Nuttall Consulting

Regulation and business strategy

Scale escalation advice sought -
Nuttall Consulting comments

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to the AER

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29 October 2010

1.1 Advice to the AER on Opex Scale Escalation

The following comments are provided in response to specific questions from the AER in relation to the application of opex scale escalators.

1.1.1 Proxy weightings

Intuitively it seems reasonable to provide some sort of weighting system for the proxy elements. There are significant scale differences (volume and value) in the assets that contribute to line length and transformer capacity/numbers.

The RAB value of line components is substantially higher than the overall value of distribution or zone substation transformers, although this difference would lessen when distribution and zone substation components (aside from the transformers) are considered.

However, RAB value is not directly reflective of attributable opex. As SP AusNet points out, it runs distribution transformers to failure. This statement is a little simplistic as it ignores the inspections and tests that the DNSPs undertake in relation to distribution substation related assets such as switches, surge diverters, etc. In other words, the whole-of-life opex attributable to a particular class or group of assets may vary considerably from a different class or group.

It would require a reasonably detailed set of data and further analysis to accurately determine the whole-of-life opex attributable to each asset group or class. As noted in the draft paper provided, the overall value of this sort of analysis may be limited as this figure is intended for use as a proxy, not a forecasting model.

In addition, the use of a simple weighting would provide a mechanism that is easier to replicate and provide the DNSPs with a degree of certainty in forecasting future revenue.

The proposed use of capex spend to determine the proxy weightings would result in more significant changes to the weightings between periods than a weighting based on asset values. As the assets are typically long-life assets and exist in significant volumes, the changes in opex levels from year to year are not likely to fluctuate wildly. The proxy weighting should reflect the stable nature of the asset related opex – suggesting that an asset value based weighting is preferable over a proportion of capex spend.

As noted above, the value of an asset does not directly impact the opex that is attributable to it. Some of the cheapest assets may attract the greatest level of opex (noting the capex-opex trade-off).

The DNSPs may consider that it is in their interest to provide information that relates opex to each of specific proxies to create DNSP specific proxy weightings.

This may provide a more accurate picture of the real impact of the assets that are used as proxies, but may also result in different proxy weightings for each DNSP[1].

1.1.2 Growth rates of proxies

The AER is considering the use of the growth rate of the following proxies to set opex escalation for the subsequent regulatory periods.

- Customer numbers
- Zone substation capacity
- The number of distribution transformers
- Line length

The advantages and disadvantages of each factor are considered in the tables below.

Table 1 - Customer Numbers

Pros	Cons
• Simple measure	• Not directly attributable to assets and asset related opex
• Clearly defined and consistently reported	• Does not account for use of spare capacity
• Already assessed as part of EDPR	• Does not recognise the differing types of customers (hospital vs domestic)
• Well aligned to IT opex as well as meter and service related expenditures	• DNSPs may have an incentive to inflate customer number projections compared with energy forecasts.
• Good historical information for trending and comparisons	•

The historical use and consistent definitions of this measure suggest it as valuable for this form of proxy. The lack of a direct link with asset related opex is a negative, although this measure does align better with overheads and non-direct opex than other measures.

Table 2 - Zone substation capacity

Pros	Cons
• Moderately simple to measure and report	• Does not recognise capacity that is not required (e.g. excess to demand)
• Directly attributable to a major asset class	• Requires good definition to ensure consistency and comparability of data
• Typically provided as part of the EDPR process	• Not well aligned to non-network related capex
• Ability to cross-check capacity with demand forecasts	• DNSP forecasts of zone substation completion dates have historically been optimistic

[1] Consistent with the opex criteria (NER 6.5.6(c)(2))

• Good historical information for trending and comparisons	• Possible to increase zone substation capacity without significant change to opex.

It is conceivable that zone substation capacity could be increased without a commensurate requirement for additional opex. However overall this is a reasonable measure and is more representative than the "number" of zone substations.

Table 3 - The number of distribution transformers

Pros	Cons
• Moderately simple to measure and report	• Does not recognise capacity that is not required (e.g. excess to demand)
• Directly attributable to a major asset class	• Requires good definition to ensure consistency and comparability of data
• Ability to cross-check capacity with demand forecasts	• Not well aligned to non-network related capex
• Reasonable historical information for trending and comparisons	• Wide variety and scale of distribution substations may mean this measure requires different DNSP weightings

There is a very broad range of distribution transformer installations. Rural settings require the use of very small units (e.g. 25kVA) that can be installed on an existing pole line. High density urban and commercial environments may require large indoor units (e.g. 2 x 1000kVA). The ongoing opex associated with these two different examples are also significantly different. This suggests that the measure may require different weightings for different DNSPs where the respective incremental opex can be shown to vary materially.

The use of the "number" of distribution substations (rather than capacity) is considered reasonable in the instance of distribution transformers. Particularly as rural DNSPs have an obligation to supply and minimum standard transformer sizing may often see capacity installed that is not necessarily required by the consumer.

Table 4 - Line length

Pros	Cons
• Directly attributable to a number of major asset classes – poles, cables, crossarms, conductor, etc.	• Differing opex associated with overhead and underground lines may mean this measure requires different DNSP weightings.
• Moderately simple to measure and report	• Some variations in historical DNSP data that may require review
• Reasonable historical information for trending and comparisons	• Not well aligned to non-network related capex
• The relationship between new lines and vegetation management is an	•

important consideration

Overall this appears as the single measure that is most representative of the value/volume of network assets installed and is therefore closely related to future opex requirements.

Vegetation management is a substantial opex item for all DNSPs. New lines will typically be constructed with consideration of future vegetation management. Underground construction will avoid future vegetation management requirements (in most circumstances). Vegetation may regrow, or new vegetation seeded/planted that will impact the lines in future years. However, this would not typically represent an efficient design if it were to be a significant factor within 5 years of the construction of the new line.

1.1.3 Summary on growth rate proxies

The range of proxies identified through the draft determination and DNSP submissions[2] represents a reasonable selection of growth rates. Individually, each of the proxy measures has advantages and disadvantages. The use of four proxy measures improves the overall consistency of the measures and reduces the impact of variability in any one measure.

It is feasible that other measures may perform equally well. However, the historical information associated with the selected measures and the familiarity of the DNSPs with the measures suggests a more efficient implementation and less administration impact on the DNSPs.

1.1.3.1 Scale efficiencies

To assess the true opex cost of a new asset (compared to the average asset group) it would be necessary to obtain factual records from the DNSPs as to the respective costs for each of the major opex categories:

- Operating expenditure
- Routine maintenance
- Condition based maintenance
- Emergency maintenance

To date the companies have predominantly responded with qualitative information on this issue and have not provided substantive figures to support their positions.

This categorisation of opex highlights an important aspect raised by SP AusNet in its revised submission – the bathtub curve. In addition to opex increasing as an asset ages, this curve recognises an increased level of emergency repair and restoration activity early in the life of an asset.

The bathtub curve is an accepted theory of asset management and well supported in literature. Most representations of the bathtub curve are focussed on the costs

[2] Including resubmissions

of failure or emergency repair, rather than the overall costs of operating and maintaining the asset. The costs associated with early-life failure may well be mitigated by the reduced maintenance, inspection and rehabilitation costs that are typical of a new asset. For example; new assets are often excluded from inspection and maintenance programs for a significant period of their early lives (e.g. 5 to 15 years[3]).

A more detailed analysis of this issue may be warranted.

SP AusNet reported approximately 33% of maintenance expenditure in the current period related to emergency maintenance. This equates to approximately a quarter of total period opex when operating expenditure is included. SP AusNet have also identified that over half of emergency maintenance expenditure relates to external triggers. This means that less than 13% of opex relates to asset related faults and only a portion of this would directly relate to early-life failure.

In comparison, routine and condition based maintenance expenditure accounts for 67% of SP AusNet's maintenance expenditure in the current period and 50% of opex. This crude analysis suggests that the impact of reduced routine and condition based maintenance for new assets may significantly outweigh the costs associated with early-life failure rates.

The DNSPs are well placed to provide more accurate assessments of the relative early life costs of new assets. However, it would be reasonable to assume that new assets require less opex than the average.

The following table provides a summary of the considerations and preliminary views provided to Nuttall Consulting by the AER. The right-hand column provides Nuttall Consulting's comments on these positions.

Table 5 – Summary of preliminary views

AER Considerations	Nuttall Consulting Comments
• AER approach to capex/opex trade-off in the draft decision - the RQM capex program provided for the replacement of 'old assets' and as a result the rate of growth of older assets within a DNSP's asset base will not increase beyond what is in the base year 2009 (removes the argument that additional opex is required for aging assets). The weighted average remaining life is not relevant so long as the proportion of older asset requiring increased maintenance is no larger than in the base year.	It is fairly safe to state that operating and maintenance costs increase as an asset ages[4]. If I understand correctly, the assumption here is that mid-life assets (exact age grouping not defined) have a relatively stable spend and that costs increase towards the end of life of the asset. This position is certainly supported in some of the literature and examples that I have reviewed, but may be open to dispute (i.e. that O&M costs increase continually over the life of the asset). If it can be proven that costs increase continually over the life of the asset this position may not be supported.

[3] Jemena commences the inspection of poles 15 years after installation – ref: POLES, LIFE CYCLE MANAGEMENT PLAN, DOCUMENT No.: UE 4356-102, Page 8.
[4] Noting the early-life failures associated with new assets.

	The DNSPs have historically argued that WARL is directly related to O&M costs.
• The proportion of replaced assets in the asset base is increasing (growth in replacement exceeds growth rate of asset base) and maintenance requirements should decline (applied PB model used in the draft decision for ETSA but subsequently removed for the final as ETSA incorporated the trade-off in an age escalation model)	As per the above discussion. Anecdotally, I believe that the AER position (as described on the left) is more representative of reality. Older assets certainly contribute more to increasing opex. However, I have not seen factual information that would support this. I would be more comfortable if we could show that growth + replacement >= aging (i.e. WARL stable or declining). Note: Some capex associated with growth actually replaces existing assets. We requested information from the DNSPs on this issue in the original RIN addendums, but the responses were not adequate to form a view.
• The AER's draft decision points to generally accepted view that an increasing rate of replacement should reduce maintenance effort all other things being equal. However this is not what is being suggested by the DNSPs qualitative arguments (eg. bathtub and aging asset base) and their data submissions (only 5% economy of scale for maintenance).	Summarising above; 1. The impact of early life failures is likely to be mitigated by reduced maintenance 2. The WARL/aging asset base argument has been used for a number of years now and would require substantive information to disprove.
• **Preliminary view (response to AER adjustments in table J.9 of the draft decision)**	
• Emergency maintenance; If we assume that -	
o the RQM program is maintaining the proportion of 'older assets' at levels consistent with the base year 2009 [check]	Agreed, but suggest evidence is required to support this position.
o the bathtub effect presents an increased probability of failure, however the actual maintenance expenditure (net of warranties) should still be significantly less than the maintenance costs per asset for assets in their 'normal' life-cycle. The issue of risk mitigation is for insurance/self-insurance.	Agreed as per above discussions.
• Conclusion is that economies of scale still exist. An economy of scale factor of zero (0%) still retains the maintenance	Anecdotally, this appears correct, but the lack of supporting evidence and the historical treatment of WARL makes this hard to prove.

level at the base year. As RQM is providing for an aging asset base the only increase in emergency maintenance required is for exogenous events and 'bathtub' effect	
• An economy of scale factor of 45% provides for maintenance of failures due to exogenous events and bathtub effect considered under capex/opex trade-off (see below)	Is there a way we can tie this to historically revealed expenditures?
• Condition-based maintenance also involves routine inspection costs and repairs that follow from such inspections. The contributor to faults is also exogenous events such as weather and animals.	Agreed, although I would have thought that faults are captured in the emergency maintenance category.
• If we assume that new assets are inspected as frequently as existing assets:	Refer to discussion above – new assets often have a honeymoon period from inspections and minor maintenance programs.
o defects caused by wear and tear / asset performance will be lower for new assets	Agreed
o the incremental inspection costs (which are predominantly labour according the CitiPower - p214) will be lower for urban infill / brownfield developments	Cannot locate this reference. There are arguments both ways for brownfield development inspections costs.
o defects caused by exogenous events comprise approximately 50% of interruptions (see table J.9 of the draft decision)	Agreed.
• conclusion is that economies of scale still exist and agree to reduce the economy of scale factor from 75 per cent to 45 per cent to align with emergency maintenance and findings regarding proportion of interruptions from asset defects and exogenous events	Agreed – noting the above caveats.

1.1.3.2 Vegetation control, insulator washing and bushfire mitigation

Best practice for the installation of new powerlines includes considering the financial impact of recurrent vegetation management.

Most Australian DNSPs will require landowners to establish a clearance zone for new overhead electrical lines on their properties[5]. Developers who establish

[5] Powercor – Requirements for new Powerlines – Vegetation Clearing – March 2007 and Western Power - Application for Supply Extension Scheme 14/3/2007.

industrial, commercial or residential developments are also required to clear vegetation away from any overhead lines within the development (if not placed underground).

When planning construction of a new powerline, DNSPs will typically ensure that the route of the line avoids unnecessary and recurrent clearing and pruning of remnant vegetation, and where practicable, vegetation species suitable for growing near the powerlines are not removed[6].

New lines in CBD and urban areas are becoming progressively harder to construct overhead due to community expectations and clearance requirements. The majority of these lines are now constructed underground.

ABC has been used in areas where trees were a concern. The impact of the line clearance regulations changes may have an impact in this area.

In summary, the requirements for vegetation management of new lines in the next regulatory period will be significantly less than existing lines.

[6] Energex - code of practice for powerline clearance around vegetation - Version 1, 6 October 2004