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Examination of an assumption used by the AER in estimating target fire starts for United Energy

Prepared for Jeremy Rothfield, United Energy

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Summary

This report examines an assumption made by the AER in their methodology of estimating the initial target number of fire starts for United Energy to apply in the new 'f-factor' scheme, namely that the percentage of United Energy's unrecorded fire start events should not differ significantly from that of Jemena.

On the basis of limited data, we show that there are indeed similarities between the characteristics of the two distribution networks.

Given these similarities and the stated common nature of their services and operations, we would expect similar patterns of recorded fires between the two DNSPs.

However data used by the AER show that United Energy has proportionately significantly less pole top and cross arm fires, and proportionately significantly more 'other' fires. We conclude that there are significant differences in the patterns of the recorded fires for the two DNSPs over the period 2006-2010.

Information on the robustness of the DNSPs reliability data systems in the SKM report, and their comments on fire start data collection methods make it less likely that these discrepancies observed in recorded fires are due to recording errors alone.

We conclude that the assumption of a common proportion of unrecorded fires for Jemena and United Energy is dubious.

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1 Introduction

The Victorian Government is introducing an 'f-factor' scheme to provide incentives for Distribution Network Service Providers (DNSPs) to reduce the risk of fire starts.

The Australia Energy Regulator (AER) will administer some aspects of the scheme. The AER is currently determining a target number of fires for each DNSP for the first period of operation of the scheme. If the actual fire numbers recorded in subsequent years are higher than the target, penalties apply. This target is based on average historical fire starts of the DNSPs over the five-year period 2006-10.

Some DNSPs, including United Energy, have argued that their current records of fire starts are incomplete in comparison to the future definition of a fire start, and so the target set should include an allowance for unrecorded fire starts.

This report examines an assumption made by the AER, namely that the percentage of United Energy's unrecorded fire start events should not differ significantly from that of Jemena.

2 The AER's target for United Energy

The AER's method of deriving the target number of fire starts for United Energy was adopted from that used by Jemena, on the basis that "until 30 July 2011, Jemena Asset Management was the exclusive provider of services including network planning, construction, management, operation, maintenance and engineering to United Energy."[1]

Jemena's methodology (and that adopted for United Energy by the AER) assumes that pole fires usually result in supply outages (or require replacing before causing an outage) and are therefore known by DNSPs. Pole fires were therefore removed from the data set before making assumptions on the number of unrecorded fire starts. The Jemena and AER methodology then assumes that only 80% of non-pole fire starts have been recorded in the past, and so inflates the number of non-pole fire starts to account for previously unrecorded fires.[2]

The AER considers that the percentage of United Energy's unrecorded fire starts should not differ significantly from Jemena's.[3]

3 Examining the target

The distribution areas serviced by the two DNSPs appear to have similar characteristics: both are a mixture of urban and semi-rural. From the data available in the SKM report[4], it is reasonable to assume similar characteristics of the two DNSPs: both have 0.02 km line per customer and 0.3 poles per customer. This compares with data for the more rural DNSPs (PowerCor and SP-Ausnet) of 0.1 km line per customer and 0.6 or 0.7 poles per customer, and the more urban CitiPower of 0.02 km line per customer and 0.2 poles per customer. While these are crude figures, they do lend support to the similarity of the

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[1] AER: Draft determinations and Explanatory statement for the draft determinations. F-factor scheme determinations 2012-15 for Victorian electricity distribution network service providers. 5 October 2011. Section 3.5.1.2

[2] Ibid, Section 3.5.1.1

[3] Ibid, Section 3.5.1.2

[4] SKM: F-factor incentive scheme: Review of submissions from Distribution Network Service Providers, 19 September 2011, Section 3.

nature of the two distribution networks. The time available for the preparation of this report has precluded a more detailed investigation.

Given this similarity, and the common nature of their services and operations, it would seem reasonable to assume similar patterns of fires in the two DNSPs.

The AER report provides data to allow this assumption to be tested, in their Table 3.2.1. This table has been collapsed to categorise fires as either 'pole and cross arm failure/fire' or 'other' in Table 1 below.

Table 1: Actual fire starts reported by DNSPs 2006-2010

Fire start category	Jemena	United Energy
Pole and cross arm failure/fire	234	317
Other	42	249
Total	276	566

Overall, United Energy was responsible for 67% of all fires in the two DNSPs. This is in good agreement with the proportion of lines lengths for the two DNSPs: according to the SKM report, United Energy is responsible for 68% of the combined line length.

However the table shows that United Energy was responsible for 58% of the 'pole and cross arm failure/fire' category, but 86% of the 'other' category. Equivalently, only 15% of Jemena's fires were in the 'other' category, but 44% of United Energy's fires were 'other'.

We use a chi-square test (with Yates' continuity correction) to test if the observed difference (58% v 86%) is the result of sampling error, or if the difference indicates a real difference between the categories. The test results in a χ^2 value of 66.7 on 1 degree of freedom. This corresponds to a probability very much less than 0.0001 which indicates that the proportions for the two types of fire start are very unlikely to be due to chance alone, and are highly significantly different.

The same test also tests whether the proportion of 'other' fire starts is different for Jemena and United Energy (ie 15% v 44%). Again the conclusion is that the two proportions are highly significantly different.

Thus we can conclude that there are significant differences in the patterns of the recorded fires for the two DNSPs over the period 2006-2010. This casts doubt on the AER assumption that the proportion of unrecorded fires is the same for Jemena and United Energy.

There are other possibilities for the differences observed:

- Cross arm and pole fires have been under-reported by United Energy.
- Other categories have been over-estimated by United Energy.
- There has been a serious misclassification of fires by one or both DNSPs.

However, SKM reported that all DSNPs appeared to have robust systems to capture reliability data, although the recording of fire start information was relatively *ad hoc*. It seems unlikely that the differences in fire start categories between Jemena and United Energy of the magnitude observed are due to recording errors alone.

We conclude that the assumption of a common proportion of unrecorded fires for Jemena and United Energy is dubious.

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7th November 2011

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Dr John Field
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Australia

Dear Dr Field,

Expert report in relation to the historical data on fire starts

The Australian Energy Regulator is responsible for the administration and operation of the f-factor scheme, and has recently released a draft determination, which is to apply over the period from 2012 to 2015[1]. The scheme aims to provide incentives for Distribution Network Service Providers (DNSPs) to reduce the risk of fire starts, and to reduce the risk of loss or damage caused by fire starts[2]. The scheme was developed by the Victorian Government.

An f-factor target has been set, which has been based, in part, on the historical occurrence of fire starts in each distribution network (including the United Energy distribution network) over the period from 2006 to 2010. United Energy has examined its data and has become aware that there was systematic under-reporting of fire starts over the five years from 2006 to 2010. The distribution management system used by the business was aimed at gathering information on faults, with a lesser degree of effort directed towards the gathering of data on fire starts.

An examination of the records in the distribution management system shows that evidence of fires and fire starts was reported in an *ad hoc* fashion. Inconsistent terminology has been used, spelling is inaccurate, and the descriptions in the text field are sometimes incomplete. The questions posed by SKM in relation to specific records in the UE Distribution Management System (DMS) are indicative of some of the problems with the historic recording of information pertaining to fire starts[3].

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[1] AER, Draft determinations and Explanatory statement for the draft determinations, F-factor scheme determinations 2012-15 for Victorian electricity distribution network service providers, Australian Energy Regulator, 5th October 2011.
[2] Energy and Resources Legislation Amendment Bill 2010, Explanatory Memorandum, page 10.
[3] See AER – Guide to Questions – F-Factor Data Verification, questions posed by Terry Krieg, Sinclair Knight Merz, 2nd September 2011.

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We are aware that linesmen were not fully briefed on the methods for reporting fire starts, although this situation began to change in 2010. Considering the 2006 to 2010 period as a whole, field personnel appear to have recorded the evidence for fire starts somewhat sporadically. Linesmen were not obliged to note down fire-related symptoms.

Previously, United Energy had formed the view that the reporting of pole and cross-arm fires from 2006 to 2010 was reasonably rigorous and well-founded. However, from a detailed examination of the records, and from discussions with field staff, we are confident that there were a number of pole fires that occurred which have not been documented.

In future, we expect more rigorous reporting of fire starts, because additional effort has been expended on re-training linesmen, and a new and enhanced reporting template has been created. The new template provides for answers to be chosen from among a menu of responses. Hence, there will be less reliance on the direct comments provided by linesmen.

In this context, we would like you to undertake and report on the following task:

- Review and assess the methods which have been applied by the AER in its draft determination to allow, and compensate for past under-recording of fire starts.
- Analyse a number of approaches which might assist in correcting for the past under-reporting of data on fire starts.
- Apply the methods making use of the various databases provided by United Energy.
- Determine a result which can be used as an appropriate benchmark to be adopted by United Energy as its "target" under the f-factor scheme.

Guidelines in preparing your report

Attached are Expert Witness Guidelines issued by the Federal Court of Australia. Although this brief is not in the context of litigation, the Victorian electricity distribution businesses are seeking a rigorously prepared independent view for use in the context of regulatory decision making and you are requested to follow the Guidelines to the extent reasonably possible in the context.

In particular, please:

Identify your relevant area of expertise and provide a curriculum vitae setting out the details of that expertise:

1.1.1. only address matters that are within your expertise;

1.1.2. where you have used factual or data inputs please identify those inputs and the sources;

1.1.3. if you make assumptions, please identify them as such and confirm that they are in your opinion reasonable assumptions to make;

1.1.4. if you undertake empirical work, please identify and explain the methods used by you in a manner that is accessible to a person not expert in your field;

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1.1.5. confirm that you have made all the inquiries that you believe are desirable and appropriate and that no matters of significance that you regard as relevant have, to your knowledge, been withheld from your report; and

1.1.6. please do not provide legal advocacy or argument and please do not use an argumentative tone.

Yours sincerely,

Jeremy T. Rothfield

Jeremy Rothfield
Network Regulation and Compliance Manager