Submission 4th Oct 2022 to ESV's draft United Energy Wood Pole Management Public Report

Prepared by [redacted]

I've personally and through our company, have provided similar narrative with respect to the dangers of reinforced poles being used as a long-term solution previously to the industry. Submissions specific to the AER and ESV include:

- Feb 2020: Review into Pole Sustainability (to ESV draft report Powercor Wood Pole Management).
- Jan 2021: AER Powercor Determination: In support to an uplift of pole replacement numbers.
- Sept 2021: ESV AusNet Review into Wood Pole Management
- July 2022: AER Powercor Uplift over previous determination (in line with ESV and our Jan 2021 submission).

Despite numerous failures of Reinforced / Staked poles prior to and during these multiple reviews, the long-term maintenance of these assets, across the wider Victorian networks, remains unchanged as evidenced in this draft report.

We believe the use of reinforcement as a permanent intervention (particularly with respect to aged networks, the elevated fire risk within the state of Victoria and a changing climate which is seeing more extremes more often), is not suitable nor safe.

1. Are you clear what the purpose of the United Energy Wood Pole Management, Public Report is?

   (•) Yes ( ) No

2. Does the report give you enough information about what ESV's role is in ensuring the asset management practices of the Victorian Major Electrical Companies (MECs) deliver sustainable safety outcomes for the community in the long term?

   ( ) Yes (•) No

3. Does the report give you enough information about how ESV has investigated the wood pole management systems and practices in place at United Energy?

   ( ) Yes (•) No

4. Does the report give you enough information about what happens next with the findings of ESV's investigation of United Energy wood pole management systems and practices?

   ○ Yes ◉ No

5. Please list any issue or concern with the draft United Energy Wood Pole Management, Public Report.

Our primary concern relates to the use of reinforcement systems currently in use in the Victorian distribution industry.

Use of RFD type reinforcement is discussed at the bottom of page 19 of the draft report[1]:

Key wood pole management forecast and delivery findings

The key findings and observations relating to this section are summarised in the table below.

Table 9: Summary of key findings and observations for assessment of forecasting and delivery

Finding	Elaboration
United Energy's use of industry standard reinforcement systems is reasonable, but additional reference material should be produced to demonstrate compliance with current standards including AS/NZS 7000:2016	United Energy has been using Utility Asset Management (**UAM**)'s proprietary **RFD** (ReinForced Design) Pole Reinstatement System as its standard reinforcement option for some time. The UAM RFD System has been used successfully in Australia by several MECs for over 20 years for its life extension benefits. United Energy relies upon a series of VESI commissioned reports to demonstrate compliance with AS/NZS 7000:2016. ESV considers the application of pole reinforcement systems as a practice within MECs for which additional reference material should be provided to fully demonstrate the compliance of these systems to current standards.

United Energy Wood Pole Management: An assessment of sustainable wood pole safety outcomes Page 19

Figure 1 Excerpt from Draft Report

It is unclear what the VESI commissioned reports contain (perhaps these can be presented for proper review?).

Reinforcement failure is neither uncommon nor rare, and the consequences can be significant.

Whilst reinforcing is acceptable as a short-term measure, it's continued use and practice as a permanent intervention is flawed for the following reasons:

[1] https://esv.vic.gov.au/wp-content/uploads/2022/09/DRAFT-Report-Review-of-United-Energy-woodpolemanagement-practices.pdf

- The interaction between the timber pole and steel bolt is more complex than the overly simplistic convention which simply assumes that the ground level is raised to the top of the stake – as the analysis on the technical report [2] into the Garvoc fire of 2018 demonstrates.

- The significant change in stiffness between timber and steel properties is not fully appreciated nor considered - particularly on double staked poles.

- There are multiple instances of failures misreported as pole failures [3] - not as stake or connection detailing issues.

- With some reinforcements now over 30 years since first installed, the structural and mechanical understanding required to maintain and inspect has not kept pace with deterioration (particularly exacerbated with the need to drill at the top of the stake – causing accelerated degradation of the aforementioned connection detail).

Figure 2 Loose Bolt connection (circled) on a compromised pole

Note: outer fibres compress inwards – reducing the effectiveness and strength of the pole / reinforcement connection

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[2] The Forensic Testing and Assessment section of this report focused exclusively on the timber neglecting any structural interaction with the steel bolt component.

• The dot point where the report concludes a minimum sound wood thickness of 32.5mm for the 29m/s wind is nonsense when one considers that minimum thickness bearing onto a single and much stiffer bolt. Failure is likely to be localized around the connection detail. https://esv.vic.gov.au/pdfs/garvoc-fire-technicalreport/

[3] For example the 20200101 Murrayville West 8 failure – reported as, and incorrectly concluded as "the root cause of failure below ground line due to internal and external rot and decay". Similarly, failures in other states are known to be misdiagnosed (further documents can be provided on request).

6. What changes would you like to see in the draft United Energy Wood Pole Management, Public Report to address your issue or concern?

We submit that the current understanding of pole reinforcement design and maintenance across the state is inadequate for the long term and therefore strongly recommend (as per this submission) that use of any pole reinforcement system, including the maintenance and inspection off, requires sign off from an appropriately qualified and experienced structural engineer before further installation into the public domain.

In absence of any demonstrated compliance with AS/NZS7000 and related other AS/NZS standards, any intervention measure, other than replacement, be considered short term
(say 2 – 5 years maximum) and used in limited situations

Double staking applies even more stress and further complicating structural forces to the already compromised timber pole section. These poles should be removed and/or assessed with immediate effect.

We agree with and support the URI Engineering Report [4] into Essential Energy AER 2015 – 2019 Determination Response when they conclude:

"If it is to be used as a cost deferral technique whilst maintaining an acceptable risk profile, a plan needs to be put in place for the management of increased pole replacements in the future."

"Reinforcement only ever delays the pole replacement, pushing the investment back 5-20 years in most cases"

"Pole reinforcement is only just starting to really be understood in terms of how it works structurally."

"Even though reinforcement testing has been done in limited quantities in the past, the methods used included a few well meaning but misguided assumptions and in reality the reinforcement systems do not perform as well as expected."

"there have been unconservative uses of plastic design theories to determine the design capacity, and assumptions that the timber and steel will work as one (composite action) to resist the design loads."

"In reality, these assumptions are not supported by sound structural theories, nor by experiences with failures in the field or during realistic testing. In short, the timber takes

[4] Pages 112 of pdf @
https://www.aer.gov.au/system/files/Essential%20Energy%20%20Attachment%206.6%20-%20Response%20to%20AER%20Draft%20Decision%20of%20Replacement%20Expenditure%20%20January%20 2015.pdf

almost all the load up until the point that it begins to fail because the timber section has a higher EI ("stiffness") than the steel, and the connection between the two has too much pl ay before transferring shear loads. Once the timber fails the steel has to take over. By the time the steel takes over, the lean on the pole is significant and the weight of the pole together with the lean and the external loads will almost always buckle the steel reinforcement and the pole will fall to the ground."

"In other cases the timber will actually fail at the top of the reinforcement through one of a number of mechanisms and definitely fall to the ground. The number of instances where the timber fails and

the steel continues to hold the pole off the ground and out of immediate danger is considered very rare. Understanding this should significantly alter perceptions of risk reduction offered by reinforcement."

"In short, increasing reinforcements to Ausgrid levels is unlikely to significantly reduce the number of replacements required, it will just add to the overall cost of a responsible Repex program by requiring more poles to be reinforced in addition to the replacements. We are not sure of the justification behind Ausgrids reinforcement strategy, but from the information available to us it is not considered responsible."

"We have been witness to pole failures at the top of reinforcement in Ausgrids network that we know were not recorded as a pole failure, let alone a reinforced pole failure, so we would question the use of Ausgrids data regarding reinforced pole failures in making any assumptions about performance of reinforced poles, regardless of the fact that the timber itself is unlikely to fail."

"In our experience, reinforcement should only be an option as a risk reduction technique until a more permanent replacement can be arranged. If it is to be used as a cost deferral technique whilst maintaining an acceptable risk profile, a plan needs to be put in place for the management of increased pole replacements in the future."

"A reinforced pole does not automatically have a lower risk of failure or consequence of failure compared with an unreinforced pole because it does not reinforce the entire length of the pole and does not support significant compressive loads."

Remaining Life of Existing Reinforcement

The average age of a reinforced pole being over 50 years and with tens of thousands of reinforced poles in service begs the question of:

"What is the remaining life of a pole which has been previously assessed as compromised due to a valid reason"?