Memorandum

From: Denis Lawrence **Date:** 19 February 2016

To: Toby Holder, AER

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Subject: Opex input price index weights

Economic Insights has been asked to review the report prepared by Frontier Economics (FE) titled *Review of AER's Preliminary Decision on opex input weights – A Report Prepared for CitiPower and Powercor Australia* dated December 2015. The FE report was submitted to the AER as an attachment to CitiPower's and Powercor's revised regulatory proposals. The FE report questions the reasons given by the AER for rejecting CitiPower's and Powercor's proposed input weights in favour of the AER's preferred weights of 62 per cent for the Electricity, gas, water and waste services sector (EGWWS) Wages Price Index (WPI) and 38 per cent for the Consumer Price Index (CPI).

There appears to have been some confusion on a number of fronts regarding the reasons for using the 62 per cent EGWWS WPI/38 per cent CPI combination for the opex price component of the rate of change formula. Consequently, we will commence by reviewing the objectives of the rate of change formula and the reasons the WPI/CPI combination has been used. We will then review a number of the specific issues raised by FE.

Background – the rate of change formula

As noted in Economic Insights (2014), the base–step–trend method for forecasting future opex requirements can be summarised as follows:

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

where:

- *rate of change*$_i$ is the annual percentage rate of change in year *i*
- A_f^* is the estimated actual opex in the final year of the preceding regulatory control period
- *efficiency adjustment* is an adjustment for the difference between efficient and estimated actual opex in the final year, and
- *step changes*$_t$ is the determined step change in year *t*.

Under this forecasting approach the product of the annual rates of change accounts for changes in real opex input prices (changes in opex input prices relative to changes in the consumer price index), output growth and opex partial productivity in the forecast regulatory control period. The rate of change can be summarised as:

$$\textit{Rate of change}_t = \textit{output growth}_t + \textit{real price growth}_t - \textit{productivity growth}_t \quad (2)$$

To put this another way, the rate of change rolls forward efficient opex (in real terms) according to changes in: distribution network service provider (DNSP) output – an increase in output will typically require additional opex; real opex price growth – an increase in opex prices relative to the CPI will require additional opex in real terms, all else equal; and, changes in opex partial productivity – an increase in opex partial productivity will reduce the amount of opex the DNSP requires to produce a given level of output.

To maintain logical consistency, the same specification of output needs to be used in the calculation of efficiency adjustments and the output growth and productivity growth components of the rate of change in the base–step–trend method. Similarly, the same specification of opex input prices needs to be used in the calculation of efficiency adjustments and the real price growth and productivity growth components of the rate of change in the base–step–trend method. It should be noted that the opex productivity growth component is usually calculated based on either extrapolation of past productivity trends or forecasts of future output and operating environment factors using relationships observed in the recent past – unless there is reason to believe circumstances will be different going forward to those observed in the recent past in which case simple extrapolation or use of past relationships will be inappropriate.

Implementation of the base–step–trend method requires us to divide nominal opex into its price and quantity components as accurately and consistently as possible. The efficiency adjustment and opex productivity growth components rely on estimates of the quantity of opex while the real opex price growth component relies on a measure of the opex price that is consistent with the quantity measure used in the efficiency adjustment and opex productivity growth components.

The challenge of consistently identifying the price and quantity components of opex

The majority of DNSP opex costs comprise labour costs (both direct and contracted). Remaining DNSP opex costs cover a wide range of intermediate inputs spanning operational consumables, office activities and professional services. Productivity studies have generally divided opex inputs into labour, materials and services components with separate price indexes for each used to deflate nominal values into quantities (or constant price series).

As we have noted on a number of occasions previously, it has become increasingly difficult to ascertain what the exact split between the labour component and the materials and services component of DNSP opex is with the move to greater (and varying) use of contracting out of field (and other) services by DNSPs. Similarly, DNSPs themselves are generally not able to identify the price and quantity components of their increasingly contracted out activities as they are only interested in the overall cost and it is up to the contractor how many resources they use, provided they meet the agreed service standards. However, to allow efficiency assessment and estimation of past opex productivity growth it is then necessary to estimate the split of opex into its price and quantity components.

The most detailed attempt to identify a representative price index for DNSP opex in Australia was undertaken by Pacific Economics Group (PEG 2004) using regulatory accounts data for Victorian DNSPs. Since the PEG study was undertaken the degree of contracting out of

DNSP opex activities has generally increased making it harder to accurately identify the price component of opex. PEG (2004, pp.13–14) described the process they adopted as follows:

> 'The process for developing an input price index for O&M was more complex [than that for capital inputs]. We began by considering the major sources of DBs' [Distribution Businesses'] operating and maintenance costs, as reported in the Regulatory Accounts. We then assigned what we believed was the most appropriate available price index from the ABS to the relevant O&M cost category. The mapping of price indexes to O&M cost categories is given below:

'O&M Cost Category	ABS Price Index
Meter data services	Producer price index (PPI) computer services
Billing and revenue collection	PPI computer services
Advertising/marketing	PPI advertising services
Customer service	PPI secretarial services
Regulatory	PPI legal services
Other operating	PPI business services
SCADA maintenance	PPI computer services
Network operating costs	Labor cost index
All other maintenance costs	Labor cost index

> 'We then constructed an overall O&M input price index as a weighted average of inflation in these subindexes. Weights were equal to the share of the O&M cost component in DBs' overall O&M cost components.'

Aggregating weights for each price index and allowing for changes in ABS price indexes associated with the introduction of the new National Accounts industrial classification in 2008, this produces the following composition of the opex price index:

- EGWWS WPI – 62.0 per cent
- Intermediate inputs – domestic PPI – 19.5 per cent
- Data processing, web hosting and electronic information storage PPI – 8.2 per cent
- Other administrative services PPI – 6.3 per cent
- Legal and accounting PPI – 3.0 per cent, and
- Market research and statistical services PPI – 1.0 per cent.

This is the opex input price specification used in the Economic Insights (2014) assessment of DNSP efficiency. Translating this to the conventional productivity study disaggregation of opex into labour and materials and services produces a labour share of 62 per cent and a materials and services share of 38 per cent. It should be noted that the EGWWS WPI covers the gamut of occupations observed in the EGWWS and so covers both field and office staff.

Subsequent to the PEG study, Economic Insights staff sought to verify the above labour share of opex. In work for the three Victorian gas distribution businesses information was requested on their estimated direct and indirect labour shares in opex (Economic Insights 2009, p.13). It is significant that only one of the three businesses was able to supply this information. The resulting estimate was consistent with the 62 per cent figure used by PEG (2004). The nature of gas distribution operations is broadly similar to that of DNSPs. Both are highly capital intensive with long–lived fixed structure assets transporting energy. Safety issues are critical

to both and both involve connecting transmission systems with a small number of large users and reticulating to a large number of small users. Customer service, maintenance and response functions are broadly similar across gas distribution and DNSP operations. This result, therefore, provides corroborating evidence for the above DNSP labour share of opex.

Just as the composition of the opex price index used in the real price component of the rate of change formula should be the same as that used in the efficiency assessment component of the base–step–trend method, then ideally the forecast of the opex price index should contain the same components as the index used for historic analysis. While forecasts of the EGWWS WPI are currently produced by a number of forecasters, forecasts of the disaggregated PPIs are not currently available and would be unlikely to be sufficiently robust. Consequently, the AER has used the CPI to escalate non–labour opex costs instead of disaggregated PPIs in recent determinations. A sensitivity analysis of the effect of using the CPI compared to the five disaggregated PPIs indicated no material difference in DNSP efficiency assessment results (Economic Insights 2014, p.14). This is in large part because aggregating the five PPIs using the relative weights listed above and the Fisher index method produces a non–labour price index which tracks the CPI closely. This indicates the CPI is likely to be a good proxy for the non–labour price component for forecasting purposes. Forecasts of the CPI are readily available from a number of forecasters.

Limited and widely varying current evidence available

The Victorian and South Australian DNSPs have supplied information indicating the current split of their opex between three broad categories: labour, contracts and other opex. An examination of this information provides a graphic illustration of the different operational practices and/or different reporting practices adopted by the DNSPs and the subsequent difficulties one would face trying to obtain robust and consistent information on the price each DNSP pays for its opex inputs using only this information. The shares of opex in labour reported across the six DNSPs range from 28 per cent to 54 per cent. The range of contracts shares reported is even larger spanning 8 per cent to 51 per cent and the range of other opex shares reported is similarly large spanning 3 per cent to 49 per cent.

The size of these ranges make obtaining accurate, consistent and reliable opex price indexes using DNSP–specific data problematic. An alternative approach would be to use aggregate shares obtained from the six DNSPs which produces a (direct) labour share of 43 per cent, a contracts share of 40 per cent and an other opex share of 17 per cent.

The next issue is how contracts should be allocated between a labour component and a materials and services component – noting that DNSPs generally claim to not have access to this information themselves. This could be addressed in a number of ways. Firstly, all contracts (both field–related and non–field–related) could be allocated to labour. This would produce an estimated labour share of opex of 83 per cent which is considerably higher than the 62 per cent currently used by the AER. Alternatively, all contracts could be allocated to material and services which would produce an estimated labour share of opex of 43 per cent – considerably lower than the 62 per cent currently used by the AER. Clearly, neither of these extreme assumptions is likely to be accurate.

The 62 per cent labour share currently used based on the PEG analysis is consistent with allocating half of the current aggregate contracts share to labour and half to other opex. In our

view it is reasonable to assume a 50/50 split of contracts between labour and other opex in the absence of more robust data from the DNSPs. At a minimum, the current assumed labour share of 62 per cent of opex is certainly consistent with the (widely varying) data reported by the DNSPs.

It is also important to recognise that the DNSPs have an incentive to argue that contracts should all be allocated to labour as the WPI (and other measures of labour prices) have generally increased faster than the CPI. In the current situation this would simply maximise the size of the future opex requirement the DNSP is allowed and not reflect an accurate disaggregation of future opex into its true price and quantity components. It would also not be consistent with the basis on which DNSP efficiency has been assessed.

Review of issues raised by FE

FE (2015b) raises a number of issues with the wording used in the AER's (2015) preliminary decision for CitiPower and Powercor and in Economic Insights (2015b). We review each of these issues below:

a) The distinction between field services and non–field services labour

FE (2015b, p.8) questions the distinction between field services staff used to deliver 'core' DNSP services and non–field staff used to deliver more generic back–office functions referred to in AER (2015, p.7–60) and Economic Insights (2015b, p.30). We agree with FE that this distinction has not proven to be helpful and does not fully reflect the process followed in arriving at the 62 per cent estimate for the labour share. The origin of this distinction comes from the allocation by PEG (2004) of the Labour cost index to the 'Network operating costs' and 'All other maintenance costs' opex components, as described above. However, these components will include a cost allocation for relevant overhead components as well as simply for field staff. Similarly, as noted above, the EGWWS WPI includes allowance for all occupations employed within the EGWWS and not just field staff.

We do, however, disagree with FE (2015b, p.iv) that the derivation of the estimated 62 per cent labour share is 'artificial and arbitrary'. On the contrary, as identified in the earlier sections of this memo, the derivation of this estimated share followed a structured and considered process, is corroborated by evidence from other energy distribution networks and is consistent with the most recent available evidence from the Victorian DNSPs.

b) The Regulatory Accounts data may not be consistent with the RIN data

FE (2015b, p.11) argue that there is no guarantee that the Essential Services Commission Regulatory Accounts data from which PEG derived its opex cost weights is consistent with the AER's current Regulatory Information Notice (RIN) data. While there will inevitably be differences between the two data sources, we are of the view that the weights derived from the earlier Regulatory Accounts provide the superior estimate of the labour share of opex. We have illustrated the problematic nature of attempting to derive estimates of the labour share using current DNSP reporting above. This problem arises from the high and varying degrees of contracting out used by DNSPs, DNSPs' lack of knowledge of the price and quantity disaggregation of their contracted out services and the incentives faced by DNSPs to maximise the reported labour share.

We also note that FE (2015a, p.xiv) criticised the Economic Benchmarking RIN data for an apparent lack of consistency, for example vegetation management expenses are not reported by all DNSPs. As noted in Economic Insights (2015a, p.9) the efficiency assessment undertaken in Economic Insights (2014) is specifically based on aggregate network services opex because disaggregated opex reporting by DNSPs is based on varying legacy state–based reporting requirements. Thus, while confidence can be had that aggregate network services will be consistent across DNSPs, varying state reporting regimes will each have different requirements for disaggregated opex reporting. In the example above, it is not that some DNSPs do not include vegetation management expenses in their reporting. Rather, some report it separately while others include it in different intermediate–level categories. Similar problems exist with attempting to obtain consistent disaggregated estimates of labour and materials and services opex components from the EBRIN data.

c) The AER is alleged to have stated that the productivity of contract non–field labour should not be included

AER (2015, p.7–60) states 'when we measure historic productivity growth we are interested in the productivity growth achieved by the service providers rather than the productivity growth achieved by contractors providing services that are not unique to electricity distribution'. FE (2015, p.12) has interpreted this as the AER suggesting 'that productivity improvements contributed by contract labour providing non–field services should be ignored'.

Firstly, we agree with FE (2015b, pp.12–13) that all sources of DNSP opex productivity are captured in the Economic Insights (2014) opex econometric cost function and productivity index analyses, regardless of whether they are from directly employed or contracted inputs used by the DNSP or from field or non–field activities. However, we believe FE has misinterpreted the point being made in AER (2015, p.7–60) quoted above. The wording used may have contributed to this misinterpretation so we will provide an example to illustrate the point the AER was making.

As noted at the outset of this memo, the objective of productivity and efficiency measurement is to divide key opex components used by the DNSP into their price and quantity components. The efficiency and productivity analysis proceeds by examining quantity relationships between outputs produced by and inputs used by the DNSP. Take the example where a DNSP purchases non–field services from a contractor and the quantity and price of the services it purchases does not change. If the DNSP's outputs delivered and the other inputs used by the DNSP also remain constant then the DNSP's productivity will not change. But if the contractor has been able to deliver those services to the DNPS with less labour (or any other input) then the contractor's productivity will have grown. However, the contractor's productivity growth is not reflected in the productivity change measured for the DNSP, at least not in the short run.

This is because what we are measuring for the DNSP is the quantity of services the DNSP uses – in this example this is the quantity of the output the contractor supplies which is in turn the input used by the DNSP. We attempt to measure this service quantity by deflating the cost of the service (or contract in this case) by the closest producer price index. If the contractor achieves productivity gains then his profits will increase in the short run. If the market for

these services is reasonably competitive then we would expect the price of the service to subsequently fall (or increase less rapidly). We would expect that to subsequently be reflected in a lower cost of the contract for the DNSP which would in turn be deflated by a lower PPI, leaving the quantity of the service used by the DNSP unchanged, assuming the DNSP has not achieved productivity gains in the use of the service itself. It was this situation that AER (2015, p.7–60) was referring to and drawing a distinction between the efficiency with which the DNSP uses contracted services versus the efficiency improvements the contractor might achieve in supplying the specified services in the short run.

Thus, while the AER's (2015, p.7–60) description of what it is interested in appears to have caused some confusion, this has no impact on the approach that has been adopted and the use of the preferred 62 per cent labour share of opex.

d) Auditing and CEO attestations remove the scope to misreport

FE (2015b, p.14) argues that the AER's requirement for EBRIN templates and bases of preparation to be audited and for DNSP CEOs to attest to the accuracy of the data supplied means the AER should be able to have confidence in the disaggregated opex reported by each DNSP – and presumably to use opex weights reported by each DNSP in forming the real opex price index. The problems with this proposition have been highlighted above where the Victorian and South Australian DNSPs have reported extreme variations in their labour, contract and other opex shares. While some of these variations may be due to different operational practices, the extreme size of the ranges indicates reporting differences are also playing a large part. And, as noted above, disaggregated opex reporting by DNSPs is on the basis of legacy state–based reporting which varies widely. There is also a range of disaggregation approaches that auditors may find acceptable. Confidence can only be had in the comparability of aggregate network services opex and not its reported components across DNSPs. Consequently, we are of the view that using the best available estimate of labour and non–labour shares of DNSP opex and applying these shares to all DNSPs remains the most robust and consistent approach available.

e) Weakened incentives to choose an efficient input mix

FE (2015b, p.14) notes that the AER may be reluctant to use a DNSP's own reported base year opex weights because it would provide an incentive for the DNSP to inefficiently alter its base year opex mix to secure higher future opex allowances. FE advances four arguments as to why it does not see this as a problem. We disagree with each of these arguments.

Firstly, FE questions the AER's (2015, p.7–63) argument that it cannot be assumed that a DNSP's reported opex weightings are efficient even if the AER's benchmarking has found the DNSP to be an efficient performer in terms of opex levels. FE argues that it 'does not make sense' that a DNSP could be found to be an efficient opex performer overall while also having an inefficient opex mix. However, the FE argument ignores the fact that the efficiency assessment is predicated on the specified opex price index which has a 62 per cent weight applied to the EGWWS WPI. It is technically possible that a DNSP could in fact be using (or reporting) a much higher share of an opex input whose price has increased less rapidly than, say, the WPI. If these weights were used in the efficiency assessment then the DNSP's estimated opex quantity would increase relative to the current assessment and the DNSP could then be found to be inefficient. This is because the same dollar value of opex is then

being deflated by a price index which has increased less rapidly and hence the quantity of opex has increased more rapidly than is the case in the current efficiency assessment. This would make the DNSP a less efficient opex performer – and perhaps an inefficient performer relative to other DNSPs – than is currently the case. We admit this scenario is unlikely to occur in practice but it is possible technically. What it does highlight is the need to use a consistent price index in the efficiency assessment and the opex real price growth component of the rate of change when applying the base–step–trend method.

FE goes on to argue that annual benchmarking by the AER and the use of benchmarking in price determinations creates a reputational incentive for DNSPs to be not seen as being inefficient. While benchmarking does encourage some degree of 'yardstick competition' among DNSPs, there is still scope to skew reporting of opex towards categories that are allocated faster growing price indexes going forward. As noted above, all else equal, there is an incentive for DNSPs to claim their contracts are all labour–related and that the faster growing WPI should be applied to all of contracts when logic would argue that contracts contain a mixture of labour and non–labour inputs. In other words, the issue is not necessarily the inflation of base year opex as FE suggests but, rather, the reported composition of base year opex. By using the best estimate available of the appropriate weights of labour and non–labour components of opex and applying these to all DNSPs, the incentive to skew either actual opex composition or, more likely, reported opex composition towards components with faster growing prices is removed.

FE's third argument is that the AER's Efficiency Benefit Sharing Scheme (EBSS) provides an incentive for DNSPs to not strategically alter the timing of achieving cost savings or to inflate base year opex. Again, this argument fails to recognise the distinction between the dollar value of opex and its composition. In fact, if DNSPs are able to influence the reporting of their base year opex's composition and skew it towards components with faster increasing price indexes this could lead to them being given a higher opex allowance going forward against which they could achieve higher savings going forward and hence achieve higher EBSS rewards. Again, these potential distortions can be avoided by using the best estimate of the labour share of opex available and applying this share to all DNSPs when calculating the opex real price growth component of the rate of change.

Finally, FE questions the AER's argument that DSNPs could game the system by using more than the efficient proportion of internal labour in the base year to maximise their price growth allowance going forward. FE argue that this overestimates the ease with which DNSPs can reallocate their labour between internal and contracted sources. While we recognise that there may indeed be costs in reallocating the actual composition of opex, there is much more scope to alter the reporting of the composition of opex so that reported opex is skewed towards the components with higher growing prices. The very wide range of reported labour and contracts shares for the Victorian and South Australian DNSPs are an illustration of the lack of consistency and 'grey areas' in current opex composition reporting. Again, application of the best estimate of the labour share of opex to all DNSPs in calculating the opex real price growth component of the rate of change removes incentives for distortion and gaming.

Conclusions

The FE (2015b) report has drawn attention to some unhelpful distinctions drawn between field and non–field labour in Economic Insights (2015b) and AER (2015) and to descriptions of opex productivity measurement in AER (2015) which have been subject to some misinterpretation. However, these issues do not change the case for using the best available estimate of the labour and non–labour component weights of opex in calculating the opex real price growth component of the rate of change, applying these weights to all DNSPs and ensuring these weights are consistent with those used in the econometric and index number modelling of opex efficiency.

In this memo we have set out:

- the basis of the estimates of opex weights for labour and non–labour components of opex currently used in our econometric and index number DNSP efficiency assessments and used by the AER in forming its forecasts of opex real price movement over the next regulatory period
- why these estimates are still currently the best available and how they are consistent with the widely varying reported information currently available from the Victorian and South Australian DNSPs, and
- why there needs to be consistency between the opex price index used in efficiency and productivity assessments and in the real price growth component of the rate of change formula.

We have also discussed how using DNSPs' reported opex weights would provide an incentive for DNSPs to shift the reported composition of opex towards those components with the fastest growing price. FE confuses the distinction between the overall level of opex and the reported composition of opex in its arguments regarding incentives. By using the best estimate available of the appropriate weights of labour and non–labour components of opex and applying these to all DNSPs, the incentive to skew either actual opex composition or, more likely, reported opex composition towards components with faster growing prices is removed.

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