is required for it to reasonably reflect the opex criteria.[127]

The proposed step change represents TransGrid's cost estimate to manage the bushfire risks posed by trees that are outside its easements but could touch conductors if they fell (off-easement tree risk).[128] TransGrid submitted that it has reassessed how it manages the off-easement tree risk due to a sustained increase in off-easement tree events in recent years. At the same time, the regulator has changed from the NSW Department of Trade and Investment to IPART. In turn, IPART has instituted a new bushfire risk compliance regime and audit guidelines.[129]

Moreover, TransGrid explained that an independent audit performed in 2015 had found TransGrid's electricity network safety management system compliant. However, audits conducted under the new IPART guideline in 2016 had identified areas of non-compliance. In response to an information request, TransGrid stated:[130]

> One non-compliance in particular relates to TransGrid not adequately demonstrating that bushfire risk is being reduced as Low as Reasonably Practicable (ALARP). IPART have also issued TransGrid with formal notices of direction to modify its safety management system in relation to formal safety assessment of bushfire risks.

Our task under the NER is to determine a total opex forecast that reasonably reflects the opex criteria. The focus of our assessment is therefore on total opex rather than individual projects or categories. We may assess specific projects or categories in arriving at efficient opex forecast but we do not provide explicit funding for each project. Instead, we prefer to rely on the business' revealed opex, at an aggregate level, as the basis for our opex forecast (as explained in section 7.3).

We consider that only exceptional circumstances that change a business' fundamental opex requirements going forward are likely to justify a step change in the opex forecast. Two typical examples are a material change in a business' regulatory obligations or an efficient capex/opex substitution opportunity. We scrutinise proposed step changes that fall outside of these categories particularly carefully to avoid the risk of upward bias inherent in a business' opex forecast. This is because a business has an incentive to inflate its total opex forecast by identifying new and increasing costs, but not the declining costs. Therefore, identifying a cost increase in a particular opex activity alone is not a sufficient justification for a step change under the base-step-trend forecasting approach.

Figure 7.7 summarises how we assess a proposed step change.

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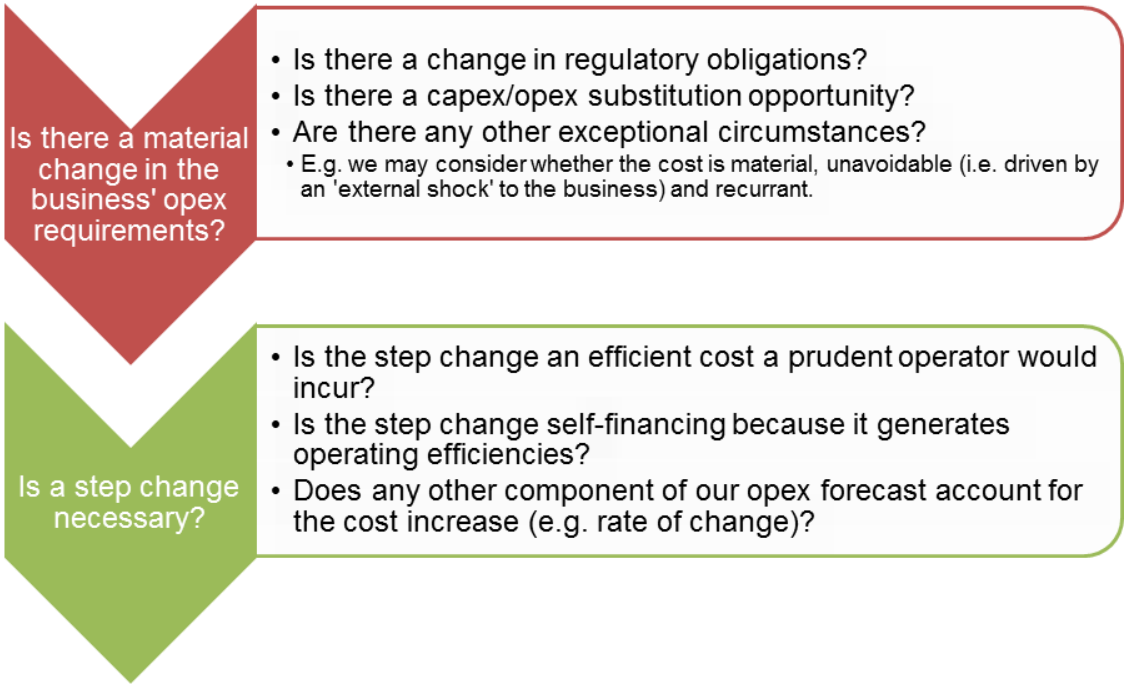
127 NER, cl. 6A.6.6(c).

128 TransGrid, *Revenue proposal*, 31 January 2017, p. 137.

129 TransGrid, *Revenue proposal, Appendix D: Off Easement Risk Management Opex–Step Change,* 31 January 2017, p. 2.

130 TransGrid, *Response to AER information request #018* , 21 April 2017, p. 3.

Figure 7.7 Step change assessment



We agree that it is prudent and efficient for TransGrid to re-assess its compliance program in response to increased incidents of off-easement trees events and concerns raised by IPART, and to adjust its compliance activities accordingly.

However, we are not satisfied there is a case to include a step change for off-easement risk management in our total opex forecast. A new regulatory obligation does not drive this cost. Nor have we identified any other exceptional circumstances to warrant a step change. We do not consider there has been a substantial change in TransGrid's operating environment that would require a step change for our forecast of total opex to reasonably reflect the opex criteria. Further, TransGrid overstated the costs it faced.

We therefore consider the proposed cost driver is a 'business-as-usual' expense for TransGrid to manage within its total opex forecast. Including the step change proposed by TransGrid would lead to a forecast of total opex that is above efficient levels.

There has been no material change in TransGrid's regulatory obligations

The step change proposed by TransGrid for 'off-easement risk management' is not driven by a new or changed regulatory obligation or requirement.

Prior to the base year, TransGrid was already required to comply with the Electricity Supply (Safety and Network Management) Regulation 2014 (the Regulation) and the *Work Health and Safety Act 2011*. The Regulation requires that TransGrid have an Electricity Network Safety Management System compliant with the requirements of Australian Standard AS5577 Electricity Network Safety Management Systems. The Independent Pricing and Regulatory Tribunal (IPART) became TransGrid's technical regulator in June 2015 and commenced an audit program in early 2016 based on a

new set of audit guidelines. IPART's *Electricity networks audit guideline* provides guidance to auditors and specifies the criteria against which auditors should assess compliance.

TransGrid acknowledged the Regulation is not new and it 'has always managed vegetation within easement corridors to maximise network reliability and public safety and to minimise bushfire risk.'[131] However, TransGrid stated that it had reviewed its compliance requirements because of the change in regulator and IPART's new compliance regime and audit guidelines. We do not consider the introduction of the new audit guidelines creates a new bushfire compliance regime or a material change to TransGrid's existing obligation to manage bushfire risks. IPART confirmed that TransGrid's obligation to manage bushfire risk has remained unchanged since the introduction of the Regulation.[132]

We consider the requirement to address bushfire risk posed by off-easement trees has always been inherent in TransGrid's obligation to ensure its network is safe in accordance with the Regulation. In our view, TransGrid's proposed step change is driven by an internal management decision to increase spending due to a perceived need to change its own environmental risk management practices. It is not due to a change in regulatory obligations or requirements.

In its proposal, TransGrid highlighted an instance of non-compliance with the regulation, as identified in an audit directed by IPART in 2016. It appears this instance of non-compliance involved a deficiency in its systems for demonstrating compliance, rather than a specific failure to address bushfire risk posed by off-easement trees.

We note information published on TransGrid's website indicates that TransGrid has already taken necessary steps to address the non-compliance issues identified by the 2016 audit.[133] TransGrid stated it submitted an action plan to IPART to rectify the issues identified and that it completed the proposed actions by the end of September 2016.[134] Consequently, TransGrid was compliant in 2016–17, the year we used to forecast our alternative estimate.

We are not satisfied the circumstances warrant a step change

Although there has not been a material change in its regulatory obligations, we have considered whether there are any other exceptional circumstances that warrant a step change. We have considered the nature of the proposed expenditure and the magnitude of the estimated costs faced by TransGrid, including the reasonableness of TransGrid's cost estimate.

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131 TransGrid, *Revenue proposal*, 31 January 2017, p. 138.

132 IPART, *Letter to AER -TransGrid Revenue Determination 2018–2023*, 29 May 2017, p.1.

133 TransGrid, *Bush Fire Risk Management Report 2015–16*, October 2016, p. 6.

134 TransGrid, *Bush Fire Risk Management Report 2015–16*, October 2016, p. 6.

We are not satisfied, based on the information provided by TransGrid, that an increase in our total opex forecast is required for TransGrid to manage off-easement tree risk.

There has not been a substantial change to the business' operating environment

We consider vegetation management costs are a 'business-as-usual' expense that are part of the normal course of operating a transmission network. We are not satisfied the nature of these costs is materially different from other costs a business would ordinarily face in managing its transmission network.

TransGrid stated in its regulatory proposal that the increased number of off-easement tree events could be, amongst other things, due to a recent El Nino event over 2015–2016.[135] Yet, TransGrid stated in its *Bush fire risk management report* that the climate factors observed in the reporting period were within ranges previously experienced and it did not take specific steps to compensate for changed climate conditions.[136]

While seasonal variations can impact vegetation, this is a common and well understood component of vegetation management practices. Standard vegetation management practices should therefore account for these variations. TransGrid has not established there will be a substantial change to its operating environment, compared to the current regulatory control period, such that a total opex forecast based on revealed costs is insufficient.

The proposed cost increase appears overstated

It is possible a business may face higher costs of a magnitude that cannot reasonably be expected to be offset by cost efficiencies, other decreasing costs or finished opex projects over a regulatory control period, or by the business re-prioritising its opex program. We recognise under limited circumstances, a cost increase may be so significant it undermines our assumption that total opex is relatively stable and follows a predictable path over time. That is, the business may not be able to manage an identified material cost increase based on a forecast using revealed costs. We have therefore examined the materiality of the cost increase proposed by TransGrid and the supporting information TransGrid provided.

TransGrid forecast the additional cost of mitigating off-easement trees risk to be $37.3 million ($2017–18). However, we are not satisfied the cost estimate TransGrid provided is reasonable or reflects the efficient costs a service provider would incur under the circumstances. In particular, TransGrid's forecast volume and unit cost of tree removals appear overstated based on the evidence available. Therefore, we consider the efficient costs of off-easement risk management should be considerably less than TransGrid forecast and it can manage them within a base opex forecast

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[135] TransGrid, *Revenue proposal, Appendix D: Off Easement Risk Management Opex–Step Change*, 31 January 2017, p. 2. TransGrid has also raised two other factors that may contribute to the increased number of off-easement tree events. We address these factors in our analysis of TransGrid's cost estimate below.

[136] TransGrid, *Bush Fire Risk Management Report 2015–16*, October 2016, p. 2.

escalated by the forecast rate of change. We discuss below how we account for cost increases in our opex forecasting approach.

TransGrid's unit cost estimate

TransGrid has estimated a total cost of $18.6 million ($ December 2016) to assess and remove 3600 off-easement trees.[137] This equates to a unit rate $5156 per hazard tree.[138] This is significantly higher than other network service providers' unit cost of tree removal that we have previously examined, and which we consider in the context of this proposal as a 'reasonableness check'. For instance, in 2010, AusNet Services (formerly SP AusNet) proposed to address 5000 hazard trees per annum at a cost of $3.94 million ($ nominal) per annum.[139] This equates to a unit cost of $788 per tree.[140]

TransGrid's unit cost estimate also appears much higher than estimated commercial rates. According to the 2016 cost guide published by Archicentre Australia, a subsidiary of the Australian Institute of Architects, the cost estimate of a tree removal including mulching is $250 to $2000 per tree.[141] While this information is indicative only, it raises questions about the magnitude of TransGrid's forecast. TransGrid did not provide any evidence to support a conclusion that its unit costs are efficient.

Although it is possible that a number of the hazard trees TransGrid proposed to remove may be in locations or of a type that incurs significant higher removal costs, we consider it is unlikely that the total proposed population of 3600 trees would exhibit typical costs in excess of two to ten times those of other businesses and commercial providers.

TransGrid's forecast number of hazard off-easement trees

TransGrid estimates 51 500 trees outside its easements could touch conductors if they fell.[142] TransGrid then estimates 3600 off-easement trees require removal based on a 1984 report titled *Native tree dieback and mortality on the New England Tablelands of New South Wales*.[143] The report studied a population of native trees and found that 7.7 per cent were dying or dead. TransGrid rounded this value down to 7 per cent and

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137 TransGrid, *Revenue proposal, Appendix D: Off Easement Risk Management Opex–Step Change*, 31 January 2017, p. 5.

138 TransGrid, *Revenue proposal, Appendix D: Off Easement Risk Management Opex–Step Change*, 31 January 2017, p. 5.

139 SPI Electricity Pty Ltd, *Electricity Distribution Price Review 2011–2015 Revised Regulatory Proposal*, July 2010, p. 212.

140 The cost estimate was based on a combination of tree removal and trimming work.

141 Archicentre Australia, *CostGuide 2016 Market Summary Overview*, November 2016, p. 3. https://www.archicentreaustralia.com.au/wp-content/uploads/Archicentre_Australia_Cost_Guide29Nov2016.pdf

142 TransGrid, *Revenue proposal, Appendix D: Off Easement Risk Management Opex–Step Change*, January 2017, p. 1.

143 TransGrid, *Revenue proposal, Appendix D: Off Easement Risk Management Opex–Step Change*, 31 January 2017, p. 5.

used this to estimate the number of off-easement trees that will require removal out of the total population.[144]

We consider that the evidence presented by TransGrid does not substantiate this forecast volume. We have a number of concerns with TransGrid's assumptions and methodology.

First, we are concerned with the use of the 1984 report because it is considerably out-of-date. Further, the study covered only the New England Tableland region, which is a very small proportion of the TransGrid's service area. The vegetation population examined in the report is unlikely to be representative of the vegetation that covers TransGrid's service area under the current climate. The study does not ascertain the 'failure mode'[145] of affected vegetation, which is relevant to the assessment of whether a tree requires trimming or removal.

Second, we expect that not all hazard trees necessarily require removal. In many cases, trees can be trimmed or cut to remove the risk of potential contact with electricity lines. The vast majority of vegetation management expenditures incurred by network service providers usually relate to the trimming and cutting of vegetation. TransGrid has not demonstrated why it should remove, rather than cut or trim, the 3600 trees.

Third, it is not apparent that TransGrid has taken a targeted approach in estimating the scope of tree removal based on identified risks. TransGrid submits that the 2003 bushfire event in the alpine region and the aging plantation of eucalypt and pine may have caused the increase in off-easement tree events.[146] In our view, these factors do not affect the majority of NSW land mass or TransGrid's service area, and TransGrid has not provided evidence that demonstrates otherwise. As such, there is a risk TransGrid has overestimated the number of hazard off-easement trees that require vegetation management in areas where these factors are not relevant.

How we account for cost increases in our opex forecasting approach

We consider that there has not been a material change in TransGrid's regulatory obligations or in its operating environment. Nonetheless, even if there had been a material change, we consider that our alternative opex estimate would likely be sufficient to cover the amount of any increase in prudent and efficient opex, without a step change. Consequently, in either case, a step change is not required for our total opex forecast to reasonably reflect the opex criteria.

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144 TransGrid, *Revenue proposal, Appendix D: Off Easement Risk Management Opex–Step Change*, 31 January 2017, p. 5.

145 The failure mode is the way in which the tree is considered likely to fail will impact the type of vegetation management that is required—consistent with good industry practice. For example, a tree that is in danger of toppling over completely may need to be removed. Where the risk is posed by a single limb or branch, then the best action is likely to be the removal or trimming of that branch.

146 TransGrid, *Revenue proposal, Appendix D: Off Easement Risk Management Opex–Step Change*, 31 January 2017, p. 2.

TransGrid proposed—and we have applied—our preferred revealed cost forecasting approach to forecast total opex. Under this approach, simply identifying a new or increasing cost—that is, a cost that was not incurred in the base year—is not sufficient justification for a step change.

As explained in section 7.3, a business' aggregated opex includes rising and falling opex items. The composition of opex typically varies from year to year and we expect that many of these variations will offset each other. We also expect TransGrid can manage the inevitable 'ups and downs' in the components of opex from year to year—to the extent they do not offset each other—by continually re-prioritising its work program.

By spending more to reduce the bushfire risk posed by off-easement trees, TransGrid may face lower costs in other opex categories. For example, TransGrid has been incurring expenditure associated with off-easement tree events, such as emergency management and repair costs. Base opex includes these costs. Therefore at least some of TransGrid's proposed expenditure for off-easement trees risk mitigation can be, in our view, characterised as a re-allocation of its resources from emergency management to risk mitigation strategies. It is also possible that TransGrid may be subject to lower insurance premiums by reducing its exposure to off-easement tree events.

Further, TransGrid has identified the proposed off-easement tree management to improve reliability outcomes, which means it may receive an incentive payment via the service target performance incentive scheme (STPIS).[147] While we understand such decreasing costs may not fully offset the costs TransGrid has proposed to manage off-easement tree risk, they are examples of the way in which numerous interrelated factors affect a business' opex requirements.

We have also considered the impact of our forecast rate of change, which accounts for average efficient changes in opex. Our productivity growth rate forecast captures the 'average' change in technology, business practices, economies of scale and regulatory obligations over time.[148] This includes the average change in the costs of environmental management practices. It reflects the historical productivity rate which service providers were able to achieve while meeting their regulatory requirements and maintaining good industry practice. We calculate our forecast of productivity growth rate using the historical average transmission industry opex productivity growth, which includes incremental or new costs associated with changing regulatory obligations and good industry practice. Additional compensation such as a step change is only warranted when the service providers face greater increases in regulatory obligations than the industry has faced in the past. We do not consider this to be the case in this instance. It is therefore not enough to simply argue that an efficient cost will be incurred for an activity that was not previously undertaken.

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147 The purpose of the STPIS is to provide incentives to network service providers to improve or maintain a high level of service for the benefit of participants in the National Electricity Market and end users of electricity.

148 AER, *Expenditure forecast assessment guideline for electricity transmission*, November 2013, pp. 23–24.

7.4.3.2 Compliance with licence conditions

We have not included in our opex forecast the full step change for compliance with licence conditions as proposed by TransGrid. While a regulatory change has occurred, we are not satisfied TransGrid requires the full cost increase it proposed to comply with its licence conditions in the 2018–23 regulatory control period.

We have included only $7.8 million ($2017–18) of the proposed step change in our alternative opex estimate. As stated earlier, this may change in final decision. We have applied our standard approach to assess step changes as set out in section 7.3.2.3.

TransGrid became subject to a transmission operator's licence on 7 December 2015 and is subject to annual audit reviews undertaken by IPART. [149] TransGrid's revenue proposal stated that an audit of its compliance with the new licence conditions had identified compliance issues and that IPART was reviewing these issues.[150]

IPART subsequently published its 2015–16 audit review report on 16 May 2017.[151] It reported that TransGrid had not complied with two of the critical infrastructure conditions during 2015–16.[152] As foreshadowed in its revenue proposal, TransGrid submitted a step change proposal on 5 July 2017.

Transmission operator's licence

TransGrid became subject to a transmission operator's licence (the Licence) in December 2015 when it changed ownership.[153] The Licence includes three conditions (6, 7 and 8) referred to as the critical infrastructure licence conditions.[154] These conditions acknowledge that the assets that TransGrid operates may constitute 'critical infrastructure'. Critical infrastructure is defined as physical facilities, supply chains, information technologies and communication networks, which, if destroyed, degraded or rendered unavailable for an extended period, would significantly impact on the security, social or economic wellbeing of the State of New South Wales and other States and Territories.

Under the Licence, TransGrid must ensure (among others things) that its transmission system can only be operated and controlled from within Australia (condition 6.1(b)). It must also ensure that it holds data on the quantum of electricity delivered and personal information solely within Australia, and that this data is accessible only from within Australia (condition 7.1(a)).

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149 TransGrid, *Revenue proposal*, 31 January 2017, p. 153.

150 TransGrid submitted its revenue proposal to the AER on 31 January 2017.

151 IPART, *Annual licence compliance report 2015–16*, October 2016, see addendum.

152 IPART, *Annual licence compliance report 2015–16,* October 2016, see addendum.

153 TransGrid, *Revenue proposal*, 31 January 2017, p. 153.

154 IPART, https://www.ipart.nsw.gov.au/Home/Industries/Energy/Energy-Networks-Safety-Reliability-and-Compliance/Electricity-networks/Licence-Conditions-and-Regulatory-Instruments/Transmission-Operators-licence-NSW-Electricity-Networks-Operations-Pty-Limited-16-December-2015 (first accessed on 7 July 2017).

We note that, although the licence was issued six months before the start of the base year (2016–17), there was some uncertainty over what constituted compliance.[155] An important milestone in determining what constituted compliance was the first audit review conducted by IPART.

IPART's audit review findings

TransGrid must submit to IPART an annual audit report certifying compliance with the critical infrastructure licence conditions (condition 8). In case of non-compliance, the audit report must certify (condition 8.3(b):

- the nature and extent of each non-compliance
- the steps TransGrid has to ensure compliance (and to preclude further non-compliance)
- the timeframe within which TransGrid expects to achieve compliance.

TransGrid submitted its 2015–16 audit report to IPART, including all the required supporting documents. TransGrid supplied these documents to us on request and we have considered them in making this draft decision.

The Electricity Supply Act 1995 (NSW) requires IPART to report to the Minister for Energy and Utilities (the Minister) annually on the extent to which TransGrid has complied, or failed to comply with its licence conditions.[156]

In its report to the Minister, IPART found that contrary to the critical infrastructure licence conditions (6.1(b) and 7.1(a)), TransGrid's contractor:[157]

- had a degree of influence over TransGrid's transmission system in 2015–16
- could access electricity load data from overseas in 2015–16.

IPART also noted that TransGrid provided evidence to the auditor that since the end of 2015–16 it had complied with, or taken steps to comply with, the critical infrastructure licence conditions.[158]

We note that TransGrid was due to submit its 2016–17 audit report to IPART on 31 August 2017. IPART must then prepare and forward to the Minister a report on the extent to which TransGrid has complied with the licence conditions by 31 October 2017. We may consider this information into account when we make our final decision.

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155 TransGrid, *Revenue proposal*, 31 January 2017, p. 153.

156 Electricity Supply Act 1995 (NSW), http://www.austlii.edu.au/au/legis/nsw/consol_act/esa1995242/s88.html, section 88(1). (Accessed on 7 August 2017)

157 IPART, *Annual licence compliance report 2015–16,* October 2016, see addendum, p. 34.

158 IPART, *Annual licence compliance report 2015–16,* October 2016, see addendum, p. 34.

7.4.4 Category specific forecasts

We have included a category specific forecast for debt raising costs of $15.8 million ($2017–18). Debt raising costs are transaction costs a service provider incurs each time it raises or refinances debt. We forecast them based on a benchmarking approach rather than a service provider's actual costs for consistency with the forecast of the cost of debt in the rate of return building block. Further details are set out in the debt and equity raising costs appendix in the rate of return attachment.