Issues paper

AER review of repex modelling assumptions

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AUSTRALIAN ENERGY REGULATOR

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Shortened forms

Shortened form	Extended form
AER	Australian Energy Regulator
capex	capital expenditure
NEL	National Electricity Law
NEM	National Electricity Market
NEO	National Electricity Objective
NER	National Electricity Rules
RAB	regulatory asset base
repex	replacement expenditure
RIN	Regulatory Information Notice

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1 About this issues paper

This issues paper seeks comments from stakeholders on a series of assumptions that underpin the Australian Energy Regulator's (AER) replacement expenditure (repex) model. Through this engagement process, we hope to help the industry to better understand the AER's repex model, including how it is applied during distribution determinations. We also hope that more informed users of the repex model will mean more certainty about the likely repex modelling outcomes and more consistent treatment of repex data, promoting regulatory certainty.

The AER's repex model is a statistical tool used to assess electricity distributors' forecast replacement expenditure for future regulatory control periods. It has been applied in all electricity distribution decisions since 2011.

The repex model was also referred to as a capital expenditure assessment technique in the AER's Better Regulation Guideline[1]. Alongside the Guideline, we published a repex model handbook to provide background and explain the workings of the repex model.[2]

Since the release of the repex model handbook, there has been further refinements to the AER's repex model, which have been applied in more recent decisions.[3] Following on from the 2018 determinations and general discussion with industry, we understand there is interest for further clarification and discussion around a number of repex modelling assumptions.

This issues paper describes and seeks industry feedback on specific modelling assumptions. At this stage, we are seeking comments on these specific modelling assumptions. Other assumptions outside the scope of this issues paper, especially those that may require more intensive industry discussion, such as changes to Regulatory Information Notices (RIN), are intended to be addressed at a later time. While a number of issues may be out of scope, this issues paper requests industry comments on any other modelling assumptions requiring clarification that can be addressed in a subsequent review.

1 As noted in that Guideline, the AER may amend the Guideline including information requirements for the repex model from time to time in accordance with its requirements of the NER. See AER, *Better Regulation Guideline: Expenditure Forecast Assessment Guideline for Electricity Distribution*, November 2013.

2 AER, *Electricity network service providers - Replacement Expenditure model handbook*, November 2013.

3 Ausgrid, Endeavour, Essential, Evoenergy, Power and Water and TasNetworks' 2019–24 Determinations. See AER, *Distribution Determination 2019 to 2024 - Attachment 5 Capital Expenditure - Repex modelling approach*, September 2018.

2 Invitation for submissions

Written submissions from interested stakeholders are invited by 7th October 2019. We will consider all submissions received by that date. Submissions should be in Microsoft Word or another text readable document format. Submissions should be addressed and sent to: repexdevelopment@aer.gov.au

Chris Pattas
General Manager – Distribution
Australian Energy Regulator

We prefer that all submissions are publicly available to facilitate an informed and transparent consultative process. Submissions will be treated as public documents unless otherwise requested. All non-confidential submissions will be placed on our website.[4] Parties wishing to submit confidential information should:

- clearly identify the information that is the subject of the confidentiality claim; and
- provide a non-confidential version of the submission in a form suitable for publication.

Consultation process

Following the review of all written submissions, we will provide an explanatory note setting out our position the repex modelling assumptions discussed in this paper. Our intention is to provide this explanatory note in November 2019. In addition, we intend to apply any refinements decided in this review process in our determinations for each electricity distributor, starting with the determinations in April 2020.

Table 1 Indicative consultation timeframes

Key steps	Indicative dates
Publish issues paper	26 August 2019
Submissions	7 October 2019
Publish explanatory note	November 2019

4 For further information regarding our use and disclosure of information provided to us, see the ACCC/AER Information Policy (June 2014), which is available on our website: https://www.aer.gov.au/publications/corporate-documents/accc-and-aer-information-policy-collection-and-disclosure-of-information.

3 Background

The AER works to make all Australian energy consumers better off, now and in the future. We regulate energy networks in all jurisdictions except Western Australia. We set the amount of revenue that network businesses can recover from customers for using these networks.

The National Electricity Law and Rules (NEL and NER) provide the regulatory framework governing electricity distribution networks. Our work under this framework is guided by the National Electricity Objective (NEO):[5]

"…to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to—

(a) price, quality, safety, reliability and security of supply of electricity; and

(b) the reliability, safety and security of the national electricity system."

At a revenue review, a regulated business proposes a total revenue amount it considers reflects its forecast of the efficient cost of providing network services over a specific regulatory control period. Our assessment of a distributor's proposed revenue proposal under the NEL and NER is based on a 'building block' approach to determine a total revenue allowance that comprises several cost components. One of these components is the return on the regulatory asset base (RAB), or return on capital, to compensate investors for the opportunity cost of funds invested in this business.

Capex is added to a distributor's RAB, which is used to determine the return on capital and return of capital (regulatory depreciation) building block allowances. All else being equal, higher forecast capex will lead to a higher projected RAB value and higher return on capital and regulatory depreciation allowances.

In assessing forecast capital expenditure, we are guided by the NEO and underpinning capex criteria and objectives set out in the NER. These criteria outline that a distributor's capex forecast must reasonably reflect the efficient costs of achieving the capex objectives, the costs that a prudent operator would require to achieve the capex objectives, and a realistic expectation of customer demand and the cost inputs required to achieve the capex objectives.[6] The capex objectives relate to a distributor's ability to comply with regulatory obligations and maintain the quality, reliability and security of supply of standard control services.[7]

We must accept a distributor's capex forecast if we are satisfied that the total forecast for the regulatory control period reasonably reflects the capex criteria. If a distributor is unable to demonstrate that its proposal complies with the capex criteria and objectives,

5 NEL, s. 7.
6 NER, cl. 6.5.7(c)(1).
7 NER, cl. 6.5.7(a).

the NER require us to set out a substitute estimate of total capex that we are satisfied reasonably reflects the capex criteria, taking into account the capex factors.[8]

3.1 The AER's repex model – an assessment tool

In coming to our position on whether a distributor's proposed capex is consistent with the capital expenditure criteria,[9] we generally have regard to several factors where that information is available. For capex proposed as repex, the outcomes of the AER's repex model are used to advise and inform us where to target a more detailed bottom-up review and assist us to determine a substitute estimate if necessary. We can also use the model to compare a distributor against other distributors in the National Energy Market (NEM).[10]

In our most recent decisions, we engaged with the relevant distributors during the pre-proposal stage and during the review period to discuss the preliminary repex modelling findings. We found this engagement process to be a useful talking point. The remainder of this section provides a short description of some key features of the repex model. A more comprehensive discussion is provided in Appendix D of Attachment 5 of our 2018 and 2019 decisions.

3.1.1 Forecasting using the repex model

Our repex model is a statistical model that forecasts asset repex for various asset categories based on their condition, unit costs and expected asset replacement lives. We only use the repex model to assess forecast repex that can be modelled. This typically includes high-volume, low-value asset categories and generally represents a significant component of total forecast repex.

The repex model forecasts the volume of assets in each category that a distributor would expect to replace over a 20-year period. The model analyses the age of assets already in commission and the time at which, on average, these assets would be expected to be replaced, based on historical replacement practices. We refer to this as the calibrated expected asset replacement life. We derive a total replacement expenditure forecast by multiplying the forecast replacement volumes for each asset category by an indicative unit cost.

Calibration

As noted above, the calibration process estimates the average age at replacement for each asset category using a distributor's observed historical replacement practices. The calibrated expected asset replacement lives as derived through the repex model may differ from the replacement lives that distributors report.

The length of the historical period analysed during this process is referred to as the ‘calibration period’. The inputs required to complete the calibration process are:

8 NER, cl. 6.12.1(3)(ii).
9 NER, cl. 6.5.7
10 This includes Power and Water Corporation.

the age profile of network assets currently in commission; and

historical replacement volume and expenditure data for each asset category.

Our current repex model approach produces repex forecasts for four scenarios. Previous distribution determinations where we have used the repex model have primarily focused on a 'historical scenario'. This scenario forecasts a distributor's expected repex and replacement volumes based on its historical unit costs and asset replacement practices (which are used to derive expected asset replacement lives).

Our refined comparative analysis repex modelling approach builds on this previous analysis and introduces the historical performances of other distributors in the NEM and compares these with a distributor's repex forecast.

Comparative scenario analysis

Our repex modelling approach analyses four scenarios that consider both a distributor's historical replacement practices and the replacement practices of other distributors in the NEM. The current approach builds on our assessment in previous determinations by considering intra-industry comparative analysis for unit costs and expected asset replacement lives. The four scenarios analysed are:

1. historical unit costs and calibrated expected replacement lives
2. comparative unit costs and calibrated expected replacement lives
3. historical unit costs and comparative expected replacement lives
4. comparative unit costs and comparative expected replacement lives.

Comparative unit costs are the minimum of a distributor's historical unit costs, its forecast unit costs and the median unit costs across the NEM. Comparative replacement lives are the maximum of a distributor's calibrated expected replacement life and the median expected replacement life across the NEM.

The 'cost', 'lives' and 'combined' scenarios rely on a comparative analysis technique that compares the performance of all distributors in the NEM. The technique analyses the two variable repex model inputs – unit costs and expected replacement lives.

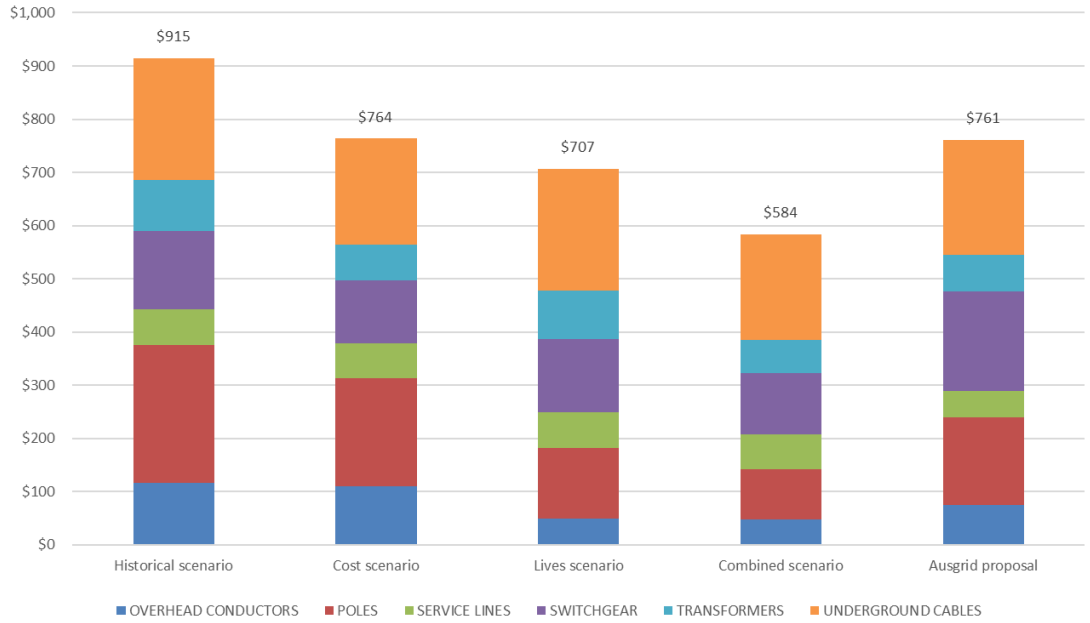
The 'cost scenario' analyses the level of repex a distributor could achieve if its historical unit costs were improved to comparative unit costs. The 'lives scenario' analyses the level of repex a distributor could achieve if its calibrated expected replacement lives were improved to comparative expected replacement lives.

Repex model threshold

For the most recent decisions, our approach has been to set the repex model threshold equal to the higher result out of the 'cost scenario' and the 'lives scenario'.[11] Figure 3-1 illustrates the repex modelling results for one of the 2019–24 determinations, where the repex modelling threshold was equal to the cost scenario.

[11] Our modelling approach means the 'historical scenario' will always be higher than the 'cost scenario' and the 'lives scenario', and the 'combined scenario' will always be lower than the 'cost scenario' and the 'lives scenario'.

Figure 3-1 Repex modelling results for one of the 2019–24 network determinations - ($m, $2018–19)



This approach considers the inherent interrelationship between the unit cost and expected replacement life of network assets. For example, a distributor may have higher unit costs than other distributors for particular assets, but these assets may in turn have longer expected replacement lives. In contrast, a distributor may have lower unit costs than other distributors for particular assets, but these assets may have shorter expected replacement lives.

4 Assumptions in review

In response to this issues paper, we are seeking industry comments on three specific modelling assumptions. Stakeholders are also encouraged to provide suggestions on other assumptions that may be reviewed at a subsequent process.

4.1 Limiting asset replacement lives

Our repex model currently does not automatically set upper and lower bounds on distributors' historical or calibrated expected asset replacement lives. During the 2019–24 resets, we and some distributors observed unrealistically high or low expected asset replacement lives for some asset categories, for example where a distributor undertook a relatively small number of replacements during an historical period compared with its reported asset population.

Setting bounds on these high and low expected asset replacement lives is likely to produce a more reasonable reflection of the average expected replacement lives and more accurately reflect distributors' practices. Our approach during the 2019–24 resets was to respond to any outliers, data discrepancies or unrealistic results on a case-by-case basis.

Good examples of our case-by-case approach were highlighted in the Evoenergy[12] and Ausgrid[13] draft and final decisions. For example, in Evoenergy's 2019–24 determination, we initially inferred a 100 years for its high-voltage underground cables based on the data before us. However, in its revised proposal, Evoenergy provided additional information, which inferred a replacement life of 87 years. We are interested in stakeholder comments on whether retaining this case-by-case approach is preferred or if a more standardised approach for limiting asset replacement lives would be preferred. Any expected asset replacement life bounding approach should have both asset management and statistical merit, rather than purely considering assets' technical design lives.

We are seeking industry comments on the following questions, or any other issues that relate to limiting asset replacement lives. If possible, we encourage stakeholders to provide examples or analysis that would support the proposed opinion or position.

Question 1: Do you consider that setting defined maximum and minimum expected asset replacement lives would improve the forecasting accuracy of the repex model?

Question 2: What do you consider would be the preferred approach to setting maximum and minimum expected asset replacement lives, including supporting engineering and statistical evidence?

12 AER, Evoenergy – Determination 2019–24 – Draft and final decisions – Attachment 5 (capital expenditure), September 2018 and April 2019.

13 AER, Ausgrid – Determination 2019–24 – Draft and final decisions – Attachment 5 (capital expenditure), November 2018 and April 2019.

Question 3: Is the current approach of addressing these concerns on a case-by-case basis sufficient, as we have done for previous decisions? If not, why not?

Question 4: Do you consider that there are any other elements we need to consider should we limit expected asset replacement lives?

4.2 Calibration period

We use a distributor's recent past replacement practices to estimate the expected asset replacement lives in order to forecast repex. In doing so, we have regard to changes in legislative obligations or other factors that might affect our analysis. This has resulted in using different calibration periods (years) for different distributors.

For example, we used three regulatory years for the NSW draft decisions, as this took into account the change in reliability standards. For the NSW final decisions, we used four years for our calibration period, as the data for the fourth year of that regulatory control year became available. We used five regulatory years for our draft and final decisions for TasNetworks and Evoenergy, as the five years were most representative of future replacement requirements.

We are seeking industry comments on the following questions or any other issues that relate to the calibration period assumption. If possible, we encourage stakeholders to provide examples or analysis that would support a proposed opinion or position.

Question 5: Do you consider that there is a better approach to selecting the calibration period?

Questions 6: Are there any issues with the current approach to select the calibration period?

Question 7: What other issues or factors should we take into account when determining the calibration period?

Modelling wooden poles

The repex model mainly assumes that repex is incurred on a like-for-like basis. When an asset is identified for replacement, the repex model typically assumes that the asset will be replaced with its modern equivalent and not a different asset.[14] The repex model forecasts the volume of old assets that need to be replaced, not the volume of new assets that need to be installed. This is simple to deal with when an asset is replaced on a like-for-like basis – the old asset is simply replaced by its modern equivalent.

However, where old assets are commonly replaced with a different asset, we cannot simply assume the cost of the new asset will match the cost of the old asset's modern equivalent. In addition, we cannot simply assume that the age at which a distributor should "intervene" on the asset would be the same as it would be under a like-for-like replacement.

[14] For example, conductor rated to carry low-voltage will be replaced with conductor of the same rating, not conductor rated for high-voltage purposes.

These circumstances are particularly relevant to wooden pole replacements. Wooden poles are often staked as a low-cost option, rather than replaced. Staking is the practice of attaching a metal support structure (a stake, nail or bracket) to reinforce an aged wooden pole.[15]

Our repex model treats staked wooden poles differently to unstaked poles. This is because staked and unstaked poles have different expected replacement lives and different unit costs. To address the different expenditure options, we have previously asked distributors for additional staked pole replacement and pole staking data over the calibration period. Where this information is not available, we estimate the number of staked wooden poles replaced over the calibration period based on the data we have available.

For unstaked wooden poles that need to be replaced, there are two appropriate unit costs – the cost of installing a new pole and the cost of staking an old pole. We use a weighted average, using the proportion of replacement and the proportion of staking, and the unit cost of pole replacement and the unit cost staking, to arrive at this blended unit cost.[16] Where this actual data is not available, we again estimate the replacement and staking proportions based on the data we have available.

We are seeking industry comments on the following questions. If possible, we encourage stakeholders to provide examples or analysis that would support a proposed opinion or position.

Question 8: Is our current approach to forecasting repex for wooden poles clear and appropriate based on the information available? If not, why not?

Question 9: What are your views on the appropriate estimation method for wooden pole staking or replacement volumes when the required data is not available?

Question 10: Are there any other approaches that could be applied to reasonably forecast repex for wooden pole asset categories?

4.3 Excluded asset categories

For our most recent determinations, our repex modelling approach has excluded asset categories which have been reported by three distributors or less from our scenario modelling. This approach ensured that asset categories which cannot be meaningfully compared to other distributors, on unit costs or expected replacement lives, are not included in the repex modelling threshold. For example, for one of the 2019–24 determinations, we have excluded 132 kV underground cables from our repex modelling scenario analysis, as only two distributors reported repex for this asset category. The same logic applied for unique assets such as fibreglass poles,[17] as we

15 The equivalent practice for stobie or steel poles is known as "plating", which similarly provides a low-cost life extension.

16 For example, if a distributor replaces a category of pole with a new pole 50 per cent of the time and stakes this category of the pole the other 50 per cent of the time, the blended unit cost would be a straight average of the two unit costs. If the mix was 60:40, the unit cost would be weighted accordingly.

17 AER, *Draft Decision - Evoenergy Distribution Determination 2019–24 - Attachment 5 - Capital Expenditure*, September 2018, p.54.

did not consider that they could be meaningfully compared to any other poles category, such as concrete, steel or wood. We included these asset categories in our unmodelled repex analysis and assessed the forecasts using bottom-up and other analytical techniques.

We are seeking industry comments on the following questions or any other issues that relate to the excluded asset categories. If possible, we encourage stakeholders to provide examples or analysis that would support a proposed opinion or position.

Question 11: Do you consider the assumption and rationale underpinning the exclusion of unique assets is clear and appropriate based on the information available?

Question 12: Are there other any approaches that could be applied to reasonably model excluded asset categories, while incorporating a level of benchmarking?

4.4 Other issues

We encourage stakeholders to outline any other issues out of scope of this review. While we will not be addressing these in this review, it will be constructive for the purposes of the next forum. We also understand that some key areas of discussion relate to the Category Analysis RIN. We therefore may consider these other repex issues at a later date.

Question 13: What other repex model issues outside the scope of this review should the AER consider in future repex model reviews or forums?

5 Questions

Question 1: Do you consider that setting defined maximum and minimum expected asset replacement lives would improve the forecasting accuracy of the repex model?

Question 2: What do you consider would be the preferred approach to setting maximum and minimum expected asset replacement lives, including supporting engineering and statistical evidence?

Question 3: Is the current approach of addressing these concerns on a case-by-case basis sufficient, as we have done for previous decisions? If not, why not?

Question 4: Do you consider that there are any other elements we need to consider should we limit expected asset replacement lives?

Question 5: Do you consider that there is a better approach to selecting the calibration period?

Questions 6: Are there any issues with the current approach to select the calibration period?

Question 7: What other issues or factors should we take into account when determining the calibration period?

Question 8: Is our current approach to forecasting repex for wooden poles clear and appropriate based on the information available? If not, why not?

Question 9: What are your views on the appropriate estimation method for wooden pole staking or replacement volumes when the required data is not available?

Question 10: Are there any other approaches that could be applied to reasonably forecast repex for wooden pole asset categories?

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