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Mr David Chan
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Australian Energy Regulator
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BY EMAIL TO: David.Chan@aer.gov.au

Dear Mr Chan,

PREVIOUSLY UNRECORDED FIRES THAT ARE NOW COVERED BY THE ORDER

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]. United Energy (UE) would like to respond on the matter of the method which the AER has applied to correct for the under-representation of fire starts in the historical data held by the business.

United Energy disagrees with the approach that has been taken by the AER, and considers that the technique lacks any form of theoretical or empirical justification. In addition, the AER's method sets a comparatively low f-factor target for United Energy, and the business believes that having the target at such a level would result in UE having to bear an unacceptable degree of risk. In any well-structured incentive scheme, the target should be established such that the benefit of superior performance is balanced by the risk of poor performance.

Description of the AER method for adjusting the historical data

The AER has adopted a rule-of-thumb approach which was proposed by Jemena. This method assumes that the historical data captures 80% of fires, that are unrelated to pole and cross-arm fires, accurately[2]. Consequently, to obtain the correct estimate of the number of non-pole and non-cross arm fires, it is necessary to divide the historical records by 0.8. At the same time, no change is needed to the reported number of pole and cross-arm fires, since these incidents are

[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] Ibid., section 3.5.1.2, page 18

believed to have been written down correctly. The AER method delivered an annual target for United Energy of 124 fires (622.25 fires over five years). The AER considered that its method was reasonable because it caused the annual target for UE to increase by approximately 10.8% (from 112.2 fires per annum in the reported, historical data to 124.45).

We note that Jemena did not apply the grossing-up method to its own data accurately. Jemena reported 276 fire starts over a five-year period, comprised of 234 pole and cross-arm fires. The grossing up method would apply to the remaining 42 fires, and would cause these to increase to 52.5. Hence, the pro-rata technique would result in an increase to 286.5 in the total number of fire starts over the five-year period. This is a modest increment of only 3.8% of the aggregate number of reported fires (276). The annual target under this approach would be 57.3 fires.

Response by United Energy

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].

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.

Submissions by United Energy

United Energy engaged a number of experts to review the AER draft f-factor determination, and to provide comments on the methods which the AER had applied. The experts included three statisticians who were briefed to analyse the data held by United Energy, and to develop empirically valid methods of correcting for the under-reporting in the historical data. The terms of reference provided to the statisticians are appended to their respective final reports. **Consistent with its endeavours to bring empirical rigour to the f-factor determination**

[3] See AER – Guide to Questions – F-Factor Data Verification, questions posed by Terry Krieg, Sinclair Knight Merz, 2nd September 2011.

process, United Energy intends to provide a further, supplementary submission from the statisticians over the next ten days. A summary of the findings from the expert reports is presented below.

Report by Lance Hancock, Energy Transfer Solutions Pty. Ltd., 18th November 2011

Energy Transfer Solutions (ETS) questioned the reliance by the AER and by its consultant, Sinclair Knight Merz, on the accuracy of the fire start data available from existing data capture systems operated by distribution businesses. ETS emphasised that the ability of these systems to record fire starts accurately was compromised because distribution outage reporting mechanisms were primarily geared towards the measurement of network reliability[4].

ETS also queried the internal inconsistency of the AER's logic regarding what might be considered to be a reasonable proportion of unrecorded fire starts. The AER considered that 10% would be an appropriate fraction to account for previously unreported fire starts for United Energy[5]. Accordingly, the AER justified the application of the Jemena grossing-up method to the UE data, which delivered an increase of 10.8% over the reported number of fire starts (see earlier paragraphs of this letter). However, the AER didn't seek to validate the application of the Jemena method to Jemena's own data. As has already been mentioned in this submission, the application of the Jemena approach would deliver an increase of only 3.8% to the number of fire starts logged in the historical data held by Jemena. This 3.8% falls short of the 10% proportion which the AER has described as being reasonable.

ETS has also criticised the AER for failing to provide adequate reasoning for rejecting the method proposed by United Energy for the assessment of unreported fires. ETS was referring to the initial submission by UE[6]. In addition, ETS has referred to the arbitrary and unsubstantiated claim made by the AER that the number of unrecorded fires in any category should not be larger than the recorded ones[7].

Finally, ETS has questioned the AER's rationale for disregarding the recommendation by SKM that the method initially proposed by UE was fundamentally sound. SKM endorsed the approach put forward by UE, and made minor changes. SKM considered that the claim from UE, with the proposed adjustments, was valid for the initial f-factor target year, and that the target for UE should be 132[8].

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[4] ETS (2011), Review of the F-factor draft determination by the Australian Energy Regulator as applied to United Energy, Energy Transfer Solutions; expert report by Lance Hancock; page 4.

[5] 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; page 18.

[6] See submission by United Energy, Further information pertaining to United Energy's response to the F-factor Regulatory Information Notice (RIN): The determination of uplift coefficients, 20th September 2011.

[7] 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; page 17.

[8] SKM, F-factor Incentive Scheme, Review of Submissions from Distribution Network Service Providers - Addendum, Sinclair Knight Merz, 22nd September 2011; page 4.

Report by Rho Environmetrics Pty Ltd together with John Field Consulting Pty Ltd

The report by John Field examined 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. The data used by the AER showed that United Energy has proportionately significantly less pole top and cross arm fires, and proportionately significantly more 'other' fires. A chi-squared test (with Yates' continuity correction) was applied to investigate whether the observed difference in the proportions was the result of sampling error, or if the difference indicated a real difference between the categories. The test results demonstrated that the differences between the two networks, in terms of the proportions of fire starts in the two categories, were highly unlikely to be due to chance alone.

John Field concluded that there are significant differences in the patterns of the recorded fires for the two DNSPs over the period from 2006 to 2010. Such a finding casts doubt on the AER's assumption that the proportion of unrecorded fires is the same for Jemena and for United Energy. Field stated that it was unlikely that the differences in fire start categories between Jemena and United Energy of the magnitude observed could be attributed to recording errors alone. Consequently, the assumption made by the AER of a common proportion of unrecorded fires for Jemena and United Energy was dubious[9].

Under-reporting of fire starts, a report for United Energy prepared by Dr Neil Diamond

Dr Neil Diamond applied probability modelling to determine the (actual) total number of fire starts in the United Energy distribution region over the period from 2006 to 2010. He noted that the number of recorded fires is 561, but he determined that the estimated actual total is 940, with a 95% confidence interval of 771 to 1,369.

The modelling method used by Dr Diamond is rigorous and defensible. It is based on a bernouilli sampling approach which has been documented and published in a refereed journal, the Austrian Journal of Statistics.

The model assumes that the number of fire starts per month that are reported follows a binomial distribution with a constant probability of a fire start being reported, π, but with a poisson distributed number of fire starts occurring where the mean of the poisson distribution is allowed to vary from month to month. In other words, it is assumed that the probability of a fire start being reported does not vary from one month to the next, but the number of fire starts per month does have a poisson probability distribution with the means of the poisson distributions themselves following a gamma distribution. Combining the distributions, the number of recorded fire starts follows a negative binomial distribution. The model was estimated using the method of maximum likelihood[10].

Dr Diamond reported that the estimate of the number of fire starts which he had obtained, 940, was most likely conservative (in other words, low). This belief has been informed by running trials of other statistical methods, including the Capture-Mark-Recapture method. Dr Diamond has analysed the United Energy data on fire starts, in conjunction with other databases held by

[9] Field (2011). Examination of an assumption used by the AER in estimating target fire starts for United Energy, a report prepared for Jeremy Rothfield, United Energy, 18th November 2011, Rho Environmetrics Pty Ltd together with John Field Consulting Pty Ltd; page 5.

[10] Diamond (2011). Under-reporting of Fire Starts, A Report for United Energy, prepared by Dr Neil Diamond, Department of Econometrics and Business Statistics, Monash University, 20th November 2011; page 5.

the Country Fire Authority (CFA), and the Metropolitan Fire Brigade (MFB). The results from the Capture-Mark-Recapture analysis will be documented and reported separately.

United Energy conclusion

United Energy submits that the fire factor benchmark to be applied by the AER should be based on the result obtained by Dr Neil Diamond, in other words 940 fires. This translates to an annual f-factor scheme target of 188 fire starts.

United Energy further submits that improvements to its reporting regime will capture a higher number of fire starts which, in the absence of an adequate allowance, will result in United Energy being financially disadvantaged by its own process improvements.

Fire Definition

As previously stated, United Energy is implementing an improved process for capture of fire starts. In so doing, United Energy is seeking further clarification of what does, and does not, constitute a fire.

Whilst the Order in Council defines 'fire start', it is silent on the definition of a fire.

The AER, in its Regulatory Information Notice, and Sinclair Knight Merz (SKM), in its final Review of Submissions from Distribution Network Service Providers, quoted the Cambridge Dictionary definition of fire as "heat, light and flames that are made when something burns".

The SKM document also quotes a Wikipedia definition (on 13th September 2011) as "the rapid oxidation of a material in the chemical process of combustion, releasing heat, light and various reaction products"[11]. Wikipedia further expands on the definition, adding that "…flame is the visible portion of the fire…"

It follows from the above two definitions, that the three characteristics, heat, light and flames must all be present, or have been present if the event is to be classified as a fire. United Energy submits that acceptance of this definition will closely align with the common use of the word 'fire'.

If you have any further questions on this submission, please do not hesitate to contact Jeremy Rothfield, Network Regulation and Compliance Manager, on (03) 8846 9854.

Yours sincerely,

Jeremy Rothfield
Network Regulation and Compliance Manager

[11] SKM, F-factor Incentive Scheme, Review of Submissions from Distribution Network Service Providers - Final, Sinclair Knight Merz, 19th September 2011; page 3.