2016–2020 Price Reset

Appendix K
Depreciation method

April 2015

Table of contents

1 Introduction

The purpose of this appendix is to set out an explanation of the amounts, values and inputs used to compile our proposed depreciation schedules to be used in the calculation of the depreciation building block pursuant to clause 6.5.5 of the National Electricity Rules (**the Rules**) and demonstrate that our proposed depreciation schedules conform with the requirements set out in clause 6.5.5(b).

This appendix does not deal with all elements of the depreciation building block or the calculation of depreciation for tax purposes.

2 Requirements of the Rules

Clause 6.5.5(a) of the Rules provides that the depreciation for each regulatory year:

(1) *must be calculated on the value of the assets as included in the regulatory asset base, as at the beginning that regulatory year, for the relevant distribution system; and*

(2) *must be calculated:*

(i) *providing such depreciation schedules conform with the requirements set out in paragraph (b), using the depreciation schedules for each asset or category of assets that are nominated in the relevant Distribution Network Service Provider's building block proposal; or*

(ii) *to the extent the depreciation schedules nominated in the Distribution Network Service Provider's building block proposal do not so conform, using the depreciation schedules determined for that purpose by the AER.*

Clause 6.5.5(b) of the Rules provides that the depreciation schedules referred to in clause 6.5.5(a) must conform to the following requirements:

(1) *the schedules must depreciate using a profile that reflects the nature of the assets or category of assets over the economic life of that asset or category of assets;*

(2) *the sum of the real value of the depreciation that is attributable to any asset or category of assets over the economic life of that asset or category of assets (such real value being calculated as at the time the value of that asset or category of assets was first included in the regulatory asset base for the relevant distribution system) must be equivalent to the value at which that asset or category of assets was first included in the regulatory asset base for the relevant distribution system;*

(3) *the economic life of the relevant assets and the depreciation methods and rates underpinning the calculation of depreciation for a given regulatory control period must be consistent with those determined for the same assets on a prospective basis in the distribution determination for that period.*

Under clause 6.5.5(a) of the Rules, the AER must accept a DNSP's proposed depreciation schedules if they conform with the requirements set out in clause 6.5.5(b). If the proposed schedules do not conform with these requirements, the AER is limited to making the changes required to ensure the schedules conform to the requirements set out in clause 6.5.5(b). The Australian Energy Market Commission (**AEMC**) limited the regulator's discretion in respect of depreciation schedules as it considered the discretion to propose depreciation schedules *'appropriately lies with [service providers] rather than with the regulator, as it is the [service providers] that have the best knowledge of the condition and likely future utilisation of their assets'*.[1]

---

[1] AEMC, *Rule Determination, National Electricity Amendment (Economic Regulation of Transmission Services) Rule 2006 No. 18*, 16 November 2006 (**AEMC 2006 Rule Determination**), p. 79. The AEMC's comments in respect of Chapter 6A are relevant given the Chapter 6 provisions mirror the Chapter 6A in the relevant respects and, in making Chapter 6 NER amendments, the Standing Committee of Officials the Ministerial Council on Energy (**SCO**) stated that, for reasons of consistency, the proposed new rules 'largely builds on the AEMC's approach to economic regulation of electricity

The AEMC described the effect of (the equivalent of) clause 6.5.5(b)(1) as being *'to limit the period over which the [service provider] is able to depreciate assets but not limit the profile that the [service provider] adopts during this period'.*[2] That is, the AEMC observed the service provider *'has the flexibility to increase or decrease the level of depreciation in a given year conditional on the asset being fully depreciated by the end of its economic life'* which *'[i]n effect allows [service providers] to choose the level of building block revenues in a given year by adjusting their proposed depreciation profile'* (subject to the other requirements in clause 6.5.5(b)(1)).[3]

transmission': SCO, *Changes to the National Electricity Rules to establish a national regulatory framework for the economic regulation of electricity distribution, Explanatory Material*, April 2007, p. 5.

2 AEMC 2006 Rule Determination, p. 79.

3 AEMC 2006 Rule Determination, p. 79.

3 Regulatory background

3.1 Calculation of regulatory depreciation and depreciation schedule assumptions (AER)

The AER's post-tax revenue model for electricity DNSPs (29 January 2015) (**AER's PTRM**) has been developed on an assumption that straight-line depreciation will be used in developing the depreciation schedules. The handbook accompanying the AER's PTRM states that:[4]

> *The PTRM is configured to use the straight-line method as the default position for calculating depreciation for regulatory and tax purposes. If DNSPs intend to propose using other depreciation profiles, it is recommended that they raise this as part of pre-lodgement discussions. For example, this could take place during the framework and approach process for a determination.*

The AER's PTRM determines real straight-line depreciation for each regulatory year by taking the sum of:[5]

- depreciation on the opening asset base, calculated as the opening asset value for the asset class divided by the remaining life for the asset class; and
- depreciation on the forecast capital expenditure for each prior regulatory year in the regulatory control period by reference to the standard life for the asset class. This element of depreciation for year 2 is calculated as forecast capital expenditure for year 1 divided by the standard life for the asset class. For year 3 it is calculated as the sum of forecast capital expenditure for years 1 and 2 divided by that standard life for the asset class, and so on.

The opening asset base values for the regulatory period are determined in the AER's roll forward model for DNSPs (April 2008) (**AER's RFM**). These values have reflected in them regulatory depreciation as applied by the AER's RFM in rolling forward the RAB to the beginning of the regulatory control period. The same approach is adopted in the AER's RFM to determining real straight-line depreciation as is adopted in the AER's PTRM.

The remaining life and standard life values referred to above are inputs in the AER's PTRM and the AER's RFM (i.e. they are not calculated in those models).

The handbook accompanying the AER's RFM indicates that both the remaining life values and standard life values input into the AER's RFM *'must accord with those used in the previous distribution determination'*.[6] This is consistent with clause 6.5.5(b)(3) of the Rules.

For the purposes of remaining life values in the AER's PTRM, the PTRM handbook indicates that the remaining life of the asset classes is to be based on the economic life of the assets. The AER suggests these values *'[g]enerally … can be derived based on the weighted average remaining life of all individual assets in the class'*.[7] The AER has indicated in recent decisions that its 'preferred' method

---

4 AER, *Final decision, Amendment, Electricity distribution network service providers Post-tax revenue model handbook*, 29 January 2015, p. 12.

5 Subject to the remaining life in that year being greater than one year.

6 AER, *Electricity distribution network service providers, Roll forward model handbook*, June 2008, p. 5.

7 AER, *Final decision, Amendment, Electricity distribution network service providers Post-tax revenue model handbook*, 29 January 2015, p. 13, footnote 10.

to establish remaining asset life values is its weighted average remaining life (**WARL**) method (discussed further in the following section).

The PTRM handbook states that the standard life *'measures how long the infrastructure would physically last had it just been built'*.[8]

3.2 AER's 'preferred' WARL approach to determining remaining life values

In spite of its limited discretion in respect of the depreciation schedules under the Rules, the AER has indicated in its recent draft determinations regarding the NSW and ACT DNSPs that its 'preferred' method to establish a remaining asset life for each asset class is the WARL approach and its intention is to assess a DNSP's proposed method against the outcomes of that preferred method (rather than the requirements of clause 6.5.5(b)). The AER states:[9]

> *This method rolls forward the remaining asset life for an asset class from the beginning of the [immediately preceding] regulatory control period. We consider this method better reflects the mix of assets within that asset class, when they were acquired over that period (or if they were existing assets), and the remaining value of those assets (used as a weight) at the end of the period. We will assess the outcomes of other approaches against the outcomes of this preferred method.*

The AER's WARL approach was first adopted by it in the context of the regulation of transmission network service providers (**TNSPs**). In its RFM for TNSPs (February 2011) the AER calculates a weighted average remaining life using asset value as the weighting factor. The AER describes its method as follows:[10]

> The AER proposes a weighted average method to calculate the average remaining asset lives. This approach involves weighting, within an asset class, the remaining life ($remaining\ life_k$) of each capital stream by the closing capital value ($closing\ capital_k$) of that capital stream as a proportion of the total closing capital value of the asset class.[1] For any given asset class, this approach results in a weighted average remaining asset life that reflects the economic life of that asset class, consistent with clause 6A.6.3(b)(1) of the NER. The calculation can be expressed mathematically as follows:
>
> 1 Capital stream refers to the opening asset value or any capex value in each year of the regulatory control period. A worked example is included in the *Asset lives roll forward* worksheet of the amended RFM.

8 AER, *Final decision, Amendment, Electricity distribution network service providers Post-tax revenue model handbook*, 29 January 2015, p. 13.

9 See for example AER, *Draft Decision, Ausgrid distribution determination 2015-16 to 2018-19, Attachment 5: Regulatory depreciation*, November 2014, pp. 5-10.

10 AER, *Explanatory statement, Proposed amendment, Electricity transmission network service providers Roll forward model*, August 2010, pp. 5-6.

$$\text{Weighted average remaining life}_i = \sum_{k=1}^{n}\left(\frac{\text{closing capital}_k}{\sum_{k=1}^{n}\text{closing capital}_k} \times \text{remaining life}_k\right)$$

where:

i is the given asset class

k is the number of capital streams within the given asset class

n is the total number of capital streams within the given asset class.

The *Asset lives roll forward* worksheet has been added to the RFM to calculate the average remaining asset lives at the end of the regulatory control period. These become the opening average remaining asset lives and used as inputs to the PTRM.

To illustrate the AER's 'preferred' approach to determining remaining life values, consider one asset class with an opening asset value of $1,000m and a remaining life of 25 years at the start of the current regulatory period, and annual actual capital expenditure in the current regulatory period of $100m with a standard life of 50 years.

The AER's method calculates a remaining life of 30.5 years, which results in $42m annual depreciation being calculated in the next regulatory period, as shown below.

	A	B	C	D	E	F	G
	Opening asset value ($m)	Average remaining life at start of period (years)	Years of depreciation in current period (years)	Depreciation over current period ($m)	Closing Asset Value ($m)	Average remaining life at end of period (years)	Annual depreciation in next period ($m)
Formula				(A / B) * C	A - D	B - C	E / F
Opening RAB	1,000	25	5	200	800	20	
Year 1 capex	100	50	4	8	92	46	
Year 2 capex	100	50	3	6	94	47	
Year 3 capex	100	50	2	4	96	48	
Year 4 capex	100	50	1	2	98	49	
Year 5 capex	100	50	0	0	100	50	
Total					1,280		42
AER default TNSP method	Weighted average remaining life = SUMPRODUCT(E:F) / SUM(E)					30.5	

While the AER has built a default option into its RFM for TNSPs, it has done so for the express purpose of assisting TNSPs in preparing their regulatory proposals and to promote greater consistency across TNSPs.[11] The AER has acknowledged in respect of its RFM for TNSPs that *'there is no single correct method for calculating the average remaining lives for a group of assets'* and that *'a variety of methods can justifiably be employed'*.[12]

11 AER, *Final decision, Amendment, Electricity transmission network service providers, Roll forward model*, December 2010, p. 7.

12 AER, *Final decision, Amendment, Electricity transmission network service providers, Roll forward model*, December 2010, p. 7.

4 Our proposal

Consistent with the AER's PTRM, our proposed depreciation schedules (set out in the completed PTRM accompanying this proposal) have been prepared by applying standard lives to forecast net capital expenditure in such as way so as to calculate straight-line depreciation of forecast net capital expenditure, and remaining lives to the opening RAB asset values in such a way so as to calculate straight-line depreciation of the opening RAB. By way of summary:

- Our proposed standard life values (input into both the PTRM and RFM) are unchanged from those determined by the AER in our final 2011-15 distribution determination.
- The remaining life values input into the RFM are those determined by the AER in our final 2011-15 distribution determination.
- We propose calculating the remaining life values to be input to the PTRM through a method we call the 'direct method'.

An explanation of how our proposal conforms with clause 6.5.5(b) of the Rules is set out below. In circumstances where our proposed depreciation schedules conform with these requirements, the AER does not have discretion to reject our proposal and substitute its own depreciation schedules (including on the basis of its 'preferred' method of determining remaining asset life values to be input into the PTRM).

4.1 Profile of depreciation

As described above, clause 6.5.5(b)(1) requires that the profile of depreciation schedules used to calculate the depreciation for each regulatory year must reflect the nature of the assets or category of assets over the economic life of that asset or category of assets.

It is uncontroversial that a straight-line method of depreciation meets this requirement for electricity distribution assets. As noted above, the AER's PTRM proceeds on this basis. Further, the AER has recognised that the straight-line method of depreciation conforms with clause 6.5.5(b) in accepting proposals for straight-line depreciation by the NSW and ACT DNSPs.[13]

We do not propose to depart from the accepted regulatory practice of using the straight-line method of calculating depreciation.

4.2 Standard life values

Our proposed standard life values are unchanged from those determined by the AER in our final 2011-15 distribution determination.

Inputting these standard life values into the RFM for the purposes of determining depreciation on capital expenditure in the 2011-15 regulatory control period conforms with the requirement in clause 6.5.5(b)(3) of the Rules that the economic life of the relevant assets be consistent with those determined for the same assets on a prospective basis in the distribution determination in that period.

---

[13] See, for example, AER, *Draft Decision, Ausgrid distribution determination 2015-16 to 2018-19, Attachment 5: Regulatory depreciation*, November 2014, pp. 5-9, 5-11.

We consider that the standard life values applied in the 2011-15 continue to reflect the economic life of the relevant assets. As a result, inputting these standard life values in the PTRM conforms with the requirement in clause 6.5.5(b)(1) that the schedules must depreciate using a profile that reflects the nature of the category of assets over the economic life of that category of assets.

4.3 Remaining life values

While the AER has indicated its 'preferred' method for calculating remaining life values, the Rules were designed to give DNSPs flexibility in proposing depreciation schedules. The AER is required to accept proposed depreciation schedules (including the remaining life values underpinning those schedules) where they comply with the requirements of clause 6.5.5(b) of the Rules. It is not open to the AER to assess or reject proposed depreciation schedules by reference to the outcomes of its preferred WARL method for the calculation of remaining lives to be input to the PTRM for use in forecasting regulatory depreciation.

We are proposing a method for calculating remaining lives which we call the 'direct method'. The direct method is built into our proposed RFM. As described further below, this method complies with clause 6.5.5(b) and thus there is no scope for the AER to substitute its own 'preferred' method.

4.3.1 Our proposed direct method

The direct method of calculating remaining lives at the start of the period is to first calculate the correct annual straight-line depreciation and then derive the remaining life:

- Remaining life at start of period = opening asset value / annual straight-line depreciation

The direct method is, for each asset class, to:

- calculate straight-line depreciation of the closing capital value of the 2011 opening asset value (being the opening value for 2011 less straight-line depreciation over 2011-15) for 2016-20 using the 2011 opening asset value and the remaining life value determined in the 2011-15 final determination;

- calculate straight-line depreciation of actual capital expenditure for the 2011-15 period (estimated capital expenditure for 2015) for each year over 2016-20 using the standard life value determined in the 2011-15 final determination;

- combine the six straight-line depreciation streams for 2016-20 together to calculate straight-line depreciation that would have arisen prior to rolling forward the 2011 opening asset value and 2011-15 capital expenditure into a single 2016 opening asset value;

- combine the closing capital value of the 2011 opening asset value and 2011-15 capital expenditure amounts into a single 2016 opening asset value; and

- determine the remaining life for the asset class by dividing the 2016 combined opening asset value by the 2016-20 combined straight-line depreciation value, divided by the number of years for which depreciation is non-zero.

Consider again the example of one asset class with an opening asset value of $1,000m and a remaining life of 25 years at the start of the current regulatory period, and annual actual capital expenditure in the current regulatory period of $100m with a standard life of 50 years.

The direct method calculates a remaining life of 25.6 years, which results in $50m annual depreciation being calculated in the next regulatory period, as shown below.

	A	B	C	D	E	F	G
	Opening asset value ($m)	Average remaining life at start of period (years)	Years of depreciation in current period (years)	Depreciation over current period ($m)	Closing Asset Value ($m)	Annual depreciation in next period ($m)	Average remaining life at end of period (years)
Formula				(A / B) * C	A - D	A / B	E / F
Opening RAB	1,000	25	5	200	800	40	
Year 1 capex	100	50	4	8	92	2	
Year 2 capex	100	50	3	6	94	2	
Year 3 capex	100	50	2	4	96	2	
Year 4 capex	100	50	1	2	98	2	
Year 5 capex	100	50	0	0	100	2	
Total					1,280	50	25.6

4.3.2 Our proposed direct method conforms with the requirements of the Rules

Our proposed direct method results in depreciation schedules that conform with the relevant requirements of clause 6.5.5(b) of the Rules.

Our proposed direct method calculates the annual depreciation for the next period under a straight-line depreciation method directly by reference to asset and capital expenditure values, and remaining and standard life values respectively, in the current period. As the average remaining life is then derived using regulatory depreciation in the next period under the straight-line method, it follows that this average remaining life is the true remaining life and that the regulatory depreciation calculated by the PTRM using that remaining life will result in the correct regulatory depreciation under a straight-line method. It is possible to determine the true remaining life in this way only because the method of depreciation is straight-line. Under a straight-line method, the depreciation amounts for each regulatory year (and therefore for a given regulatory period) are known in advance.

It can be seen that the average remaining life calculated using our proposed direct method will result in the true remaining life using a water analogy. Consider two buckets of water:

- one containing an opening volume of 110 litres of water (asset value) constantly leaking at 10 litres per minute (straight-line depreciation), therefore having a remaining life of 10 minutes at the start of the second minute; and

- another added after 1 minute containing 50 litres of water (capital expenditure) constantly leaking at 1 litre per minute (straight-line depreciation), therefore having a remaining life of 50 minutes.

Clearly water is being constantly leaked at 11 litres per minute in total from the start of the second minute. Under our proposed direct method, the remaining life at the start of the second minute would be calculated as follows:

Total volume in buckets (asset value) divided by total leak rate (depreciation):

150 litres / 11 litres per min = 13.6 min

This implies a loss in the second minute as follows:

150 litres / 13.6 min = 11 litres, which is equal to the true leak rate of 11 litres per minute.

The direct method therefore results in the depreciation of each category of assets over the standard life values, which are consistent with the economic life of those categories of assets, thereby conforming with clause 6.5.5(b)(1).

Further, as straight-line depreciation is being consistently applied and standard life values are consistent with the economic life of the relevant assets, it follows that the requirement in clause 6.5.5(b)(2) (that the sum of the real value of the depreciation that is attributable to any category of assets over the economic life of that asset be equivalent to the value at which that category of assets was first included in the RAB) is met.

4.3.3 The AER's preferred WARL method does not conform with the requirements of the Rules and, in any event, is not preferable to our direct method

Given our proposed direct method complies with clause 6.5.5(b) of the Rules, there is no scope under the Rules for the AER to substitute an alternative 'preferred' method. Nevertheless, we observe that the AER's preferred WARL method does not result in depreciation schedules that conform with the requirements of that clause and, in any event, does not result in depreciation schedules that are preferable to the depreciation schedules resulting from our direct method.

As shown by the worked examples above, the AER's preferred WARL method would result in a longer average remaining life at the end of the period than our direct method (which we have shown results in the true remaining life). This means that the depreciation schedules resulting from the AER's preferred WARL method do not conform with clause 6.5.5(b)(1) in two respects:

- depreciation is occurring over a period that is longer than the economic life of the category of assets; and
- the depreciation profile is not straight-line (which it has been accepted is the profile that reflects the nature of the relevant assets over the economic life of those assets).

Support for our direct approach (over the AER's WARL method) can also be drawn from the water analogy outlined above, which considers two buckets of water:

- one containing an opening volume of 110 litres of water (asset value) constantly leaking at 10 litres per minute (straight-line depreciation), therefore having a remaining life of 10 minutes at the start of the second minute; and
- another added after 1 minute containing 50 litres of water (capital expenditure) constantly leaking at 10 litres per minute (straight-line depreciation), therefore having a remaining life of 50 minutes.

Under the AER's WARL method:

Remaining life of each bucket weighted by volume in the bucket (asset value):

(10 min x 100 litres) + (50 min x 50 litres) / (100 litre + 50 litres) = 23.3 min

This implies a loss in the second minute of:

150 litres / 23.3 min = 6.4 litres, less than true leak rate of 11 litres per minute.

The AER's WARL method thus results in an incorrect leak rate (straight-line depreciation) being calculated, whereas the direct method calculates the correct leak rate.

4.3.4 Comment on real depreciation method

We observe, for completeness, that the real depreciation method (which has previously been proposed by other service providers) results in remaining lives that reasonably approximate true remaining lives. Under this method, the remaining lives to be input into the PTRM for the purpose of estimating regulatory depreciation in a regulatory control period are derived by dividing the closing asset value at the end of the preceding regulatory control period by regulatory depreciation for the final year of that period. So, for example, the real depreciation method results in a remaining life of 26.7 (rounded to 1 decimal point) (i.e. 1,280 / (40 + 2x4)) in the worked example above, as compared to the true remaining life of 25.6 years.

Any capital expenditure incurred in the final year of the preceding regulatory control period is reflected in the closing asset value for that period (i.e. the numerator under the real depreciation method) but depreciation of that capital expenditure is not reflected in regulatory depreciation for the final year of that period (i.e. the denominator under the real depreciation method). The real depreciation method therefore assumes that capital expenditure in the final year of that period remains undepreciated throughout the forthcoming period and, thus, (significantly) overestimates the remaining life of that capital expenditure. It is for this reason that the real depreciation method, when applied to the worked example set out in this appendix, results in a remaining life that approximates but is slightly higher than the true remaining life.

The AER's conclusion in the recent draft decision regarding ActewAGL that, where there are both existing assets and new capital expenditure during a regulatory control period, the real depreciation method systematically underestimates remaining life, is incorrect.[14] The AER's reasons for this conclusion were as follows:[15]

> *Broadly speaking, if there is both [sic] existing assets and new capex in an asset class during the regulatory control period, the real depreciation approach will systematically underestimate the remaining asset life. To understand the cause of this underestimation, note that the final year depreciation (used to divide the asset value) will include depreciation arising from both the older asset and the newer asset. At some point in the future, the older asset will be completely depreciated; but the newer asset will not. If the remaining asset lives for the individual assets were preserved, at this point yearly depreciation would decrease to reflect only the depreciation arising from the newer asset. However, the real depreciation approach assumes that depreciation continues at the same level as the final year until all assets are completely depreciated. Hence, the overall remaining asset life will be underestimated - that is, it will be closer to the remaining life of the older asset than would be reasonable based on their relative asset values.*

The AER's conclusion that the real depreciation method systematically underestimates remaining asset life would appear to be premised on an assumption that the AER's preferred WARL method

---

14 AER, *Draft Decision, ActewAGL distribution determination 2015-16 to 2018-19, Attachment 5: Regulatory depreciation*, November 2014, pp. 5-11 to 5-12.

15 AER, *Draft Decision, ActewAGL distribution determination 2015-16 to 2018-19, Attachment 5: Regulatory depreciation*, November 2014, pp. 5-12.

results in the true remaining life. This is evident from the final sentence of the AER's reasoning set out above. While the AER is correct in observing that the real depreciation method results in a remaining life that is closer to the remaining life of existing assets than would be the case if remaining life were derived using relative asset values (as under the AER’s WARL method), it does not follow that the real depreciation method underestimates the overall remaining life. This is because, as explained above, the use of relative asset values under the AER’s WARL method will result in significant overestimation of the remaining life.

The AER is correct only insofar as it concludes that the real depreciation method will underestimate the remaining life of new assets. The AER's conclusion that it follows from this that the real depreciation method will necessarily underestimate the overall remaining life for the asset class is incorrect. This is because the AER fails to recognise that (like the AER's preferred WARL method) the real depreciation method will also overestimate the remaining life of existing assets.