Low-voltage Network Visibility

Phase 3 Final Report

31 March 2025

AUSTRALIAN ENERGY REGULATOR

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1 Executive summary

Distributed energy resources (DER), such as photovoltaic solar panels, stationary batteries and electric vehicles are transforming the generation and delivery of energy in Australia. Unlike other energy technologies, DER are able to generate, store or flexibly demand energy in downstream, low-voltage areas of electricity distribution networks. The efficient integration of DER within distribution networks, facilitated by data access, provides an opportunity for lower emissions, improved efficiency of network asset use and putting downwards pressure on network costs.

Australia's electricity networks were originally designed to deliver energy to end users from a small number of generators. Today, there are more than 2.9 million photovoltaic solar systems and 130,000 batteries connected to the National Electricity Market[1]. More than 10% of energy delivered to distribution network customers is sourced from small scale DER[2].

Distribution network service providers (DNSPs) have historically had poor visibility of their low-voltage networks. For example, traditional analogue electricity meters can only record simple information and are read manually approximately once per quarter. However, 58% of customers now have digital smart meters, which automatically relay information every 5 minutes[3]. DNSP access to data on their own networks is improving as they invest in enabling technologies including smart meters, transformer monitors and data analysis and storage systems. The AEMC's 2024 Rule determination, *Accelerating smart meter deployment,* enables DNSPs to access basic power quality data from small customer smart meters without charge.[4]

As the capabilities of DNSP's to collect data on the performance of their networks improves, the benefits of sharing that data with third parties increases. Organisations seeking to install DER such as electric vehicle chargers, photovoltaic solar panels or community batteries can use public data to identify appropriate sites and understand constraints for their installations. Currently, DNSPs have greater access to network data than non-network third parties. Improved access to data can improve the ability of planners and governments to be informed and make appropriate decisions about distribution networks. Open visibility of network data provides a level playing field where actors can determine new use cases that haven't yet been defined, fostering competition in the delivery of new services.

The role of distribution networks is evolving. Two-way flows of electricity are becoming the norm, installation of DER is increasing, and total electricity demand is forecast to increase due to the electrification of transport and heating[5]. New roles and responsibilities are being considered for a body that plans and dispatches distribution network connected DER, that is,

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[1] Australian Energy Regulator, *Insights into Australia's growing two-way energy system*, December 2024.

[2] Australian Energy Regulator, *Insights into Australia's growing two-way energy system*, December 2024.

[3] Australian Energy Regulator, *2024 Electricity and gas networks performance report*, September 2024.

[4] Australian Energy Market Commission, *Accelerating Smart Meter Deployment, Rule determination*, 28 November 2024.

[5] Australian Energy Market Operator, *2024 Integrated System Plan (ISP)*, 26 June 2024.

a Distribution System Operator (DSO)[6]. DSOs enable better coordination of DER on a network, providing benefits of improved utilisation, lower capital expenditure on networks through avoided or deferred network investment, and lower wholesale market prices through increased supply of energy when the system requires it. Data quality and access will have a strong influence on the ability of DSOs and energy system participants to make informed decisions.

1.1 Summary of actions

In this report we outline the following actions that we will take to ensure there is adequate visibility of distribution network data to third parties:

We will support changing the National Electricity Rules to ensure DNSPs publish key information that they possess: We will support key elements of the 'Integrated Distribution System Planning' Rule change request recently submitted to the AEMC.[7] This will improve DNSP planning processes, increase the amount of useful data collected and published by DNSPs and make it easier for third parties to understand the costs and benefits of DER investments connected to distribution networks.

We will publish network performance metrics as reputational incentives for DNSPs to facilitate the connection of DER: Our Export services network performance report enhances transparency of DNSP performance, supports more informed regulatory and policy decisions by government agencies and can inform investment and operating decisions made by consumers and DER service providers. We will investigate new inclusions in this year's report, including data on electric vehicle chargers and community scale batteries, subject to availability of data. Reporting on these types of metrics can provide reputational incentives and influence DNSP behaviour.

We will investigate if new incentive arrangements are needed to align DNSP actions with consumer outcomes: We will review incentive arrangements, including our existing incentive schemes, guidelines and benchmarking models. We will seek to ensure that incentive arrangements are appropriate so that DNSPs are encouraged to provide available network capacity to potential customers, before building new network infrastructure. We will commence this review in 2026.

We will encourage innovation in data sharing within the regulatory framework through policy-led sandboxing: The AER administers the Energy Innovation Toolkit, which supports energy innovators in trialling new products and services that will benefit consumers. Trial waivers can exempt innovators from having to comply with specified energy laws and rules for a specific period of time. We will consider trial waiver proposals favourably where they demonstrate enhanced benefits associated with the public sharing of network data and information.

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[6] The Department of Climate Change, Energy, the Environment and Water, *National Consumer Energy Resources (CER) Roadmap*, 19 July 2024.

[7] Energy Consumers Australia, *Integrated Distribution System Planning (electricity) rule change request*, 22 January 2025.

2 Background

In 2023 the Energy Security Board (ESB) Data Strategy tasked the AER to improve third party access to network data through the Low-voltage Network Visibility project.[8] Improved access to network data supports investors, planners and policy makers to make informed decisions for the connection of DER to distribution networks.

This report provides the outcomes of the final phase of the Low-voltage Network Visibility project.

- **Phase 1** defined the network data that is required by stakeholders making DER planning decisions.
- **Phase 2** tested the challenges and value in delivering the data sets identified in Phase 1 through a real-world trial supporting the installation of community scale batteries in Victoria.
- **Phase 3** (this report) proposes a pathway for the ongoing delivery of priority datasets to the market, informed by phases 1 and 2.

2.1 Phase 1: Benefits of increased visibility of networks

We published the Phase 1 consultation paper "Benefits of increased visibility of networks", which was authored by the ESB, in July 2023[9]. Phase 1 involved a series of workshops with a range of stakeholders to define the range of use cases for network data and the datasets that are needed to support those use cases. The full lists of use cases and datasets are provided in Appendix A. These recommended datasets are discussed in Outcome 1 (sections 3.1.2 and 3.1.3).

The Phase 1 consultation paper sought stakeholder views on the identified use cases and datasets.

2.1.1 Responses to the phase 1 consultation paper

Many stakeholders supported the low-voltage network visibility project and the proposed use cases and datasets, including:

- Shell Energy, which noted that greater network visibility would be particularly beneficial to upscaling flexible demand, a key resource in Australia's energy transition.[10]
- The Electric Vehicle Council, which noted that timelines for connection approvals will be shortened by the efficiencies gained through improvements in visibility. The Council praised Essential Energy's network capacity map, noting that while the tool doesn't replace a formal connection application process, it does allow organisations such as

[8] Energy Security Board, *Data Strategy*

[9] Energy Security Board, *Benefits of increased visibility of networks: Consultation paper*, July 2023.

[10] Shell Energy, *Submission to AER ESB Network Visibility Paper*, 4 September 2023.

charging point operators to rapidly assess a geographic area against their equipment deployment plans. The council noted that it would be beneficial for other DNSPs to present network data using a similar interface to that used in Essential Energy's map. The map includes an easy-to-understand "traffic light" style colour code to show whether a site has spare capacity.[11]

- The Victorian Department of Energy, Environment and Climate Action (DEECA), which noted that the AER's actions will promote technology innovation and support the smooth integration of consumer energy resources (CER) into the network, unlocking value for consumers and community. It also recommended two additional datasets related to network voltage – average voltage data by time period (for example, the morning peak, solar generation peak and evening peak), and the percentage of customers experiencing under- or over-voltage and the associated duration.[12]
- Nexa Advisory, which submitted that the Distribution Annual Planning Reports (DAPRs) are no longer fit-for-purpose, and while they do identify needed investment, they do so at a very high level in the distribution system. The DAPR should be reoriented to identify network needs much deeper into the system, sharing opportunities for non-network solutions including flexibility services from the customer side.[13]
- The Public Interest Advocacy Centre (now called the Justice and Equity Centre), which submitted that network system data should be part of an open access regime. That is, if the network data exists, is of usable quality, and can be made available at relatively low cost, with appropriate protection for the source point of that data (consumers), then it should be made available.[14]

Other stakeholders provided more cautionary feedback, including:

- Origin Energy, which suggested that instead of vastly increasing the volume of data available, it may be more prudent to develop a similar, consistent framework for the sharing of data already collected with other parties to ensure it can be used once delivered.[15]
- CitiPower, Powercor and United Energy, which noted that it already provides a range of network data free of charge to customers which is designed to support third party providers and market participants develop contestable solutions. It also suggested that data without context will not meet customer needs, and it would be costly to make the required data in the consultation paper available.[16]

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[11] Electric Vehicle Council, *Submission to AER ESB Network Visibility Paper*, August 2023.

[12] Department of Energy, Environment and Climate Action, *Submission to AER ESB Network Visibility Paper*, 20 September 2023.

[13] Nexa Advisory, *Submission to AER ESB Network Visibility Paper*, 1 September 2023.

[14] Public Interest Advisory Centre, *Submission to AER ESB Network Visibility Paper*, 1 September 2023.

[15] Origin, *Submission to AER ESB Network Visibility Paper*, 1 September 2023.

[16] Citypower, Powercor, United Energy, *Submission to AER ESB Network Visibility Paper*, 1 September 2023.

2.2 Phase 2: Neighbourhood battery trials

Phase 2 of the low-voltage network visibility project involved a trial to provide data to support the Victorian Neighbourhood Battery Initiative (NBI). This was undertaken through a number of meetings hosted by the AER with representatives from NBI provider organisations, DEECA and Victorian DNSPs.

NBI providers requested the following data from DNSPs:

- A low-voltage network map which geographically shows
  - distribution substations, low-voltage feeders and service lines,
  - Low-voltage network configuration, including low-voltage switches and fuses with 'open' or 'closed' status.
- Substation capacities,
- Conductor/cable ratings,
- Number of customers – solar/non-solar/business,
- Solar generation – capacity (kW) and exports (kWh),
- Network constraint identification – maximum, average and minimum demand curves, and
- Voltage data – voltage curve at the distribution substation terminals and/or customer voltage summary.

2.2.1 Trial findings

Overall, the trial found that information available to NBI participants from DNSPs was not suitable to meet their needs. The Phase 2 report identified eight key outcomes which are addressed in this phase 3 report.

Table 1 Summary and resolution to Phase 2 outcomes

Phase 2 outcomes (summarised)	Resolution in phase 3
Outcome 1: Access to more detailed DNSP data (e.g., feeder level) is likely to benefit consumers in the long run (including spatial mapping, substation capacities, solar capacity and exports, constraints, and voltage data).	**Action 1 (rule change)** More detailed DNSP data will be required to be published.
Outcome 2: Network connection and augmentation costs are uncertain, and we should consider whether DNSPs should provide this data.	**Action 1 (rule change)** We recommend that historical network connection and augmentation costs (or cost ranges) are provided by DNSPs
Outcome 3: A lack of up-to-date data increased the likelihood of unsuccessful connection applications, and we should consider whether more frequent data (than annual data) should be an alternative control service.	**Action 1 (rule change)** The rule change will consider requiring some key data to be provided frequently (e.g. on a three-month basis).
Outcome 4: Data provided by DNSPs required detailed technical assessments by NBI participants to determine site suitability, requiring substantial expertise and leading to significant time and cost (no proposed action).	**Action 1 (rule change)** The rule change will consider options to provide simplified information, such as network opportunity maps.
Outcome 5: Lack of user-friendliness of network data platforms can significantly impact outcomes. However, DNSPs were responsive to user feedback (no proposed action)	**Action 1 (rule change)** Over time, network approaches to providing data will be compared and contrasted, encouraging networks to improve their data usability.
Outcome 6: We should consider whether ten customers is the appropriate threshold for data privacy.	**Action 1 (rule change)** The appropriate data privacy threshold can be investigated during the development of information guidelines as required by the rule change.
Outcome 7: Uncertainties from evolving business models, consumer technology and network technology need to be considered.	**Actions 1 (rule change), 2 (reporting), 3 (incentives) and 4 (regulatory sandboxing)** The rule change allows data publishing requirements to change over time. Reputational and financial incentives will encourage DNSPs to release appropriate data even if not explicitly required. Regulatory sandboxing will allow for innovative new approaches from DNSPs.
Outcome 8: Actions to mitigate network augmentation were not viewed as profitable by NBI participants (finding only, no proposed action)	**No resolution required**

2.3 Sharing of DNSP data

DNSPs currently share network data with the public in a range of ways, including:

- All DNSPs submit Regulatory Information Notices (RINs) to the AER, which are subsequently published[17].
- All DNSPs publish Distribution Annual Planning Reports (DAPRs).
- Most DNSPs implement online data portals that allow their network data to be visualised geographically[18].

Some DNSPs have begun using the Piclo Flex platform.[19] Piclo Flex is an online marketplace that identifies and advertises those parts of the network that are subject to network constraints. The platform allows DNSPs to quantify the value of alleviating a constraint and the forecast period over which the constraint could be managed through the provision of non-network alternative. Third parties, such as DER providers, may then be paid for alleviating the constraint.

Interested parties may submit requests to DNSPs for data that isn't publicly available. DNSPs may choose not to provide information that they consider to be difficult to produce, or that would violate customer privacy.

Some information, such as whether a proposed new connection can be made, is often available to external parties only after submitting a connection application and paying associated fees to cover assessment costs by DNSPs.

[17] Australian Energy Regulator, *Regulatory Information Notices*

[18] Rosetta, *APR Portal*

[19] Piclo, *Piclo Flex Australia*

3 Actions

3.1 Action 1: Support for a National Electricity Rule change

We consider that changes to the NER are required to ensure that improvements in network visibility are shared by DNSPs for the ultimate benefit of consumers. To accomplish this, we will support key elements of a recent rule change proposal by Energy Consumers Australia (ECA) on the 22 January 2025[20]. The rule change is called 'Integrated Distribution System Planning (electricity)', which we refer to as the IDSP rule change.

We support the IDSP rule change as a pathway to provide the market with low-voltage network data. We will make a submission to the AEMC when the Rule change is open for consultation and we may provide a wider view of the rule change, beyond its role to provide data to the market, at that time.

3.1.1 The proposed IDSP Rule change

In our view, key requirements of the IDSP rule change that can improve network visibility include:

- Increasing the comprehensiveness of distribution planning by replacing the DAPR with a biennial integrated distribution system plan (IDSP). The IDSP will be based on a 20-year projection horizon with a 10-year action period.
- Requiring DNSPs to publish some data more frequently, such as no less frequently than every three months for CER hosting capacity maps.
- Requiring DNSPs to develop a roadmap outlining how they will develop the tools to collect and utilise more data and information at greater spatial granularity and provide more fit-for-purpose distribution planning in the future.
- Requiring DNSPs to increase the transparency of the data, modelling, and methodologies they use to determine key calculations about the condition of their infrastructure.

DNSPs would be required to make all the above data, methods, and outputs used for their network publicly available by 1 July 2027. Initially, this would include all data that DNSPs have available at that time and would include data at more granular levels over time as each DNSP develops their capabilities.

3.1.2 Priority datasets

We recognise that the proposed volume of additional data and information to be included in the IDSP is extensive. We welcome ECA's suggestion that initially reporting requirements will apply to data and information that is currently available, as this will provide DNSPs with the necessary time to develop their analytical capabilities. We anticipate that the AEMC will

[20] Energy Consumers Australia, *Integrated Distribution System Planning (electricity) rule change request*, 22 January 2025.

consult collaboratively with industry stakeholders (including ECA and AER) during the course of the Rule change process to refine data definitions, establish priority datasets and identify datasets for inclusion in future IDSPs.

The IDSP Rule change must promote the achievement of the National Electricity Objective and deliver efficient outcomes to the benefit of electricity consumers in the long-term. Therefore, priority datasets should be those that maximise net benefits to electricity consumers, and could be:[21]

- datasets already being collected by DNSPs which can be reported at a minimal or incremental cost to DNSPs, even if potential use cases are uncertain or the benefits are expected to be minimal, and
- datasets not currently being collected by DNSPs, but have the potential to provide significant benefits to electricity consumers.

Datasets related to import capability, export capability and network connection (see Table 2) are most likely to fall into this category. DNSPs already collect some of this data (or are in the process of doing so), and a significant number of use cases were identified by stakeholders for these categories. For example, the regular provision of feeder level data could expedite the connection of distributed storage (such as community batteries) and deliver consumer benefits in the form of cheaper and cleaner electricity.

It follows that lower priority datasets are those that are cost prohibitive and/or provide immaterial or less certain benefits to electricity consumers. Real-time outage information is likely to fall into this category (Table 3) because of its greater cost. However, as DNSPs improve their analytical capabilities the provision of this data will become more cost effective.

Table 2 Phase 1 datasets proposed to be priority datasets

Import capability	
Current and forecast remaining electricity delivery capability	kW or kVA by season for HV feeder and distribution substation
Network augmentation plans	kW or kVA by feeder and distribution substation
Indicative annual deferral value	$/kW or $/kVA by HV feeder and distribution substation
Export capability	
Current and forecasting remaining electricity export capability	kW static limit for export (based on POE90 forecast demand and POE10 forecast export). Export capability by season and time of day.
Network augmentation plans	kW or kVA by feeder and distribution substation
Indicative annual deferral value	$/kW or $/kVA by HV feeder and distribution substation

[21] Benefits could relate to price, quality, safety, reliability, security of supply of electricity or reductions in greenhouse gas emissions.

Curtailment	kW reduction in inverter capacity by duration of curtailment by network element (HV feeder and distribution substation), season, time of day, and reason (e.g. export limitation, voltage condition)
Network connection	
Voltage levels	Historic average voltage by distribution substation and HV feeder
Historic reliability	Historic SAIFI and SAIDI by distribution substation and HV feeder

3.1.3 Potential additional (non-priority) datasets

Phase 2 datasets

Unlike the phase 1 datasets, the phase 2 datasets (see section 2.2) had relatively less consultation and are likely to be applicable to a more limited number of use cases. We recommend that the phase 2 datasets (section 2.2) are considered in the rule change as an additional (non-priority) dataset for consideration as per Table 3.

Note that we have not included low-voltage network configuration data as an additional dataset (as included in section 2.2), as these network configurations may change very fast, limiting the usefulness of the data when reported over longer timeframes.

DEECA requested datasets

In addition to the datasets identified in our earlier reports, as per Table 3 we recommend the AEMC consider the voltage-related metrics suggested by DEECA (noted in section 2.1.1) and additional data to streamline the connection of large CER, including electric vehicle supply equipment (EVSE).

DCCEEW requested datasets

In 2024 the Department of Climate Change, Energy, the Environment and Water (DCCEEW) published a consultation paper on options to streamline network connection processes for large CER, including EVSE and distribution level storage and renewables.[22] The paper suggested that we should consider incentivising DNSPs to shorten the time required to connect and energise EVSE and large CER. This could involve reporting on the average time taken for each step of the connection process. We recommend the inclusion of this dataset as an additional, non-priority dataset. Reporting this information will place reputational incentives on DNSPs to encourage shorter times taken for DNSPs to process new EVSE and large CER connections.

[22] Department of Climate Change, Energy, the Environment and Water, *Streamlining the connection of Electric Vehicle Supply Equipment (EVSE) and large Consumer Energy Resources (CER) – Options Paper for consultation*, 26 August 2024.

Table 3 Additional datasets

Network operations (phase 1 recommendation)	
Real-time outage information	Cause Location and assets affected Number of customers affected Estimated time for restoration Planned/unplanned outage
Phase 2 datasets	
Number of customers	Disaggregated by customer type (e.g. Solar/non-solar/business)
Conductors and cables	Capacity ratings
Solar generation	Capacity (kW) and export volume (kWh),
Network constraint identification	Maximum, average and minimum demand curves
Voltage data	Voltage curve at the distribution substation terminals and/or customer voltage summary.
Additional data proposed by DEECA	
Customers experiencing under- or over-voltage	% of customers and duration
Additional data proposed by DCCEEW	
Average time taken to connect and energise EVSE and large CER	Days taken (for each step in connection process)

3.1.4 Methods and frequency of reporting

In our view, network data should be presented in the form of a geographical map where possible. Additionally, where DNSPs identify actions that can defer network investment, and quantify the value of that investment, DNSPs should provide some of that value back to parties that provide services that defer the network expenditure (e.g. using a Piclo Flex platform or equivalent).

Where possible, information provided by DNSPs should be in an easy to understand format, for example, using a “traffic light” colour code for available network capacity similar to Essential Energy’s network capacity map[23].

In the longer term, we consider that the data and information reported in the IDSP should be compatible with, and reported on, the CER Data Exchange. The CER Data Exchange

[23] Electric Vehicle Council, *Submission to AER ESB Network Visibility Paper*, August 2023.

project, which is being run by the Australian Energy Market Operator (AEMO), aims to improve data accessibility and transparency, reduce the costs of data access, enable greater CER coordination and support innovation and customer choice. [24] The project will be delivered through the implementation of a digital platform designed to streamline the exchange of CER information between stakeholders. It is anticipated that CER operational data, including that of EVs and EV supply equipment, will be captured for use to better manage local networks and the energy system as a whole.

We consider this is likely to be a practical solution in the longer term because many market participants will want to compare data across DNSPs, and accessing individual IDSPs or network maps for each DNSP would be time consuming. In its recent consultation paper, AEMO indicated that one potential benefit of the CER Data Exchange would be standardised data formats and consistency across industry.[25] While we agree, we note that it may be some time before data reported by DNSPs in their IDSPs reaches the level of consistency needed to enable meaningful comparisons across DNSPs. In our submission to the rule change, we will recommend that the AEMC consider how the IDSP is expected to function alongside the CER Data Exchange while ensuring that reporting requirements and processes are not onerous and duplicative.

In terms of the frequency of reporting, we support ECA's proposals that:

- IDSPs are developed every two years on years alternating the ISP releases. ECA suggests that this will allow the IDSPs to use the modelling from the previous ISP, and for the next ISP to use the modelling from the IDSPs, which will enable more complete whole-of-system planning.
- Certain key data is to be updated more frequently than the IDSP, for example hosting capacity maps being updated no less frequently than every three months. This aligns strongly with our Phase 2 report, which found that annual data may be out of date by the time connection applications are submitted to DNSPs.

3.1.5 Cost impacts

DNSPs have either recently received or requested regulatory allowances (capital and operating expenditure) to increase network visibility, in a variety of different ways. A summary of network expenditure for each DNSP is provided in Appendix A. However, we recognise that DNSPs have not been funded to collect and report the data and information proposed for the IDSP.

We suggest that DNSPs quantify the approximate level of funding necessary to meet the new obligations of the IDSP Rule Change and allow other stakeholders to scrutinise these claims. In doing so, DNSPs should also quantify potential cost savings due to:

- A more streamlined connections process, with greater network visibility leading to higher quality connection applications and shortening this process.

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[24] Australian Renewable Energy Agency, *AEMO – CER Data Exchange Industry Co-Design*, accessed 4 February 2025.

[25] Australian Energy Market Operator, *CER Data Exchange Industry Co-Design: Consultation paper*, October 2024.

- Basic power quality data now being available to them free of charge, following the AEMC's 2024 Rule determination (Accelerating smart meter deployment).[26] DNSPs that previously received opex allowances for this purpose would otherwise benefit from an opex efficiency gain.

We support ECA's proposal that new data requirements are staged – only beginning in 2027 with data already currently available, and providing DNSPs with the opportunity to identify data limitations and how they will address them over time. Although the IDSP requirements may increase DNSPs costs, we do not expect significant step changes in expenditure that would have material customer bill impacts.

In our view, it is not necessary for DNSPs to make all data available. Some data may not be useful or may have been historically formatted in a way that is not cost-beneficial to publish. DNSPs should focus on providing useful data to the public, such as the priority datasets nominated in this report.

As networks continue to undertake expenditure to collect or organise data (as per Appendix A), where appropriate, this data should be collected with the view that it will be made public at minimal extra cost.

3.2 Action 2: Performance reporting

We publish annual network performance reports to provide accessible information resources that enhance transparency and accountability around how network service providers are performing, thereby encouraging improved performance. We report on the operational performance (such as revenue, expenditure history and incentive scheme performance) and financial performance of network service providers (return on assets, return on regulated equity and earnings before interest and tax per customer).

In 2024 we published our second annual export services performance report. This report analyses the performance of DNSPs in providing services for embedded generators, such as residential solar and batteries, to export into their networks. Our latest report commented on numerous aspects of export services, including export volumes, average static export limits, customers on static-zero export limits, the deployment of flexible export limits, time taken to provide a connection offer and network expenditure to maintain export services.[27]

Our reporting on export service performance is evolving. From 2025 information collected from DNSPs will be standardised through the AER's regulatory information orders (RIOs). In addition to standardising the core measures collected from networks, the RIOs require DNSPs to provide additional auditing and assurance compared to the information requests that were used to collect data for the 2022–23 and 2023–24 reports. We will investigate new inclusions in this year's Export services network performance report through voluntary information requests, including data on electric vehicle chargers and community scale batteries, subject to availability of data. We will continue to develop and refine our annual

[26] Australian Energy Market Commission, *Accelerating Smart Meter Deployment, Rule determination*, 28 November 2024.

[27] Australian Energy Regulator, *Insights into Australia's growing two-way energy system*, December 2024.

export services performance reports and metrics in consultation with key stakeholders, including DNSPs, state and territory jurisdictions and consumers.

3.3 Action 3: Incentive schemes

As part of the 2021 'Access, pricing and incentive arrangements for distributed energy resources' Rule change, the AER was required to undertake a review to consider arrangements to provide incentives for DNSPs to provide efficient levels of distribution services provided to retail customers for the supply of embedded generating units into the distribution network. Key outcomes of this review were:[28]

- We decided not to extend the Service Target Performance Incentive Scheme (STPIS) to export services, in part due to a lack of robust data to measure export service performance.
- We decided to introduce a new small-scale incentive scheme – the Export Service Incentive Scheme (ESIS) – which we suggested would be a transitional measure until a standardised scheme could be introduced via the STPIS.
- We committed to initiating a future review of incentive arrangements for export services by 2027, which will consider the availability of new data to support the implementation of a standardised incentive scheme. We also committed to reviewing relevant AER guidelines, including the Distribution Reliability Measures Guideline, Demand Management Innovation Allowance Mechanism and Demand Management Incentive Scheme, as well as our benchmarking models (also by 2027).

Following our review of incentive arrangements for export services, we developed a new small scale incentive scheme related to export services – the Export Service Incentive Scheme. However, no DNSPs have so far proposed to apply this incentive scheme. We consider that this is likely because:

- Current estimates of export service levels are very high for the vast majority of distribution networks.
- DNSPs lack high quality data to support estimated service measurements (the estimates rely on assumptions and may not be reported on a network-wide basis).
- The level of revenue at risk under the small-scale incentive schemes is not high enough for DNSPs to proactively pursue such an incentive scheme. Instead, DNSPs prefer to forecast expenditure related to CER integration – this carries no risk of penalty and results in regulatory asset base growth instead of revenue adjustments.

When it was originally developed, it was envisaged that the Service Target Performance Incentive Scheme (STPIS) would contain a 'Quality of supply' component.[29] Quality of supply can be measured directly through the use of voltage monitoring equipment or through secondary sources such as customer complaints. However, commonly used quality of supply measures did not exist, and therefore the STPIS has focused on the frequency and duration of supply interruptions.

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[28] Australian Energy Regulator, *Incentivising and measuring export service performance*, 10 March 2023.

[29] Australian Energy Regulator, *Issues paper – Service target performance incentive scheme*, November 2007.

We expect that recent improvements in data quality, and expected further improvements following the IDSP Rule change, will be a focal point of the incentive scheme review and may provide us with the necessary data and information to extend the STPIS to export services. This could be through measures related to network utilisation, quality of supply, or other potential metrics. We will commence our review of incentive schemes for export services in 2026.

3.3.1 Measuring network utilisation

As we consider new ways of incentivising network visibility and DER deployment, we may consider new ways of measuring network utilisation. We currently report on network utilisation in annual network performance reports[30].

Our current measure of utilisation uses a calculation based on "Non-coincident peak demand", resulting in a metric that reflects how close to capacity a typical zone substation is during peak periods. The average utilisation of distribution networks was reported as 43% in our 2024 network performance report[31].

This metric is a useful indicator of whether a network business has too much installed capacity relative to their peak demand. However, it may not be well suited as a measure of whether distribution networks are effectively managing peak demand in the first place (for example through the efficient integration of DER).

Other measures of network utilisation may be useful for future incentives on distribution networks. One example may be to incorporate a measure of "average utilisation" to supplement our current measure which may be considered as "peak utilisation". The difference between peak and average utilisation may be considered to be a measure of how "peaky" or "flat" a network's demand is.

Using strategies such as innovative pricing or integration of DER, networks may be able to flatten their demand curves. Flatter demand curves allow for a greater throughput of electricity for a fixed amount of network assets and may therefore help to put downwards pressure on network costs per unit of electricity delivered.

3.4 Action 4: Policy-led sandboxing

In February 2025 we published our policy-led sandboxing paper, declaring our interest in exploring and testing how the regulatory sandboxing framework can be used to accelerate our understanding of the different models to overcome barriers to access, deployment and orchestration of DER, including CER, or create incentives for it to occur, in a way that is both effective for, and protective of, consumer interests.[32]

The existing Energy Innovation Toolkit is a market-led sandbox, and targets issues at a point in time, as raised by applicants on a case-by-case basis. We are augmenting the Energy Innovation Toolkit through a policy-led approach of identifying the need to

[30] Australian Energy Regulator, *2024 Electricity and gas networks performance report*, September 2024.

[31] Australian Energy Regulator, *2024 Electricity and gas networks performance report*, September 2024.

[32] Australian Energy Regulator, *Policy-led Sandboxing: Accelerating access, deployment and orchestration of distributed energy resources through the regulatory sandbox*, February 2025.

accelerate access to, and deployment and orchestration of, DER and CER through large-scale, in-market trials.

Policy-led sandboxing provides the opportunity to move quickly to test things at scale and in market (rather than just as a desktop study or a study in a non-grid-connected setting). It is this in-market nature that allows these trials to accelerate thinking by contributing meaningful evidence to policy and regulatory work.

We encourage regulatory sandboxing trials that are guided by the principles below:

- Equitable access to CER/DER
- Facilitating deployment and orchestration
- Lowest whole-of-system cost
- Meeting consumer needs
- Scalability and replicability
- Addressing system challenges

Our paper identifies conceptual trial buckets, that is, areas of innovation that would be useful to explore through trials. One of these buckets relates to ‘network data visibility as an enabler’, and asks how we can improve access to network data to facilitate effective orchestration of targeted CER by non-network participants. Trials in this area could involve:

- using network data to deploy and orchestrate CER, or
- testing different commercial models for CER orchestration.

Policy-led regulatory sandboxing enables DNSPs to try new methods of achieving network visibility. We can then apply any learnings from these sandboxing trials to the way we regulate DNSPs more broadly.

4 Conclusion

This report concludes our planning for the provision of low-voltage network visibility to the market. Next, we will work with stakeholders to execute this plan, with key next steps outlined below.

- May 2025: AEMC commences consultation on proposed Rule Change
- H2 2025: AEMC draft determination on IDSP Rule Change
- End 2025: AEMC final determination on IDSP Rule Change
- End 2025: Publication of the 2025 Export services performance report
- 2026: AER commences review of incentive arrangements for export services and a range of AER guidelines

In this phase 3 report, we have identified actions that we will take to ensure that low-voltage distribution network data is provided to the public. Actions range from short term reputational incentives via performance reporting through to structural, long-term regulatory changes from an NER rule change and the investigation of new incentive schemes. Policy-led regulatory sandboxing will support further innovation that is not currently covered in the regulatory framework.

Low-voltage network visibility is a key enabler of the transition of Australia's energy system to incorporate more small-scale DER. Network visibility empowers non-network actors of all kinds to understand, interact, invest and connect with the distribution network. Understanding local network capabilities and limitations allows DER investments to be right-sized and installed in locations where they will be utilised.

There are also challenges to implementing improved network visibility, as data requirements change over time, and DNSP costs associated with providing visibility can be difficult to determine in advance. We will work with stakeholders to overcome these challenges and will seek to implement network visibility measures where they are cost beneficial to consumers.

Network visibility facilitates the use of DER as an integral part of Australia's secure, affordable and sustainable future electricity systems. It supports both the National Energy Objectives and our goal to ensure that energy consumers are better off, now and in the future.

Glossary

Term	Definition
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CER	Consumer Energy Resources
Curtailment	Any reduction on the capacity of an inverter to generate power. This could be caused by the inverter tripping in response to voltage disturbances or formally imposed through network static or dynamic voltage limits.
Connection agreement	An agreement between a DNSP and a customer by which the customer is connected to the distribution network and receives distribution services.
DER	Distributed Energy Resources
DAPR	Distribution Annual Planning Report
DNSP	Distribution Network Service Provider
ECA	Energy Consumers Australia
ESB	Energy Security Board
EVSE	Electric vehicle supply equipment
Export	Electrical Energy that flows from a customer's premises to a distribution network via the connection point.
Export capacity	The maximum amount of electricity a customer's system is capable of exporting to the distribution network in accordance with the connection agreement.
HV	High-voltage
IDSP	Integrated Distribution System Plan / Planning
kVA	Kilovolt-ampere
kW	Kilowatt
NBI	Neighbourhood Battery Initiative, a program that seeks to support the deployment of 100 neighbourhood batteries across urban and regional Victoria.
NER	National Electricity Rules
SAIDI	System Average Interruption Duration Index, a normalised measure of the average length of time that a customer experiences network outages.
SAIFI	System Average Interruption Frequency Index, a normalised measure of the average number of network outages experienced by customers.
STPIS	Service Target Performance Incentive Scheme

Appendix A: Supplementary information

Table A1: Use cases identified in Phase 1

	Organisation	Use case
1	AEMC	Information to support Rules development
2	Aggregators/VPP providers	Region wide issues and network issues impacting aggregation
3	CER investors	Network issues, including likely curtailment
4	CER service providers	Connection information but focused on equipment and services required
5	Consumers and consumer advocates (including installers)	Information on service quality, emerging issues and network issues, and to support consumer decisions, including balancing poor information from installers/sellers
6	Data provider (e.g. Telstra, NBN)	Information on energy usage and value – distribution network and constraint data: demand, constraints costs/price, outage information
7	Data provider (e.g. ABS, representative organisations)	Source of general information to support others
8	Electricity dependent, geographically spread services	Real time operational information, location and planning information for site planning
9	Embedded generator	Seeking connection information, including potential locations
10	Emergency services	Real time operational information, location and planning information for emergency response planning
11	Investors in EV charging for any location (street and fast charging)	Seeking connection information, including locations and tariffs and forecasts and costs for augmentation
12	Investors in network support	Options for network support by location, network issues to be addressed
13	Investors with sites looking to add EV charging	NMI/site information, forecasts and load hosting capability and costs
14	Large property developer	Seeking connection information for a location, alternative approaches, e.g. SAP
15	Large user	Seeking connection information, including potential locations
16	Local and jurisdictional planners (general planning and PV/EV/storage impact)	Data for planning, load and export hosting capability and forecasts by feeder/locations
17	Retailers	Information on innovative tariffs
18	Ombudsmen and Governments	Information on service quality issues and complaints
19	Safety regulators	Understand where systems are reaching limits or deteriorating, impact of CER on networks

	Organisation	Use case
20	Smaller property developer/ residential developer	Seeking information on own sites and for refits
21	Startup and innovators	Market gaps and potential and emerging issues
22	Solar and battery installers and consultants	Issues with connecting at various locations
23	Storage provider (community)	Seeking connection information at a location

Table A2: Priority datasets identified in Phase 1

Category, data item	Specific data
Import capability	
Current and forecast remaining electricity delivery capability	kW or kVA by season for HV feeder and distribution substation
Network augmentation plans	kW or kVA by feeder and distribution substation
Indicative annual deferral value	$/kW or $/kVA by HV feeder and distribution substation
Export capability	
Current and forecasting remaining electricity export capability	kW static limit for export (based on POE90 forecast demand and POE10 forecast export). Export capability by season and time of day.
Network augmentation plans	kW or kVA by feeder and distribution substation
Indicative annual deferral value	$/kW or $/kVA by HV feeder and distribution substation
Curtailment	kW reduction in inverter capacity by duration of curtailment by network element (HV feeder and distribution substation), season, time of day, and reason (e.g. export limitation, voltage condition)
Network connection	
Voltage levels	Historic average voltage by distribution substation and HV feeder
Historic reliability	Historic SAIFI and SAIDI by distribution substation and HV feeder
Network operations	
Real-time outage information	Cause Location and assets affected Number of customers affected Estimated time for restoration Planned/unplanned outage

Table A3: Network expenditure related to network visibility

Regulatory period	Expenditure
2024-29 revenue determinations: AER final decision ($2023-24)	
Ausgrid	Opex step change: $10.2 million Smart meter data acquisition
Endeavour Energy	Opex step change: $14.2 million Capex: $5 million Smart meter data acquisition, distribution transformer monitoring, analytical capabilities
Essential Energy	Opex step change: $13.9 million Capex: $13 million Smart meter and solar irradiance data acquisition, distribution transformer monitoring, analytical capabilities
Evoenergy	Opex step change: $8.4 million Capex: $2 million Smart meter data acquisition, network monitoring, analytical capabilities
PowerWater	Opex step change: $2.7 million Capex: $1 million State estimation and constraints engine, analytical capabilities, DER register
TasNetworks	Capex: $9.7 million Distribution substation monitoring, analytical capabilities, network asset model development
2025-30 revenue determinations: AER draft decision ($2024-25)	
Energex	Opex step change: $14.6 million Capex: $22.3 million Smart meter data acquisition, distribution transformer monitoring, service line LV monitors
Ergon Energy	Opex step change: $6.8 million Capex: $24.8 million Smart meter data acquisition, distribution transformer monitoring, service line LV monitors
SA Power Networks	Opex step change: $6.8 million Capex: $9.1 million Smart meter data acquisition, analytical capabilities, network model improvements

Regulatory period	Expenditure
2026-31 revenue determinations: DNSP initial proposal ($2025-26)	
CitiPower	Opex step change: $0.7 million Capex: $1.2 million Customer data portal
Powercor	Opex step change: $2.8 million Capex: $1.6 million Customer data portal
United Energy	Opex step change: $1.7 million Capex: $1 million Customer data portal
Jemena	Opex step change: $3.5 million Capex: $14.8 million Data, visualisation and analytics, near real-time smart meter data
AusNet Services	Opex step change: $0.6 million Capex: $60 million Network model management, field enablement program, CER data exchange management