Tribunal's Preliminary Assessment of EnergyAustralia's Methodology under the D-Factor mechanism of the 2004 Distribution Pricing Determination

PO Box Q290, QVB Post Office NSW 1230
Level 2, 44 Market Street Sydney NSW 2000
T (02) 9290 8400 F (02) 9290 2061
ABN 49 202 260 878

www.ipart.nsw.gov.au

The Tribunal's *Guideline – Calculation of avoided distribution costs, April 2005*, established principles for assessment and approval of avoided distribution costs as part of the D-factor regime. Section 8.1 of the Guideline also indicated the Tribunal's willingness to provide a preliminary assessment of whether the DNSP's approach to estimating avoided distribution costs was reasonable within the context of the D-factor prior to a project being implemented. This assessment would only be preliminary and would not constitute formal approval of the estimates themselves as this occurs during the D-factor process.

The Tribunal recognises that demand management (DM) measures have several possible aims such as avoiding or deferring distribution costs or simply removing or reducing network constraints even if planned distribution costs are not affected in the process.

The Tribunal's preliminary assessment of EA's proposed methodology is that it is:

- consistent with the Tribunal's 2004 Distribution Pricing Determination,
- supplementary to the Guideline – Calculation of Avoided Distribution Costs, April 2005,
- technically feasible (assuming that a project can reasonably be envisaged that is a basis for calculating avoided distribution costs), and
- reasonable (as applied to situations envisaged in EA's proposed methodology paper).

This assessment encompasses the proposed formula and the manner in which it is used in the examples in the EnergyAustralia proposal (see Appendix 1). The formula in question is:

$$AC_{value} = AC_{valuemax} \times \frac{(\text{Load at risk}_{\text{without DM}} - \text{Load at risk}_{\text{with DM}})}{\text{Load at risk}_{\text{without DM}}}$$

where:

- AC_{value} is the avoided distribution costs applicable to a partial DM solution
- $AC_{valuemax}$ is the present value of the distribution costs that would have been avoided had the DM measures reduced demand to below the design limit for the entire period until the increased capacity became available
- "Load at risk" is defined as that energy which is supplied to customers when the peak load on the limiting network supply element is above the design risk rating. It is measured in MVAh/yr.

The Tribunal engaged consultants to investigate EnergyAustralia's proposal. Their final report is attached at Appendix 2.

Appendix 1. EnergyAustralia's proposed methodology

Proposed methodology for calculation of Avoided Distribution Costs for partial Demand Management solutions

Introduction

IPART's Distribution Pricing Determination for 2004/05 to 2008/09 introduced an incentive to implement demand management (DM) where it is the least cost solution to an emerging network constraint. This incentive, via the D-Factor, includes recovery of the implementation costs of demand management actions.

Recoverable DM implementation costs are capped at the value of expected avoided distribution costs, calculated in accordance with the "Calculation of Avoided Distributions Costs Guideline", issued by IPART in April 2004. Section 8 of the guideline indicates that the Tribunal is willing to provide a preliminary assessment of the reasonableness of a DNSP's proposed methodology for calculation of this avoided cost cap prior to project implementation, in order to provide for increased certainty.

EnergyAustralia has identified a class of potentially valuable DM opportunities for which the guidelines are difficult to apply, and we wish to request consideration of the reasonableness of our proposed methodology for calculation of the relevant avoided distribution cost cap that would apply.

Background

From time to time, circumstances result in a situation where the most appropriate supply side solution cannot be delivered in time to ensure that loading does not exceed the target levels prescribed in network planning criteria. This situation could occur due to a range of unexpected changes in external conditions, including unexpected changes in customers' loads, new large customers, downgrading of equipment ratings, delayed planning consents, or unavailability of key resources or equipment. Often, alternative supply approaches either do not exist or are less prudent.

In these cases, the cash outflows associated with the supply project are delayed compared to those that would have occurred had the project been able to be delivered at the ideal time.

Sometimes, DM solutions can be found that will enable load to be kept below the network planning criteria for the extent of the delay and thus maintain customer outcomes. In these cases, the value of the avoided costs due to the delay of the supply project can be calculated according to the guidelines, and this value used as an "avoided cost cap" under the D-factor. This ensures that DM costs are

recoverable only to the extent that they are cost effective. For example, a $10m project delayed by one year would result in avoided distribution costs of about $90,000. A DM solution that maintained network load below the target levels for that period might cost $150,000, but only $90,000 would be recoverable under the D-factor, in keeping with the intent of the determination.

While this situation was not anticipated in some of the language of the Determination, this approach was used in our 2004/05 claim, endorsed as reasonable by SKM's independent review and accepted by the Tribunal for inclusion in 2006/07 prices. The relevant projects include the Nelson Bay, Wollombi and Medowie embedded generation projects.

IPART's acceptance of these projects demonstrated its view, consistent with the spirit of the D Factor framework, that where capital expenditure has been deferred (for any reason), demand management activity qualifies under the D-Factor regime where it reduces the load at risk to zero, for the assumed forecast, network capacity and contingencies.

However, in some cases only partial DM solutions can be found. While they will improve the situation (reduce the load at risk), they may be insufficient to completely eliminate the load at risk. Because of this, the outcome of the DM solutions is not equivalent to the outcome from delivery of the supply solution at the ideal time. Therefore the value of the DM solution is positive, but less than the full value of the avoided distribution costs.

Where the available amount of DM is not sufficient to entirely reduce the gap between forecast loading and target levels, we have not had an appropriate means to calculate an avoided cost cap and therefore not pursued the partial DM solutions.

Clearly it would be preferable to undertake DM solutions that improve the probability of reliable customer outcomes in such circumstances, and there should be an appropriate methodology for evaluating a reasonable avoided distribution cost cap.

We believe that using the entire expected value of avoided costs due to the difference in the timing of the project is not reasonable and some method of apportioning value is required. We propose a methodology that proportions value according to "load at risk" (a familiar and defined concept in network planning) with and without the DM solutions.

Proposed methodology

The methodology is based on proportioning the avoided distribution costs according to the reasonably expected impact of the DM options. The base costs are calculated as the present value of the difference between the cash flows that would have occurred if the supply solution had been delivered at the time required to avoid exceeding the target levels and the cash flows that will occur due to the delayed implementation. This is no different to the methodology in the guideline that has been used and accepted as reasonable in past claims.

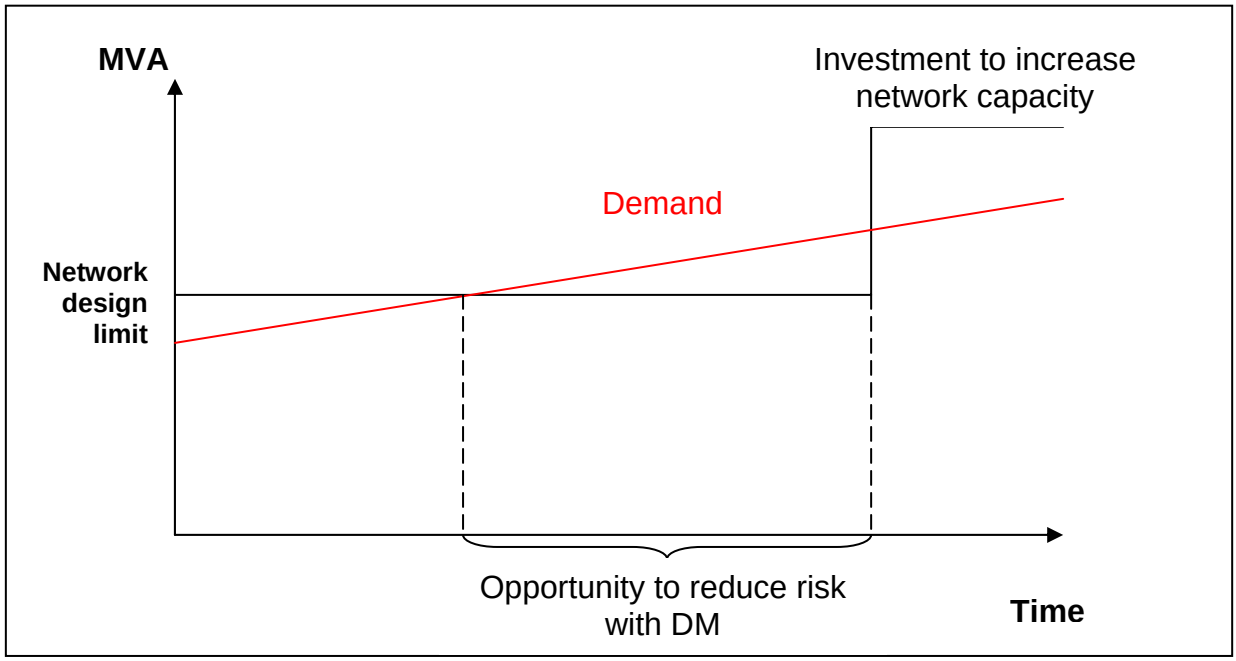


Figure 1: Timeline showing opportunity to reduce risk with demand management

This would be the appropriate avoided cost cap if the available DM were sufficiently large to reduce demand to below the design limit for the entire period until the increased capacity became available. In the formula below this avoided cost value is defined as $AC_{valuemax}$

The value that should apply to a partial DM solution would be:

$$AC_{value} = AC_{valuemax} \times \frac{(\text{Load at risk}_{\text{ without DM}} - \text{Load at risk}_{\text{ with DM}})\ \%}{\text{Load at risk}_{\text{ without DM}}} \qquad (1)$$

Where "Load at risk" is defined as that energy which is supplied to customers when the peak load on the limiting network supply element (eg substation or feeder) is above the design risk rating, and is measured in MVAh/yr.

Example

We will demonstrate this methodology with the hypothetical example of a zone substation investment.

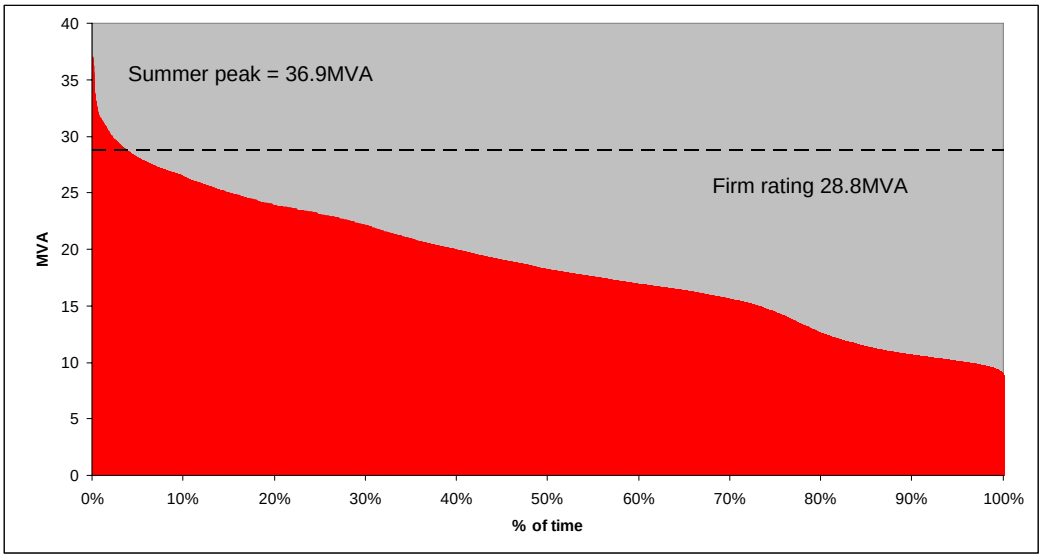
The substation is required to relieve constraints on an existing substation. To avoid load at risk the substation should be operational in late 2007, however due to circumstances, commissioning is not possible until late 2008.

The estimated cost of the new zone substation is $30m. The NPV of the avoided distribution costs arising from its deferral from 2007 to 2008 is $2.4m.

We need to analyse the load at risk in summer and winter separately because the capacity limit is different for these seasons.

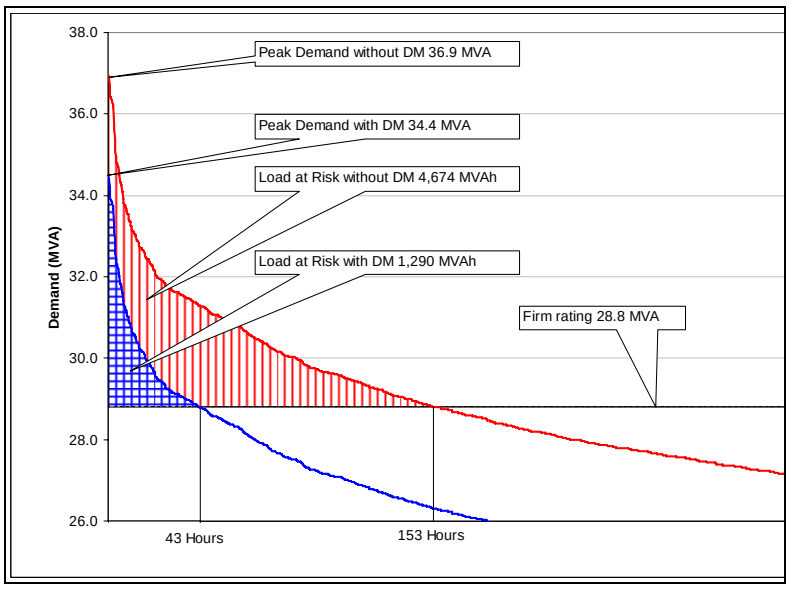
Looking at the case of summer 2007/08, it is forecast that the existing substation will have a peak demand of 36.9MVA, which is 5.7MVA below the summer maximum rating of 42.6MVA, but 8.1MVA above the summer “firm” or “n-1” rating of 28.8MVA. The forecast summer load duration curve in 2007/08 is shown in Figure 2. This data reveals that we expect the substation to be operating above firm rating for 153 hours in this season, and the total load at risk is 4,674 MVAh.

Figure 2: Load duration curve for summer 2007/08.



We will assume that it is not possible to achieve the entire 8.1MVA of demand reduction in summer, but we can achieve a reduction of 2.5MVA through DM. This would not completely eliminate load at risk in summer 2007/08, but it would reduce it from 4,674 MVAh to 1,290MVAh, and reduce the hours operating above firm rating from 153 hrs to 43 hrs. This is shown in more detail below.

Figure 3: Detail showing reduction in load at risk for summer 2007/08

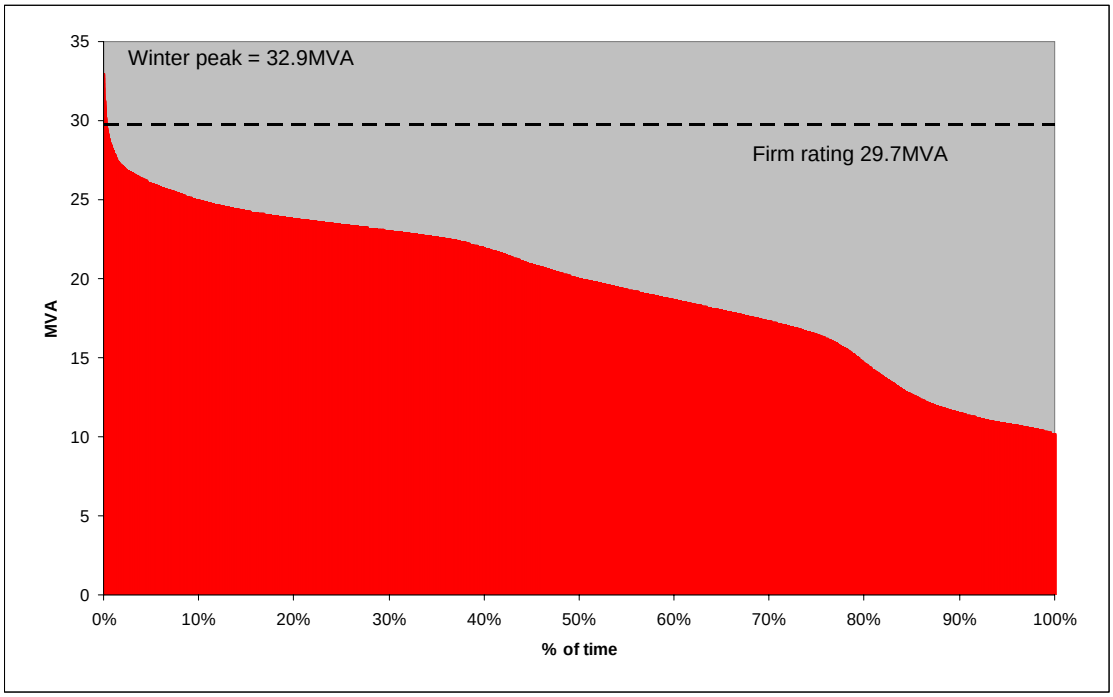


In winter 2008 it is forecast that the existing substation will have a peak demand of 32.9MVA, which is 9.7MVA below the maximum winter rating of 42.6MVA, but

3.2MVA above the “firm” or “n-1” rating of 29.7MVA. The forecast winter load duration curve in 2008 is shown in Figure 3. This data reveals that we expect the substation to be operating above firm rating for 11 hours in this season, and the total load at risk is 324 MVAh.

Assuming we are also able to achieve 2.5MVA of peak reduction in winter through demand management (as per summer), the load at risk would reduce from 324 MVAh to 30MVAh, and reduce the hours operating above firm rating from 11 hrs to 1 hr.

Figure 4: Load duration curve for winter 2008.



Demand management could potentially reduce the load at risk in the year prior to the commissioning of the new zone substation from 4674+324=4998MVAh to 1290+30=1320MVAh.

Substituting into equation (1) we get for this case:

$$AC_{value} = AC_{valuemax} \times \frac{(\text{Load at risk}_{\text{without DM}} - \text{Load at risk}_{\text{with DM}})\ \%}{\text{Load at risk}_{\text{without DM}}} \qquad (1)$$

$$AC_{value} = \$2.4m \times \frac{(4{,}998 - 1{,}320)}{4{,}998}$$

$$AC_{value} = \$1.77m.$$

It is therefore concluded that it would be reasonable to spend up to an avoided distribution cap of $1.77m on demand management actions that are capable of

achieving 2.5MVA peak reduction in the supply area in summer 2007/08 and winter 2008 (prior to the commissioning of the new zone substation).

It should be noted that in the case where the DM solution does achieve the reduction required to meet the planning design criteria (ie, to bring the load at risk to zero), the proportioning factor would equal one, and the full value of avoided costs would be available.

Summary

EnergyAustralia proposes the above methodology for consideration by the Tribunal as a means of determining a reasonable value for the avoided distribution cost cap that would apply in these circumstances. This will enable the wider use of cost effective demand management to improve outcomes for customers consistent with the principles of the Determination.

Appendix 2. Farrier Swier report

Assessment on EnergyAustralia's proposed methodology on apportioning avoided distribution costs

1 Introduction

IPART engaged Farrier Swier Consulting (Farrier Swier) to:

- *"review EnergyAustralia's proposed methodology for apportioning avoided distribution costs in the light of the IPART 2004 Network Determination and the Guideline – Calculation of Avoided Distribution Costs, April 2005;*
- *assess whether the methodology is technically feasible and whether it can be applied with reasonable accuracy for apportioning avoided distribution costs;*
- *advise the Tribunal how the Guideline should be revised to accommodate the methodology proposed by EnergyAustralia including a draft of the proposed revision; and*
- *report to the Tribunal the findings of its review."*[1]

This report sets out Farrier Swier's findings. In summary, we found that EnergyAustralia's proposed methodology is:

- consistent with the 2004 IPART Network Determination and is broadly supplementary to the *Guideline – Calculation of Avoided Distribution Costs, April 2005* (the "Guideline")
- technically feasible, provided that a reasonable project exists as a basis for calculating avoided distribution costs
- can be used to determine a reasonably accurate "pro- rata" of costs, if applied in situations similar to those envisaged in EnergyAustralia's proposed methodology.

We also found that the Guideline should not be revised to accommodate EnergyAustralia's proposed methodology for partial allocation. Rather, the Tribunal should continue to take account of the Guideline in its decisions and should endorse the approach set out in the methodology noting that it would expect such an approach to be applied on a case by case basis.

This report has been structured to address each of our findings in sequence. To assist the Secretariat and Tribunal to understand the background to our findings, the report also includes a contextual section (section 2) on how demand management appears to be applied currently and how this differs from the assumptions on which the d-factor regime was based.

[1] Refer Request for Quotation "Consultancy to provide assessment on EnergyAustralia's proposed methodology on apportioning avoided distribution costs for the calculation of D-factor under clause 11 of the NSW Electricity Distribution Pricing 2004/05 to 2008/09, Final Determination"

2 Current drivers for demand management projects in context of d-factor regime

The 2004/05 network determination included a d-factor regime to facilitate use of demand management measures to relieve network constraints and reduce the peakiness of demand for electricity.

The d-factor regime was designed to provide incentives for increased application of demand management generally. However, to some extent the d-factor formula, specifically the use of an "avoided distribution cost" cap, contemplated that demand management measures generally provide benefits because they defer or avoid network expenditure and that this is the prime purpose of such measures.

However, material provided to Farrier Swier and discussions held during this review, highlight a range of instances where demand management is (logically) being applied where the prime purpose is not to avoid or defer network expenditure. In some cases, this is a direct result of the d-factor regime, while in other cases it is a result of network planners (correctly) considering demand management measures as one of the options for addressing network constraints.

Because the subtle differences between the alternative objectives for a demand management measure can become important in applying the d-factor formula, Farrier Swier has defined the following continuum of objectives for demand management[2].

1. **Network constraint planned to be addressed through network solution and the prime objective of demand management is to avoid or defer to distribution costs.** Demand management can be used to avoid or to defer a specific planned network solution (i.e. avoid or defer distribution costs).
2. **Network constraint was planned to be addressed through a network solution, but this solution cannot proceed and so the prime objective of demand management is to remove the network constraint.** The planned network solution cannot be implemented on time. Demand management is applied to directly address, and remove, the resulting network constraint.
3. **Network constraint planned to be addressed through network solution but cannot be implemented on time and so objective of demand management is to reduce the network constraint.** The demand management option can only be applied to directly reduce, but not remove, the network constraint.
4. **Network constraint not planned to be addressed through network solution because this would not be cost effective and the objective of demand management is to remove or reduce network constraint.** Demand management can be applied to directly remove or reduce network constraint.

As highlighted earlier, the details of a d-factor regime (and the Guideline on Avoided distribution costs) were largely, unintentionally, developed in the context of scenario 1 above. This doesn't mean that the regime and formula cannot be applied to the other three scenarios, rather that it is slightly more difficult to apply the regime and interpret the principles established in it.

EnergyAustralia's proposal deals with scenario 3 above. A number of projects submitted in EnergyAustralia's D-factor Submission for 2004/05 relate to scenario 2.

Scenario 4 describes a theoretical position and has not been submitted by the distribution network service providers to the knowledge of Farrier Swier. Farrier Swier considers that scenario 4 represents a plausible circumstance and may need to be considered in the future.

3 Farrier Swier's approach

[2] This continuum was developed in the course of this review, and was discussed with EnergyAustralia.

In undertaking this review, Farrier Swier has recognised the objectives of the d-factor regime, the intent and role of the Guideline and the implications of decisions taken in early 2006 on the 2004/05 projects[3].

Our approach addresses the Tribunal's objectives for the review (as set out in the terms of reference) drawing on our understanding of EnergyAustralia's proposed methodology.

The methodology proposed by EnergyAustralia for the calculation of Avoided Distribution Cost for partial Demand Management solutions relates only to the calculation of the Avoided Distribution Cost or "recovery cap".

The methodology has two parts:

- The calculation of "total" avoided distribution costs where a supply project is delayed; and
- The calculation/application of an apportionment ratio.

EnergyAustralia asserts, reasonably, that the calculation of the total avoided distribution costs where a supply solution is delayed was implicitly addressed through their D-factor Submission for 2004/05 Cost and Forgone Revenues. Therefore, they contend that that the new element in the proposed methodology relates only to apportioning the total avoided distribution costs.

We have considered both the total and the apportionment parts of Energy Australia's proposed methodology.

Our approach is based on the following questions:

- Is the methodology consistent with the determination and guidelines?
- Is the methodology technically feasible?
- Can the methodology be applied with reasonable accuracy?
- Should the guideline be revised?

The following sections detail the Farrier Swier's findings.

4 Is the methodology consistent with the determination?

Farrier Swier considers that the proposed methodology on apportioning avoided distribution costs is consistent with the intent of the 2004/05 Network Determination. However, the methodology assumes that avoided distribution costs can be calculated using a notional network solution and this was not explicitly envisaged in the determination.

The clear intent of the determination is to provide an incentive for the DNSPs to undertake efficient demand management and options. The projects being considered to which the partial methodology is to be applied are of the type that were intended to be encouraged.

Farrier Swier considers that the use of a notional network solution to calculate avoided distribution costs is not precluded by the determination. Further, EnergyAustralia's 2004/05 D-factor submission, which was approved by the Tribunal, incorporated a number of projects for which the avoided distribution costs were calculated on the basis of notional network solutions.

5 Is the methodology technically feasible?

The proposed methodology is feasible as long as it is possible to associate a deferral of prescribed distribution costs with the proposed demand management project.

[3] As contained in DNSP's D-factor Submissions for 2004/05.

Where the demand management measure is designed to address a network constraint, this means that there may be no clearly associated distribution cost deferral, and therefore a notional network solution is required to calculate avoided distribution costs.

In some cases the notional network solution may be readily identifiable and arguably efficient. In other cases, the notional solution may be very difficult to identify, and may be beyond reasonable consideration.

In particular, it is foreseeable that a demand management measure may be warranted where no reasonable alternative network solution can be identified. This may be due to cost effectiveness, physical or resource limitations or some other factor.

This scenario is more likely to occur in rural and remote areas where an emerging network constraint may require investment well above any reasonable recovery period; particularly in the instances of small/incremental load increases on long and "stringy" assets. In this instance the proposed methodology would identify the most cost effective network solution and utilise the associated costs to determine the avoided distribution cap, even though the identified network solution was unlikely to have been implemented under normal circumstances.

In this example, the avoided distribution costs, and hence the cap on demand management cost recovery, could in theory be set at level that would not be seen to be cost effective or efficient. The risk of this outcome could be mitigated by requiring the independent assessors (of the DNSP's annual claims) to verify the reasonableness and cost effectiveness of any notional network solution used to determine avoided distribution costs. We do not believe that this verification was provided in SKM's report on the EnergyAustralia 2004/05 D Factor submission[4].

In summary, Farrier Swier considers that the methodology proposed for the calculation of a partial avoided distribution cost is technically feasible.

The use of a notional network solution could potentially result in "inefficient" avoided distribution costs which could allow recovery of inefficient demand management costs. However this risk is limited given the lack of evidence to date and the short term nature of the d-factor regime. In addition, it could be further mitigated by requiring the independent assessor to specifically consider this issue.

6 Can the methodology be applied with reasonable accuracy?

The accuracy of the methodology reflects the accuracy of the total avoided distribution costs assessment and the accuracy of the prorating.

Issues associated with the assessment of the total avoided distribution costs amount were discussed in section 5.

The formula for apportionment proposed by EnergyAustralia is as follows:

$$AC_{value} = AC_{valuemax} \times \frac{(\text{Load at risk}_{\text{without DM}} - \text{Load at risk}_{\text{with DM}})}{\text{Load at risk}_{\text{without DM}}}$$

Where "Load at risk" is defined as that energy which is supplied to customers when the peak load on the limiting network supply element (e.g. substation or feeder) is above the design risk rating, and is measured in MVAh/yr.

Farrier Swier considers that the methodology proposed for prorating can be applied with reasonable accuracy. Load at risk is a common and well understood metric in electricity planning and should be

[4] The SKM review of the EnergyAustralia 2004/05 D Factor submission details a process that may not have identified the reasonableness of the proposed avoided distribution cost project. The areas considered by SKM are that "a network constraint exists", and that "the cost of the network expenditure is reasonable". The link between these two considerations is whether the removal or mitigation of the network constraint is itself reasonable.

able to be independently assessed. The resulting apportioned ADC should represent a fair estimate of the contribution of the demand management measure outcome to addressing the total network constraint.

The methodology adopts load at risk to establish a pro-rata figure. While Farrier Swier considers that this is a reasonable approach, demand could potentially also be applied for prorating.

The use of Load at risk in the methodology could arguably provide an incentive for some forms of demand management and a disincentive for others. However, "load at risk" is more aligned with the customer impact of the demand management project.

Determining the most accurate or reasonable apportionment measure requires a review of the application of these measures on likely demand management projects. The EnergyAustralia website[5] lists four types of demand management project:

- Agreement with energy users to interrupt or reduce some loads during peak periods
- Using generators or cogenerators on customers' premises
- Installing more efficient equipment, such as lights that have a lower power demand
- Switching electricity use to outside peak periods, such as Off-Peak water heating.

Farrier Swier considers that load at risk could appropriately be used to apportion avoided distribution costs for these projects. However, going forward, Farrier Swier considers that the Tribunal does not necessarily need to lock in load at risk as the only means of apportionment.

7 Should the guideline be revised?

Farrier Swier does not recommend that the Guideline on avoided distribution costs be revised to incorporate EnergyAustralia's methodology at this time because:

- The existing guideline was drafted reflecting situations where the prime objective for the demand management measure is to defer or avoid distribution costs (scenario 1 in section 2 above). As such it does not address well the concept of a notional network solution or scenarios 2 to 4 in section 2 above. Significant changes would be required to properly address all scenarios.
- The "remaining life" of the Guideline and the d-factor regime is relatively short; the Determination expires in 2008/09.

In addition, the Guideline states that the Tribunal will take account of the Guideline when making decisions. This implies flexibility about how the Guideline is used in specific situations. The Tribunal also considers the DNSP's submission and the independent assessment. In practice the Tribunal took such an approach when making decisions on the 2004/05 d-factor submissions.

[5] https://energy.com.au/energy/ea.nsf/Content/Network+Demand+Management+What+Is