Exploring network visibility: costs, benefits and value

Discussion paper

5 September 2025

ELECTRICITY AUTHORITY
TE MANA HIKO

1. Increasing network visibility is important

Introduction

1.1. The Electricity Authority Te Mana Hiko (Authority) is considering how to promote better visibility of the energy flows and power quality on distribution networks, to help ensure New Zealand's shift towards a decentralised, digitalised electricity system benefits consumers.

1.2. We want to test our initial thinking and explore key issues with others to deepen our understanding of 'network visibility' and consider next steps. As a first step, we are holding a workshop in Wellington on Thursday 18 September 2025 to:

- explore the costs and benefits of network visibility
- understand how information in current distributor disclosures supports efficient choices on connection and participation in flexibility markets
- consider and inform potential options to promote network visibility.

1.3. This paper outlines the concepts we'll explore in the workshop and seeks your views on the key questions.

The benefits of network visibility for consumers and the system

1.4. 'Network visibility' involves distributors having an accurate view of, and regularly publishing, up-to-date information on network topology,[1] linked with data on available network capacity[2] (including current and forecast capacity) and other useful information (e.g. reliability). We think consumers benefit from this information being collected by distributors and made available to stakeholders – including access seekers, flexibility service providers and innovators.

1.5. We think network visibility helps support:

- decisions relating to new connections or upgrading existing connections, resulting in connections that are better aligned with the location of network capacity and with access seekers' needs and preferences
- investment decisions in distributed energy resources (DER) by enabling better matching of distributed energy resource capabilities with network capacity
- better identifying network locations where DER and non-network assets can offer and deliver value to a range of interested parties
- efficient planning and investment by distributors, reducing the risk of over- or under-building infrastructure, and supporting timely, lower-cost solutions, such as demand response or other non-traditional options that can defer or replace capital works.

[1] Network topology refers to the way which constituent parts are interrelated or arranged as a network.

[2] Access seekers are likely to be firstly interested in the network's ability [at a location] to convey energy (kW MW). We understand that distributors will require a range of inputs to calculate network capacity, e.g. voltage, harmonics, power factor (reactive power).

1.6. Over time, network visibility will strengthen resilience, improve service quality, and ensure distributors can respond effectively to emerging technologies and changing patterns of use, ultimately delivering long-term benefits to consumers.

1.7. The use of the information from network visibility offers significant long-term benefits for consumers. Quality network capacity information enables better optimisation of available capacity, more efficient investment and ultimately puts downward pressure on power bills. Examples of decisions where network visibility is helpful are attached as Appendix A.

Some information is currently required to be disclosed

1.8. Both the Commerce Commission (the Commission) and the Authority have roles regarding disclosure of information related to 'network visibility'. This means there is the potential for regulatory overlap. The Electricity Industry Act 2010 and the Commerce Act 1986 have provisions to ensure regulators' roles are clear, and that each regulator works with the other when considering amendments that may impact on the other's functions, powers, decisions or rules. This is why we're working closely with the Commission on exploring this issue.

1.9. Both regulators require distributors to make certain disclosures that provide information relating to network visibility. Our interest in network visibility relates mainly to setting quality or information requirements in relation to access to transmission or distribution networks. The Commission has had requirements in place for many years requiring information from distributors related to network visibility and recently strengthened these considerably. The Commission's disclosure rules are intended to allow stakeholders to:

- assess whether distributors are making efficient investment decisions and delivering services at a quality that reflects consumers' demands
- better understand how distributors are performing in the context of increased electricity demand due to decarbonisation.

1.10. We anticipate feedback on matters discussed in this paper will consider the overlap of any potential future information requirements with existing information disclosure requirements. Suggestions may require refinements to the existing disclosure requirements to reduce potential duplication.

1.11. Appendix B provides an outline of the current regulatory disclosure requirements relating to network visibility and rules relating to regulatory overlap.

1.12. Distributors may also freely provide some form of network visibility outside their regulated disclosures. We are seeing progress on voluntary disclosures, with several distributors posting network capacity maps on their websites. We are also seeing several distributors sourcing the data and developing modelling capabilities to better understand power flows and capacity of their low-voltage networks. We are seeing the rapid evolution of new use cases, innovation and new technology that's better enabling distributors to see greater value, or potential value, from monitoring their low-voltage networks.

We want to understand how further distributor disclosures can add value for network stakeholders and distributors

1.13. We want to understand the extent to which benefits of network visibility are currently being realised. We note that network visibility is only one component of information that supports decisions regarding consumer choice, innovation, and the development of new services.

1.14. We have reviewed the current context and the disclosures made by distributors. We have several observations on the current state of network visibility we would like to test with distributors and other interested parties.

1.15. Currently, we understand distributors have good power quality data and understanding of the topology of their high-voltage networks. However, most distributors are not publishing high-voltage capacity information. We are keen to better understand the benefits of this information for access seekers and the barriers to publishing capacity information, noting that a few distributors have recently begun publishing high-voltage capacity maps.

1.16. In contrast, we understand distributors generally do not have access to good power quality information for their low-voltage networks or a good understanding of the topology of their low-voltage networks. We recognise many distributors would need to invest to improve their systems and processes to obtain and maintain data on low-voltage network topology and monitor low-voltage network power quality. As part of our research, we examined potential barriers to low-voltage network visibility, including capability of retail meters and the price of power quality data from these meters. Appendix C summarises our findings on these matters.

1.17. We have also looked at the information distributors are publishing on network visibility and the information relating to network visibility provided under regulation. We are keen to understand the range of perspectives on (A) the application of these disclosures for those who are looking to use this information and distributors who collect, process and disclose this information and (B) added value that could result from additional disclosures.

Questions for discussion:

Q1. Are stakeholders aware of the extent of the information on network visibility currently being provided by distributors (including through disclosures)? (see Appendix B)

Q2. How do current distributor disclosures support the understanding of available capacity, constraints and opportunities on high- and low-voltage networks?

Q3. How are interested parties making use of existing disclosures to support more efficient outcomes?

Q4. Would changes to the type of data, format, regularity or granularity of current distributor disclosures better support decision-making? (*note: the full set of relevant disclosures required by recent Commission decisions has not yet been made*)

Q5. What other disclosures from distributors relating to network information would further inform choices and decisions of access seekers and other interested parties?

Q6. What are distributors' perspectives on the value of their work collating and publishing network visibility information for their own businesses?
Q7. What are distributors' perspectives on how well interested parties are using the data they already publish?
Q8. What are stakeholders' perspectives on recent developments regarding access to smart meter data?

Is there a case for change?

1.18. The answers to the above questions are designed to support decisions on the need for changes regarding regulatory or voluntary disclosures relating to network visibility. To support discussions on the possible direction of any future change, we provide the following observations.

1.19. There is a range of potential measures of capacity and other relevant information (eg, reliability and power quality measures) that may support more efficient decisions by distributors and access seekers. The Australian Energy Regulator has undertaken work in the last few years to improve low-voltage network visibility. Some of the lessons learnt there, and the measures being considered, are likely to be relevant for further consideration of network visibility in the New Zealand context. A summary of the process and the conclusions of the Australian Energy Regulator are included in Appendix D.

1.20. Noting that the range of datasets and other measures that support network visibility will likely evolve over time,[3] we are interested in the perspectives of stakeholders and distributors on the Australian Energy Regulator's conclusions on:

- the priority datasets relating to import capability, export capability, and network connections and whether these are the most useful datasets and which of the priority datasets can be reported at a minimal cost
- how often information that supports network visibility should be updated
- the importance of linking the above information with network topology and the idea of easy-to-understand network maps (ie, network maps containing standardised base-level capacity information).

1.21. We are also interested in various perspectives on whether it would be best to improve network visibility by focusing on high-voltage networks, followed by low-voltage networks. This approach:

- leverages current information about the high-voltage networks
- allows the value proposition of network visibility to be tested sooner and at lower cost
- likely provides valuable insights that could support future work on improving visibility of low-voltage networks.

[3] For example, the types and frequency of data and how that data is processes will be different to support dynamic operating envelopes and distribution system operations.

1.22. Finally, we are interested in perspectives on whether more needs to be done to ensure efforts to improve network visibility occurs at the right pace and in the right way.

1.23. There are likely to be three possible regulatory approaches to any future work on improving network visibility. The options could be:

- developing industry guidance or standards, and a roadmap for improving network visibility, with input from stakeholders, distributors and regulators, with the regulators monitoring progress and outcomes
- introducing a regulatory backstop that would codify the industry guidance or standards and roadmap, if progress on improving network visibility is too slow or too inconsistent
- developing additional regulatory standards and timeframes for improving network visibility.

Questions for discussion:

Q9. Is the pace of distributor progress on developing the capability needed to support work on improving network visibility appropriate? If not, what are access seekers' expectations regarding timeframes?

Q10. What are the barriers and costs to distributors developing the capability needed to support work on improving network visibility faster?

Q11. Do you agree that distributors having a better understanding of network capacity/constraints and publishing this information in an easily accessible way is in the long-term interest of consumers?

Q12. Is there a case for further regulatory intervention to further improve progress and the quality (e.g. timeliness, granularity, format standardisation) of disclosures that improve network visibility?

Q13. Is there a need for measures to improve awareness of, and encourage the use of network visibility disclosures by interested parties?

Q14 If further work is required to support the development of network visibility, which of the three regulatory approaches outlined above do you prefer to improve network visibility, or do you prefer another approach?

Q15. Do you support an approach that focuses on high-voltage networks first, or do you have another preference?

Q16. What other aspects of international developments relating to network visibility should we be looking at for lessons that could be considered in the New Zealand context?

Q17. Should metering equipment providers be required to publish schedules of available data and prices to improve transparency and reduce transaction costs?

Q18. What elements of Part 12A of the Code relating to default distributor agreements should be reinforced or extended to ensure consistent access to both consumption data and other types of data e.g. power quality data from smart meters or other devices (such as inverters)?

2. How you can inform our thinking

In-person workshop

2.1. We invite you to you to register for our workshop on Thursday 18 September in Wellington where we will explore the ideas in this paper. Please note, numbers are limited and unfortunately there is no option to join remotely. However, the workshop materials, including a summary of participants' feedback, will be published on our website and can be used to inform written feedback.

2.2. The views and opinions captured during the workshop will be considered alongside written feedback and inform decisions on the next steps.

Feedback can be made by email using our template

2.3. The Authority's preference is to receive written feedback in electronic form (Microsoft Word) in the format shown in Appendix E. Submissions in electronic form should be emailed to distribution.feedback@ea.govt.nz with "Discussion Paper—Exploring network visibility" in the subject line.

2.4. If you cannot send your feedback electronically, please contact the Authority (distribution.feedback@ea.govt.nz or 04 460 8860) to discuss alternative arrangements.

Authority staff are available to meet individually

2.5. If you are unable to attend the workshop but would like to meet with Authority staff to discuss your organisation's views, this can be arranged. Please contact us at distribution.feedback@ea.govt.nz to set up an online meeting.

Your feedback may be made public

2.6. Please note the Authority intends to publish all feedback it receives. If you consider that the Authority should not publish any part of your feedback, please:

(a) indicate which part should not be published,

(b) explain why you consider we should not publish that part, and

(c) provide a version of your feedback that the Authority can publish (if we agree not to publish your full feedback).

2.7. If you indicate part of your feedback should not be published, the Authority will discuss this with you before deciding whether to not publish that part of your feedback.

2.8. However, please note that all feedback received by the Authority, including any parts that the Authority does not publish, can be requested under the Official Information Act 1982. This means the Authority would be required to release material not published unless good reason existed under the Official Information Act to withhold it. The Authority would normally consult with you before releasing any material that you said should not be published.

When to provide feedback

2.9. Please deliver your feedback by 5pm on Friday 17 October 2025

2.10. Authority staff will acknowledge receipt of all feedback electronically. Please contact the Authority distribution.feedback@ea.govt.nz or 04 460 8860 if you do not receive electronic acknowledgement of your feedback within two business days.

Appendix A Types of use cases for network visibility disclosures

A.1. Note that an access seeker may have a requirement for multiple types of use cases.

User	Use case for network visibility information
Demand response aggregators/VPP providers	Region-wide issues and network issues impacting aggregation. Identifying locations with higher value to increase marketing to consumers.
Consumers and consumer advocates	Information on: • service quality, emerging issues and network issues, including curtailment • current and forecast headroom for load and export by potential locations sometimes to balance poor information from installers/sellers • forecasts of network upgrades • capacity information to support consumer behind-the-meter investment decisions
Distribution network connected generators	Seeking connection information (voltage levels, historical reliability, location of network assets), current and forecast headroom for export, including hosting capacity upgrades, by potential locations
Investors in EV charging for any location: **• Normal/street charging** **• Fast charging stations**	Seeking connection information, including location of load capacity and forecasts of network upgrades, by potential locations
Investors in network support services	Options for network support by location, network issues to be addressed and forecast network upgrades. Identifying locations with higher value to increase marketing to consumers.
Large property developers	Seeking connection information for a location, current and forecast headroom for load and export, forecasts of network upgrades
Large connections	Information on current and forecast headroom for load, network capacity upgrades across multiple choices of location
Solar and battery installers and consultants	Issues with connecting at various locations, including current and forecast headroom for export, forecast upgrades for hosting capacity. Identifying locations with higher value to increase marketing to consumers

Distributors	Support efficient planning and investment, timely, lower-cost solutions, such as demand response or other non-traditional options, that can defer or replace capital works, strengthening resilience, improving service quality, and ensuring that distributors can respond effectively to emerging technologies and changing patterns of use

Appendix B Current disclosures relating to network visibility

Overview of the Commerce Act information disclosure requirements – Network Visibility and flexibility services

B.1. The Commerce Commission sets Information Disclosure (ID) requirements for EDBs to publicly disclose information regularly about how they are performing, including how they are responding to changing consumer demands and planning for the future.[4]

B.2. The purpose of ID regulation is to ensure sufficient information is available to stakeholders (including consumers) to be able to assess EDBs' performance in terms of the outcomes listed in section 52A and 53A of Part 4 of the Commerce Act 1986.

B.3. The ID information requirements are set by the ID Determination - the regulations. Information is disclosed in standardised schedules and in EDBs' Asset Management Plans.

B.4. The Commission also undertakes summary and analysis of disclosed information so that stakeholders can better understand the performance of EDBs.[5]

Network visibility requirements since 2012

B.5. The Part 4 ID requirements for EDBs were first introduced in 2012. From the outset EDBs were required to disclose information on matters relating to network visibility:

- **Peak demand and load characteristics** Insight into how networks are utilised, via time series of maximum demand, load factors, and related intensity measures. (Schedule 1 and Schedule 4).
- ***Network configuration description.*** *Including connection of any distributed generation > 1 MW)* (Clause 4.2, Attachment A, (AMP requirements) ID Determination)
- ***Narratives on non-network solutions*** Encouragement for EDBs to explore alternatives—such as demand response or embedded generation—rather than relying solely on traditional infrastructure. (Section 11, Attachment A, (AMP requirements) ID Determination)

B.6. These disclosures provided stakeholders with early signals about network constraints and opportunities. This was particularly important as distributed energy resources (DERs) began to emerge, and consumers became more active participants in the electricity system.

Targeted ID Reviews – suite of new ID requirements relating to improved network visibility and flexibility services

B.7. The Commission's two targeted ID review tranches refined and expanded EDBs' disclosures on network visibility and flexibility services.

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[4] The Commission regulates electricity distribution businesses under Part 4 of the Commerce Act 1986

[5] Public pieces of performance analysis using ID data are available on the Commission's website here.

Tranche	Year	Relevant requirements
1	2022	Foundation for voltage monitoring, connection impacts, and innovation practices
2	2024	Enhanced detail on network constraints, non-traditional solutions, and pricing

B.8. Decarbonisation was a particular focus in the final decisions for both these projects and resulted in an expansion of reporting requirements to capture more information on network constraints, non-traditional solutions, and pricing.

TIDR ID (Tranches 1 &2) requirements relevant to improved network visibility and supporting flexibility services

Section or Schedule Requirement	Description
EDBs' monitoring their voltage quality **Attachment A ID Determination (AMP requirements) – Clause 17.2, Attachment A, ID Determination.**	EDBs are required to disclose their practices for monitoring voltage (including any plans for improvements) including: • what the EDB is doing to develop and improve practices for monitoring voltage quality on its low voltage (LV) network (eg, the EDB may provide reference to any work they are undertaking with other companies); • work it is doing on their LV network to address any known non-compliance with the applicable voltage requirements of the Electricity (Safety) Regulations 2010; • how it is responding to and reporting on voltage quality issues when it identifies them, or they are raised by a stakeholder (eg, the EDB may provide reference to performance over the previous period to give the forward plan context); and • how it is communicating the work it is doing to improve voltage quality on its LV network to affected consumers
EDBs' planning and preparing for decarbonisation. - impact of new connections **Attachment A ID Determination (AMP requirements) – Clause 17.5**	EDBs are required to disclose: • how the EDB assesses the impact that new demand, generation, or storage capacity will have on its network, including: ○ how the EDB measures the scale and impact of new connections;

	○ how the EDB takes the timing and uncertainty of new connections into account; and ○ how the EDB takes other factors into account, eg, the network location of new connections; and ○ how the EDB assesses and manages the risk posed by uncertainty regarding new connections.
EDB's preparing for the changing environment brought about by decarbonisation - innovation **Attachment A ID Determination (AMP requirements) Clause 17.6**	EDBs are required to describe their innovation practices, including a description of: • any innovation practices the EDB has planned or undertaken since the last AMP or AMP update was published, including case studies and trials; • what the desired outcome of any innovation practices is, and how it may improve outcomes for consumers; • how the EDB measures success and makes decisions regarding any innovation practices, eg, how the EDB decides whether to commence, commercially adopt, or discontinue any innovation practices; • how the EDB's decision-making about innovation practices may depend on the work of other companies, including other EDBs and providers of nonnetwork solutions; and • the types of information the EDB uses to inform or enable innovation practices, and their approach to seeking that information. In providing its responses to the above, EDBs are not required to publicly disclose any commercially sensitive or confidential information.
EDB's releasing information on network constraints **Schedule 12 b**	EDBs are required to disclose the following information for each existing zone substation in Schedule 12b(i): • the current peak load period (eg, the season current peak load occurred); • the installed operating capacity (at the zone substation's assigned security level); • whether it is constrained or forecast to be constrained (eg, by selecting a 'Current constraint type' or 'Forecast constraint type').

	If a zone substation is currently or forecast to be constrained: • whether it is a capacity or security constraint; • the cause of the constraint; • the type of solution (where known) to the constraint; • if the solution is temporary, how long it is expected to be in place (required for current constraints only). For a forecast constraint, whether it occurs within or after the AMP planning period. The relevant year must be identified if the constraint falls within the period (required for forecast constraints only); • if a zone substation is not currently constrained, the available capacity before it becomes constrained; • forecast available capacity in 5 years and an approximate range of forecast available capacity in 10 years; and • forecast peak load period and forecast security of supply classification in 5 and 10 years.
EDBs disclosing location information for zone substations **Geopackage or Shapefile.**	EDBs are required to disclose data about their networks in a generic geospatial file format, such as Geopackage or Shapefile. EDBs are required to disclose, for each zone substation: • its name, location (in coordinates), the names of any feeders connected to it, the input and output voltages it primarily transforms, and the boundary of the area it serves.
EDBs disclosing information related to LV networks **Attachment A ID Determination (AMP requirements). Clause 11.12 & 17.2.2** **The Commission produced a summary and analysis report assessing this disclosed information.:** Commerce	EDBs required to disclose the following information: • a description of any policies or practices for providing sufficient information on current and forecast constraints (including LV network constraints where known) to inform the decision-making of potential consumers connecting to the network and potential providers of non-network solutions; and • regarding load and injection constraints on LV networks, a description of: • any challenges, and progress, towards collecting or procuring data required to inform the EDB of current and forecast constraints on

Commission - Low Voltage network visibility across electricity distributors	its LV network, including historical consumption data; and • any analysis and modelling (including limitations and assumptions) the EDB undertakes, or intends to undertake, with that constraint-related data.

B.9. The changes introduced by the Commission through Tranche 1 and Tranche 2 of the TIDR were designed to be iterative—establishing a foundation that could be built on and refined over time. By analysing the information EDBs disclose, the Commission aims to encourage greater transparency and consistency in how network capacity and constraints are reported and other relevant matters relating to flexibility services.

The Electricity Industry Participation Code 2010 currently requires some disclosures

B.10. The Authority, through Part 6 of the Code, requires distributors to publish on their website a range of network information to support the connection of distributed generation, such as circumstances when distributed generation may be curtailed or interrupted, the location of known or forecast constrained network hosting capacity, and export limits.

B.11. The Code[6] also contains rules around access to and the use of consumption data. Access to consumption data from retailers or the retailer's metering equipment provider can help distributors developing distribution pricing and planning and management of the network. The Code does not currently include specific provisions for access to or the use of power quality data, such as voltage, current and phase angle. We understand that this data is useful for working out remaining network capacity for network planning and operational purposes.

B.12. The use and storage of personal and consumption data is covered in Parts 10 and 12A of the Code. It includes obligations to comply with the Privacy Act 2020, confidentially obligations and requiring consumption data to be controlled in accordance with a Code specified information security plan.

B.13. The Authority recently amended the Code to require distributors by late 2026 to publish on their website best estimates of network capacity for zone substation feeders and low voltage transformers 500kVA and above.

Overlap in regulatory jurisdiction between the respective regimes

B.14. Both the Authority and the Commission have powers to require disclosure of information under the Electricity Industry Act 2010, the Electricity Industry Participation Code 2010 (Code) and the Commerce Act 1986 respectively.

B.15. The Commission's information disclosure regime currently contains clauses which, consistent with its role under section 53C(2) of the Commerce Act, require a substantial amount of information to be disclosed which directly relate to our proposed definition of "network visibility" information, summarised above.

[6] Parts 10 – Metering, regulates data use, handling, storage, and transmission processes associated with metering installations and metering data; and 12A – Distributor Agreements, arrangements and other provisions, and Schedule 12A.1 Appendix C – Default agreement – Provision of distribution data refers.

B.16. The Authority also currently requires network visibility related information to be disclosed on a distributor's website, as outlined above.

B.17. The Authority and the Commission intend to work together regarding further development of information requirements, if required, consistent with the provisions and roles under our respective legislation.

B.18. The Electricity Industry Act 2010 has specific provisions on the respective scope of each agencies regulation making powers. Section 32(2)(b) of the Electricity Industry Act 2010 states that the Code may not purport to do or regulate anything that the Commerce Commission is authorised or required to do or regulate under Part 4 of the Commerce Act 1986 (other than in accordance with subsection (4)).

B.19. Under section 32(4), the Code may contain provisions that do any of the following, regardless of whether such a provision would otherwise be prohibited under section 32(2)(b):

- set quality or information requirements for Transpower or 1 or more distributors in relation to access to transmission or distribution networks;
- set pricing methodologies for Transpower or 1 or more distributors.

B.20. The potential for legislative decisions to affect each other's regulatory sphere is also addressed under section 54V of the Commerce Act, including:

- section 54V(1): the Authority must consult with the Commission before amending the Code in a manner that will, or is likely to, affect the Commission in the performance of its functions or exercise of its powers in relation to electricity lines services under Part 4 of the Commerce Act;
- section 54V(4): the Commission must take into account, before exercising any of its powers or performing any of its functions in relation to electricity lines services under Part 4 of the Commerce Act,—
  (a) any provision of the Code, or decision made under it, that relates to or affects—
    i. pricing methodologies that apply to a supplier of electricity lines services; or
    ii. quality or information requirements that apply to a supplier of electricity lines services

B.21. The intention of this workshop is to further engage on information related to 'network visibility' which is of the most relevance for access seekers including the methods for presenting network visibility information and the frequency of reporting to determine what additional information may best support the decentralisation and digitalisation of our electricity system.

B.22. We anticipate feedback from stakeholders will include and consider the overlap of any potential future information requirements with existing information disclosure requirements across both regulatory regimes. Suggestions may require refinements to the existing disclosure requirements from either the Authority or the Commission to reduce potential duplication.

Appendix C Smart meter capability stocktake and data pricing review

C.1. Distributors have raised concerns with us over the capability of smart meters to provide power quality data and the costs of acquiring this data. We understand that smart meter power quality data can be used to infer capacity information about the nearest upstream distribution transformer.

C.2. We have undertaken a stocktake of the existing meter fleet and reviewed prices that meter equipment providers are charging for power quality data (including consumption data, and voltage and current). The following summarises our findings.

Smart meter stocktake

C.3. We have undertaken a smart meter fleet stocktake to understand the extent to which the existing AMI, or 'smart meter', fleet can provide power quality data to support low-voltage network visibility. The stocktake looked at the current capability of the category one- and two-meter fleets (meters usually in domestic and small business locations) across the country.

C.4. Our stocktake indicates that overall, the existing 'smart meter' fleet has the capacity to support low-voltage network visibility. Utilising this capability may require some additional investment by meter equipment providers in back-end systems. Over 90 percent of meters on distribution networks can provide power quality data. Less than two percent of these meters are not in regular communication with a meter equipment provider's gateway.

C.5. Just over half of all distribution networks have greater than 90 percent smart meters connected. The Lines Company and Orion have the highest percentage of smart meters connected to their networks, at 98%. As at 24 January 2025, we observed the lowest percentage of smart meters connected at connection points on a network, is 60 percent.[7] It is therefore likely that some distributors would need to consider augment smart meter data with other technologies if they wanted to monitor power quality on the whole of their networks.

C.6. We also found that power quality monitoring capability (remote meter capabilities, communications, gateway, interface and database modules) are enabled across some but not all meter equipment providers' meter fleets. We have been advised that this is due to a lack of demand for these services. Further, we have been advised that these capabilities can be stood up and improved if distributors are prepared to purchase power quality data from meter equipment providers.

Price and terms for meter-based power quality data

C.7. The Authority has looked at several of the issues that distributors raised during Ara Ake's EDB Challenge.[8] In the context of network visibility, distributors raised the lack of market regulation and competition between metering equipment providers to ensure the development of fair commercial agreements regarding access to smart meter data. Distributors also recommended that the Authority specifically address the lack of data standardisation provided by metering equipment providers and build a framework to resolve the excessive liability terms attached to using smart meter data.

[7] For up-to-date information about smart meters, please see Electricity Authority - EMI (metering snapshot)

[8] See Ara Ake's EDB Challenge Learnings and insights report (October 2024) for a description of distributor recommendations.

C.8. The Authority reviewed contracts and agreements that meter equipment providers have with retailers and distributors relating to the procurement of meter data. We looked at the input costs and prices for providing consumption data and power quality data to distributors.

C.9. Overall, the review did not identify any material concerns with respect to proportionality, fairness or transparency, and the observed price being charged to distributors for consumption and power quality data from smart meters. We conclude that the price being charged for this data is reasonable for now. We also observed metering equipment providers negotiating and agreeing different contract terms that appear to suit distributors' needs.

C.10. That said, we also made the following additional observations:

- the range of different contractual terms relating to intellectual property rights and ownership of data, between meter equipment providers and retailers, does not appear to cause any issues with distributors accessing power quality data at present, but we would want to see continued access to data for distributors
- there were a range of opinions amongst distributors on some of the terms and conditions in the contracts, including the length of the contracts for meter data. We observed a range of contract lengths for meter data across meter equipment providers, as well as proposals for shorter trials. On this matter the market seems to be evolving. We want distributors to continue to be able to access data on reasonable terms
- meter equipment providers and distributors have views on the maturity and stability of the market for smart meter data. The contracts we reviewed contain exit/re-negotiation clauses in the event of regulatory change. We think these clauses should address any concerns about signing agreements for power quality data and the potential for future regulatory change making those contracts onerous.
- in the contracts we reviewed, we note that the scope of the unlimited liabilities only relate to losses arising from wilful breach or fraud, and breaches of confidentiality, intellectual property rights, and data use policies. We understand that some distributors believe that these liability terms impose significant costs to develop data storage environments and training systems to meet these contractual requirements. We haven't reviewed this matter in detail. However, we think that these concerns may reduce as distributors' systems and practices mature and the market for low voltage network data develops.

C.11. With the market for low voltage network power quality data still in early stages of development, the review had only limited information to work with. The level of data and understanding of meter data products, alternative sources of power quality data, and use cases is expected to mature for both distributors and meter equipment providers.

C.12. In the future, we may consider progress on making network capacity information accessible, new technologies and use cases that create demand for power quality data by distributors and others. We are open to considering data standardisation between metering equipment providers and distributors, where negotiations with metering equipment providers for smart meter data have not been able to minimise the administrative burden and additional operating costs for distributors in formatting the data appropriately.

Appendix D Australian Energy Regulator (AER) Low-voltage Network Visibility Project

D.1. In Australia, the Low-voltage Network Visibility project, led by the Energy Security Board (ESB) and the Australian Energy Regulator (AER), aimed to improve third-party access to distribution network data to support the efficient integration of Consumer Energy Resources (CER) – such as rooftop solar, batteries, and electric vehicles – and the management of network-related risks across low-voltage networks.

D.2. The initiative identified three core datasets required for network visibility, with the focus being on datasets already collected at low cost and those with high potential value (see detailed datasets in the table below9). These are the datasets they propose adopting.

Table of AER 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
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

9 Australian Energy Regulator, Low-voltage Network Visibility – Phase 3 Final Report, 31 March 2025. See Table 2 “Phase 1 datasets proposed to be priority datasets” on page 12. Available at: Low-voltage Network Visibility - Phase 3 Final Report

D.3. The definition of the datasets required for network visibility presented above reflects a three phase, consultative process that evolved through stakeholder engagement, real-world trials, and recommended policy changes.

Phase 1 identified data needs and mapped these against available data[10]

D.4. Workshops with stakeholders defined 23 use cases. A high-level breakdown of use case is below:

- Ten use cases were identified by consumers (and consumer advocates) and CER investors. These focussed on the data needed to plan, install, and operate CER like rooftop solar, batteries, and EV chargers.
- Three use cases were raised by CER service providers, advisers, and installers. These related to the feasibility of installing and operating CER devices and responding to customer queries about this.
- Three use cases were contributed by policy and planning bodies (e.g. the Australian Energy Market Commission, state governments, and safety regulators). These focussed on data needed for regulatory oversight, planning and review, and rule development.
- Seven additional use cases were identified by other stakeholders such as emergency services, data providers, and large property developers. These included needs for real-time outage data, connection information, and network reliability metrics.

D.5. The use cases served as the basis for abstracting common data requirements which then fed into workshops with data providers to develop core datasets. The key principles behind designing the core datasets were:

- Relevance to use cases: the datasets be derived from the stakeholder-defined use cases, ensuring alignment with real-world decision-making needs.
- Low cost and feasible: emphasis be placed on using data already collected or that which would be available from smart meters and CERs in the future.
- Available in machine-readable format: all datasets are able to be provided in the most granular detail possible and in structured, standardised formats to support automation and analysis.
- Value even with partial coverage: even data representing partial coverage of the network can offer meaningful insights, provided it is accompanied by metadata detailing its “accuracy and robustness”.
- Build on existing reporting: where possible, consideration should be given to expanding or enhancing current data sources.

D.6. This led to the definition of four initial core datasets – import capability, export capability, network connection, and network operational performance. These initial datasets were then tested in Phase 2.

[10] Energy Security Board, Benefits of increased visibility of networks: Consultation paper, July 2023. Available at: ESB - Network Visibility - July 2023.pdf

Phase 2 trialled data access with four Neighbourhood Battery Initiative participants and five Distributed Network System Providers in Victoria[11]

D.7. Phase 2 tested the practical challenges of accessing distribution network data by non-network parties. It was found that Distributed Network System Provider (DNSP) data was often insufficient, outdated, or inaccessible without costly applications. This in turn was found to hinder effective planning and deployment of neighbourhood batteries.

D.8. Key findings of these trials included:

- Inconsistent availability of feeder-level data limited low-cost assessments of site suitability.
- Lack of up-to-date data increased the chance of unsuccessful connection applications.
- Data often required technical expertise to interpret, and data platforms were inconsistent and not user-friendly, although their quality improved during the trials.
- Privacy thresholds (e.g. 10-customer aggregation rule) limited data granularity.
- Network visibility recommendations should account for evolving DNSP capabilities and changing data needs of non-network stakeholders – business models continue to mature and DNSPs continue to improve data access.
- Participants prioritised the potential of wholesale electricity trading and community benefits as the driver for resolving network constraints.

D.9. In addition, during the trials, participants highlighted the importance of accessible and well-formatted network data in supporting decisions. Participants found data in electronic format generally valuable – particularly geospatial data (i.e. network visibility maps).

Phase 3 integrated learnings from previous phases to recommend final datasets and key actions to ensure visibility of network data to third parties[12]

D.10. To ensure meaningful network visibility balanced against the practical limitations faced by distributors, the AER determined that the final "priority datasets should be those that maximise net benefits to electricity consumers, and could be:

- 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
- datasets not currently being collected by DNSPs but have the potential to provide significant benefits to electricity consumers."[13]

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11 Australian Energy Regulator, Low-voltage Network Visibility – Summary of neighbourhood battery trials, October 2024. AER - Low-voltage Network Visibility - Summary of neighbourhood battery trials - October 2024

12 Australian Energy Regulator, Low-voltage Network Visibility – Phase 3 Final Report, 31 March 2025. Available at: Low-voltage Network Visibility - Phase 3 Final Report

13 Australian Energy Regulator, Low-voltage Network Visibility – Phase 3 Final Report, 31 March 2025, p. 12. Available at: Low-voltage Network Visibility - Phase 3 Final Report

D.11. The final three core datasets (see table above) were determined to be the most valuable for enabling informed investment and planning decisions, while minimising the cost and complexity of reporting for DNSPs.

D.12. Based on the outcomes of Phase 2, four key actions were proposed to ensure visibility of network data:

- The Australian Energy Regulator (AER) will support key elements of the Integrated Distribution System Planning (IDSP) rule change proposed by Energy Consumers Australia as a pathway to visibility of low-voltage network data. These changes aim to improve transparency of Distributed Network System Providers (DNSP) planning and modelling; increase the volume, timeliness, and usefulness of data made publicly available; and help third parties better understand the costs and benefits of Distributed Energy Resource (DER) investments.
- The AER will investigate expanding their Export Services Network Performance Report to include EV chargers and community scale batteries, creating reputational incentives for DNSPs to facilitate the connection of DERs.
- The AER will assess whether current incentive schemes, guidelines, and benchmarking models are still appropriate to align DNSP behaviour with consumer outcomes, with the goal being to ensure DNSPs are motivated to use available network capacity before building new network infrastructure.
- The AER will use sandbox trials to test, within the regulatory framework, innovative data sharing models that support DER deployment and orchestration strategies. This addresses the need for large-scale, in-market trials to fast-track DER and CER integration and experiment with innovative methods for achieving network visibility.

During this process, several datasets were considered but ultimately excluded for now

D.13. "Lower priority datasets" were defined as those that would be prohibitively expensive, offer negligible or uncertain value, or had less consultation and would likely apply to fewer use cases.[14] It was recommended the Australian Energy Market Commission (AEMC) consider these datasets for inclusion in future rule changes following further consultation and prioritisation.

Network operations	
Real-time outage information	Cause Location and assets affected Number of customers affected Estimated time for restoration Planned/unplanned outage

[14] Australian Energy Regulator, Low-voltage Network Visibility – Phase 3 Final Report, 31 March 2025. See Table 3 "Additional datasets" on page 14. Available at: Low-voltage Network Visibility - Phase 3 Final Report

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 Department of Energy, Environment and Climate Action (DEECA)	
Customers experiencing under- or over-voltage	% of customers and duration
Additional data proposed by Department of Climate Change, Energy, the Environment and Water (DCCEEW)	
Average time taken to connect and energise EVSE and large CER	Days taken (for each step in connection process)

D.14. Real-time outage data as a measure of network operational performance (identified as a core dataset in Phase 1) was reclassified to a lower priority dataset. While some stakeholders expressed interest, most agreed that predictive data based on historical trends was more practical. Real-time data was deemed valuable only for specific users like emergency services or telecoms and was considered cost-prohibitive to make available to other stakeholders. However, it was noted that this may become more viable as provider capabilities improve.

D.15. The datasets proposed in Phase 2 received less stakeholder consultation and were determined to likely be less relevant for a wide range of use cases, so were deprioritised.

D.16. While the datasets suggested by DEECA and DCCEEW were noted to offer value for applications such as voltage monitoring and the connection of large Consumer Energy Resources (CER), they were ultimately assessed as lower priority as they did not align with the core requirements for low-voltage network visibility.

Appendix E Format for submissions

Exploring network visibility: costs, benefits and value

Submitter	
What is your interest in network visibility?	

Questions	Comments
Q1. Are you aware of the extent of the information currently being provided by distributors (including through disclosures)?	Yes / No
Q2. How do current distributor disclosures support your understanding of available capacity, constraints and opportunities on: a) high-voltage networks? b) low-voltage networks?	
Q3. How are you making use of existing disclosures to support more efficient outcomes?	
Q4. Would changes to the type of data, format, regularity or granularity of distributor disclosures better support decision-making? Please provide detail.	
Q5. What other disclosures of network information would further inform your choices and decisions?	
Q6. What are distributors' perspectives on the value of collating and publishing network capacity information for their own businesses?	
Q7. What are distributors' perspectives on how well interested	

parties are using the data they already publish?	
Q8. What are your perspectives on recent developments on access to smart meter data?	
Q9. Is the pace of distributor progress on developing the capability needed to support work on improving network visibility appropriate? If not, what are your expectations regarding timeframes?	
Q10. What are the barriers and costs to distributors in developing the capability needed to support work on improving network visibility faster?	
Q11. Do you agree that distributors having a better understanding of network capacity/constraints and publishing this information in an easily accessible way is in the long-term interest of consumers?	
Q12. Do you consider that there is a case for further regulatory intervention to further improve progress and the quality (e.g. timeliness, granularity, format standardisation) of disclosures that improve network visibility?	
Q13. Do you consider that measures are needed to improve awareness of and encourage use of network visibility disclosures by interested parties?	
Q14. If further work is required to support the development and use of network visibility, which approach do you prefer: a) developing industry guidance or standards. b) introducing a regulatory backstop that would codify	

the industry guidance or standards. c) developing regulatory standards and timeframes for improving network visibility. d) Something else.	
Q15. Do you support an approach that focuses on high-voltage networks first, or do you have another preference?	
Q16. What other aspects of international developments relating to network visibility should we be looking at for lessons that could be considered in the New Zealand context?	
Q17. Do you consider that metering equipment providers should be required to publish schedules of available data and prices to improve transparency and reduce transaction costs?	
Q18. Do you consider that elements of elements of Part 12A of the Code relating to default distributor agreements should be reinforced or extended to ensure consistent access to both consumption data and other types of data e.g. power quality from smart meters or other devices (such as inverters)?	