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Katie Brown  
Director, Energy Resources Strategy  
Department of Environment, Land, Water and Planning

### **Energy Consumers Australia response to Voltage Management in Distribution Networks Consultation**

Dear Katie,

We appreciate the opportunity to provide comments on the Voltage Management in Distribution Networks Consultation. We have solicited an independent review of the Consultation from Energeia. Their submission is enclosed, and it provides expert evidence expanding and supporting our views.

Energy Consumers Australia is the national voice of Australia's residential and small business consumers. Our vision is that consumer values, expectations and needs are realised through a modern, flexible and resilient energy system. Achieving that vision requires effective regulation and management of voltage in the distribution system to deliver reliable, sustainable and affordable energy services to consumers.

With that in mind, I want to highlight three particularly important points related to the Consultation.

First, information and data are key in improving voltage management. Consumer energy resources – rooftop solar, energy efficiency, electric vehicles, and sources of flexibility, including electric water heaters and batteries – are both potential drivers of and solutions to voltage management problems within Australia's distribution networks. Voltage management provides a key opportunity for consumer energy resources and other non-network approaches to help provide low-cost solution to network challenges. For such non-network solutions to compete fairly with traditional network-based approaches requires that third-party providers have access to the same data and information that network companies have on voltage within the distribution system.

Second, another key barrier to the efficient use of consumer side resources is the lack of industry standards for the delivery of voltage management services by third parties, e.g. aggregators. Work is needed at the national level to define and develop industry standards for the provision of voltage management services. With these standards in hand, it will reduce transaction costs for third party service providers to enter the market and to develop a range of potential service offerings and solutions, reducing industry costs.

Finally, your initiative to focus resources on voltage management through this consultation is a tremendous first step towards the development of a better path forward in Victoria and throughout Australia. We cannot thank you enough for taking the time and effort to work through this technically challenging but key area of our energy system to ensure a better future for energy consumers in Victoria and nationwide.

Should you have any questions or require clarification, please contact Brian Spak at [brian.spak@energyconsumersaustralia.com.au](mailto:brian.spak@energyconsumersaustralia.com.au).

Yours sincerely,

Lynne Gallagher  
Chief Executive Officer

## Submission: Voltage Management in Distribution Networks

### 1. How have current distributor voltage reporting requirements been useful since their introduction?

Additional industry transparency is always welcome and a step in the right direction. However, the highly averaged nature of this data means that its application is limited.

Greater transparency, including 'green button' style consumer access to their own voltage data is essential for unlocking an ecosystem of potential services around it. We understand that this may have additional costs, and these would need to be weighed up against the potential additional benefits.

Additional granularity, at the asset level, e.g. summed to the low voltage (LV) transformer, is also important for potential providers of voltage services, who could use the information to develop their business strategies and technical solutions.

Key consumer applications for voltage data include:

#### 1. Consumers

- a. Identifying where voltage is out of tolerance for raising a service request with the utility
- b. Identifying where the voltage excursion could have damaged equipment for raising a compensation request with the utility, including for damages to equipment, but also due to impacting on inverter performance and potential loss of benefits

#### 2. Service Providers

- a. Identifying and quantifying the opportunity to develop products and services to manage voltage within distribution Network Service Provider (DNSP) and industry standards, or to enter the market
- b. Determining the appropriate solution to potential offer to consumers and/or DNSPs for a specific voltage issue, e.g. if there was a RIT-V<sup>1</sup>
- c. Responding in real-time to changes in voltage via a voltage management products or services on behalf of consumers or DNSPs

#### 3. Academia

- a. Analysing voltage trends and issues across Australia to add to the general body of knowledge
- b. Developing new technical solutions and innovations that could become the next generation of products and services

Each of the above potential applications has different data measurement and communication needs and would be associated with different costs and benefits. Previous work around the value smart meter data could be a useful example of how additional voltage data could benefit consumers and the wider community.<sup>2</sup>

### How could these requirements be updated to provide more meaningful data for consumers and useful information to support public transparency?

More research regarding international best practice in the provision of voltage data would be a good start. Industry best practice benchmarking is a low-cost way to discovering useful policies and practices that have been implemented by other similar jurisdictions.

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<sup>1</sup> RIT-D applies to investments over \$5m but the example is used here due to it being a well understood industry process for soliciting market bids to provide a lower cost solution.

<sup>2</sup> See Energeia's work for the ENA on smart meter benefits from additional data <https://www.aemc.gov.au/sites/default/files/content/996c9319-39d8-49e2-b2ba-26afb8d0ff3b/RuleChange-Submission-ERC0169-Energy-Networks-Association-140529.pdf>

As suggested above, an expert-led, cost-benefit-assessment, such as the one completed for smart meter data by Energy Networks Australia (ENA), could help identify the key voltage applications, and their associated costs and benefits, which would, by definition, result in the discovery of potential value-added regulations.

## **2. Can third-parties who wish to provide non-network solutions (such as neighbourhood batteries and electric vehicle chargers) currently access voltage data to support their needs?**

Our understanding is that third parties lack the access to sufficient historic voltage data to see if there are compelling business cases to be made providing solutions that better manage voltage. There is clearly a lack of real-time or near real time data to third parties to manage voltage for networks.

### **Is there other data and information from distributors that could cover this need? Are there any privacy issues associated with sharing this data and if so, how can they be managed?**

Safeguarding consumer privacy is critical, and no personal information including data on a consumer's smart meter measured voltage attributes should not be released without their explicit consent. The need to keep a consumers data private does not necessarily mean, however, that the data cannot be encrypted and shared in such a way that parties have the data they need with no potential of exposing private data.

There are well established industry approaches in other jurisdictions that enable the provision of asset level data above a certain threshold, and these approaches should be investigated.<sup>3</sup> Voltage performance is typically measured at the point of connection, but this data may be aggregated to the LV transformer for instance, and still be useful for most of the above applications. Where a consumer specific voltage data stream is required, it will either need to be approved by the consumer to ensure their privacy is protected or groups need to agree to an approved approach to securely share the data with no risk of sensitive consumer data being released.

## **3. Do you have any comments about the analysis presented on voltage levels in Victoria's distribution networks? What further evidence or investigations should be considered to understand the voltage in Victoria's distribution networks?**

The analysis presented is a good start in the direction of meaningful analysis of the role that voltage plays in service quality for consumers. We believe the analysis could be further improved by relating it to the key cost and benefits of voltage excursions, including:

1. Damage to appliances, e.g. mainly due to sustained or acute over voltage
2. Reduction in service amenity, e.g. due to flickering lighting or reduced solar PV generation
3. Increased losses and peak demand

The analysis does show hourly voltage profiles by DNSP, which are related to issue 2 above, however, they are presented for the year, and not by season, which could have further informed the analysis. Visualizations should be developed for each of the key voltage value drivers, and this will in turn inform the most useful regulatory reporting and data input needs.

## **4. How could regulatory arrangements for voltage management be enhanced to accommodate high levels of DER and new technologies such as electric vehicles and batteries and deliver better value for consumers?**

The key risks that need to be managed here include ensuring that DNSP and consumer incentives are aligned when it comes to investing in and managing voltage performance and ensuring information symmetry between networks and potential providers of non-network solutions.

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<sup>3</sup> [https://docs.cpuc.ca.gov/PublishedDocs/WORD\\_PDF/FINAL\\_DECISION/140369.PDF](https://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/140369.PDF)

Detailed analysis of the key voltage value drivers for consumers is critical to ensure that the associated costs and benefits are well understood. With these value drivers well understood, the costs associated with achieving them can be assessed, to ensure that the optimal level of expenditure (costs) given the benefits is achieved overall.

Analysis<sup>4</sup> by Renew, which was undertaken by Energeia and funded through Energy Consumers Australia's Grants Program, found that voltage management in the face of high levels of DER could in many cases be delivered by consumer side resources, e.g. electric water heaters. The analysis also showed that cost reflective pricing, and enforcement of industry inverter standards via enhanced inspection and monitoring, as being low cost methods in addition to the more traditional phase balancing and offload tap changes.

The regulatory regime needs to ensure that the least cost approach is adopted that maximises net benefits for consumers, as required by the National Electricity Objective (NEO).<sup>5</sup> While the National Electricity Rules (Rules) require DNSPs to meet the capital and operational expenditure objectives, and there is ex-post and ex-ante oversight by the Australian Energy Regulator (AER), there is a risk that DNSPs may not make optimal investments due to a capital investment bias, lack of industry familiarity with non-traditional solutions (increasing perceived levels of risk internally, and potentially relying on incomplete or incorrect information), which is likely to diminish over time with experience.

Energy Consumers Australia therefore sees value in regulatory support for pilots and trials to build industry capability in the use of consumer side resources. The Australian Renewable Energy Agency (ARENA) has funded a range of voltage related pilots and trials, but has, to our knowledge, only funded one trial<sup>6</sup> specifically focused on the use of consumer side resources for managing voltage performance at least cost. DELWP should therefore consider encouraging these types of pilots and trials in the near future.

Another key barrier to the efficient use of consumer side resources is the lack of industry standards for the delivery of these types of services by third parties, e.g. aggregators. Work is needed at the national level to define and develop industry standards for the provision of voltage management services. With these standards in hand, it will reduce transaction costs for third party service providers to enter the market and to develop a range of potential service offerings and solutions, reducing industry costs.

Greater data transparency on historic voltage within the distribution system and real-time releases of appropriately protected voltage data can enable a number of innovative third parties to provide lower-cost options for managing voltage.

## **5. What levers would support greater accountability for distribution businesses to deliver investments for network voltage?**

Proposed expenditure is approved on the basis of DNSP analysis, potentially promoting over-estimation of the need, tempered by the AER's (limited) benchmarking of the efficient frontier. Improving industry performance requires ensuring that moving the efficient frontier forward earns a higher return than the gains from a higher investment multiple and a lower rate of efficiency improvement, which is a larger industry issue to solve beyond voltage investment.

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<sup>4</sup> See Renew study on least cost DER integration <https://renew.org.au/wp-content/uploads/2020/06/Renew-DER-Enablement-Project-Stage-2-Optimisation-Analysis-Final-Report.pdf>

<sup>5</sup> [https://www.legislation.sa.gov.au/\\_/legislation/lz/c/a/national%20electricity%20\(south%20australia\)%20act%201996/current/1996.44.auth.pdf](https://www.legislation.sa.gov.au/_/legislation/lz/c/a/national%20electricity%20(south%20australia)%20act%201996/current/1996.44.auth.pdf)

<sup>6</sup> <https://arena.gov.au/projects/networks-renewed/>

Best practice investment processes are key to ensuring efficient outcomes, namely:

1. Demonstrating that third parties have access to sufficient data to enable fair quoting of voltage management services.
2. Demonstrating that a reasonable range of investment options has been considered
3. Demonstrating that the sustainably least cost option on a net present value over a reasonable investment horizon (driven by the asset lifetime) has been selected
4. Demonstrating that capital and operational expenditure trade-offs have been considered

Even the above best practice framework and approach will not deliver efficient outcomes if conditions change, and/or if there are issues with what is considered reasonable due to differences in industry experience, and therefore perceptions of risk (i.e. the perceived higher risk of consumer side solutions).

To the degree that the use of consumer side resources is higher risk or perceived to be so, that there are informational asymmetries, and/or that information is dynamic, an incentive framework similar to the S-Factor may be appropriate to investigate further to maximize the net benefits of voltage optimization.

A key issue with the S-Factor is the stochastic nature of reliability, and it can be very difficult to determine whether the changes are due to efficient investments or the weather. This is likely to be less of an issue with voltage, but an effective scheme will need to ensure additionality.

**6. What is the role of energy users in providing services to manage network voltages and how can others, such as aggregators, operationalise this? What opportunities are there to ensure energy users and others are fairly compensated for delivering network voltage support?**

Energy Consumers Australia believes that the Renew report mentioned in Question 4 above covers the potential role of energy users in providing services to manage network voltages comprehensively.

Changes to inverter standards effectively require consumers to provide voltage compensation for free, which could be inequitable depending on the situation. Energy Consumers Australia supports a more systematic assessment of the sources of voltage excursions, so that the costs may be more fairly allocated.

Whether and how these costs are allocated would be the next natural step in the process. Ensuring access to voltage data will help even the playing field for aggregators in the provision of network services.

**7. Do you agree with how the impacts of undervoltage and overvoltage have been characterised?**

The characterization of the impacts in the consultation report at a high level are correct. However, we support the development of a more detailed level of the impacts, so that the range of specific costs and benefits of voltage performance can be effectively managed.

As set out in the responses above, Energy Consumers Australia supports a more detailed analysis of voltage performance value drivers, voltage data applications and voltage issue causation factors and actors, so that more efficient and effective regulations can be determined and promulgated.

**What further impacts should be considered?**

A starting list has been provided in our response to Question 3, a much more comprehensive, and specific list, is important to develop to inform the conversation

## **8. What further evidence and studies are required to better understand the impacts of voltage on consumers, appliances, and DER?**

As suggested in our responses above, we recommend that DELWP consider the following additional evidence and studies to inform this important work.

1. Benchmarking international best practice voltage information publication
2. Assessment of voltage value drivers for consumers, DNSPs and other type of businesses
3. Assessment of voltage data applications, and associated costs and benefits
4. Assessment of international best practice regulatory mechanisms for voltage performance
5. Assessment of international best practice service specifications for 3<sup>rd</sup> party voltage services
6. Development of a program of consumer side resource-based voltage management trials and pilots to address the key unknowns and to develop industry capability and capacity

Energy Consumers Australia would be happy to discuss any of the above suggestions in further detail with DELWP.

## **9. Do the current regulatory arrangements adequately protect consumers from the impacts of undervoltage and overvoltage? If no, what improvements are required?**

Without adequate data, the ECA does not believe that it is possible to determine.

Overvoltage leading to shortened appliance lifetimes is almost impossible to detect and prove except in the most egregious cases, leaving consumers out of pocket. Where it is leading to inverter shutoffs, that is easier to identify with monitoring software, but it is still outside the capabilities of the average consumer, again leaving consumers out of pocket.

More detailed reporting is an important first step in determining the degree of the issue. Requiring DNSPs to report all material (i.e. likely to do harm to consumers) voltage excursions to the regulator on an ongoing basis, similarly to the reporting of worst performing feeders under the reliability service scheme, would be a step in the right direction. Requiring that these excursions capable of reducing appliance lifetimes or reducing solar PV output be notified to the consumer would ensure that there is explicit notification of consumers. However, the costs and benefits of doing so need to be weighed up as it could lead to uneconomically higher costs.

## **10. How can the objective of voltage management which maximises consumer benefits in the high DER future be balanced with the need to ensure network investment is prudent and efficient?**

Learning from best practice approaches implemented elsewhere, as well as learning from the lessons of the Service Target Performance Incentive Scheme (STPIS) implementation, would be good first steps. This is a complex area, and it will require a flexible approach that changes as new information becomes available.

It is important to remember that the industry is at the very beginning of understanding the drivers of and solutions to voltage excursion from high consumer energy resources. Rather than anticipating a significant conflict between responsible management of network voltage and high adoption of consumer energy resources, we encourage networks and governments to support innovation and trials to inform low-cost ways to integrate rooftop solar, electric vehicles and other consumer energy resources. We anticipate that low-cost approaches will emerge and evolve, as we are seeing with the concept of flexible export limits.

**11. What steps and strategies could help to maximise voltage compliance and deliver value for consumers?**

Energy Consumers Australia has set out a number of strategies in our above responses, e.g.:

1. Identifying and leveraging best practices and lessons learned in other jurisdictions
2. Reporting of all material excursions to the regulator and to consumers
3. Building industry capacity and capability via targeted pilots and trials
4. Minimising transaction costs via best practice service standards and specifications
5. Potentially implementing a V-factor to address issues with the 5-year investment process

**12. What are your views on the risks and benefits of going beyond compliance?**

Energy Consumers Australia believes that targeted incentive-based regulation has a role in ensuring the best outcomes for consumers over the long-term, and that a voltage performance focused incentive scheme could very well add value. However, achieving this objective will require building on best practices and lessons learned from other jurisdictions, as well as from the lessons learned from other similar schemes such as the STPIS and F-Factor.<sup>7</sup>

**What other risks and benefits should be considered?**

Energy Consumers Australia have raised a number of potential benefits and risks throughout our response and will not repeat them here for brevity.

**13. Is pursuing policy and regulatory reform to improve voltage management beyond compliance a worthwhile exercise?**

Energy Consumers Australia believe that reforms done well are worthwhile exercises.

**If yes, which options in Figure 15 are most worthwhile pursuing further that have a low potential to increase consumer electricity bills from upgrading the network? What other options which should be considered?**

Each of the options in Figure 15 is potentially worthwhile, but more work is needed to better understand the scope of the issue, and the potential costs and benefits at a more detailed level, to ensure each of the potential regulatory intervention options is well supported by the evidence.

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<sup>7</sup> [https://www.energy.vic.gov.au/\\_\\_data/assets/pdf\\_file/0022/44419/f-factor\\_-\\_Regulatory\\_Impact\\_Statment\\_Oct16.pdf](https://www.energy.vic.gov.au/__data/assets/pdf_file/0022/44419/f-factor_-_Regulatory_Impact_Statment_Oct16.pdf)