3 June 2026

Ms Anna Collyer
Chair
Australian Energy Market Commission
Level 15, 60 Castlereagh Street
Sydney NSW 2000
E aemc@aemc.gov.au

Dear Ms Collyer,

RE: Submission on Project ERC0410: Draft Rule Determination - Enhancing Distribution Network Planning and Reporting Rule 2026, proposed by Energy Consumers Australia

1 BACKGROUND and AUTHOR CREDENTIALS

I am a Queensland registered professional electrical engineer, with over 40 years working in the state's electricity, mines, renewable and rail industries. I've held multiple positions in the Qld electricity supply industry, including that of Power Quality Manager at Energex from 2011-13. I have also designed commercial solar installations and negotiated the technical elements of the connection agreement for the University of Queensland's Gatton Solar Farm. This submission draws on extensive professional experience, DNSP published data, and recent Standards Australia declarations regarding a proposed amendment to a critical utility supply standard, AS61000.3.100.

2 EXECUTIVE SUMMARY

This submission opposes the proposed amendments to the National Electricity Rules (NER) under Project ERC0410, which would further dilute already inadequate quality of supply (QoS) reporting obligations for Distribution Network Service Providers (DNSPs).

The draft rule removes some of the few existing requirements for DNSPs to publish QoS performance data. This change:

- Reduces existing meagre QoS reporting in the NER,
- Fails to acknowledge the inadequacy of existing Supply Voltage requirements in that they are mismatched to many appliance safety standards,
- Fails to provide sufficient QoS information to allow customers to determine if their Supply Voltage is fit for purpose,
- Fails to provide adequate incentives for DNSPs to correct non-compliant Supply Voltage, and
- In reducing QoS reporting further has the potential to undermine public confidence in the electricity system during a period of rapid energy transition.

Evidence from DNSP supplied monitoring data, appliance safety standards, state legislation, and Standards Australia demonstrates that many Australian customers are routinely supplied voltages outside the limits to which their appliances are safety tested.

The AEMC's draft rule fails to address this critical safety gap and weakens the existing NER mechanism that provides a measure of year-on-year QoS reporting.

There are strong reasons to adopt the Ronald Reagan era principle of **Trust but Verify**. More, not less QoS reporting is required, and it must be transparently produced and publicly accessible to permit independent review.

3 THE DRAFT RULE REMOVES BASIC QUALITY OF SUPPLY REPORTING

3.1 Existing NER Requirements Are Already Minimal

Under NER Version 247, Schedule 5.8(j) shown below, requires DNSPs to publish:

- A summary of QoS standards,
- A summary of performance against those standards,
- Corrective actions for non-compliance, and
- Processes to ensure compliance.

Even these requirements are insufficient however, because they do not identify individual customer level voltage problems, which can persist for years without detection or remedial action.

NER Ver 247 Schedule 58 (j) extract

(j) information on the performance of the *Distribution Network Service Provider's network*, including:

(1) a summary description of reliability measures and standards in *applicable regulatory instruments*;

(2) a summary description of the quality of *supply* standards that apply, including the relevant codes, standards and guidelines;

(3) a summary description of the performance of the *distribution network* against the measures and standards described under subparagraphs (1) and (2) for the preceding year;

(4) where the measures and standards described under subparagraphs (1) and (2) were not met in the preceding year, information on the corrective action taken or planned;

(5) a summary description of the *Distribution Network Service Provider's* processes to ensure compliance with the measures and standards described under subparagraphs (1) and (2); and

3.2 The Draft Rule Eliminates These Requirements

The proposed amendment replaces Schedule 5.8(j) with a vague requirement to describe "*factors that may have a material impact on the distribution network*," including voltage levels and QoS.

This is not a reporting requirement. It:

- Provides no specific metrics,
- Provides no customer centric QoS performance data (eg. Supply Voltage),
- Provides no transparency, and
- Provides no ability for customers or researchers to verify DNSP claims.

This is a step backwards in ensuring consumer safety and minimising economic harm arising from inadequate power quality.

Draft National Electricity Amendment (Enhancing distribution network planning and reporting) Rule 2026 extract

(5) a description of any other factors that may have a material impact on its *distribution network*, including the factors affecting:

(i) fault levels;

(ii) voltage levels;

(iii) other *power system security* requirements;

(iv) the quality of *supply* to other *Network Users* (where relevant); and

4 THE REGULATORY GAP – NO ENTITY ENSURES THAT SUPPLY VOLTAGES ARE SAFE (They assume it)

4.1 The NER Does Not Set Enforceable LV Voltage Limits

The NER V247 states that voltage "*should not vary by more than 10%*" (S5.1a.4 & Fig S5.1a.1), but this does not protect typical low voltage customers because:

- "*Should*" is not mandatory,
- Schedule 5.1a applies only to Registered Participants as explained in S5.1a.1, and
- Most low voltage customers are not Registered Participants

The lack of any NER restrictions on steady state Supply Voltage performance by DNSPs, has been confirmed by an email from an AEMC Director - Technical Specialist on 16 March 2020. It stated that "*Specific voltage limits for residential customers are governed by state based legislation and Australian Standards*." It further explained that "*the rules were developed for the transmission and medium voltage distribution networks in mind, without explicitly specifying the voltage level.*"

4.2 Some State Legislation Relies on AS61000.3.100 — Which Is Not a Safety Standard

The Australian Standard governing steady state voltage limits in public electricity systems, AS61000.3.100, is used in states such as Queensland and Victoria to define allowable DNSP Supply Voltages. However, Standards Australia, in response to a proposed amendment (P-005151) to that standard has now formally stated:

- *"this is not a safety standard",*
- *"the risks associated with permitting voltages outside the percentile Supply Voltage limits identified were acknowledged",*
- *"the probabilistic limits are intended for system level power quality performance assessment under normal operating conditions, not safety assurance",* and
- *"Network events will occur from time to time leading to Supply Voltage excursions that may be outside appliance test limits".*

These are critical admissions. In particular, the probabilistic limits of the standard, whilst useful to compare DNSP performance, permit uncapped voltages to be supplied to customers. The standard used to regulate DNSP voltages does not ensure customer safety and no entity is leaping forward to claim responsibility for that task.

4.3 Appliance Safety Standards Assume Only a Moderate Supply Voltage Range

Many household appliances, including smoke alarms, refrigerators, air conditioners, microwave ovens and televisions are tested at voltages significantly narrower than the Supply Voltages permitted by state regulations. This is particularly so, by virtue of the allowance of AS61000.3.100, for unlimited voltages, either above or below the prescribed voltage limits, for 1% of the time (ie. 100 min per week).

When queried, two separate smoke alarm manufacturers advised in writing:

- "*We cannot guarantee that the product will still work properly in the future*" if used outside given specifications.
- "*If the voltage goes above the tested limits we couldn't guarantee that the alarm would function/test correctly due to potential damage that may occur*."

Noting that a defective smoke alarm can remain undetected for considerable time and noting the prospect of even its test function being damaged, it follows that exposing such devices to voltages above test limits or unlimited voltages for 100 min is a direct safety risk.

There is also an economic cost associated with voltages outside the designed voltage range of appliances. The University of Wollongong has drawn attention to this and was quoted in a Guardian article which noted that high voltage shortens appliances' operational lives. Customers should not have to pay the cost of poor voltage management, and the associated hidden cost is distorting any attempt at optimising the network as part of the energy transition. Ref. https://www.theguardian.com/australia-news/2024/oct/19/could-australias-outdated-voltage-standards-be-taking-years-off-the-life-of-your-toaster

5 EVIDENCE OF WIDESPREAD SUPPLY VOLTAGE EXCEEDANCES

5.1 Energex's Own Monitoring Data Revealed Hundreds of Problem Sites

Energex previously published 10 minute voltage data covering the 2021-22 financial year for ~8,800 transformers. These contain steady state voltage data and are not to be confused with voltage surges which are of a brief duration. Analysis of that data showed:

- 182 of the 8,800 sites (not independently verified) exceeded statutory upper voltage limits, a non-compliance rate (2.1%) not too dissimilar from the 1.4% non-compliance reported by Energex in the DAPR (24,000 monitored sites).
- Potentially 5,600 customers were supplied from the 182 affected transformers (assuming 30.7 customers per transformer using 1.6M customers & 52,000 transformers in DAPR).
- Extrapolated across 24,000 monitored sites and 28,000 unmonitored sites, the affected customer population could be expected to be far larger. 1.4% of 1.6M customers would represent 22,400 customers.
- Shortly after high voltage concerns were raised publicly, Energex coincidentally or otherwise, removed the 2021–22 dataset from its website (2025) advising that "*EQL has decided to no longer publish this data externally*" as "*Validating and publishing data from a large number of transformer PQ monitors requires extensive resources*".

With such a large section of the community receiving non-compliant Supply Voltages under an exceedingly lax regulatory regime that allows 100 minutes of unlimited voltage per week, this underscores the need for mandatory transparency. Data from other DNSPS is not expected to differ materially, noting that in Victoria, the ABC recently reported conditions had deteriorated in some areas to the extent that appliances could not even operate at times.

https://www.abc.net.au/news/2026-04-22/victoria-undervoltage-melbourne-gas-electricity/106588882

5.2 The Dangers of Excessive Voltages are Well Published

Multiple authorities have warned about the dangers of voltages that are either too high or too low for safe appliance operation. There is an incongruity to the statements warning of dangers to the apparent disregard for ensuring that voltages to customers do not exceed appliance test limits.

- The Qld 2017 Regulatory Impact Statement on changing voltage limits noted problems associated with voltage extremes
    - *"A supply voltage well over the nominal operating range (e.g. +15%) can result in immediate damage and failure of equipment, particularly electronics. In extreme cases, overheating and fire is possible."*
    - *"Regular exposure to a high supply voltage (e.g. +10 to +15%) can cause malfunctioning of electronic equipment and the accelerated failure of appliances"*
    - *"Regular exposure to a low supply voltage (e.g. -15%) can result in poor performance of appliances and equipment"*
    - *"In extreme cases, appliances that run at voltage levels well above the median (e.g. +15%) run the risk of overheating and causing fires"*
    - *"In addition, insurance claims for appliance damage associated with voltage rise cost distributors about $60,000 per year"*
- Energex Power Quality Strategic Plan 2015-20 (PQSP) – Appendix 29 of Oct 2014 regulatory proposal states:
    - *"There is little quantitative data showing the impact of high voltage on typical customer household appliances and equipment."*
    - *"Old electrical motors and pumps, designed for 240/415V, may overheat or malfunction if exposed to voltage in the range 205V-216V when starting or heavily loaded."*
- Victorian Voltage Management in Distribution Network Consultation by Dept of Env, Land, Water & Planning 2022
    - *"the relationship between voltage and appliance damage is not well understood"*
- Citipower, Powercor & United Energy's Aug 2022 Submission into the Victorian Voltage Management in Distribution Networks paper
    - *"We agree the impact of overvoltage and undervoltage on appliances is not well understood and requires significant additional research."*

5.3 DNSPs Are Not Required to Notify Customers

Customers who experience **Supply Voltages** that result in appliances receiving **Utilisation Voltages** outside the appliance safety standard voltage limits to which they are tested are disadvantaged. They:

- Cannot access a public database to obtain their location specific voltage data,
- Cannot determine if they are receiving compliant Supply Voltages even within the existing inadequate legislated voltage range,
- Receive no alerts to voltage extremes that may damage safety equipment,
- Cannot easily cross check equipment failure with a voltage supply that is outside appliance voltage limits,
- Cannot easily claim damages for such an occurrence,
- Cannot assess whether they are at increased risk from regular or infrequent voltage extremes.

This is unacceptable, particularly with the proliferation of LFP and NMC lithium batteries, which are highly combustible and can produce toxic gases (eg. Hydrogen fluoride). Exposing such equipment to a source of supply that is not managed within tight levels, without transparency in reporting non-compliant voltages, is placing customers at increasing and unnecessary risk.

6 THE TECHNICAL MISMATCH: SUPPLY STANDARDS VERSUS APPLIANCE SAFETY STANDARDS

The allowable **Supply Voltage** (at the customer's point of supply) provided by DNSPs, is determined in some states by the Australian Standards AS60038 and AS61000.3.100. They allow:

- 230V ± 10% (207 – 253V) for most of the time,
- Greater that 253V for 1% of the time (100 minutes per week), and
- Less than 207V for 1% of the time (100 minutes per week).

The allowable **Utilisation Voltage** that appliances receive (at the power outlet) is determined by the **Supply Voltage,** together with the impact of two other standards that can further raise or lower the voltage:

- 2% inverter voltage rise allowed by inverter standard AS4777.1, and
- 5% wiring voltage drop allowed by the wiring rules AS3000.

This creates a situation where appliances can be legally exposed to Utilisation Voltages:

- Between 195.5V (230V – 15%) and 257.6V (230 + 12%),
- Greater than 257.6V for 100 min per week, and
- Below 195.5V for 100 min per week.

Noting that most appliances do not require testing that covers the extended range stated above:

- Appliances may legally receive voltages far outside their tested limits,
- Which Standards Australia has recently acknowledged, and
- Which can cause damage and fire according to many authorities in their public statements.

Yet no regulatory body has addressed this significant regulatory oversight.

7 RECOMMENDATIONS – TRUST BUT VERIFY (from the Russian Doveryai no Proveryai)

To protect consumers, the NER must require DNSPs to publish collected or available voltage data with sufficient granularity to identify potentially unsafe conditions. As a minimum, the following data needs to be publicly available.

A. DNSPs shall annually publish locations of all sites where steady state Supply Voltages (ie. 10 min aggregations or averages at the Point of Supply or nearest monitored point) exceeded 253V (230V + 10%).

B. DNSPs shall annually publish locations of all sites where steady state Supply Voltages (ie. 10 min aggregations or averages at the Point of Supply or closest monitored point) fall below 216.2V (230V - 6%)
(A 216.2V min Supply Voltage aligns with the tighter voltage range within the superseded AS60038 and is closer to the minimum Utilisation Voltage included in many appliance safety standards.)

C. DNSPs shall annually publish maximum and minimum (non-zero) steady state Supply Voltages, at all sites with extremes outside the 216.2 – 253V range, so that the severity of the voltage extreme can be considered by the affected customers.

D. Published data shall include all available steady state single-phase voltages and where possible, the corresponding current phase angles.
(Load data, via current or power parameters, do not need to be published if customer privacy is of concern. Supply Voltage data does NOT compromise customer privacy as it is predominantly a DNSP controlled parameter.)

E. DNSPs shall alert affected customers to severe steady state voltage extremes (say 260V) as soon as possible, in recognition of the increased risk of appliance damage under such conditions.

These measures:

- Improve customer safety,
- Allow customers to assess whether they are being compromised by non-compliant voltages,
- Allow independent review of DNSP quality of supply reporting,
- Allow researchers to investigate a possible correlation between poor voltage and residential fires,
- Allow researchers to better investigate the economic cost of poor voltage management,
- Provide an insight into network performance at a granularity that is needed to sustain the growth of distributed energy resources, as its penetration in the low voltage network increases,
- Provide DNSPs with a strong incentive to correct non-compliant Supply Voltage to the benefit of affected customers and more DER integration,
- Provide the DNSPs with important, informed, customer feedback on power quality matters, that will impact on their regulatory proposals,
- Require no new monitoring in addition to that which is being progressively rolled out,
- Are relatively low cost, given that processing of data is a software task involving minimal human resources and given that data storage is cheap,
- Improve accountability, and
- Restore consumer trust.

DNSPs will no doubt oppose these measures on cost grounds, but the data already exists and is easily processed.

8 CONCLUSION

The AEMC's draft rule weakens consumer protections at a time when voltage issues are increasing due to the energy transition. The evidence is clear:

- Existing legislation lacks coordination between Supply Voltages and voltage levels that appliance safety standards determine as safe.
- DNSPs routinely supply non-compliant voltages under even the existing inadequate Supply Voltage requirements, thereby exposing appliances to unacceptable voltage extremes.
- Customers are left unaware of their exposure and risk exposure and are inadequately protected.
- Publication of low voltage data and transparency is the only effective safeguard.

The AEMC should urgently restore and strengthen QoS reporting obligations. Customers deserve to know whether the electricity supplied to their homes is safe, fit for purpose, and within the limits their appliances are designed to withstand. The ECA proposed amendment does not achieve that

goal and weaken already meagre reporting requirements. The proposed recommendations above afford long needed further customer protection.

Yours sincerely,

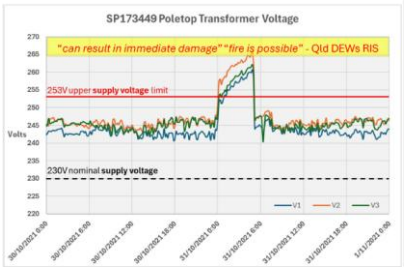
VJGarrone

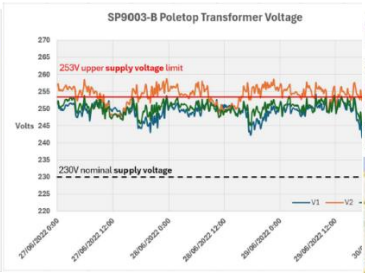
Vince Garrone BE (Elec), RPEQ, Dip Ed, SAA accredited

FURTHER REFERENCES

- Proposal P-005151 to Standards Australia titled "A Caution against Relying upon AS61000.3.100 to Protect Individual Customers Against Voltages Outside Appliance Test Limits". Ref: https://www.linkedin.com/posts/vince-garrone-7060a727_proposed-as610003100-amendment-6p-background-activity-7394226562524508160-raYo?utm_source=share&utm_medium=member_desktop&rcm=ACoAAAWHzTYBPyecG3su7e8e9EnYrRzLF7z3CIo.

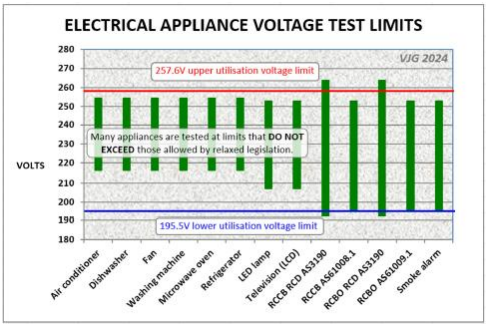
- A paper presented to the Electric Energy Society Paper titled "Inconsistencies between Queensland Supply Voltage Limits and many Electrical Appliance Safety Standards". Ref: https://www.linkedin.com/posts/vince-garrone-7060a727_the-voltage-supply-problem-activity-7330734820525793282-owZ-/.
  Some excerpts below.





- An article in The Guardian raising concern about voltage impact on appliances. Ref: https://www.theguardian.com/australia-news/2024/dec/07/smoke-detector-risk-power-shutdowns-blackouts-solar-power-grid

- A paper titled "Relaxation of Qld Supply Voltage Limits Exacerbates the Mismatch with Many Electrical Appliance Safety Standards" Ref: https://www.linkedin.com/posts/vince-garrone-7060a727_supply-voltage-mismatch-with-appliance-safety-activity-7252095191568797696-Hl84?utm_source=share&utm_medium=member_desktop&rcm=ACoAAAWHzTYBPyecG3su7e8e9EnYrRzLF7z3CIo
  Some excerpts below



Parameter	Pre 2016 [1] Traditional Limits	2016- 2017 Due to AS4777.1 Change	2017-2022 [2] Due to Legislative Change	2022-now [2] Due to AS60038 Change
Max utilisation voltage	254.4V (+6%)	259.2V (+8%)	257.6V (+12%)	257.6V (+12%)
Max supply voltage	254.4V (+6%)	254.4V (+6%)	253V (+10%)	253V (+10%)
Nominal voltage	**240V**	**240V**	**230V**	**230V**
Min supply voltage	225.6V (-6%)	225.6V (-6%)	216.2V (-6%)	207V (-10%)
Min utilisation voltage	213.6V (-11%)	213.6V (-11%)	204.7V (-11%)	195.5V (-15%)
Supply Voltage range	28.8V (12%)	28.8V (12%)	36.8V (15%)	46V (20%)
Utilisation voltage range	40.8V (17%)	45.6V (19%)	52.9V (23%)	62.1V (27%)

Note 1. AS4777.1:2005 was in force until AS4777.1:2016 was issued
Note 2. Neglecting the 2% of time each week where voltages can breach these limits.
Note 3: The **Supply Voltage** is the voltage provided at the consumer's point of supply and the **Utilisation Voltage** is the voltage allowed at an appliance.