21 December 2018

Mr Sebastian Roberts
General Manager, Transmission and Gas
Australian Energy Regulator (AER)
GPO Box 520
Melbourne, VIC, 3001

Dear Mr Roberts,

RE: AER Draft Decision Paper – *Forecasting productivity growth for electricity distributors* (November 2018)

Endeavour Energy appreciates the opportunity to provide feedback to the AER's draft decision paper – *Forecasting productivity growth for electricity distributors* (November 2018). To date, the AER has not applied productivity factors to DNSPs (or applied a zero factor) given the negative industry wide trend across several measures. The draft decision outlines the AER's new approach resulting in a productivity factor of 1.0 % p.a. which is proposed to be applied to all DNSPs in the upcoming round of regulatory determinations.

Our concern is that a poorly specified, unrealistic and/or inaccurate productivity factor carries significant regulatory risk and the available evidence does not support a positive productivity factor. The averaging period selected is opportunistic as it produces the highest possible productivity factor and there are a number of methodological errors and inconsistencies. A productivity factor of -0.7% is calculated when correcting for these issues and updating for the latest available information.

Table 1: Summary of productivity growth estimates

Measure	Draft decision	AER method corrected	Endeavour Energy method
Opex PFP	1.6%	-1.1%	-0.7%
Undergrounding	0.5%	0.35%	Output factor issue
Time trend	0.5% (gas)	-0.3% (gas) to -1.8% (electricity)	-1.8%
Labour productivity	0.9%	0.5%	0.5%
Productivity estimate	1.0%	-0.5%	-0.7%

If made final, this decision will have a material impact on the opex and revenue allowances of DNSPs and their ability to respond efficiently to the incentive based framework. In our view, the productivity factor contained in the draft decision will be distortionary. It creates perverse incentives to achieve mandated productivity gains at the cost of service outcomes and/or dis-incentivises outperformance of the productivity factor.

If a productivity factor can accurately be forecast, then it can operate within our incentive based regulatory framework in certain circumstances. For example, transitioning a DNSP to the efficient frontier over the course of a regulatory period(s) i.e. catch-up improvement. There is greater risk and complexity in attempting to forecast frontier productivity performance. A business aspires to become more efficient over time but generally does not know by how much or whether this will occur in changing environments. A business

incurs costs upfront and bears the risk of whether productivity growth will occur in the time or at the level expected. This is why the revealed cost framework and EBSS are effective in incentivising DNSPs to continuously improve and discover their efficient level of opex.

It is worth noting that several Australian DNSPs have been subject to incentive regulation and privately owned for more than 20 years. These DNSPs consistently make up the group of efficient frontier networks. Under the AER's incentive based regulatory regime the remaining DNSPs have made significant improvements over recent years in 'catching up' to these frontier firms. We would caution against undermining the regulatory approach that has delivered positive outcomes for Victorian customers for 20 years and improvements in other jurisdictions since the introduction of the EBSS and the recent privatisation of some NSW businesses.

Our primary concerns with the productivity factor in the draft decision are as follows:

- **Adjusting for non-replicable events:** the measures relied upon generally cover the 2012-16 period. The 2006-12 period is disregarded on account of the regulatory obligations introduced during this time. These obligations are not specified and their impact is not quantified or adjusted for. This approach does not address the issue of non-replicable events and overstates what will be achievable in the future. The results vary significantly with any change to the averaging period. To avoid cherry-picking and to produce more robust results, the longest possible averaging period should be used or performance outliers and non-replicable events should be accounted for properly.
- **Capturing 'frontier shift'**: based on the averaging period and frontier firms selected the results are likely to capture a significant amount of 'catch up' productivity improvement rather than 'frontier shift'. This is contrary to the AER's stated objective and it penalises all DNSPs by setting opex targets that are unlikely to be replicable in the future.
- **Sources of productivity:** it is not clear how the potential sources of productivity were identified and whether they have been quantified robustly. Particularly:
    - Proportion of undergrounding: an increase in the proportion of underground circuit line length is considered to be a source of productivity growth. This is illogical as it sets a growth rate in the proportion of underground line length that is unachievable for most DNSPs and fails to distinguish between growth from conversions of existing overhead assets, which would reduce opex, versus underground asset growth from new developments, which would increase opex. As an output factor this issue is better dealt with directly as part of the AER's output growth forecast rather than applied broadly to all costs.
    - Gas time trend: the remaining sources of productivity are captured by the time trend realised by gas distributors. The evidence indicates that gas distribution results are not a good proxy for expected electricity distribution performance. Also, an electricity time trend is now available for 2012-17 which produces a similar estimate as the 2006-16 period.
- **Labour productivity:** a quality adjusted labour productivity growth forecast provided by Deloitte Access Economics (Deloitte or DAE). Limited supporting information was provided to verify the analysis. However, the results appear to be highly volatile. BIS Oxford Economics forecast lower labour productivity growth and highlight the inconsistencies with the approach to accounting for labour price growth, Attachment 1 to this submission.

- **Cost of productivity:** The EBSS provides both the compensation and incentive required to pursue efficiency improvements. Productivity improvements require either opex or capex. The benefits from these investments may take several years to materialise or fail to deliver the expected improvements. The costs and risks involved in pursuing productivity improvements should be accounted for.
- **Impact on incentives:** the draft paper does not consider how a productivity factor impacts the incentive based regulatory framework. In particular, whether it would distort the EBSS sharing ratio, create an imbalance between the incentives to manage costs and service outcomes and whether it necessitates changes to the rate of return and the step change and cost pass-through mechanisms.
- **International practice:** the draft paper does not consider the practices of international regulators. In our review it is clear that; long-term trends are relied upon which often cover multiple business cycles and differences between ongoing and catch-up productivity gains and non-replicable cost savings are controlled for. There is some divergence on whether the productivity growth assumption is based on the companies in question or a wider dataset including other industries. These precedents should be considered in further detail with primacy given to the practices of incentive based rather than cost-plus regulatory regimes.

We also have procedural concerns given this review is occurring very late into our 2019-24 determination process. At the Framework and Approach (F&A) stage the AER decided to apply the 2013 Expenditure Forecast Assessment Guideline (the Guideline) to assess the 2019-24 proposals. In the Draft Decision in relation to our 2019-2024 distribution determination, the AER applied a zero productivity growth forecast, but indicated it would take the outcome of the productivity review into account in making its final decision.

The draft decision paper in the productivity review now proposes a material change to the AER's approach to forecasting productivity and the way in which it proposes to apply the Guideline. At a minimum and in order to ensure procedural fairness, such a material change in approach requires detailed consultation, analysis and expert advice. Instead, the proposed change in approach has been identified after the publication of our 2019-24 draft decision within only a six week period to respond, at a time when we are also preparing our revised regulatory proposal.

Once a final decision in this review is made, the NSW/ACT DNSPs may have only a matter of days or weeks to interpret and analyse the final decision and make a submission on how it should be applied in our circumstances for the 2019-24 period, well after the conclusion of the formal proposal consultation process. Our concern is that due process is being compromised to expedite an outcome. Whilst this may address stakeholder feedback in the short-term it could result in outcomes detrimental to the long-term interests of customers.

The appendices below provide our more detailed response to the draft paper. If you have any queries or wish to discuss this matter further please contact Jon Hocking, Manager Network Regulation at Endeavour Energy on (02) 9853 4386 or via email at jon.hocking@endeavourenergy.com.au.

Yours sincerely,

Andrew Schille
General Manager Network Regulation & Corporate Affairs
Endeavour Energy

Appendix 1 – Endeavour Energy detailed response to forecasting productivity growth draft decision

Our detailed response to the draft decision is structured on addressing two key questions:

1. How does a productivity factor compliment the incentive based regulatory framework?
2. Have the AER accurately measured historical productivity performance and developed a reasonable forecast using the available information?

1. The Australian Economic Regulatory Framework

1.1 Overview

The fundamental objective of economic regulation is to replicate the outcomes that would arise in a workably competitive market. In the absence of perfect information and foresight it is impossible to know what a DNSPs' optimal revenue allowance should be. In Australia an ex-ante, incentive-based regulatory framework is used to regulate electricity networks to overcome this limitation in order to achieve the aforementioned objective. The AER explains[1]:

> *This incentive-based regulatory framework partially overcomes the information asymmetries between the regulated businesses and us, the regulator. 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.*
>
> *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.*

This means the focus of incentive regulation is setting a total opex forecast that is efficient rather than requiring the AER to make precision judgments about the minutiae of input and output decision making at an opex component level in any given regulatory period. Instead, a DNSP has the flexibility and bears the risk of managing their assets and operating costs as they see fit to achieve the expenditure objectives and NEO.

The AER therefore assesses total opex on a top down basis relying primarily on revealed costs and benchmarking analysis. Provided historical levels of opex are reasonably efficient, an opex forecast is established on a base-step-trend basis. The acceptance of a DNSPs' base year provides comfort that it is efficient in a productive and allocative sense.

The step and trend components of the method are designed to account for changes that are either known or can be forecast reasonably accurately. In combination with the continuous efficiency incentives provided by the EBSS this provides comfort that a DNSP will be dynamically efficient over the regulatory control period.

[1] AER, Transgrid transmission determination 2018-23, Draft decision, Attachment 7, September 2017, p.11

Therefore, there are circumstances under which a productivity factor can reasonably be applied in a manner that is consistent with the ex-ante incentive based framework. For instance, where a DNSP is "behind" the efficiency frontier by a quantifiable margin. This gap can be closed with a single step efficiency adjustment or gradually over the course of a regulatory control period through a productivity factor.

There may also be circumstances whereby a DNSP commits to specific productivity targets as part of a planned efficiency program. We consider this to be an exception to the default cost forecasting approach and one that may be politically motivated or designed to avoid a base year efficiency adjustment.

Essentially, the AER's approach is predicated on the fact that there is an efficient level of opex for each DNSP. That point cannot be estimated reliably, and changes over time, but a DNSP can be incentivised to discover it. The EBSS provides an effective and strong incentive for DNSPs to continually improve their efficiency.

This is evident in the relative benchmarking performance of DNSPs. The Victorian DNSPs consistently make up the majority of the networks performing at the efficient frontier. These DNSPs have been privately owned and subject to an opex incentive scheme for the longest period of time.

The remaining government owned (during 2012-16) DNSPs have been making significant improvements in catching up to the efficient frontier. Notably, the NSW DNSPs have all made large opex reductions in order to meet the AER's 2014-19 opex allowance with two now privately owned.

The key question then is in what circumstances will a productivity factor better deliver this outcome. In our view it is when it can be predicted with a reasonable degree of confidence and certainty.

1.2 Impact on incentives

In developing the Guideline, many DNSPs raised concerns with the potential for a productivity factor to undermine the EBSS and distort a DNSPs' incentives. At a high level, it was argued that the EBSS should reward or penalise a DNSP for efficiency gains or losses. A productivity factor would result in efficiency gains going unrewarded or level performance being penalised as a loss.

In response, the AER noted that efficiency gains and losses are made in reference to the expenditure allowance accepted or substituted by the AER and not historical performance. Outside of this counter argument there was no detailed discussion of how a productivity factor impacts incentives in the explanatory statement accompanying the Guideline.

There is currently a mix of input based and output based incentive schemes. This is to appropriately incentivise DNSPs to improve their opex and capex efficiency without compromising service quality or innovation. Mandating productivity growth creates a high-powered incentive as the DNSP bears the full cost of failure.

If an upwardly bias productivity factor is set DNSPs may be perversely incentivised to achieve productivity growth in an unsustainable manner and/or at the expense of service outcomes.

Intuitively, it may also amplify the EBSS in a way that undermines it. Notionally, a 1% productivity factor means that a DNSP would need to find more than 1% of productivity improvements each year at a growing rate in order to earn an EBSS benefit. This would then result in a lower opex allowance for the following period and a higher productivity factor.

An appreciation of the potential impacts a productivity factor may have on incentives demands a detailed consideration of issues such as:

- Whether the dataset that is used for determining forecast productivity growth includes the regulated businesses or a wider dataset of other industries.
- How is the dataset adjusted for one off cost savings or non-replicable events?
- How is frontier shift separated from catch up productivity gains?
- Over what period of time is productivity measured?

To date, the analysis of these issues has been limited to establishing that an efficient opex forecast may include a reasonable expectation of productivity growth. In turn, estimating productivity growth appears to be driven by what data is available.

A clearer understanding of how a productivity factor fits within our ex-ante regulatory framework should result in a set of principles and criteria that guide when one is applied and what constitutes a productivity forecast that can reasonably be relied upon without compromising the effectiveness of the EBSS or increasing the financial risks a DNSP bears or a service risk that customers bear.

1.3 Impact on other aspects of the regulatory framework

The component parts of the regulatory framework are all inter-linked in promoting economic efficiency. An amendment to one aspect of the framework will have consequential impacts on other aspects. With respect to productivity, the EBSS is an obvious example.

Having determined a DNSP's opex allowance for a forthcoming regulatory control period, the AER requires that networks bear the costs of changes in circumstances within that regulatory control period that impose additional cost on the business, as would be expected in a workably competitive market. As a consequence two issues can be observed.

Firstly, the network will need to achieve savings elsewhere or reductions in the returns paid to investors to meet such costs.

Secondly, the regulatory regime accounts for known changes and uncertainty via the step change and cost-pass through mechanisms respectively. A DNSP currently has the flexibility to manage cost pressures that arise over period within the opex allowance. Given this, both step changes and cost pass-throughs are difficult mechanisms to access.

The AER apply a strict and narrow approach to step changes that mean very few have been accepted over the last several determinations. Additionally, step changes do not wholly mitigate the risks of changes to regulatory obligations because they can only include what is known at the time of submitting a regulatory proposal.

Cost pass-throughs provide therefore complement step changes by allowing for re-openers for a set of specified or nominated events. A materiality threshold applies (with the exception of retailer insolvency) of 1% of a DNSPs annual revenue requirement for cost pass-throughs.

Consequently, it is likely that there is an underlying improvement in efficiency being achieved by networks that is absorbed by other cost pressures. In light of this, a piecemeal approach to examining specific areas of potential efficiency gains has the potential to lead to outcomes that do not consider the overall environment of the network; and therefore will not provide an opportunity to recover the efficient costs of running the network.

The approach and materiality thresholds to both step changes and cost pass-throughs should be reviewed if a productivity factor is applied. Particularly if a short-term average is used to estimate productivity growth. A shorter averaging period is unlikely to capture the breadth of obligation changes that could occur and therefore increases the risks of forecasting error. It may also require a review of the rate of return if there is an increase in the risk a DNSP faces.

There are other flow on impacts of a productivity factor that also warrant consideration. For example, the AER's choice of labour escalator as noted in the Guideline[2]:

> *our preferred approach is to apply a single productivity measure in the forecast rate of change. This productivity measure would include forecast labour productivity changes. Consequently forecast increases in the labour price would not need to be productivity adjusted under this approach.*
>
> *Another important, and related, consideration is the choice of labour price measure, namely the WPI or average weekly ordinary time earnings (AWOTE), which is also reported by the ABS. One key difference between these two measures is the AWOTE measure includes compositional labour change.*

As discussed further in section 2.6 WPI is not compatible with the quality adjusted labour productivity forecast in the draft report. To correct this, the productivity measure must exclude workforce compositional and upskilling effects or AWOTE is used as the labour price measure.

1.4 Costs of productivity

The draft decision also does not consider the risks and costs associated with achieving productivity improvements.

The costs can include compositional labour changes, redundancy or training costs and capital investment in system and procedural upgrades. These costs of often followed by a period of "bedding down" the organisational changes where operational costs may increase in the short-term before productivity improvements are realised.

As explained by HoustonKemp[3]:

> *Our review of the administrative science and human resources management literature identified a number of short-term challenges arising from reductions in a business' workforce, which have the potential to give rise to a temporary decline or stagnation in productivity.*
>
> *For example, Said (2007) highlights that:*
>
> > *The performance effects of major personnel reductions are more complex and unpredictable than that simplistically by the economic rational argument.*
>
> *Similarly, Shah (2000) highlights disruptions to relationship networks within a firm, Said et al (2007) notes the loss of valuable human, intellectual and social capital and Wagar (1998) highlights management focus on downsizing and a shift away from innovative behaviour, along with:*
>
> > *…the more time consuming but critical elements of redesigning the organisation and developing a systematic strategy predicated on massive cultural change within the firm.*

[2] AER, Expenditure forecast assessment guideline, Explanatory statement, November 2013, pp. 75-76
[3] HoustonKemp, Operating expenditure productivity growth, A report for Ausgrid and Endeavour Energy, November 2018, p. 3

These factors all have the potential to contribute to temporary declines or stagnation in productivity.

This suggests that a longer-term averaging period should be used to ensure the net costs and full effects of productivity are captured. A shorter averaging period is more likely to partially capture productivity growth/decline and bias the results.

The risks can include incurring more costs than expected, the improvements taking longer to materialise than anticipated or below expectations or nothing at all. The improvements may only end up increasing costs that were previously unaccounted for (e.g. new obligations). Pursuing productivity growth requires upfront costs with anticipated savings that may not be realised. As noted by HoustonKemp, this could distort DNSPs incentives in a number of ways[4]:

A consequence of this is that any upwards bias in forecast opex productivity could encourage a DNSP to bear an excessive degree of risk in endeavouring to achieve the necessary productivity improvement, as compared with that which would be borne by a DNSP operating efficiently. Any cost consequences would then be passed (in part) on to customers through the AER's incentive schemes.

There also exists the potential that, in light of those risks, a DNSP decides not to pursue the full improvement in opex productivity implicit in the AER's forecast. This could give rise to perverse incentives for a DNSP to take a strategic approach to the penalties that might arise under the AER's various incentive schemes, eg, strategic decisions as to whether to exceed the AER's opex allowance and share part of that cost (through the EBSS) or to not exceed the AER's allowance and risk penalties under the AER's Service Target Performance Incentive Scheme (STPIS).

This brings into question the averaging period selected by the AER. The discounting of 2006-12 assumes there were material one-off costs associated with new obligations with essentially no lag between the introduction of the obligation and its impacts on productivity performance. At the very least the results of the 2012-16 period are a direct consequence of the 2006-12 period and potentially still reflective of actions taken by businesses during the 2006-12 period. The issue of the averaging period is discussed in more detail in section 2.2 below.

The EBSS currently provides an incentive and funding to pursue productivity improvements. Whereas it is not evident that the productivity factor selected by the AER in the draft decision is net of costs.

The opex PFP correctly relies on opex inclusive of redundancy costs to capture a key cost of achieving productivity improvements. However, the 1% productivity factor will in part be achieved through the incursion of additional capex. As noted by HoustonKemp, failure to account for productivity in net terms will under-compensate networks[5]:

One consequence of providing a DNSP no explicit opex allowance for the cost of productivity enhancing measures and no share of the resulting benefits is that forecast productivity growth must reflect the expected net effect of productivity enhancing measures. This means it must reflect the anticipated change in opex productivity after accounting for all expenditure – both capital and operating in nature – required to achieve those gains and the effects of its incentive mechanisms.

[4] HoustonKemp, Operating expenditure productivity growth, A report for Ausgrid and Endeavour Energy, November 2018, p. 10

[5] HoustonKemp, Operating expenditure productivity growth, A report for Ausgrid and Endeavour Energy, November 2018, pp. 7-8

> *Any failure to meet this requirement when forecasting productivity growth would not provide a DNSP with a reasonable opportunity to recover its efficiently incurred costs and derive a normal return, in contrast to the revenue and pricing principles in the rules and the workably competitive market paradigm.*

BIS Oxford Economics raise similar concerns noting that capex must be considered when setting a productivity factor and that opex productivity growth is likely to be constrained in future years as capex continues to reduce across the industry[6].

> *Opex and Capex cannot be viewed as being mutually exclusive. Capital expenditure directly impacts the level of output and the ability to increase Opex productivity within the utilities sector, particularly in terms of labour-saving or labour-enhancing investment, or increased undergrounding mentioned in the AER paper. Specific to the productivity outlook for the overall utilities sector, BIS Oxford Economics is currently forecasting that Capex will decline over the next six years from present high levels, which is likely to constrain productivity improvements going forward.*

The opex PFP results are a key input into the AER's preferred productivity growth estimate. Given the limitations noted above opex PFP estimates are unlikely to afford a DNSP a reasonable opportunity to recover its efficiently incurred costs and derive a normal return. We support HoustonKemp's recommendation that productivity growth should be set at the lower end of the range of potential outcomes to mitigate this risk.

1.5 International regulatory practice

The approach to measuring and applying a productivity factor outlined in the draft decision does not compare favourably with international regulatory practice. In fairness, other jurisdictions typically have access to a much larger dataset and have been measuring and applying productivity estimates over several regulatory cycles.

We suggest the AER review international practices in more detail. In our view, it is clear that there is a preference for relying on long-term trends to estimate productivity growth. This is evident in the United States, United Kingdom, Canada, Netherlands, Germany and France. This approach protects against outliers in short-term performance which distort estimates, as noted in a report commissioned by the Ontario Energy Board[7]:

> *…it is often not warranted to assume that TFP growth measured for short historical periods will be a good proxy for future trends. Shorter sample periods are more likely to be distorted by factors such as the timing of expenditures or unusual output growth. …a general rule of thumb in regulatory proceedings is that a minimum of 10 years of data are needed to calculate a generally reliable estimate of the industry's long-run TFP trend.*

An area of divergence is whether the datasets relied upon to estimate productivity contain the comparator companies themselves. Many regulators use broader datasets so that individual companies' do not affect the industry average materially. This issue warrants further consideration as it involves a trade-off between the relevance of the dataset and preserving incentives.

Our preliminary view is that Australian DNSP data should take precedence with broader datasets (starting with electricity networks) acting as a sense check.

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[6] BIS Oxford Economics, Draft decision paper – forecasting productivity growth for electricity distributors, December 2018, p. 9

[7] Pacific Economics Group, Defining, measuring and evaluating the performance of Ontario Electricity Networks: a concept paper – report to the Ontario Energy Board, April 2011, p.49.

1.6 Conclusion

For the reasons outlined above, a productivity factor can only complement the incentive-based Australian regulatory regime in specific circumstances. We do not consider the broad based application of a productivity factor as contemplated in the draft decision is appropriate.

An inaccurate productivity factor is likely to create an imbalance between a DNSPs incentives to manage costs versus service outcomes. It may also distort the EBSS sharing ratio and prevent a DNSP from recovering at least its efficient operating costs. To mitigate these risks international regulators utilise long term averaging periods.

In light of these issues, a more principled and cautious approach should be adopted by the AER. In our view, a productivity growth factor is more well-suited to transitioning inefficient DNSPs to the efficient frontier.

2. The AER's approach to forecasting productivity growth

2.1 Overview

As established above, a mandated productivity factor must be realistic (achievable) in order to be compatible with the regulatory framework (if it can be). The draft decision examines four data sources; opex MTFP, labour productivity, time trends and the opex impacts of undergrounding.

As no single data source or approach is sufficiently robust to be exclusively relied to provide a reliable productivity estimate, the AER has adopted a 'holistic' approach drawing on each of these sources to derive a 1.0% productivity factor value.

We support the AER having regard to a range of data sources and productivity measures. However, it is not clear which criterion were used to select the measures relied upon by the AER. The list of potential sources of productivity is most likely exhaustive. Selecting a list of relevant measures would involve some sort of trade-off between availability, simplicity, validity, reliability etc. The draft decision weighs the pros and cons of the four measures relied upon. However, it would have benefited from a clearer set of principles/selection criteria against which potential data sources are assessed and ranked.

Notwithstanding these concerns the measures selected by the AER may be the most relevant and useful for the task at hand. Even if this were the case we have serious concerns with how the AER have utilised and interpreted the results of these measures. Specifically, the AER have:

- adjusted for non-replicable events by discounting the 2006-12 period. This limits the sample size and may exacerbate the issue of non-replicability rather than mitigate it.
- relied on time trend estimates observed in the gas industry which may not be statistically significant and are less relevant than the available electricity time trend estimates which are used to assess base year opex efficiency.
- accounted for the impacts of undergrounding as a potential source of productivity. Circuit line length is an output factor which is already accounted for and the analysis does not distinguish between growth in the proportion of underground network driven by the conversion of overhead network vs. via customer growth.
- relied on volatile quality adjusted labour productivity data without considering the inter-relationship with the labour price growth measure currently used.

We note that each of the AER's preferred measures produce positive productivity estimates that support the improving opex PFP trend observed since 2012. We think this is primarily the result of only partially capturing a business cycle and validating this result with selective and inconsistent treatment of secondary data sources.

We recognise that estimating future productivity performance is a difficult task. Unlike the price and growth 'trend' measures, productivity is not easily discernible and the risk of achieved performance differing from predicted performance in the absence of widely recognised and established measures is high. It is therefore vital that potential data sources which underpin measured productivity performance not be unduly influenced by subjective interpretation.

In our view, an objective and principle-based approach towards evaluating and treating the potential sources of information would improve the accuracy of productivity measures and reduce the risk of cherry-picking and confirmation bias. We discuss the issues listed above in more detail in the following sections.

2.2 Adjusting for non-replicable events

AER's approach

The AER uses data provided by DNSPs from 2006 in econometric benchmarking models and multi and partial productivity measures. These measures are used to establish overall industry wide trends and to assess the relative efficiency of DNSPs, including the assessment of base year opex in the determination process.

Whilst the industry productivity trend since 2006 has been declining, 2012 marks a distinct point where the previous consistent declining trend was arrested and productivity improvement was observed for most years thereafter.

The AER have stated the productivity declines prior to 2012 did not reflect business as usual circumstances and nominated cost increases from meeting new regulatory obligations as the key reason. We support accounting for non-replicable events. Given the difficulties involved in doing so, we think the most practical way is selecting the longest possible averaging period.

We therefore do not support disregarding the 2006-12 period for a number of reasons:

- There is no detailed explanation as to why the 2006-12 years are collectively an outlier and why 2012-16 will be reflective of business as usual conditions;
- The events that occurred over 2006-12 are not identified in the draft paper;
- There has been no attempt made to quantify and account for the impacts of the potential one-off events from this period; and
- The impact of the 2006-12 period on the 2012-16 performance is not analysed.

Based on commentary from the 2017 ABR[8] we suspect the AER is referring to the mandatory licence conditions which set higher reliability and design standards and network planning requirements for NSW and Queensland DNSPs. They may also be referring to obligations on Victorian DNSPs resulting from the 2010 Victorian Bushfire Royal Commission (VBRC).

To account for these events the AER have only relied on opex PFP growth since 2012 to inform its productivity factor estimate. We believe incorporating more observations over a longer time frame is a more effective way of dealing with non-replicable events. In addition to this, we dispute the AER's decision not to include 2006-12 opex PFP data for several reasons.

Firstly, it is inconsistent with the AER's previous approach to accounting for changes in regulatory obligations. The AER have previously explained that its productivity estimates should capture the effects of past changes in obligations and only future changes in obligations should be accounted for in its application[9]:

> *Finally, Incenta point to the effects of new obligations being imposed on NSPs that may reduce productivity growth as a reason to exclude the time-trend component of productivity growth. We have previously dealt with new obligations by incorporating a step change. However, changes in obligations and regulatory burden occur continually and are reflected in past productivity performance. It is only if future new obligations impose a relatively larger change in productivity growth than have past changes in obligations that there would be a case for adjusting the productivity growth rate.*

[8] AER, 2017 Annual Benchmarking Report – Electricity distribution network service providers, November 2017, p. 42
[9] AER, Expenditure forecast assessment guideline, Explanatory statement, November 2013, p. 105

Assessing the 2006-12 period

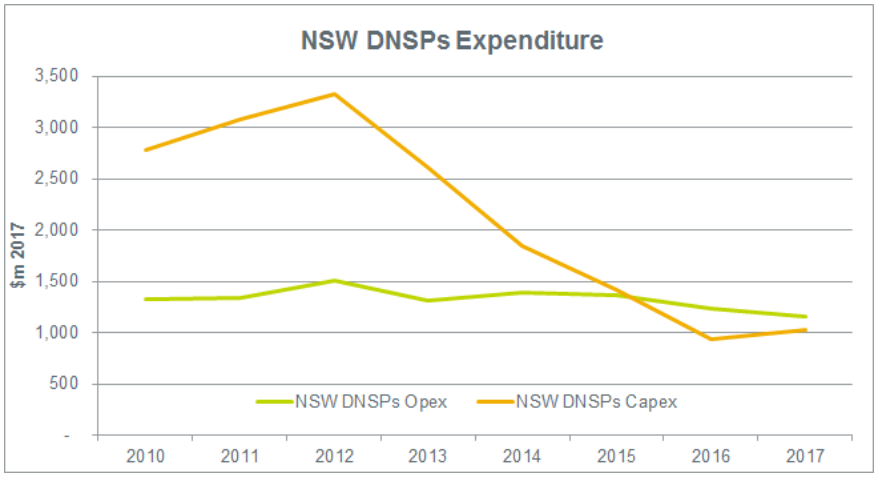
Secondly, it is not apparent that these obligations were significant contributors to declining productivity prior to 2012. IPART's 2005 cost-pass through decisions for the NSW DNSPs regarding the mandatory licence conditions indicate that a large proportion of costs were capex rather than opex. This suggests the cost impact of the NSW licence conditions on opex PFP would have been relatively minor/moderate. Even if the impacts were material, the AER has sufficient data to address the impact of these obligations from the base data to allow for an adjusted data set to be used rather than simply discarding the data in its entirety.

Table 1 NSW DNSP DRP Licence Conditions approved pass-through expenditure

Pass through event: NSW DNSPs DRP Licence Conditions							
AER decision ($m; 05/06)	**2005**	**2006**	**2007**	**2008**	**2009**	**Total**	**% of total expenditure**
Ausgrid							
Opex	0	3.7	14.2	19.3	23.3	60.4	8.8%
Capex	0	52.6	189.5	194.6	187.7	624.3	91.2%
Total	0	56.3	203.7	213.9	211	684.7	100%
Endeavour Energy							
Opex	0	0.3	1.5	1.4	1.4	4.6	1.3%
Capex	41.6	3.5	91.8	94.8	199.8	348.3	98.7%
Total	41.6	3.8	93.3	96.2	201.2	352.9	100%
Essential Energy							
Opex	0	0	42.1	41.9	43	127	25.6%
Capex	0	0	123.2	123.2	123.2	369.7	74.4%
Total	0	0	165.3	165.1	166.2	496.7	100%

Furthermore, the NSW Schedule 1 licence conditions had to be meet by 30 June 2014. This means the impact of this obligation would extend beyond 2006-12 by at least a further two years. For the NSW DNSPs, the impacts of these obligations are most visible in capex while opex remained stable over time.

Figure 1: NSW DNSP 2009-10 to 2016-17 actual expenditure



From an opex perspective, the primary challenge associated with the licence conditions was managing stranded costs post 1 July 2014. A large amount of overheads and labour costs that were previously utilised by the capex peak had to be absorbed and eventually exited from our opex over the 2014-19 period. The sale of Endeavour Energy's retail business in 2011, a pass-through event for EBSS purposes, most likely had a larger impact on our opex performance during the 2006-12 years.

Similarly, the AER's cost-pass through decisions for Powercor and Ausnet also indicate that the costs arising from the VBRC were primarily capex. Furthermore, almost all of the proposed opex was expected to be incurred in 2012 and beyond having no impact on opex PFP during the omitted 2006-12 period.

Table 2: Victorian DNSP VBRC approved pass-through expenditure

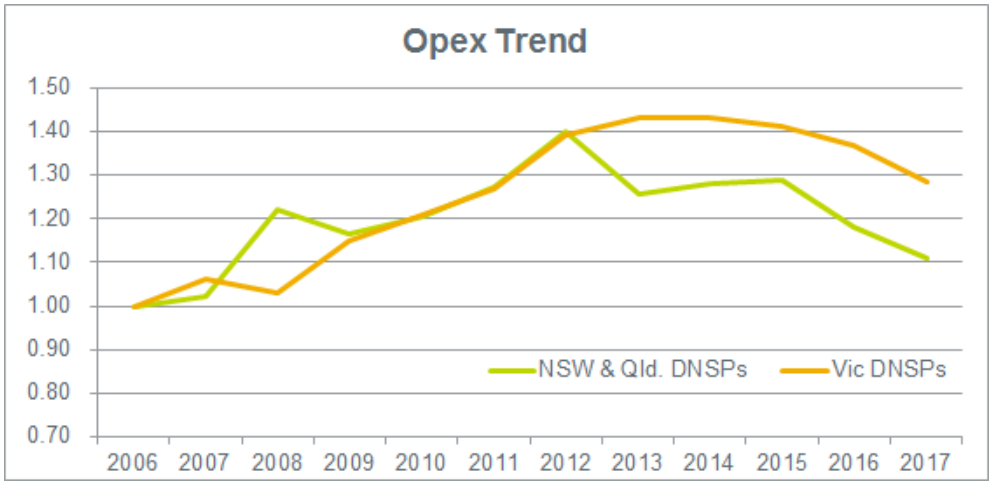
Pass through event: Costs arising from VBRC							
AER decision ($m; 2012)	**2011**	**2012**	**2013**	**2014**	**2015**	**Total**	**% of total expenditure**
SP Ausnet							
Opex	0.3	1.31	4.07	3.54	2.74	11.97	10.7%
Capex		5.16	28.75	34.93	31.53	100.37	89.3%
Total	0.3	6.47	32.83	38.47	34.28	112.34	100%
Powercor							
Opex		4.23	3.61	3.07	2.53	13.43	18.2%
Capex		14.78	14.98	15.26	15.54	60.55	81.8%
Total		19.01	18.59	18.33	18.07	73.98	100%

If these events had a material impact on opex it should be discernible in the opex trend over time. We would expect the NSW and QLD DNSPs to have a markedly different trend to other DNSPs as a result of the jurisdictional licence conditions. Instead, it appears all DNSPs had increasing opex over the 2006-12 period. For example, HoustonKemp notes[10]:

> *.. we observe that TasNetworks and SAPN, which were not subject to those changes in regulatory obligations and were operating relatively efficiently over the 2006 to 2018 period, experienced the same declining trend in opex productivity that, for DNSPs in Victoria, the CCP attributes to changes in regulatory obligations.*

This suggests the performance is attributable to other factors not considered by the AER rather than the impacts of the new obligations:

Figure 2: Jurisdictional opex trends 2005-06 to 2011-12



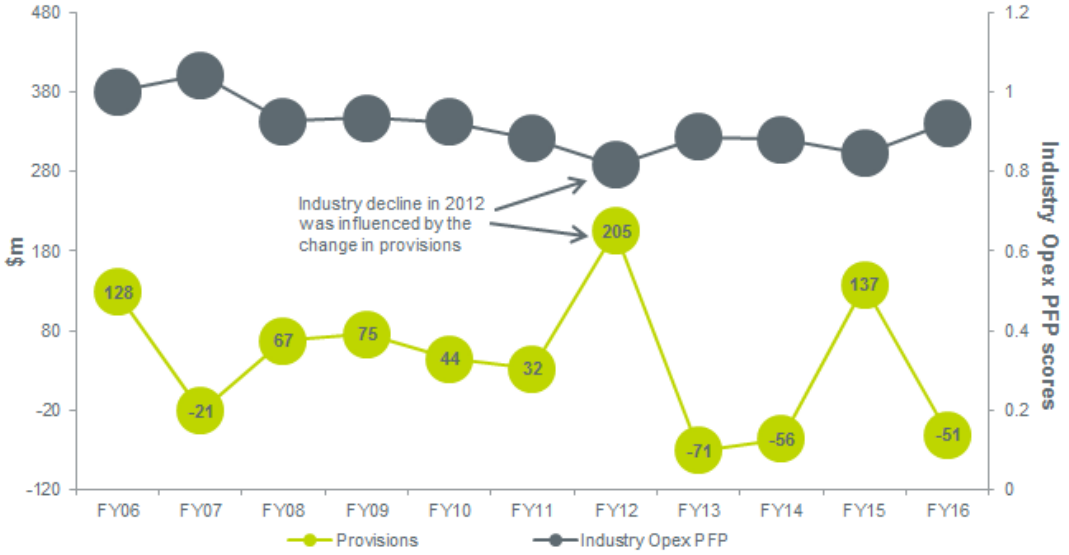
Given this, we do not consider the events the AER are likely referring to are outliers from an opex perspective. Even if they were excluding the 2006-12 period does not actually properly account for them. Instead, there is evidence to suggest that the 2012 industry opex PFP performance is an outlier creating an artificial drop and improvement in performance over the 2011-13 period.

[10] HoustonKemp, Operating expenditure productivity growth, A report for Ausgrid and Endeavour Energy, November 2018, p. 16

Drivers of 2012-16 performance

The improvement between 2012 and 2013 is a key driver of the positive trend over 2012-16. Breaking the dataset at this point leads to the highest possible average annual opex productivity estimate out to 2016. There is evidence to suggest that 2012 was an outlier year on account of movements in provisions, a non-efficiency related opex adjustment.

Figure 3: Annual changes in industry Opex PFP and provision movements



This suggests the 2012-16 opex PFP trend is not wholly reflective of potential productivity gains. Setting a productivity target on the basis of this measure would be inappropriate for reasons previously outlined by the AER[11]:

> *We considered that to reward or penalise a service provider for changes in provisions would reward or penalise it for changes in assumptions, not efficiency improvements. This undermines what the EBSS is intended to do.*

Thirdly, the 2012-16 period has also not been assessed for non-replicable or one-off events outside of the adjustments to account for 'catch-up' investment which is discussed in section 2.3 below.

Variability in results

Industry productivity performance can vary substantively depending on the period and DNSPs selected.

Table 3: Annual Opex PFP growth with different averaging periods

Opex PFP annual average growth	2012-16	2011-16	2013-16	2006-17
All DNSPs	3.33%	1.06%	3.45%	-0.42%
Base year efficient DNSPs	1.55%	-0.33%	1.42%	-0.69%
Top 5 DNSPs (2017 efficiency score)	2.74%	0.29%	5.03%	-0.69%
Top 5 DNSPs minus 2016	2.49%	-0.18%	1.54%	-1.53%
Top 3 DNSPs	3.10%	-0.19%	5.53%	-1.06%

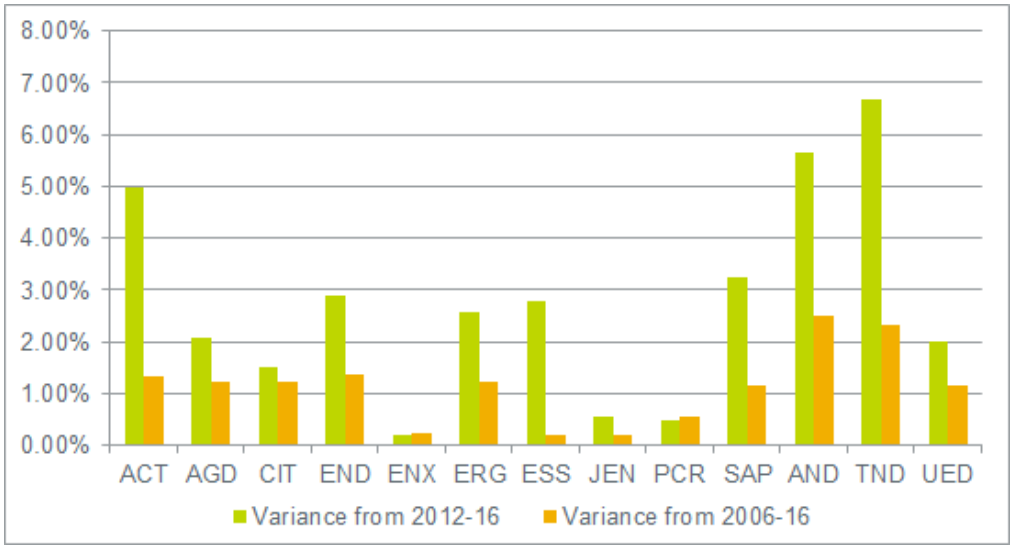
It is clear that a short term assessment of productivity over the 2006-16 period can suggest substantively different trends. As noted by HoustonKemp, the unnecessary

[11] AER, Ausgrid distribution determination 2014-19, Final decision, Attachment 9, April 2015, p. 8

shortening of the evaluation period can exacerbate the risk of forecasting error and not affording a DNSP a reasonable opportunity to recover its efficient costs[12]. It also risks placing undue weight on productivity changes in a particular year or by a particular DNSP.

This is evident in the table above and also when incorporating the outcomes of the final 2018 ABR which was recently published. Adding 2017 to the 2012-16 averaging period has a far greater impact then adding it to the longer 2006-16 period as evident below.

Figure 4: Change in average annual opex PFP from addition of 2017 data



We are therefore not confident that a reliable forecast can be developed using an averaging period within a subset of the 2006-16 period that captures only some of those changes. As discussed in section 1.5 this is a key reason why most international regulators use a long-term average to measure productivity growth. A longer the averaging period lowers the risk that individual events materially influence the results.

Suitability of Opex PFP

Fourthly, even if a suitable historical averaging period is used there still needs to be an assessment of the expected industry changes that may occur in the coming years and whether historical performance is predictive of future performance. These changes could be accounted for through step changes if they can be quantified. They may also require amendment to a productivity growth estimate or consideration in the application of one depending on the nature of the changes.

The electricity industry is currently undergoing transformative changes as we move to more renewable energy sources and bi-directional energy flows. We recently released a report by Deloitte which outlined the changes that will occur in all parts of the energy supply chain in coming years. The 2012-16 period does not capture the potential impacts of these changes, or those currently occurring under the Power of Choice reforms. The 2012-16 period only partially captures the impacts of the Better Regulation reforms.

As explained in the attached report from BIS Oxford Economics it is unlikely electricity networks will be a source of productivity growth in the coming years[13]:

> *The move towards renewable energy, which requires less labour per output, in place of coal powered power stations will be a key driver of productivity growth in*

[12] HoustonKemp, Operating expenditure productivity growth, A report for Ausgrid and Endeavour Energy, November 2018, p. 15

[13] BIS Oxford Economics, Draft decision paper – forecasting productivity growth for electricity distributors, December 2018, pp. 11-12

the Electricity sector. However, we believe that this productivity growth will not be reflected across the Electricity Distribution of Transmission sub-sectors. Further, productivity growth in these subsectors will be constrained by households moving to solar and batteries, ultimately reducing the output (GVA) for the industry, and a reduction in capital expenditure within the electricity sector.

A longer averaging period is more likely to pick up multiple business cycles and better account for the potential impacts of changes in obligations. Step changes also provide a mechanism to adjust historical performance or an opex base year for known and quantifiable changes. However, as noted in section 1.3 some future changes may be more difficult to quantify and adjust for in a productivity growth rate.

The transformative changes associated with the future grid are likely to occur over multiple regulatory periods. It will be difficult to account for these via step changes, pass-throughs or adjusting a productivity factor. Given this, a cautious approach should be applied as the industry enters a potentially new business cycle.

Fifthly, these transformative changes also raise an important question as to whether Opex PFP remains (or ever was) an appropriate measure of productivity in the electricity industry. BIS Oxford Economics explains[14]:

our position is that a 'classic' output/ employment is not the 'correct' productivity measure for any gas, electricity, water and waste service business. The classic productivity measure is more applicable to most of the 'market' sectors where to achieve high productivity, businesses aim to run their operation at maximum capacity where all inputs (such as labour and capital) are fully utilised and the highest production (output) of goods and services is achieved.

However, most of the 'businesses' in the utilities cannot run at maximum capacity all the time – 'maximum' (or high) utilisation is only achieved at peak times during the summer and winter peaks (i.e. only a few days per year) and then only for a few hours on those days. There are also large daily fluctuations in demand. Furthermore, the aim of utilities businesses is maximum reliability. Accordingly, a significant proportion of the work undertaken by utilities' workforces involve replacing and refurbishing old assets to maintain maximum reliability rather than adding new capacity. This also means that the utilities sector does not conform to 'normal market' investment/output relationships.

As noted above, classical input/output measures of productivity will become even less applicable to the electricity industry with the proliferation of renewable generation and battery storage at the customer level. The shortcomings of the Opex PFP measure are tolerable when it is only used for comparing the relative efficiency of DNSPs. A broader use, such as using it to set a productivity growth target, would be inappropriate. This is because it would require DNSPs to manage their inputs/outputs in a way that is not aligned to the nature of managing an electricity network. It may also penalise DNSPs for implementing demand management initiatives which increase opex while reducing a networks outputs.

Given its limitations we think it would be inappropriate for it to be used to set productivity growth targets. The input/output mix is not well suited to electricity networks and it does not account for the ongoing transition from one-way to two-way energy flows.

[14] BIS Oxford Economics, Draft decision paper – forecasting productivity growth for electricity distributors, December 2018, p. 13

Conclusion

Overall, we are concerned that the AER has not assessed and selected an averaging period in a methodical or objective manner. We think there has been bias in the selection and interpretation of data to confirm their position that[15]:

> *a prudent and efficient distributor would not reduce its productivity over time unless it needed to increase its costs to meet a non-discretionary obligation. Given that we generally fund the costs of new and material regulatory obligations through step changes we have, in the past, forecast zero productivity growth. We maintain the view that, as long we provide step changes for the costs of new regulatory obligations, forecast productivity growth should be non-negative. We have previously stated that we did not consider the negative productivity growth we were seeing would continue. We expected distributors to make positive productivity growth in the medium to long term.*

There a numerous drivers of productivity performance beyond implementing non-discretionary obligations. This expectation of positive productivity growth has guided the AER's selection and assessment of information sources. The objective should be to determine a realistic estimate of productivity growth, rather than a positive one.

Relying only on the 2012-16 period is opportunistic and asymmetric as it fails to account for industry performance over a full business cycle. The improvements made over 2012-16 are only possible due to the declines experienced over 2006-12. This means the 2012-16 performance is upwardly bias and not a realistic estimate of potential future productivity growth. It is widely accepted that productivity is more reliably measured over a longer period of time so as to capture the full effects of a business cycle as noted by several experts.

Productivity Commission[16]:

> *…productivity trends are best measured using productivity cycles, which measure average annual MFP growth between cyclical peaks.*

AEMC[17]

> *We are of the view that at least 8 years of robust and consistent data will be required to establish a TFP growth rate that could be used in a TFP methodology for price and revenue determinations.*

Deloitte Access Economics[18]:

> *Because so many factors can influence productivity it is often best measured over an entire economic cycle.*

Brattle Group[19]:

> *Since TFP growth rates fluctuate yearly, it is preferable to use the longest historical time period possible to conduct the TFP study.*

HoustonKemp[20]:

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[15] AER, Forecasting productivity growth for electricity distributors, Draft decision paper, November 2018, p. 10
[16] Productivity Commission, Productivity and Income – The Australian Story, 5 Year Productivity Review Supporting Paper No.1, August 2017, p. 5
[17] AEMC, Final report review into the use of total factor productivity for the determination of prices and revenues, June 2011, p. 23.
[18] Deloitte Access Economics, Labour price growth forecasts, Prepared for the Australian Energy Regulator, July 2018, p. 78
[19] Brattle Group, Use of total factor productivity analyses in network regulation: case studies of regulatory practice, October 2008, p. 4
[20] HoustonKemp, Operating expenditure productivity growth, A report for Ausgrid and Endeavour Energy, November 2018, p. 15

In light of the apparent volatility in opex productivity from year-to-year and the absence of consistent productivity drivers – both through time and across DNSPs – regard should be had to observed historical changes in opex productivity over the longest available time frame, unless there is a robust reason to do otherwise….

….. our conclusion has parallels with the AER's recent draft decision on its Rate of Return Guideline to estimate the market risk premium – which is subject to considerable volatility – by reference to an assessment of historical excess returns over an extended period ranging from 29 years to 80 years in length.

For the reasons outlined above, we do not consider the 2012-16 period is an appropriate averaging period. Instead, there should be further consideration of the appropriateness of the opex PFP measure and whether historical performance is a useful indication of potential future performance. In the event opex PFP is used to estimate future productivity growth it is clear a long-term average should be relied upon.

2.3 Adjusting for catch-up investment

Changes in industry productivity can be broadly divided into two categories:

- Productivity frontier shift: productivity changes of the most efficient business (or highly efficient businesses as a group) within an industry; and
- Productivity catch-up: productivity changes of firms that are relatively less efficient and not operating at the frontier.

The draft report reinforces the Expenditure Forecasting Assessment Guideline by stating that the productivity growth forecast, should reflect the best estimate of changes in the productivity frontier. The productivity forecast should not include productivity catch-up from inefficient distributors which the AER address separately via efficiency adjustments to revealed or base year opex.

This is because there is greater scope for productivity improvement from firms operating outside the efficient frontier. Including the performance of these firms in industry average measures would not reflect the improvements a prudent and efficient distributor operating at the frontier can reasonably be expected to achieve.

It is difficult to distinguish between frontier shift and catch up productivity improvements. To date, the AER have defined the frontier as the top five or top quartile of DNSPs as measured by their Cobb-Douglas SFA scores when assessing the efficiency of base year opex.

In the draft decision, all DNSPs whose base opex in their most recent determination was accepted as efficient are considered to be a part of the frontier. This means 9 of the 13 Australian DNSPs are operating within the efficient frontier. This raises the novel question of whether a productivity factor is required if 70% of DNSPs are operating efficiently. It is an outcome that is counter-intuitive given that many of the 9 frontier firms base year opex was considered to be "not materially inefficient" rather than efficient. The results suggest that it does not fully account for catch-up productivity performance.

Firstly, the base opex assessed includes the 2012-13, 2013-14, 2014 and 2014-15 years while the evaluation period commences from 2011-12. There may be catch-up improvement in the years prior to the assessed base year for each of the 9 frontier DNSPs that may still be captured in the 2012-16 opex PFP performance.

The AER acknowledges this in the final 2018 ABR listing a number of DNSPs who have made progress catching up to the efficient frontier including 3 of the 9 frontier firms[21]:

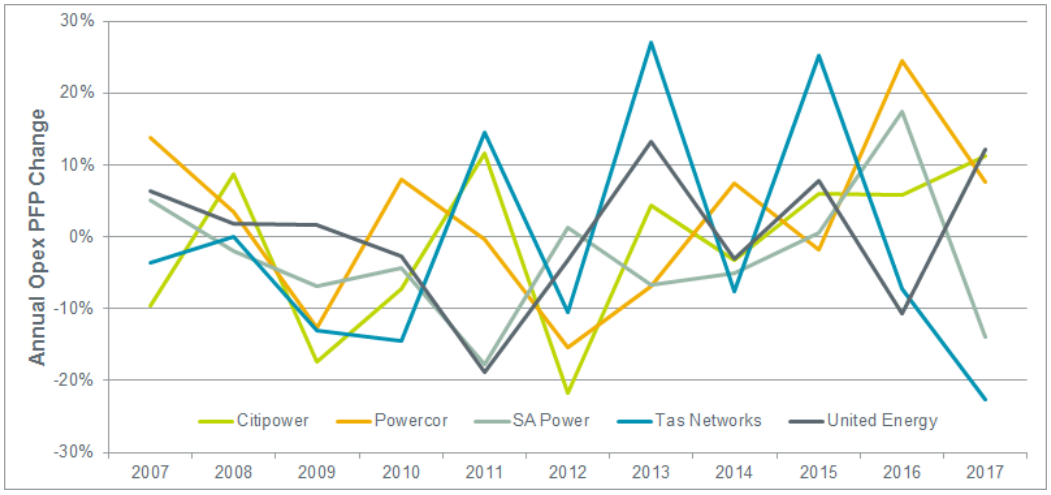
[21] AER, 2018 Annual Benchmarking Report – Electricity distribution network service providers, November 2018, p. 19

With these opex reductions, some networks are now beginning to catch-up to the more efficient networks in the NEM. This is most evident from the improvements in the opex PFP results of Ausnet Services, Ergon Energy, Endeavour Energy and Ausgrid in 2017 and the improvement of Essential Energy and Evoenergy since 2015, as shown in Figure 4.5. As a result of these improvements, Evoenergy, Energex, Ergon Energy, Essential Energy, Endeavour Energy and AusNet Services are now all among the middle group of opex PFP networks in 2017.

Secondly, the 2012-16 period was impacted by a number of one-off events like VBRC recommendations, the Better Regulation reforms, the removal of the NSW Schedule 1 Licence Conditions and establishment of Networks NSW, the QLD Independent Review Panel outcomes and the TasNetworks distribution and transmission merger.

The 2012-16 averaging period is therefore likely to include productivity improvements that are not sustainable or replicable. For instance, Endeavour Energy has reduced its workforce by 29% from 2012-13 to2016-17. TasNetworks has seen a 27% decrease in its opex PFP performance after experiencing the largest turnaround in performance between 2006-12 and 2012-16. As depicted below, this variability is common amongst a number of the frontier firms and it reinforces that it is no more readily apparent that 2012-16 is reflective of BAU conditions compared to 2006-12.

Figure 5: Annual opex PFP change amongst 2018 frontier firms



Based on this variability we do not think a reasonable estimate of future productivity growth can be made. Notwithstanding this, any frontier should be based on the top quartile DNSPs according to the AER's econometric models. The frontier productivity performance should be measured over the longest possible period for the reasons explained in section 2.2. This produces a productivity estimate of -0.7%.

2.4 Adjusting for the proportion of undergrounding

A number of the options considered in the draft paper attempt to account for productivity growth associated with increasing the proportion of a network that is underground. The AER considers this to be a significant factor in driving lower operating and maintenance costs.

To quantify this factor the AER calculate the industry average annual growth rate in the proportion of undergrounding over 2006-16. This is then applied to the average estimated elasticity of the proportion of underground in the AER's econometric models over 2006-16. This results in an estimate of a 0.5% reduction in opex per year due to increased undergrounding. We have a number of concerns with this approach and do not consider the resulting productivity factor is accurate or replicable.

Measurement errors and updates

Firstly, the proportion of undergrounding is measured over the full 2006-16 period which is disregarded in other measures relied upon. We support a longer term averaging period and consider this should be used in all other productivity measures consistent with the long term averages used in other regulatory inputs such as the market risk premium and forecast rate of inflation.

However, if the AER considers the 2006-12 period is non-replicable due to the changes in obligations that occurred over this period, then it should be excluded from all measures. The proportion of undergrounding may have been impacted by the jurisdictional licence conditions or the VBRC findings.

The calculation also relies on an industry average across all 13 Australian DNSPs. As noted above, a frontier group of 9 DNSPs is used to separate frontier shift vs catch-up productivity growth. As noted in section 2.3 we do not agree that the frontier group properly accounts for catch-up investment. Nevertheless, a consistent approach should be used. The growth in the proportion of undergrounding achieved by non-frontier firms may have only been so as part of their catch-up improvements.

The table below provides a comparison of potential outcomes when addressing these issues. We have also incorporated 2017 data based on the final 2018 ABR. We consider the top 5 DNSPs are an appropriate frontier group.

Table 4: Average annual growth in underground proportion of network 2006-17 and 2012-17

	Average Annual UG Growth (2006-17)	**Average Annual UG Growth (2012-17)**
Industry	3.11%	2.41%
Efficient BY opex DNSPs	3.34%	2.70%
Top 5 DNSPs	2.67%	2.33%
Top 3 DNSPs	2.91%	2.30%

The final 2018 ABR also introduced results for an additional econometric model, the SFA Translog. We note that Economic Insights considers the results of this model are of sufficient quality to be included in the AER's base year opex assessment[22]:

> *Given this improvement in the SFATLG's model's properties with the more recent sample, we are of the view that it is now worth presenting its results for the shorter period and it should be considered for inclusion in any averaging of model results for base year assessment purposes.*

We have therefore updated the estimated elasticity of the proportion of undergrounding in the econometric models for this new model. We note the 2006-17 results were not provided in the 2018 ABR so the 2012-17 period has been used. This lowers the average in the draft decision from 0.16 to 0.13.

Table 5: Underground network econometric model coefficient results

	SFA CD	**LSE CD**	**LSE Translog**	**SFA Translog**	**Average**
Undergrounding coefficients (2012-17)	-0.111	-0.195	-0.159	-0.063	**-0.132**

[22] Economic Insights, Economic Benchmarking Results for the Australian Energy Regulator's 2018 DNSP Annual Benchmarking Report, November 2018, p. 19

Collectively, these updates result in a productivity factor estimate of 0.35 rather than 0.5. However, we have broader concerns with this measure.

Benchmarking underground network growth

Firstly, this approach effectively sets a proportion of undergrounding benchmark growth rate for all DNSPs. This is unlikely to be achievable or efficient for many DNSPs; particular those with an already relatively high proportion of undergrounding like Evoenergy, CitiPower, Ausgrid, Energex and Endeavour Energy.

There may be various technical or practical reasons why certain DNSPs have a lower amount of underground network or growth rate in the proportion of undergrounding. The decline in the growth rate between 2006-12 and 2012-17 suggests that the opportunities for growth reduce over time.

Secondly, the approach in the draft decision wrongly implies that a network is static and/or that the growth in the proportion of undergrounding is driven by converting the overhead network to underground network. As evident in the table below the growth in the undergrounded network has not resulted in a reduction to the overhead network line length. This is because a significant source of growth is new connections. This additional network, whilst underground, would obviously increase opex rather than reduce it.

Table 6: Growth rates in overhead and underground line length

	2006-17	**2012-17**
Av. Annual change in O/H (all DNSPs)	-0.01%	-0.05%
Av. Annual change in U/G (all DNSPs)	3.84%	3.03%

This means the opex required to manage the overhead network is unchanged and it is instead a question of how much additional opex is required to service the growth in the underground network.

Underground circuit line length is an output factor

We also note that circuit line length is already accounted for as an output factor in the AER's multi and partial productivity measures. This implies that a DNSP has limited control over this factor. It also reinforces the need for business specific forecasts to be used rather than an industry average.

Currently, circuit line length is one of the factors used to calculate the real output growth trend in the AER's base-step-trend opex model. Arguably, this output growth factor may overstate the impact of circuit line length growth on opex if it is calculated based on a historical proportion of undergrounding that is not maintained in the future. Further consideration of this issue is required, particularly given that the weight attributed to circuit line length was increased in the 2018 ABR.

If there is any deficiency in this measure it should be addressed directly rather than through a productivity factor. The most logical approach would be to split the circuit line length factor between overhead and underground with different elasticities. This approach would also ensure business specific forecasts could be used rather than an industry average.

Conclusion

Overall, we consider a productivity factor should only relate to the mix and use of inputs rather than outputs. For this reason, undergrounding should not inform the AER's estimate of a productivity factor.

2.5 Use of a gas distribution time trend

AER's approach

The draft decision includes a time trend measure to capture changes in productivity over time not attributable to other variables in the cost function of its econometric models. This includes changes in technology, processes and obligations.

The AER discounts the time trend estimates for electricity networks over the 2006-16 period due to its concerns with the replicability of the 2006-12 period. In the absence of a 2012-16 time coefficient the AER instead relied on gas distribution results. Across four gas studies conducting in 2015 and 2016 the average time coefficient was approximately -0.5 (i.e. a positive productivity factor).

Latest available information

We do not agree with the use of gas distributors data in this manner. For reasons outlined above we do not consider the 2006-12 period should be excluded from the AER's measures. Notwithstanding this, a time trend estimate for the 2012-17 period is included in the AER's final 2018 ABR. By the AER's reasons, this would obviate the need to rely on the gas distribution data.

The table below shows that the time trend over 2012-17 is positive (i.e. negative productivity growth). This trend may indicate that improvements in technology have been outweighed by increased costs from regulatory obligations or changes in the nature or quality of the outputs provided like improved service quality or the effects of increased distributed generation.

Table 7: Econometric model time coefficients

	SFA CD	LSE CD	LSE Translog	SFA Translog
Time coefficient (2012-17)	1.6	1.8	1.9	1.5
Time coefficient (2006-16)	1.8	1.9	1.9	-

It is also similar to the 2006-16 time coefficient which the AER considers to not be reflective of potential future performance. This position requires justification and in our view it can only be reasoned by the conclusion that historical performance, over 2006-16 or 2012-17, is not predictive of future performance.

Otherwise, we are of the view the time coefficient produces a productivity factor estimate of -1.8%.

Comparability of gas data

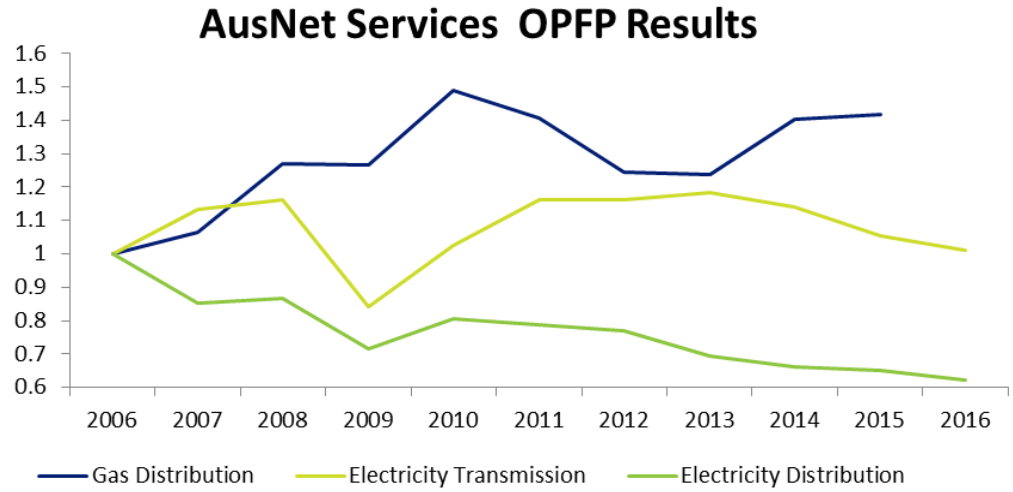
We consider the gas distribution data is a third order source behind the performance of Australian electricity networks followed by international electricity networks. We note the time trend results above would reflect both Australian and International electricity network performance as the econometric models include Ontario or New Zealand data.

This also provides further evidence the 2006-12 productivity downturn experienced by Australian networks was not unique and attributable to new obligations.

The draft decision does not provide any explanation as to why the historical performance of gas distribution networks is predictive of future productivity growth in electricity networks. Given the transformative changes expected to occur in the electricity industry in the future it is unlikely to be the case.

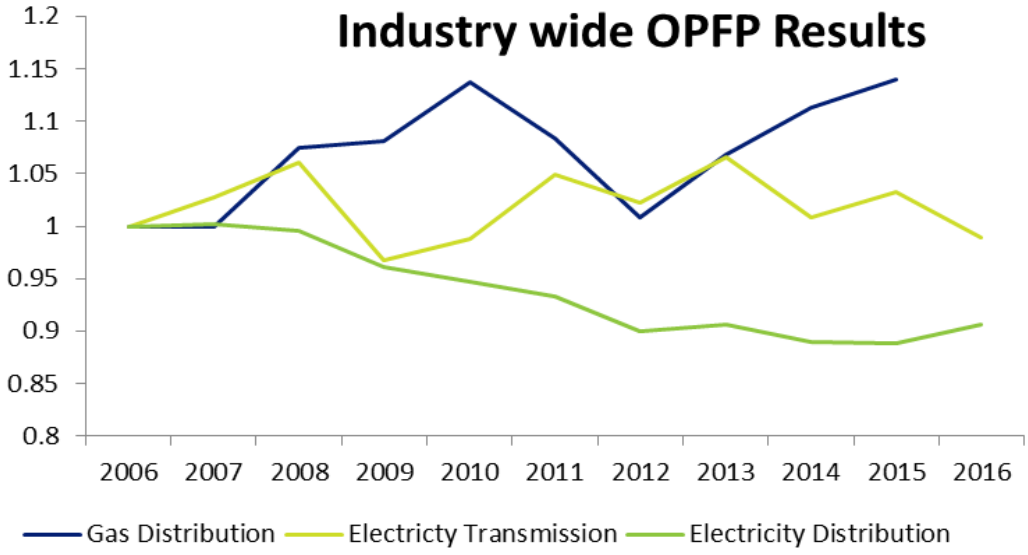
AusNet services provide a useful example of the differences between gas and electricity distribution. AusNet manage electricity distribution and transmission networks and a gas distribution network. According to opex PFP measures they rank 1st for electricity transmission and gas distribution but 9th for electricity distribution. The same management team have delivered substantively different results since 2006[23].

Figure 6: AusNet Services Opex PFP results for Electricity Transmission and Distribution and Gas networks



Industry wide opex PFP results show a similar lack of comparability[24].

Figure 7: Industry Opex PFP results for Electricity Transmission and Distribution and Gas networks



It is also worth noting that the ACIL Allen gas distribution studies referenced in their draft report consistently predict for each estimated method opex partial productivity declines over the 2017-22 period averaging -0.2% to -0.3%[25].

[23] AusNet Services, Can Gas Distribution Productivity Trends be applied to Forecast Productivity for Electricity Distribution?, AER Public Forum – Productivity Review, November 2018, pp. 2-3
[24] AusNet Services, Can Gas Distribution Productivity Trends be applied to Forecast Productivity for Electricity Distribution?, AER Public Forum – Productivity Review, November 2018, pp. 2-3
[25] ACIL Allen Consulting, Opex partial productivity analysis, December 2016

Table 8: ACIL Allen gas distribution forecast productivity growth

	Average annual opex partial productivity growth forecast (2017-22)	Time coefficient - statistically significant
Single Output Model		
Random effects model	-0.08%	Fail
FGLS model	-0.05%	Fail
SFA model	-0.42%	Fail
Average	**-0.18%**	
Two Output Model		
FGLS model	-0.11%	Pass at 5% significance*
SFA model	-0.44%	Fail
Average	**-0.27%**	

* 5% probability of concluding a relationship exists when it does not.

For these reasons we do not consider the gas distribution time trend should be relied upon in setting an electricity network productivity factor. The electricity distribution network data should be given primacy and it continues to support a negative productivity growth estimate.

2.6 Estimating and accounting for Labour Productivity

AER's approach

The draft report also includes a measure of labour productivity in order to estimate future productivity growth. The AER rely on Australian Bureau of Statistics (ABS) data on quality adjusted labour productivity. Similar to other measures, the 2011-12 to 2015-16 period is given precedence over earlier periods during which the utilities industry experienced declines in productivity.

DAE provide a forecast for the utilities industry, by jurisdiction for the 2019-20 to 2023-24 period. The average quality adjusted labour productivity growth is 1.5% which, when applied to the AER's benchmark proportion of opex labour, produces an opex productivity forecast of 0.9%.

There is limited supporting information provided on the Deloitte forecast making it difficult to assess its accuracy. As noted by BIS Oxford Economics[26]:

> *In their Labour Price Growth Forecasts prepared for the Australian Energy Regulator, DAE did not provide specific forecasts for output, employment or the weights used in development their composite productivity measure. Therefore, we are unable to comment on the components, or the application of the described methodology (including assumptions), that underpin their labour productivity growth forecast.*

Volatility in the dataset

Notwithstanding this, historical quality adjusted labour productivity in the utilities sector appears to be highly volatile which brings into question the reliance that can be put on the dataset.

The AER typically relies on Deloitte to forecast labour price changes which are used in their opex determinations. Their reports also serve to provide a check of the forecasts

[26] BIS Oxford Economics, Draft decision paper – forecasting productivity growth for electricity distributors, December 2018, p. 10

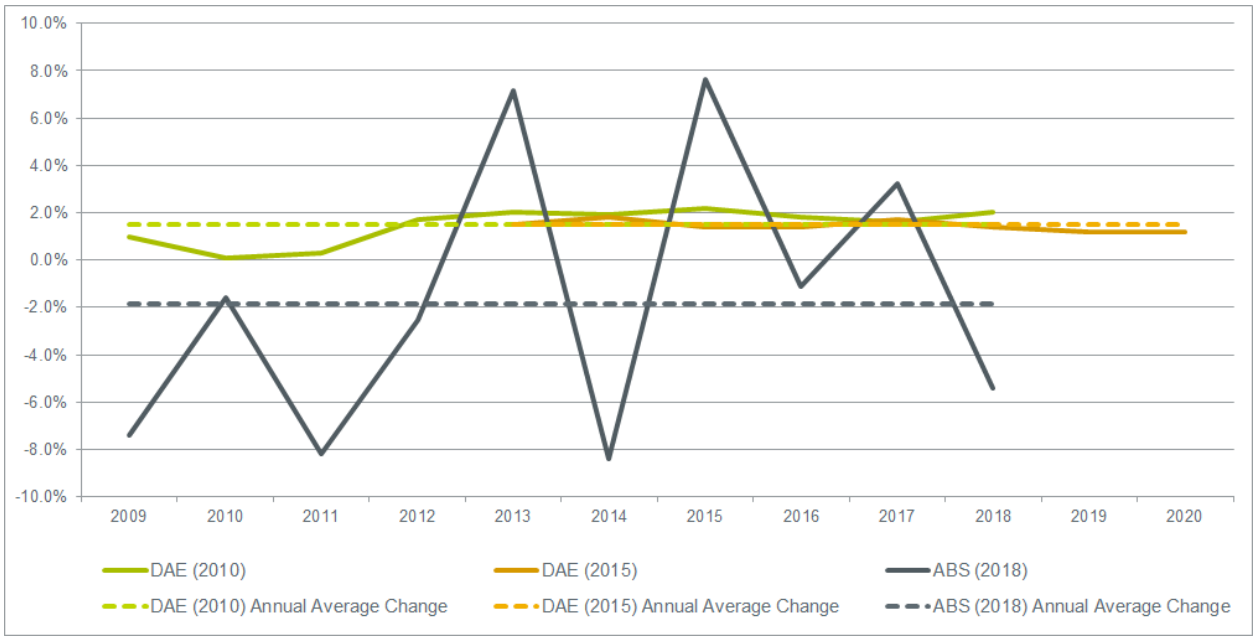
provided by independent expert consultants engaged by network businesses (and typically averaged with them). In relation to labour price forecasts, the AER state[27]:

> *A further consideration is the source of the forecasts used. The forecasts produced for the AER have often varied significantly from the forecasts produced for and proposed by the NSPs. We have tested the accuracy of labour price forecasts in the past and will continue to analyse the labour price forecasters' past performance when determining the appropriate labour price forecasts to rely on.*

We have applied this same principle to assess the past productivity forecasts provided by Deloitte in reports to the AER from 2010 and 2015. In these reports, Deloitte provide productivity adjusted forecasts of wage price changes for the utilities sector. Unadjusted forecasts are also included and allow their labour productivity forecasts to be determined.

To assess their accuracy, these forecasts are compared with the annual quality adjusted labour productivity measures reported by the ABS for the EGWWS sector.

Figure 8: Accurate of DAE labour productivity forecasts



It can be seen that Deloitte's average productivity forecasts, albeit stable at around 1.5% per year, is significantly higher than the -1.8% annual average productivity decline reported by the ABS. Although we acknowledge forecasting productivity will invariable produce imprecise estimates, the size and frequency of Deloitte's estimates raises concerns that their methodology suffers from an upward forecasting bias and should therefore be applied conservatively (if at all).

Consistency with labour price measure

We engaged BIS Oxford Economics to review the approach outlined in the draft decision and to produce a forecast of quality adjusted labour productivity. As noted above, the AER often rely on an average of the estimates produced by Deloitte and BIS Oxford Economics in setting labour price growth. Refer to Attachment 1 to this response for the full report.

A key issue is the inconsistency between the labour productivity estimate in the draft decision compared to the AER's preferred source of estimating labour price growth. BIS Oxford Economics explains[28]:

[27] AER, Expenditure forecast assessment guideline, Explanatory statement, November 2013, p. 76

> *As noted by the ABS, the WPI measures changes in the price of labour services resulting from market pressures and is unaffected by changes in the quality and quantity of work performed (i.e. quality and quantity are held constant). More specifically, WPI is not impacted by change in the composition of the labour forces, hours worked, or changes in characteristics of employees (i.e. changes to skills level and work performance)….*
>
> *….our position is that the labour productivity cannot be applied to the Wage Price Index (WPI). We still believe that if a labour escalator is to be adjusted for productivity improvements (which incidentally is still the favoured outcome of the AER), then Average Weekly Ordinary Time Earnings (AWOTE) is the most logical choice. In addition, we believe that the WPI can only be adjusted for labour productivity if the matching labour productivity measure excludes workforce composition effects.*

The productivity measure is therefore likely to overcorrect for productivity improvements as it includes compositional changes. We consider that AWOTE should be used to forecast labour price growth or the labour productivity factor is adjusted for workforce composition.

Based on the available information we also believe Deloitte applied on economic cycle methodology, rather than an annual methodology to generate their productivity forecasts. This is a methodology the AER has previously rejected for application to the labour price method.

As above, a consistent approach should be applied. Given the volatility in utilities data we support the use of long-term averages or over-the-cycle methodology for labour price and productivity measures.

Latest available information

We also note the AER favour the trend in labour productivity over 2011-12 to 2015-16 as it is supports the theory that distributors have been improving since 2012. Given the volatility in this measure the productivity results can vary widely year-to-year.

To demonstrate this BIS Oxford Economics updated the AER's data for the 2017-18 year. This produces a labour productivity estimate of -0.4% from 2012-13 to 2017-18, contradicting the results of other measures over the AER's favoured 2012-16 period[29]:

> *The average annual quality adjusted labour productivity growth presented in the AER paper does not include data for 2017/18. Based on the calculated average adjusted from 1998/99 to 2016/17 (or even 2011/12 to 2016/17), we estimate the quality adjusted labour productivity growth to be -5.9 per cent in 2017/18. Considering the most recent five-year period from 2012/13 to 2017/18 inclusive, quality adjusted labour productivity actually declined by an average of -0.4 per cent per annum. This refutes the suggestion by the AER that there has been an improvement in the productivity of the utilities sector, and as such, is therefore justification to continue to apply a zero productivity increase to labour prices going forward.*

There is a preference to set the productivity factor by reference to the most recent 5 year period. A short averaging period and highly volatile data set means there is a high risk that an additional year can result in materially different outcome as BIS Oxford Economics have shown.

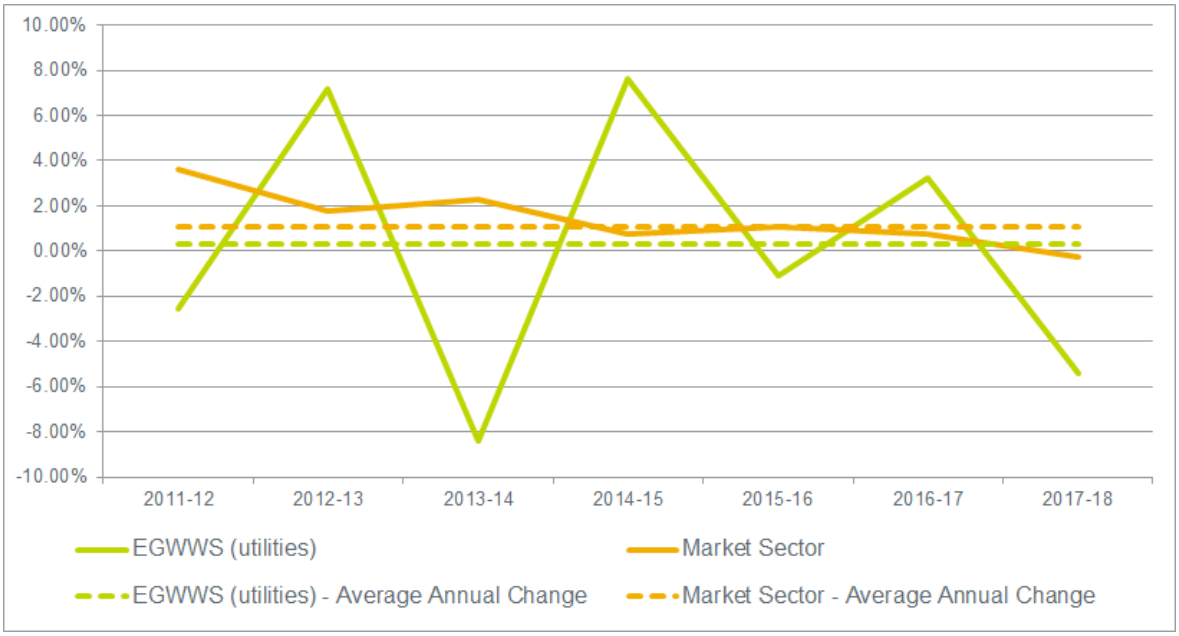
[28] BIS Oxford Economics, Draft decision paper – forecasting productivity growth for electricity distributors, December 2018, pp. 2, 4

[29] BIS Oxford Economics, Draft decision paper – forecasting productivity growth for electricity distributors, December 2018, p. 13

Since BIS Oxford Economics completed their review, the ABS has released their labour productivity data for 2017-18. Their measure of quality adjusted labour productivity in the EGWWS (utilities) sector indicates productivity declined by 5.42% during 2017-18. This reconciles closely with the -5.9% forecast from BIS and supports their estimation methodology and productivity forecast for 2019-24.

Updating for the latest available ABS data, the average annual productivity change from 2011-12 for the utilities sector is 0.08% and is below the all industry rate of 1.06%.

Figure 9: Quality Adjusted Labour Productivity updated for 2017-18 data



Based on their estimation of the 2017-18 performance, BIS Oxford Economics estimates average labour productivity growth of 0.9% per annum over the 2019-20 to 2023-24 period. This produces opex productivity growth of 0.5% compared to the 0.9% forecast contained in the draft decision.

2.7 Summary

For the various procedural, framework and methodological reasons outlined above we do not support a productivity factor of 1% per annum being applied to DNSPs in upcoming determinations. We recommend the following when estimating productivity:

- use a long term average covering at least one full business cycle in order to reduce volatility and account to limit the impact of one-off or non-replicable events;
- assess the significance/explanatory power of the measures relied upon and whether they are fit-for-purpose both now and into the foreseeable future;
- give primacy to electricity industry data (domestic and international) when estimating productivity. Use comparable industry data as a sense check if necessary but not as a substitute;
- it should only include input based improvements. Changes in outputs, like the proportion of undergrounding, should be addressed as part of the output trend factors;
- do not place reliance on data that is highly volatile or not statistically significant;

- labour productivity should be calculated on a consistent basis/source as labour price growth; and
- assess the accuracy of historical forecasts compared to actuals to identify any bias.

Estimating productivity in accordance with these recommendations produces a more accurate range of -1.8% to 0.5% with two of the three measures negative.

Table 9: Summary of productivity growth estimates

Measure	Draft decision	AER method corrected	Endeavour Energy method
Opex PFP	1.6%	-1.1%	-0.7%
Undergrounding	0.5%	0.35%	N/A (output growth factor issue)
Time trend	0.5%	-0.3% (gas) to -1.8% (electricity)	-1.8%
Labour productivity	0.9%	0.5%	0.5%
Overall position	1.0%	-0.5%	-0.7%

Appendix 2 – Endeavour Energy's procedural concerns with the forecasting productivity growth draft decision

The Expenditure forecast assessment guideline (the Guideline) was published in November 2013. The Guideline outlined the AER's intended approach for reviewing, assessing and substituting (if required) an expenditure forecast. With respect to opex, it established the AER's preferred base-step-trend method and introduced a suite of new benchmarking techniques that the AER would have regard to.

As part of the trend component of the base-step-trend the AER outlined its preference to apply a productivity factor to capture any expected improvements in the efficiency frontier in forecast opex. Their reasons being[30]:

> *By including a productivity growth forecast that is consistent with the productivity growth observed in the industry, our opex forecast incorporates the expectation that an efficient and prudent distributor should achieve at least the same level of productivity growth as the frontier distributors. We consider such an opex forecast would reasonably reflect the opex criteria in the National Electricity Rules (NER).*

Generally, in determinations since the publication of the Guideline, a productivity factor of zero has been applied. This is because the best available evidence has consistently produced a negative productivity factor (i.e. if applied it would increase opex).However, some stakeholders have provided strong feedback to the AER as part of the NSW/ACT 2019-24 determination process that a (positive) productivity factor is required.

It appears this review has been triggered in response to this feedback. The inference in the review is that the AER is not changing its approach as set out in the Guideline, but is reconsidering the evidence previously used to arrive at a productivity factor of zero:[31].

> *It is important to note that we are not proposing a change in how we incorporate productivity growth in our approach to forecasting opex. We have not changed our view that we should include forecast productivity growth in our alternative opex estimate, and that forecast should reflect our best estimate of the shift in the productivity frontier. We have been forecasting zero productivity growth because we considered that to be the best estimate of productivity growth, not because we thought productivity growth should not be included from our alternative opex estimate.*

The AER have reviewed additional sources of information and changed how they interpret previously available evidence (i.e. the opex PFP averaging period). Our primary concern is that an information source previously relied upon to set productivity at zero is being re-interpreted and complemented with new additional sources late into the 2019-24 determination process to determine a positive productivity factor.

In our view, the available evidence continues to support a negative productivity factor. It is concerning that within a short space of time the AER will go from agreeing with this to finding that a positive productivity factor should now apply, based on the re-interpretation of the established opex PFP information and the selective introduction of previously unconsidered sources.

Businesses often go through cycles and productivity fluctuates with these ups and downs. A principled approach protects against cherry-picking and/or gaming by networks and the AER. It is becoming clear that in practice an asymmetrical approach is being applied in this review. To date, the AER have, in the interests of customers, decided not to apply a negative productivity factor. As it is becoming clear that the opex PFP is taking many

[30] AER, Forecasting productivity growth for electricity distributors, Draft decision paper, November 2018, p. 5
[31] AER, Forecasting productivity growth for electricity distributors, Draft decision paper, November 2018, p. 12

years to produce a positive productivity factor a new averaging period is selected and new information sources are examined.

It is proposed by the AER that the productivity growth forecast arrived at in this review will apply to all DNSPs in the upcoming round of determinations. It is critical that an accurate forecast is developed. An inaccurate or unreasonable estimate of productivity will distort a DNSPs' incentives and result in an opex allowance that does not satisfy the opex criteria or revenue and pricing principles. Proper and detailed consideration is required of the AER's new intended approach to forecasting productivity growth and a full opportunity for all stakeholders to respond and for their positions to be considered must be provided in order to comply with the requirements of procedural fairness.

Instead, consultation on the proposed new approach in this review has opened *after* our draft decision was published. A period of only six weeks has been allowed to provide this submission at a time when we are also preparing our revised regulatory proposal.

The consultation to date also lacks transparency. The draft decision paper is not accompanied by analysis from Deloitte or Economic Insights that would allow us to review the methodologies or statistical validity of the results. It also appears to be skewed to achieving an outcome that would satisfy stakeholders with all evidence reviewed suggesting a positive productivity factor when previously the opposite was true and agreed upon. There is no discussion of the costs and risks involved in achieving productivity improvements, international regulatory practice or the potential impact on a networks incentives. Overall, it does not appear there is scope for meaningful engagement.

This draft decision paper (if applied in the final decision) will materially change our forecast revenue allowance for the 2019-24 period. Our proposal was based on the AER's continuation of its existing approach to assessing and applying productivity growth. Our position that our proposed revenue allowance is sufficient and meets the NEO and RPP is based on a productivity factor of zero. Changing this assumption changes our position on these matters without any meaningful opportunity to explain why as part of our determination process.

The AER notes in the draft decision that DNSPs will be provided an opportunity on how the productivity factor should be applied in their specific circumstances. They explain[32]:

> *We intend to apply the opex productivity growth forecast approach determined in this review process to the electricity distribution regulatory determinations we will publish in April 2019. We will provide the relevant distributors an opportunity to submit their views on how we should apply the opex productivity growth forecast we determine to their specific circumstances. We will take those submissions into account in our final regulatory determinations for those distributors.*
>
> *Other distributors will be able to express their views on how productivity growth should be applied in their specific circumstances when they submit their regulatory proposals. We will take these views into account in our regulatory determinations for those distributors.*

It is clear that the opportunity to make submissions on how a productivity factor should be applied to a particular DNSP in a regulatory determination process is necessary. The timetable for this review included in the draft decision paper indicates that the final decision is proposed to be made in February/March 2019 with submissions on implementation by March/April 2019. On this timetable, Endeavour Energy may be given only a matter of days or weeks to respond before the AER's final 2019-24 determination is

[32] AER, Forecasting productivity growth for electricity distributors, Draft decision paper, November 2018, pp. 27-28

made. This will all occur well after our revised proposal is submitted and submissions on the AER's draft decision and our revised proposal close.

Further, the process will have followed on from a limited time to provide this submission in response to the draft decision paper, at a time when we are also preparing our revised regulatory proposal due in January 2019.

In these circumstances, proceeding with the approach and timetable outlined in the draft decision paper will result in a lack of procedural fairness.

We proposed a productivity factor of zero percent which was accepted by the AER in its draft decision (albeit contingent on the outcomes of this review). We have accepted this aspect of the draft 2019-24 determination in our revised proposal. It is neither reasonable nor fair to defer key matters of judgment to reviews that are finalised well after the regulatory determination consultation process has concluded. This does not provide us with an adequate opportunity to review and analyse the AER's final decision and make a submission on how the final productivity decision should then be applied in our circumstances.