Integrated Distribution System Planning (electricity) rule change request

Energy Consumers Australia rule change request to AEMC.

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Energy Consumers Australia Rule Change Request – Integrated Distribution System Planning (Electricity)

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2. Executive summary

Energy Consumers Australia (ECA) sees a need for changes to the National Electricity Rules (NER) to improve the existing distribution system planning processes. Consumer energy resources (CER) hosting capacity is changing quickly and substantially as consumers increasingly invest in CER. The existing Distribution Annual Planning Reports (DAPRs) are not required to include an analysis of CER hosting capacity, and the analysis undertaken every five years through the existing expenditure proposal process is insufficient to ensure Distribution Network Service Providers (DNSPs) can account for large shifts of CER uptake.

There is an asymmetry of information between distribution networks and third-party participants, which results in less optimal consumer outcomes. Also, the rapid and expected increase in electrification, including the adoption of electric vehicles and phase out of gas, requires more frequent, comprehensive, and granular planning.

To this end, ECA requests this rule change, which will require DNSPs to make appropriate use of the data they have, develop a roadmap towards collecting more data at greater granularity, and increase the comprehensiveness and forward-looking timeframe of their planning. Additionally, this rule change will require DNSPs to make public the data, methodology, calculations, and outputs (such as CER hosting capacity maps) that are central to their plans.

These changes will help achieve the National Electricity Objective (NEO) and result in a host of benefits for consumers and DNSPs, including generating more value from the existing network infrastructure and already available data, particularly from smart meters, proactive network planning to right-size investment in CER, improved network utilisation, improved oversight on network planning and costs, and better guiding of CER investments and distributed energy resources. Most importantly, better distribution system planning should reduce network costs, thereby reducing consumer electricity bills.

3. Nature and scope of the issues

ECA is requesting a change to the NER, particularly the DAPR requirements,[1] to enable an improved distribution system planning process. The changes will include:

- Requiring DNSPs to make appropriate use of and publish the insights from the data they have.
- Increasing the comprehensiveness of distribution planning by replacing the DAPR with a biennial integrated distribution system plan (IDSP) and requiring DNSPs to update certain outputs more

[1] 5.13 of the NER

frequently, such as no less frequently than every three months for online CER hosting capacity maps.[2]
- 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.
- Requiring DNSPs to improve their stakeholder engagement and engage more extensively with communities who desire to play a role in the planning and development of their local energy system and those at risk of extended outages from extreme weather.

Integrated distribution system planning (IDSP) is a holistic and modern approach to meeting electricity distribution requirements and expanding consumer choice through data sharing processes.[3] The specific features that must be included as part of the IDSP are outlined in Section 4.

This change is requested because the DAPR is no longer adequate to achieve the NEO for the following reasons:

- The AEMC changed the NER to require DNSPs to provide export services on their distribution systems[4], and yet made no change to the key distribution planning process, so there is no requirement for DNSPs to plan future export services in their DAPR.
- The AEMC changed the NER to accelerate the rollout of smart meters[5] and to provide DNSPs with better access to data from smart meters, and yet there is no requirement that networks use that data to inform their planning or to explain how they intend to leverage that data to benefit consumers.
- The NER state that "each tariff must be based on the long run marginal cost"[6] of providing network services, yet it is unclear how a DNSP can calculate long-run marginal cost of network services when many assets significantly outlast the five-year planning horizon[7] in the DAPR.
- The expected rapid increase in adoption of solar systems, battery energy storage systems, electric vehicles (EVs), public EV charging stations, and flexible appliances (broadly defined as CER) connected within the low-voltage system requires more frequent, granular, and comprehensive modelling and planning to account for the quickly changing network and CER hosting capacity.
- Networks are not required to transparently share information about network and CER hosting capacity and constraints across the network, including where the best network locations are for community batteries and electric vehicle charging infrastructure.
- Network costs have increased and are likely to continue to increase significantly due to increasing use of distribution network services, and better planning can ensure that the future system is designed and built at least-cost.
- An increasing number of local communities have shown an interest in playing a direct role in planning the future of their local energy system[8], and networks have not consistently and systematically engaged with them.

[2] EPRI, 2020 – The Hosting Capacity Process p 6.
[3] US Department of Energy – Integrated Distribution System Planning
[4] AEMC, 2021 – Access, pricing and incentive arrangements for distributed energy resources
[5] AEMC, 2024 – Accelerating smart meter deployment
[6] 6.18.5 of the NER
[7] 5.13.1 of the NER
[8] See, for example, the Coalition for Community Energy and "Electric Communities" from Rewiring Australia

- There is no standard requirement for networks to engage with communities at particularly high risk of extreme events to help ensure network plans account for their needs and improve their long-term energy resilience. As a result, there are lost opportunities with respect to the efficient investment in and operation of electricity services in terms of reduced cost for consumers — now and into the future — and achieving emissions reduction targets.

Australia's energy system is changing in rapid and unpredictable ways and network spending is high and increasing, resulting in the need for more robust and better integrated network planning to ensure that distribution network costs are efficient, reducing the cost of energy for households and small businesses. We discuss these issues further in Section 3.1.

Affordability of energy is by far the primary concern of Australian residential energy consumers.[9][10] It is vital that DNSP costs are efficient, and consumer costs for energy minimised. As such, we consider this a "no regrets" action, which can assist with the AEMC's consideration of Distribution System Operators (DSOs) and their 2027 Integrated System Plan (ISP) review.

The need for greater visibility into the distribution system has been identified as a gap in energy sector planning and reporting for some time. Several reports, most notably the Energy Security Board's 2021 Data Strategy[11], have highlighted this need:

> *With the rapid ongoing growth of Consumer Energy Resources (CER) (such as roof-top solar, batteries, electric vehicles and active demand management), managing the changing demand-supply balance in localised low-voltage distribution networks is becoming increasingly challenging. Optimising local grids is significantly hampered by the current lack of visibility of those networks and CER performance, with limited monitoring across most of the low-voltage systems.*

While the AER is working through a process for "ongoing delivery of priority datasets to the market,"[12] we believe that leveraging and improving the existing distribution planning processes is a more effective approach that can proceed at pace. As outlined below, our approach avoids a "one size fits all" approach to sharing network data, while also requiring networks to avoid any further market distortions by sharing the insights they have now.

Integrated distribution system planning has emerged as best practice for modernising electricity grid infrastructure, as highlighted by the US Department of Energy's 2023 Integrated Distribution System Planning Overview.[13] While none of the 22 states outlined in the report have rooftop solar at the world-leading rates of Australian consumers, most of them require substantive sharing of hosting capacity and transparency on the way these critical calculations are determined. Benefits listed include bringing the benefits of grid modernisation and clean energy to all retail customers, reducing environmental impacts and carbon emissions, and enabling a cost-effective economy-wide transition to a decarbonised future.[14]

This comprehensive approach can provide benefits to the NEM such as enabling a more efficient, transparent, and adaptive distribution network. This approach allows for better integration of CER, proactive network planning, improved oversight of DNSP CER hosting capacity assessments and

[9] Energy Consumers Australia, 2024 – Consumer Energy Report Card
[10] Energy Consumers Australia, 2024 – Energy Consumer Sentiment Survey June 2024
[11] Energy Security Board – Data Strategy
[12] Australian Energy Regulator, 2024 – Low-voltage Network Visibility: Summary of neighbourhood battery trials p 1.
[13] US Department of Energy, 2023 – Integrated Distribution System Planning Overview
[14] US Department of Energy, 2023 – Integrated Distribution System Planning Overview

expenditure, reduces market asymmetries, and allows community groups to participate directly in planning their local energy system. The need for greater distribution network transparency has been identified, there is clear best practice overseas, and there is not a good case for further delay in ensuring DNSP's transparently share the data they have.

Network capacity and CER hosting capacity are inconsistently defined terms. We loosely define network capacity here as the net power flow that the network can safely and reliably support, and CER hosting capacity as the physical capacity for the network to support more CER in a given location while maintaining system operating requirements. Careful definition of these terms must be undertaken by the AER or another body independent of DNSPs and standardised across DNSPs and IDSPs to ensure consistency.

There are several current rule change proposals and processes that in some way relate to this rule change request. It is ECA's view that these existing proposals and processes, while valuable in themselves, do not adequately address the problems and opportunities that this rule change articulates. Details are discussed in Appendix A.

Section 3.1 examines eight use cases for better DNSP planning to clearly articulate the specific value that better planning may provide. Following the identification of these use cases, Section 3.2 details five issues with current distribution planning processes (note these issues often overlap with the use cases, but the latter section includes more detail).

3.1 Use cases of improvements to DNSP data collection and planning

3.1.1 Proactive network planning to right-size investment in CER

Improved network planning will enable DNSPs to proactively plan for consumer investments in CER (including electrification) in the most cost-effective way. Planning should be performed as locally as possible, ideally down to the street/low-voltage transformer level, to plan for the uptake of CER and electrification. Without improved data and planning capabilities, DNSPs can only be reactive to future issues in the network, not proactive.

Other electricity plans such as the ISP assume that consumers will invest in CER and electrification, but we simply don't know whether the local distribution network is ready for that level of investment in the next 5-10 years. Reactive investments such as upgrading each piece of infrastructure as it reaches capacity will cost more and deter the interest and ability of consumers to electrify.

Certain neighbourhoods and streets will electrify sooner and have more CER. Networks can and should proactively ensure that they right-size and least-cost the investment with improved planning to ensure that consumers can invest where they want to and when.

Relatedly, improved network planning would allow for the identification of opportunities to replace capital expenditure on network upgrades with demand management, potentially reducing costs to consumers.

3.1.2 Guide consumer investments in CER

Just as networks make decisions about whether and when to make investments, consumers are making decisions about whether and when to invest in CER. Consumers, or those working in the interests of consumers such as CER installers, should have access to as much relevant information as possible to inform their decisions.

For example, there are limits that networks will impose on different customers, such as export limits on solar and requiring payment to upgrade the local low-voltage transformer to allow the customer to add load from EVs and electrifying gas appliances. With more access to information, a consumer could, for example, know that they could install 10 kW of rooftop solar today, or only 5 kW in 3 years, and thus make an informed decision on when to install solar. Proactive planning can find ways to increase network capacity proactively so consumer attempts to add electricity demand by stopping gas use are not stymied by a lack of available network capacity.

Consumers deserve to have the same insight into future network conditions as networks to inform their investments. Better planning, forecasting, and transparency, such as via open data practices, that are effectively communicated with the broader community, including local tradespeople, will allow consumers to know how these limits will change in the future, and to better inform their investments in the energy transition.

3.1.3 Guide developer investments in DER, community batteries, and EV chargers

Developers of distributed energy resources (DER), such as community battery and EV charging providers, don't have visibility over the network to know where these investments are needed or where there is sufficient hosting capacity. There is currently an information asymmetry between networks and other parties on the best places for community batteries and EV charging. It is imperative that all parties have equal access to information on network limits and opportunities.

DNSPs are making or hoping to make investments in storage and EV charging technology and should be using their knowledge of network conditions to make better investments for consumers. DNSPs either know or could work out where there are hosting capacity constraints. Publishing this information in the form of CER hosting capacity maps would enable more informed and cost-effective non-network investments. This would help address the existing information asymmetry and should increase competition in the delivery of network and consumer services from DER.

3.1.4 Improve regulation/oversight of DNSP assessment of hosting capacity

Networks make critical engineering judgements about the current and future capacity of their networks to enable consumer consumption demands and export requirements. The decisions networks make require complex modelling and underpin capital expenditure needs. However, there is little to no regulation, oversight, or policing of the analysis underpinning these assessments. Networks have incentives to be conservative, leading to greater network capital, and therefore shareholder return and total system cost.

DNSPs in the NEM use different data, methods, and models to inform their assessments of hosting capacity, making some assessments more robust than others. This lack of consistency in data format and methods also makes independent assessment by interested parties, including non-network service providers, researchers, and regulators, difficult and time consuming.

Greater transparency into this decision-making process can help ensure consumers receive reasonable value from the investment in the network they have made. Improved transparency can also allow AER and independent researchers to compare and highlight best and worst practice in network capacity assessments and ensure that networks are appropriately judicious in their decision-making. Unvalidated network models may potentially lead to misleading outcomes. Transparency to enable independent assessment is critical to validate network models and increase trust in their outputs.

3.1.5 Improve determination of LRMC of network service

Network tariffs must be based on the long-run marginal cost (LRMC) of providing network service[15], but it is difficult to accurately determine the LRMC without good future-based plans on the network.

The AEMC's pricing review highlights the importance of accurate network tariffs that can enable CER coordination/orchestration and lead to better consumer outcomes. These tariffs rely on network judgements on LRMC, and those judgements should be based on well-developed and validated long-term network plans.

Better network planning would provide the necessary inputs to enable network tariff setting to be more accurate and better reflect the true costs of the network on the margin. Additionally, DNSP disclosure of locational LRMCs and where network constraints are occurring can provide a market for demand response and CER programs to provide network services, avoiding the need for costly network upgrades. In other words, by strategically implementing demand response where it is needed, we can avoid network costs.

3.1.6 Benchmark network performance

Benchmarking is an effective tool to positively influence corporate behaviour by comparing the outputs from peer groups of companies. The AER does many benchmarking comparisons in its annual performance reports for both gas and electricity network service providers. The data required for better distribution planning can also be leveraged to enable additional and valuable benchmark comparisons, the most important of which is network utilisation.

Network utilisation is a metric used to assess the efficiency and performance of electricity grid infrastructure. DNSPs currently measure network utilisation based on a measure of how well the network is utilised during the one-hour block of peak demand for the year.[16] Recently, the Institute for Sustainable Futures at the University of Technology Sydney (UTS), through a grant from ECA and with input and feedback from a working group including the AER, AEMC, DNSPs and other experts, developed proposed new metrics for network utilisation, which are better measures of how well the system is utilised throughout the year and include measures of electricity export, which are more appropriate in the context of widespread CER uptake and export.[17][18] More data at a greater granularity is required to use these improved metrics. Additional data will allow better measures of network utilisation and allow DNSPs to benchmark network performance, ultimately resulting in lower network costs.

A least-cost energy system will seek to both limit peak and minimum demand (i.e. shaving peaks and filling valleys of demand) while also increasing the overall usage of the network throughout the day and year. Implementing improved measures of network utilisation would reduce the need for capital overinvestment by encouraging non-network investments. However, these measures require data and spatial granularity that networks either don't collect or don't use.

[15] 6.18.5 of the NER
[16] Network utilisation as whole is relatively low for electricity distribution networks. Network constraints are highly locational and relatively infrequent — i.e. only occurring during peak demand events.
[17] UTS, 2024 – Reimagining Network Utilisation in the Era of Consumer Energy Resources (forthcoming) p 4.
[18] AER, 2024 – Insights into Australia's growing two-way energy system p 2.

3.1.7 Enable community groups to participate directly in planning their local energy system

Consumers and community groups want to have more input into the design and development of their local energy system. Consumers generally only have opportunities for input into their local network once every 5 years during the network reset processes, and those processes tend to focus more on specific investments rather than on the long-term plan for networks in particular geographies. A more collaborative, regular planning approach can ensure these communities have the opportunity to engage with DNSPs to plan their local energy system. Networks collecting and publishing more data, modelling, and forecasting will allow these groups to have more information.

Projects such as Electrify 2515[19] run by Rewiring Australia (alongside Brighte, and Endeavour Energy, with funding from ARENA) benefit from increased access to data, but our understanding is that the data sharing happening in 2515 is highly atypical. This rule change request will enable increased access to data so that more projects like Electrify 2515 can determine the effectiveness of a given intervention, enabling improvements for communities in the planning of their local energy system. Moreover, it will provide an avenue for communities and DNSPs to engage and plan together, offering a chance to leverage opportunities for networks to build the future network reflecting local needs and perspectives.

3.1.8 Provide transparency into DNSP requirements for future energy systems

The future network will be digital and data driven. For networks to be more efficient, they will need better data and to use the data they have more effectively. While there is no certainty on the future role of DNSPs or the evolution of a Distribution System Operator, there is certainty that networks in the future will need to use more data and use it more effectively to guide their decisions and operations. This rule change request helps promote a more data-dependent and data-driven network, enabling — though not mandating or foreclosing — future business models for DNSPs and other electricity services providers.

Consumers are spending significantly on the installation of smart meters. While the costs to consumers from the roll-out are certain, the benefits are more speculative. This rule change request increases the clear, definite benefits of smart meters by ensuring that their data is used by networks to inform and improve network planning.

3.2 The case for change

The electricity distribution system is arguably the most vital enabler of a low-cost energy transition. It contains the infrastructure required to connect the millions of new electric appliances and vehicles that consumers will purchase, and to host the millions of solar panels they will buy and install. Further, a flexible distribution system that accounts for consumer needs while taking advantage of technological advantages can play a critical role in balancing the variability of wind and solar power.

Electricity distribution network costs typically comprise around 35% of the electricity bill for Australian residential and small business consumers (the largest component of an electricity bill).[20] The allowed revenues for DNSPs determined by AER are generally significantly higher for the next period than the current period.[21] If this increased revenue comes without increased network utilisation, this would result in an increase in the distribution network component of consumer electricity bills.

[19] Electrify 2515
[20] AEMC, 2021 – Residential Electricity Price Trends 2021 p 4.
[21] AER - Determinations and Access Arrangements

The total regulatory asset base for distribution networks is $90 billion as of 2023 compared to $26 billion for transmission networks.[22] There is a risk that the rate of growth of the distribution system will approximate the rate of growth of electricity consumption (overall electricity consumption is expected to more than double by 2050), thereby eliminating any potential energy system savings resulting from lower cost electricity generation from renewables. This indicates a need for more comprehensive planning and scrutiny of that planning to ensure the best outcomes for consumers.

Without adequate planning, networks will be reactive to consumer decisions to invest in more electric appliances and vehicles and to install more solar and battery systems. A more proactive approach enables networks to help usher in the energy transition at a lower overall cost with less friction and tension between existing network capabilities and consumer needs.

3.2.1 The expected rapid increase in electrification and CER requires more frequent, comprehensive, granular, and proactive planning

Network and CER hosting capacity can change quickly and substantially over time as electricity demand changes and new rooftop solar, batteries, and EVs enter the system.[23] Further, hosting capacity can vary throughout a given day.[24] Existing DAPRs are not required to include an analysis of CER hosting capacity in the NER, and an analysis every five years through the existing expenditure proposal process is insufficiently frequent to account for potentially large shifts in CER uptake.

Of 500 rooftop solar systems analysed in Adelaide, the average amount of electricity curtailed was 1%; however, some households lost over 4% of their total generation, with one losing ~20%.[25] Curtailment can be partially reduced through better planning and understanding of the distribution networks. Reducing the amount of curtailed electricity from consumer-owned energy resources requires better management of the distribution networks, which largely requires better visibility of the low-voltage network and better planning.

The 2024 ISP indicates that across the NEM overall demand is expected to increase from 200 TWh to 410 TWh annually by 2050, even after accounting for a large increase in energy efficiency, due largely to increased electrification of vehicles and household appliances.[26] Operational demand is forecasted to grow from around 180 TWh to around 305 TWh annually, with the gap between overall and operational demand explained by increased uptake of CER and on-site industrial power generation. It is unclear whether, and to what extent, DNSPs planning aligns with these forecasts, largely because they do not publish load or CER forecasts out to 2050.

In addition, there will be substantial local variation, with some areas experiencing a larger net increase in operational demand. For example, more solar in Newcastle does not necessarily offset greater consumption from EVs in Sydney. Gas usage also varies significantly between and within states — e.g., around 5% of NSW homes have central gas heating, while around 40% of Victorian homes do.[27] Accordingly, the impact on electricity networks from electrifying gas usage will vary significantly.

While we have not yet seen a large increase in electrifying gas usage, this may occur suddenly and rapidly. Under the ISP's Step Change scenario, non-EV electrification of residential, business, and

[22] AER, 2024 – 2024 Electricity and gas networks performance report p 35.
[23] AER, 2024 – Insights into Australia's growing two-way energy system p 19.
[24] EPRI, 2020 – The Hosting Capacity Process p 4.
[25] Yildiz, B. et al., 2021 – Curtailment and Network Voltage Analysis Study (CANVAS) p 36.
[26] AEMO, 2024 – 2024 Integrated System Plan p 25.
[27] Energy Consumers Australia, 2024 – Energy Consumer Sentiment & Behaviour Surveys (2021, 2022, 2023)

industry gas consumption will increase substantially over the next 25 years.[28] This is unlikely to align well with existing holistic DNSP planning processes that occur every five years through expenditure proposals. Instead, frequent and proactive planning is required.

By consulting with gas networks, electricity DNSPs can have greater visibility of the timing and location of gas network disconnections and help ensure that local electricity networks are well prepared for potential short and long-term changes to consumption due to electrifying gas use. Gas networks would also have insight into which locations are more suitable for the electrification of gas appliances.

The DAPR currently has a five-year planning horizon[29]. By contrast, the ISP planning horizon is at least 20 years,[30] and the 2024 ISP made projections through to 2050. These large changes in load and CER uptake are unlikely to align well with existing DNSP expenditure proposal timeframes and holistic system planning processes, which results in the need for a longer forward-looking projection than five years. Also, a longer forward-looking projection would enable improved network resilience through better identification of communities at risk of long-duration outages, allowing solutions to be developed in advance. For example, long-term analysis might identify areas that will require and be suitable for DER as backup power or the creation of microgrids or islandable sections of the network.

Increasing adoption of CER and electrification as well as larger opportunities for demand flexibility will lead to planning and accurate forecasting becoming both more technically challenging and economically valuable. If DNSPs meet the forecasted increase and spatially varying demand through existing practice, this will lead to untenable increases in energy costs for the end consumers.

3.2.2 Network costs are increasing, with insufficient emphasis on improving network utilisation and benchmarking DNSPs, and no requirements for DNSPs to include the insights of greater smart meter data in their planning

As noted above, electricity distribution network costs typically comprise around 35% of the electricity bill for Australian residential and small business consumers (the largest component of an electricity bill) and allowed revenues for DNSPs are generally significantly higher for the next period than the current period.[31]

DNSPs currently have a clear incentive to conservatively assess their network's capacity because doing so would increase the need to build more network infrastructure, thereby increasing their regulatory asset base. As articulated in CSIRO's National Low-Voltage Feeder Taxonomy Study:[32]

> *…network constraints that are communicated are likely quite conservative, because with limited information the natural and proper course for DNSP businesses is to avoid exceeding the capacity of the network by underestimating its limits. This approach lowers the overall utilisation of the network, increasing costs to customers.*

The AER agrees, noting that "where data is available there is limited inherent incentive for DNSPs to freely share this with interested parties."[33] Despite this, there is little transparency or regulation over the development of these network capacity assessments.

[28] AEMO, 2024 - 2024 Integrated System Plan p 26, 27.
[29] 5.13.1 of the NER
[30] 5.22.2 of the NER
[31] AER - Determinations and Access Arrangements
[32] Geth, F. et al., 2021 – National Low-voltage Feeder Taxonomy Study p ix.
[33] AER, 2024 – Low-voltage Network Visibility: Summary of neighbourhood battery trials p 1.

At the same time, the Finkel Review identifies that,[34]

> *Incremental planning and investment decision making based on the next marginal investment required is unlikely to produce the best outcomes for consumers or for the system as a whole over the long-term or support a smooth transition*.

In other words, we need a proactive and robust network planning process to ensure that DNSPs can efficiently respond to and plan for the rapidly changing energy system — which is becoming more distributed and renewable — as well as the rapidly changing way consumers are engaging with energy — who are adopting CER and using their energy more flexibly. Current network planning requirements do not deliver this.

There is a need for transparency in the decision-making process behind DNSP network capacity assessments to ensure consumers are getting reasonable value from the investment in the network they are making, and to allow AER and independent researchers to ensure that networks are being appropriately judicious.

Network utilisation is a metric used to assess the efficiency and performance of electricity grid infrastructure. Better network utilisation will result in lower network costs per consumer, per unit of energy, and/or per unit of capacity, ultimately resulting in reduced electricity bills for consumers. The traditional metric for network utilisation is defined by AER as the "non-coincident, summated raw system annual peak demand divided by total zone substation transformer capacity",[35] or in other words, the peak hour of demand for a given year for each zone substation divided by the total capacity of all zone substations. This is insufficient in the context of widespread CER uptake, and only provides value for less than 0.1% of the time.

This is because current network utilisation metrics only consider how much network capacity is installed to address maximum electricity demand. This is no longer appropriate, given the uptake of CER, which create two-way flows of electricity and represents a different kind of network value (export services), creating flow-on effects such as minimum demand or voltage constraints that might also drive network investment. In considering only the peak hour of energy demand and aggregating at the whole-of-network level, the traditional metrics also shed no light on where and how to obtain more value from the network for the remaining 99.9% of the time.

Electricity distribution network utilisation as whole is relatively low. Network constraints are highly locational and relatively infrequent — i.e. only occurring during peak demand events. Network utilisation is also likely to change over the coming years due to three key factors:

- Electrification of transport
- Electrification of gas
- Increased use of export services from CER

There is a need for better locational planning of how these trends will increase the use of networks.

Research conducted by UTS — funded by an ECA grant — proposes new metrics that are better measures of network utilisation in the context of CER and increasing electrification — Total Energy

[34] Finkel, 2017 – Independent Review into the Future Security of the National Electricity Market p 123.
[35] AER, 2021 – State of the energy market 2021 p 168.

Throughput Utilisation[36] (TETU) and Two-way Power Flow Utilisation[37] (TPFU). These network utilisation metrics should be calculated at more granular spatial scales or asset-levels within the network (including at the low voltage transformer level) to offer a nuanced picture of utilisation at different times and locations. Doing so has substantial potential to lower the average costs of network supply for consumers. However, these metrics can't be accurately calculated without the appropriate data and insights, which currently DNSPs are not required to collect, analyse, or publish. The data and insights required are outlined in Section 4.1.1.

Improved planning processes can provide better updates on network expenditure and utilisation to ensure consumer bills are stable and affordable over time. Improved planning would also provide additional benefits to both DNSPs and consumers from the rollout of smart meters. Better distribution data collection and planning would help ensure a return on investment for smart meters by utilising the data to achieve demonstrable consumer benefits.

3.2.3 Networks do not transparently share information about CER hosting capacity and constraints across the network, including where the best network locations are for community batteries and electric vehicle charging infrastructure

DNSPs' unique access to data and information about their networks, leveraged — in part — from consumers' data, distorts market outcomes on emerging technologies such as community batteries and electric vehicle charging infrastructure. DNSPs are a natural monopoly — they are granted monopoly access to provide network services to consumers, but in exchange face regulation. At present, their monopoly status provides them with unique and unfettered access to data and information about hosting capacity and constraints for CER. This lack of visibility at the local level represents an unfair advantage, making it difficult for non-network participants who want to connect energy-related infrastructure, such as community batteries and EV charging equipment, to know which parts of the network have greater CER hosting capacity and can be accessed at lower costs.

There is increasing interest in using batteries, solar PV, or adjusting water heaters, pool pumps, and other flexible devices to provide network services such as controlling voltage. However, without the necessary data, it is unclear where and how much capacity of these devices are required in order to maximise the value provided to the grid.

A report prepared by The Brattle Group for ECA found that community-scale storage could provide a larger net benefit than household and transmission-scale storage, but that this is reliant on identifying high-value locations in the grid, such as areas where there is high congestion or high outage frequency.[38] It also identified the need for networks to share more data and insights on where batteries could be best located to resolve network constraints.

The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) is currently considering how to streamline network connection processes for large CER and electric vehicle supply equipment.[39] The Options Paper identifies that proponents of new projects struggle to access

[36] "An energy metric focussed on maximising the customer value that is facilitated by a grid connection, in the form of energy imported from the grid, exported to the grid and self-consumed." UTS, 2024 – Reimagining Network Utilisation in the Era of Consumer Energy Resources (forthcoming) p 4.
[37] "A power metric focussed on understanding and balancing the level of capacity risk accrued to deliver the network productivity represented in the TETU. This provides visibility of the critical time-of-day and seasonal variations in two-way grid usage that inform how TETU can be maximised." UTS, 2024 – Reimagining Network Utilisation in the Era of Consumer Energy Resources (forthcoming) p 4.
[38] Brattle, 2023 – Unlocking the Value of Community-scale Storage for Consumers p 15.
[39] DCCEEW, 2024 – Streamlining network connection processes for consumer energy resources (CER) and electric vehicle supply equipment (EVSE) options paper p 10.

information on grid capacity for CER at particular sites, and that one solution would be for DNSPs to provide a network data portal to address this. Some DNSPs already provide this tool, such as Essential Energy's Network Information Portal, [40] but there would be value in requiring all DNSPs to produce these tools and to ensure standardisation between their inputs and methods so outputs can be directly compared.

Further, if DNSPs themselves lack this data and insight, this raises a concern as to why they might be investing in community batteries in some locations and not others, calling into question whether consumers can trust that their funding is being used prudently and efficiently.

Consumers pay for the metering infrastructure — both at their premise through smart meters and through network capital spent on metering throughout the low-voltage system — used by DNSPs to better understand the condition of the network. Consumers deserve reciprocal access to the insights and information this data creates.

3.2.4 There is insufficient outreach and consultation with communities on network plans, particularly given rising community interest in local energy issues and increasing threats to energy resilience

Many local communities want to play a larger role in the design and development of their energy system. Further, climate change has and will continue to lead to more extreme weather events that cause more extensive outages in electricity networks. These outages will have greater impacts as transportation and gas use continue to electrify. At present, DNSPs are not required to provide consumers with a way to engage with networks on these issues outside of the five-yearly network reset processes.

A mechanism is needed to require DNSPs to conduct outreach and engagement with local communities in a consistent manner, to ensure that their interests in and suggestions for the future of the distribution system are considered. For example, more regular consultation by DNSPs with local communities can better support community energy resilience and align network and non-network investments that provide a suite of affordable, resilient services that meet community needs and expectations.

3.2.5 Current distribution and transmission planning processes do not provide an adequate whole-of-system analysis

Clause 2.22.2 of the NER states that:

> *The purpose of the Integrated System Plan is to establish a whole of system plan for the efficient development of the power system that achieves power system needs for a planning horizon of at least 20 years to contribute to achieving the national electricity objective*.

However, the current ISP is not a whole-of-system analysis, as it does not sufficiently include distribution-level considerations.

On one hand, this is not surprising, given that the original Independent Review of the NEM — the Finkel Review, which resulted in the development of the ISP — was focused on a "strategic approach [...] for the coordination of generation and transmission investment in the NEM".[41] From a consumer perspective, however, CER is just as valuable — if not more — than large-scale transmission connected generation, and yet has been left absent from the existing planning regime.

[40] Essential Energy – Electricity Network Maps
[41] Finkel, 2017 – Independent Review into the Future Security of the National Electricity Market p 121.

The ISP plans the electricity system to the zone substation level, of which there are around 2,000 in the NEM. At present the ISP assumes there are no constraints on exports from CER at the zone substation level. The ISP and DAPR occur at different frequencies, have different inputs, and have different forward planning horizons.

While the Commonwealth DCCEEW rule change request to improve consideration of demand-side factors in the ISP goes some way in addressing this issue — in requesting more granular distribution system data in the ISP — it does not actually create a plan for the distribution system. Rather, it focuses on improving transmission system planning with more useful and accurate whole-of-system data. While a better transmission plan is useful, there is an additional need for these data and insights to be used by DNSPs to create their own distribution plans. This is especially valuable given that consumers pay more than three times as much for the distribution network as the transmission network.

We do note that some of the inputs used by the ISP are also produced for DAPRs — for example they both forecast load — but these forecasts are not compared and there is no requirement they are consistent. They both should be forecasting CER, but again, these forecasts aren't necessarily shared or common. Accordingly, the existing rules have allowed AEMO and networks to plan a transmission system via the ISP that assumes a certain ability of a distribution system to contribute to meeting load but does not require the planning of a distribution system that is capable of providing such services. The DCCEEW rule change helps solve some of this problem, by requiring more information from DNSPs, but DNSPs must themselves plan their own infrastructure with more granularity and detail to reduce risks that the future distribution network will not match the ISP's ambition or assumptions for it.

At a certain scale, the ISP becomes too unwieldy to reasonably accommodate all new changes and requirements. Therefore, rather than further expanding the ISP to realise its vision of a "whole-of-system plan," we recommend improving the outputs and processes of distribution system planning and effectively integrating them into the ISP by amending the DAPR and creating biennial Integrated Distribution System Plans (IDSPs).

4. Description of the proposed rule

ECA requests that the NER be amended, particularly the DAPR requirements,[42] to enable a more integrated distribution system planning process.

4.1 Significant amendments to the DAPR requirements are needed

We propose that the NER requirements with respect to the DAPR be amended to require a more comprehensive Integrated Distribution System Plan (IDSP). The changes will include:

- Requiring DNSPs to make appropriate use of the data they have.
- Increasing the comprehensiveness of distribution planning by replacing the DAPR with a biennial IDSP and requiring DNSPs to update data more frequently as required, such as no less frequently than every three months for online CER hosting capacity maps.
- Requiring DNSPs to develop a roadmap outlining how they will collect and utilise more data and information at greater spatial granularity in the future.
- Increasing the transparency of data, modelling, and methods used by DNSPs.
- Improving the degree and nature of stakeholder engagement.

[42] 5.13 of the NER

The specific features that must be included are outlined throughout the remainder of this section.

We recognise that the data collection and planning requirements called for in this rule change request will require a transition. Where DNSPs are not able to meet the requirements, they should state in their IDSP why and outline a Network Data and Insights Roadmap, which explains how and when they will develop the data and tools to undertake such analysis in the future.

4.1.1 Data collection, modelling, and planning

DNSPs must outline the methods, calculations, and data they will use to provide insight about the condition of their networks down to the low-voltage transformer. If DNSPs lack the data or tools to provide the insight at this level, they must provide information at least to the zone substation level. DNSPs must also provide a "Network Data and Insights Roadmap" that identifies how and when they will collect more data and when they anticipate being able to provide greater insights into different parts of their network. It is expected that networks would achieve greater visibility over certain parts of the network before others and would articulate the rationale for focusing on some areas before others.

DNSPs must develop an IDSP every two years on years alternating with ISP releases. 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 to enable more complete, whole-of-system planning. This increased consistency between transmission and distribution would align expectations and improve the regulatory framework.

There should not be a mandate that networks collect data and provide insights throughout the low-voltage system by any particular year. Rather, the mandate is for DNSPs to explain how they make use of the data they have and how they plan to increase their data collection and share greater insights with stakeholders in the next seven years.

Based on requirements and existing IDSPs, we propose that past, present, and projected data, modelling, and forecasts[43] of the information from the below list are captured in the IDSP (as the revised DAPR) and/or in a publicly accessible online database at the level of spatial and temporal resolution defined by the AEMC or AER.

- Adoption of solar systems, energy storage systems, electric vehicles, public electric vehicle charging stations, and flexible appliances connected within the low-voltage system.
- Low-voltage consumption, both for native demand and operational demand, wherein native demand is the total amount of electricity used by individual consumers and operational demand is the total amount of electricity provided via the distribution network.[44]
- Low-voltage network power and power quality data.
- Estimates of low-voltage consumption met by low-voltage connected generators.
- Smart meter power and power quality data, including usage.
- Change in electrification uptake, including of reticulated gas.
- Change in energy efficiency.
- Low-voltage CER hosting capacity for electric vehicles, public electric vehicle charging infrastructure, electrified gas appliances, and solar systems during the study year, and throughout the planning horizon, assuming no material changes in hosting capacity.

[43] This should include the inputs, assumptions, and methods used.

[44] Improving network utilisation and other system-level benefits require that new and existing large commercial and industrial loads be taken into consideration as well as residential and small business load. More granular data collection including separating residential, commercial and industrial, and other loads at the distribution level would enable improved analysis of what source demand growth is attributed to.

- Best locations for CER and DER at or below the zone substation level in the form of an online network opportunity map.
- Degree of network utilisation, projections, and a plan for improvement, and any other relevant measures of network constraints.
- All other relevant inclusions from the existing DAPR process as outlined in the National Electricity Rules (Section 5.13).
- Any deviations from the above data requirements, reason for deviating, and a detailed plan for how and when the DNSP will develop and share the required information via the "Network Data and Insights Roadmap".

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

This analysis will be based on a 20-year projection horizon with a 10-year action period, similar to the ISP. This will increase network resilience by identifying communities at risk of long-duration outages further in advance, allowing solutions to be developed. Note that forecasts of electrification of gas will require consultation with gas networks to determine when areas will be disconnected from gas, which may also require a change to the National Gas Rules.

Data and information required for DNSPs to accurately measure and improve network utilisation which DNSPs should collect and include in IDSP calculations include:[45]

- Installed solar PV capacity by zone substation.
- CER curtailment figures — curtailment varies substantially in different parts of the network due to differential CER uptake and demand profiles of connected customers.
- Actual weather data, which is distinct from 'typical meteorological year' simplifications that are used as a proxy.
- Voltage data for substations and current flow data for feeders.
- Reliability performance data in the form of System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI) disclosed at the same level of spatial granularity as the energy/power metrics (zone substation and below).
- The Weighted Average Value of Customer Reliability for assets with proposed investment at the same level of spatial granularity as the energy/power metrics to enable a calculation of accumulated asset risk.

Data releases should ideally come with documentation and support. Further, each IDSP must note any limitations the DNSP faces due to a lack of data or network visibility and how it aims to improve that visibility over time, i.e. for future IDSPs. After the initial IDSP, each subsequent IDSP must also note how the methodology compares and contrasts from the other DNSP methodologies and how the methodology has changed from previous versions. This information will be shared via the Network Data and Insights Roadmap.

[45] UTS, 2024 – Reimagining Network Utilisation in the Era of Consumer Energy Resources (forthcoming) p 66 – For each of these data, the report has outlined recommendations.

Also, in their IDSP, each DNSP must outline how they meet new requirements to engage with relevant stakeholders — see more information in section on stakeholder consultation below. Each DNSP should provide a compliance statement within their IDSP indicating how they have satisfied their requirements.

The AER must publish regular reports comparing and contrasting IDSP methodologies, identifying best practices and areas for improvement. These reports must also include a record of DNSP compliance with the new requirements.

The same data, analysis, and outputs of the IDSP should be used in the 5-yearly network reset process for each DNSP to minimise costs and ensure consistency. DNSPs must show how they're using their IDSP in their network reset or otherwise note and explain discrepancies.

There are 13 DNSPs in the NEM and there would therefore be 13 IDSPs. Standardising inputs, modelling, methods, and outputs as much as possible would result in a material increase in efficiency, reducing costs for DNSPs and increasing the usefulness for external parties by allowing them to be directly compared. This may require AER to create guidelines for data collection, methodology, and outputs in consultation with AEMO, DNSPs, and other stakeholders.

4.1.2 Stakeholder consultation, including resilience assessment

Consumers are no longer simply the end of the chain of the energy system. By 2050 they will provide around a third of system capacity[46] and a fifth of annual generation,[47] they are investing — sometimes blindly or nearly so — in costly infrastructure, and they are facing significantly higher network bills. Therefore, consumers need to be actively engaged and partnered with networks to achieve the best outcomes for consumers themselves and for the entire energy system.

Each IDSP must include a community and consumer outreach process to inform and improve demand and CER projections and identify potential constraint solutions. This must include consultation with local governments to gather information on local electrification rates and assist in supporting those specific locations undergoing electrification.

Each DNSP must outline how they meet new requirements to engage with relevant stakeholders, including:

- Consumers and communities in general, and how that engagement has impacted its analysis, if at all.
- Consumer advocacy organisations.
- Local and state governments.
- Communities on consumer electricity resilience.
- Other non-network service providers and their peak bodies, particularly focused on non-network community battery developers, electric vehicle charger providers, and virtual power plants.
- Where appropriate, gas distribution networks and significant providers of bottled or non-reticulated gas service on the timing and location of reductions in gas demand.

DNSPs must outline the ways in which the DNSP will engage with stakeholders to:

[46] AEMO, 2024 - 2024 Integrated System Plan p 11.
[47] AEMO, 2024 - 2024 Integrated System Plan p 30.

- Develop forecasts for the future distribution network, including load, generation, storage, and flexible demand.[48]
- Develop options for ensuring energy reliance to combat the risk of extended outage due to extreme weather for communities at risk (DNSPs need to outline the methods for identifying these risks and how they will work with these communities).
- Identify ways in which communities would like to be engaged, including the types of information most valuable for them and preferred modes of communication.
- Share initial findings and enable stakeholder feedback from draft analysis.

Each IDSP must also include risk assessments on the vulnerability of their network equipment to severe weather, preferably using a standard suite of common climate projections and an ISO 31000 compliance risk assessment framework; and identify their plan for maintenance and repairs to support consumer electricity resilience. Following the damage to Victorian electricity transmission and distribution networks from the 13 February 2024 storm event, 19 recommendations were made by an expert panel to reduce prolonged power outage impacts on Victorian communities, several of which relate to risk management and resilience and should be considered to supplement IDSP requirements.[49] For more on the role of DNSPs in supporting consumer electricity resilience, ECA recently funded a report on this topic.[50]

Each IDSP must include a summary of lessons learned from the previous two years of stakeholder engagement, and how their methodology and outputs have changed as a result.

DNSPs should collaborate with local governments to gather further information on local electrification rates or to assist those with specific locations undergoing electrification.

Standardised formats for stakeholder consultation for all 13 DNSPs are critical to ensure that consumers and consumer advocates can participate in consultation processes with the least effort possible.

The AER sets out their expectations of how network businesses will engage with consumers and incorporate that engagement in their proposals in their Better Resets Handbook,[51] which includes features that would be welcome additions to more frequent stakeholder consultation alongside the IDSP in addition to the above requirements.

4.1.3 Demand and CER projections

Electricity demand is changing rapidly and profoundly.[52] The increasing uptake of CER and its integration into the energy system presents new opportunities for DNSPs to consider in their planning, including helping to manage minimum demand and reduce peak demand, provide essential system services, and reduce the need for costly network upgrades, grid scale generation, and storage investments.[53]

DNSPs will need to develop better and more frequently updated forecasts of CER growth than they have done historically to plan and build the network infrastructure required. This transition is possible, given that this is already done in the ISP, and the fact that the methods for forecasting CER growth has strong

[48] Demand flexibility is defined here as 'varying when and how energy is used' to align with the definition used in the National Energy Performance Strategy.
[49] Network Outage Review Expert Panel, 2024 – Network Outage Review
[50] Erne Energy, 2024 - Approaches to electricity network resilience & consumer electricity resilience
[51] AER, 2024 – Better Resets Handbook: Towards Consumer Centric Network Proposals
[52] AEMO, 2024 – 2024 Integrated System Plan
[53] Energy and Climate Change Ministerial Council, 2024 – National Consumer Energy Resources Roadmap: Powering Decarbonised Homes and Communities p 8.

overlap with the methods for forecasting demand growth. Both forecasts rely on the input of demographic, economic, and historical data that are probabilistic in nature.

As above, each DNSP must create projections for CER (such as solar, batteries, electric vehicles,[54] and flexible devices such as pool pumps and water heaters), energy efficiency, and demand (including from electrification) within its service area over the next 20 years, with detailed analysis required for the next five to ten years. These scenarios must align with the ISP scenarios, and the IDSP inputs and assumptions must align with ISP inputs and assumptions as well to integrate planning across transmission and distribution networks, or otherwise note and explain misalignment. Relevant maps must be made available for the present time and for at least every five years into the future for the relevant planning horizon. Some outputs may only be required every two years in the IDSP, while others should be updated more frequently. Generally, forecasts will need to be updated less frequently than present-day data.

Each IDSP must include a detailed assessment of CER hosting capacity and distribution network constraints down to the low-voltage transformer level for the next five years across different scenarios. These scenarios must align with the ISP scenarios. Where this is not possible, each IDSP should state why and outline a roadmap for how and when they will develop the data and tools to do such analysis in the future.

Each IDSP must identify network areas with the greatest need for, and where customers will receive the greatest benefit from, energy storage. This must include both storage located at the consumer premise (i.e. consumer battery) and storage located within the distribution network (i.e. network battery, e.g., community batteries or DNSP-owned/operated batteries).

The Network Data and Insights Roadmap must include the methods and data used for forecasting:

- Demand (underlying/native and operational).
- Installed generation.
- Stationary storage.
- Electric transportation.
- If practicable, other sources of flexible demand within the distribution network.

The Roadmap will explain how localised the insights provided will be – i.e. at the zone substation level or to the low-voltage transformer level. Where insights are not at the low-voltage transformer level, the Roadmap will outline the process the DNSP anticipates using to improve its visibility and forecasting over the next seven years.

4.2 How the proposed rule change would address the identified issues

Overall, the proposed rule would address the issues highlighted in Section 3.2 by improving upon current distribution network planning and forecasting processes, increasing the amount and granularity of data collected by DNSPs, and increasing public access to the inputs, assumptions, modelling, methods, and outputs used by DNSPs.

In addition, the proposed rule change addresses the following issues:

- Improve the reliability and resilience of the national electricity system by reducing the likelihood of load shortfalls, incorporating longer term planning, and better identifying communities at risk of

[54] Projections for EVs should account for where they are charged. E.g., EVs will often be charged in public spaces away from home.

long-duration outages through longer forward-looking projections, allowing solutions to be developed in advance such as right-sizing investment in CER.
- Prevent market asymmetries by increasing the availability of information on capacity and constraints for CER and load across the network to non-network participants.
- Increase transparency and enable better oversight of DNSP expenditure, allowing for benchmarking and leading to a least-cost energy transition.
- Protect the interests of consumers by allowing for more frequent community consultation.
- Promote achievement of greenhouse gas emissions reduction targets by increasing the uptake of CER technologies.

5. How the proposed rule change will contribute to the energy objectives

The NEO is:

> "to promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity with respect to:
> a) price, quality, safety, reliability and security of supply of electricity.
> b) the reliability, safety and security of the national electricity system.
> c) the achievement of targets set by a participating jurisdiction—
> i. for reducing Australia's greenhouse gas emissions; or
> ii. that are likely to contribute to reducing Australia's greenhouse gas emissions."

The proposed rule change is likely to contribute to the achievement of the NEO in the following ways:

- **Better forward planning to account for increased uptake in and right-size investment of CER and electrification.** CER hosting capacity can change quickly and substantially, but DAPRs are not required to include any hosting capacity analysis. Electrification of appliances and space heating is also expected to take place rapidly and with great spatial variability. Current analysis by DNSPs is not frequent or sufficiently forward-looking to account for the rapid pace of change in CER uptake and electrification. It is unclear if, when, where, or why DAPR demand forecasts align or misalign with the assumptions in the ISP. The proposed rule change ensures that distribution networks are fit-for-purpose to guide CER investments in the most cost-effective way.

- **Increasing network utilisation.** Current measures of network utilisation are insufficient in the context of widespread CER uptake and two-way flows of electricity. Additional data will allow better measures of network utilisation and allow DNSPs to improve network performance, resulting in lower network costs.

- **Increasing oversight on network costs for consumers' energy bills.** Network costs currently comprise around half of the consumer electricity bill costs and are increasing. This warrants greater oversight and transparency than is currently in place with existing planning processes. There needs to be greater transparency in network decision-making to ensure consumers are getting value from the investment in the network and to allow AER and independent researchers to compare and highlight best and worst practices in network utilisation and expenditure.

- **Improving reliability and resilience of the national electricity system.** Improved planning will also reduce the likelihood of load shortfalls due to increased demand from electrification and increased spatial variability in operational demand. Electrification of gas usage, which may happen quickly, unexpectedly, and in specific areas, will benefit from increased consultation

between gas and electricity networks, which this proposed rule change will help provide. A longer forward-looking projection will increase network resilience by identifying communities at risk of long-duration outages, allowing solutions to be developed in advance.

- **Addressing market asymmetries.** By giving information on capacity and constraints for CER and load across the network, such as community batteries and EV chargers, non-network actors, including community groups, will be enabled to play an active role in the development and rollout of these technologies. This will reduce the unfair advantage and information asymmetry that DNSPs have over non-network participants, reducing potential market inequities, therefore assisting non-network solutions which may be least-cost.
- **Protecting the interests of consumers.** More frequent community consultation will allow consumers to play a larger role in the design and development of their energy system. Networks collecting and publishing more data, modelling, and forecasting will provide a better way for communities to engage with networks more frequently than the current 5-yearly network reset process.
- **Promote achievement of greenhouse gas emissions reduction targets.** As above, increasing access to information will allow non-network participants to play a role in developing CER technologies, thus serving to achieve greenhouse gas emissions reduction targets by increasing the proportion of electricity generated from low-emissions sources. IDSPs will also enable better planning by the DNSPs and AEMO, unlocking the benefits of CER and ensuring that the local network is equipped to meet consumer desires to electrify their gas and petrol use.

6. Expected impacts

6.1 Benefits

There is a vast amount of consumer investment in Australia's energy system that has begun and will accelerate in the coming decades, though this investment — which will considerably outstrip public or corporate investment — receives far less attention or consideration than it deserves. The 2024 ISP Step Change scenario assumes that in 2030 there will be 18 times more electric vehicles on the road than today, more than a 50% increase in rooftop solar PV, more than a 600% increase in small-scale energy storage, and that there is nearly 30 TWh of additional electricity use from electrification.[55] In other words, we are planning the large-scale transmission and generation system based upon expectations that consumers are going to be using much more electricity, and that much more electricity will be generated by assets they have paid for directly — both individually and collectively. As such, consumers will expect the system to be ready to handle and integrate their new rooftop solar, batteries, and electric cars and appliances.

The ISP is a world class plan and exists to ensure that investors in large scale generation and storage assets have the necessary transmission infrastructure in place to meet their needs. Australian households and businesses deserve a planning regime just as or more robust for their investments and the role they are expected to play in the energy transition.

Consumers are the primary beneficiaries of this proposed rule. Electricity distribution network costs typically comprise ~35% of the electricity bill for Australian residential and small business consumers,[56]

[55] AEMO, 2024 - 2024 Integrated System Plan p 25, 26.
[56] AEMC, 2021 – Residential Electricity Price Trends 2021 p 4.

compared to ~35% for electricity generation[57] and ~10% for transmission. Meanwhile, our analysis has found that electrifying vehicles and gas appliances along with effectively integrating CER can lower distribution costs for all, ensuring that all consumers see benefits from the transition.[58] 2024 AEMC analysis suggests that there are large reductions to be made in consumer bill costs through faster electrification and avoiding sub-optimal CER orchestration,[59] which will be facilitated through this rule change request.

Improved planning and projections on CER uptake, capacity, and constraints and load data will help consumers, DNSPs, and third-party providers place more batteries in more strategic locations, which could help DNSPs reduce costs in other areas, such as costs associated with controlling voltage or frequency within their feeder networks, therefore reducing costs for consumer energy bills. Reducing the amount of electricity curtailed through better planning and uptake of battery storage would also likely result in a reduction in consumer energy bills.

The curtailment of solar during periods of low operational demand is a problem that can be partly solved through better planning and understanding of the distribution networks. It would also benefit from increased availability of both network and consumer batteries. Reducing the amount of curtailed electricity from consumer-owned energy resources requires better planning and management of the distribution networks.

As such, a more robust and accurate distribution system planning process will ensure that distribution system costs are justified, CER and demand-side solutions are appropriately integrated, and communities are appropriately consulted.

Optimising network utilisation and right-sizing investment would also benefit large commercial and industrial users of electricity. Increasing the availability of network data and insights will also help large energy users to optimise their approach to network connection. Improvements in network and CER hosting capacity assessments should also lead to improvements for determining the best location to add new commercial and industrial load.

Improved planning will provide additional benefits to both DNSPs and consumers from accelerating the rollout of smart meters. Smart meter data is instrumental in providing many of the planning improvements outlined above, including better integrating CER, lowering overall network costs through digital and non-network solutions, and enabling improved network utilisation. AEMC's Accelerating Smart Meter Deployment rule change will assist in this, as it will provide DNSPs with access to power quality data from 2025, as well as a target of universal smart meter uptake by 2030.[60] Better distribution data collection and planning helps ensure a return on investment for smart meters. Utilisation of smart meter data may also be used by DNSPs or independent researchers for network visibility and can result in benefits to networks and consumers.

Voltage readings in the NEM are frequently high[61] which results in damage to the network and consumers, causing infrastructure and appliances to fail earlier than they otherwise would. DNSPs may also be requested by AEMO to use overvoltage to increase curtailment of rooftop solar through Emergency Voltage Management.[62] Voltage visibility and reducing overvoltage would therefore lead to

[57] ACCC, 2023 – Inquiry into the National Electricity Market: December 2023 Report p 29.
[58] Energy Consumers Australia, 2023 – Stepping Up: A smoother pathway to decarbonising homes
[59] AEMC, 2024 – Residential electricity price trends 2024 p 36.
[60] AEMC, 2024 – Accelerating smart meter deployment
[61] Bruce, A. et al., 2020 – Voltage Analysis of the LV Distribution Network in the Australian National Electricity Market p 52-101.
[62] AER, 2023 – Export services network performance report p 17.

significant consumer savings. Network visibility, and therefore voltage, is almost zero in low-voltage networks;[63] however, a new study has shown that voltage could be better estimated with smart meter data and neural networks.[64] Better low-voltage network visibility using smart meter data may assist with monitoring Emergency Voltage Management to ensure it is being used judiciously. This rule change would unlock this benefit by requiring the use and publication of smart meter data.

More granular data from smart meters will help state and federal governments to understand how communities and individuals differ in terms of their behaviours and motivations. This will allow them to optimise their strategy for targeting subsidies and rebates for CER to achieve the NEO, such as reducing emissions and energy costs for consumers.

There are also benefits for DNSPs, particularly due to improved planning resulting in greater reliability of the electricity distribution network. Additionally, increased network visibility would enable DNSPs to act as DSOs.

Leveraging consumer CER, when economically and technically viable, has benefits over building new grid infrastructure because it encourages consumers to become more engaged in their energy system and enhances grid resilience. CER may in many cases offer grid services to distribution systems at a lower cost than conventional infrastructure investments. When used to provide network or broader system services, CER provides the additional benefit of rewarding participating consumers, enabling them to lower their own bills while lower the overall costs incurred by the broader community. Without network planning that looks beyond the next few years, these benefits will be largely missed. The ISP has delivered significant benefits to consumers due to its wide scope, biennial frequency, and future-focus, and there is an opportunity for these benefits to be extended through an IDSP.

6.2 Costs

Many of the costs required to do more effective planning are already being incurred — most notably, the cost of smart meters and the data collection infrastructure required for networks to have access to smart meter data. While some limited additional investment may be required by this rule change, we think that these costs should be accounted for by how networks are or should be doing business in the future.

Accordingly, we suspect that the most significant costs are in:

i) Synthesising/vetting the information/analysis that networks are currently doing or planning to do.
ii) Greater consultation, to understand the needs of communities and share the outputs of network analysis.
iii) Writing the report and communicating its findings more generally.

DNSPs would incur costs associated with increasing the amount of network data they collect and the granularity, as well as costs associated with undertaking forecasting, planning, and greater community consultation. This may be frontloaded by costs associated with developing new data collection and new procedures and methods. This would be considerably offset by replacing the need for a DAPR. We note that while it would be ideal that these costs are not passed on to the customer, if they are, the process is likely to result in a net saving for end users due to reduced electricity distribution network costs in the mid to long term.

[63] SA Power Networks, 2019 – Maximising customer value from the network in a high-DER future p 5.
[64] Bassi, V. et al., 2024 – Demonstrating Electrical Model-Free Voltage Calculations with Real Smart Meter Data

We think these relatively minor costs for greater vetting of network analysis are justified given the importance of these assessments. Better community consultation is needed and justified, particularly given interest from some communities in proactively planning for their local energy future.

6.3 Impacts

The AER would be expected to develop new guidelines for the IDSP and Roadmap in consultation with AEMO, DNSPs, and other stakeholders, and would likely be tasked with ensuring DNSP compliance with the guidelines. AEMO would be engaged in ensuring integration between IDSP outputs and the ISP.

Forecasts of electrification of gas as part of an IDSP will require consultation with gas networks to determine when areas will be disconnected from gas, which may also require a change to the National Gas Rules.

Appendix A – Related regulatory processes

This appendix lists some current regulatory processes that are particularly relevant to this rule change request.

A rule change request from the Honourable Chris Bowen MP, Minister for Climate Change and Energy to improve consideration of demand-side factors in the ISP has reached its final determination.[65] The final rule will:

- Require the Australian Energy Market Operator (AEMO) to publish a demand-side factors statement as part of its ISP. This would include consideration of the technical and non-technical factors that influence the uptake and orchestration of CER and distributed resources. (The AEMC has adopted a broad definition of demand-side factors to also include energy efficiency, demand flexibility, and electrification),
- Introduce obligations on DNSPs to provide information requested by AEMO for the purposes of informing the ISP and demand-side factors statement, and
- The data sets, and timing, frequency and format for providing the data would be established in guidelines that AEMO would be required to publish in consultation with the Australian Energy Regulator (AER), DNSPs, and other interested stakeholders.

AEMO is required to publish these Information Guidelines within 12 months of the rule commencement date (December 2024), which would result in information being provided in time to inform the 2026 ISP.

ECA has considered the final determination. While these changes are welcome and begin to address some of the current shortcomings in whole-of-system planning, we consider that more is needed to improve the robustness and accuracy of the DNSP data provided for the ISP and to better integrate that information into DNSP decision-making processes and provide greater transparency to consumers. This can only be achieved through a separate rule change. As AEMO focuses on transmission, the information covered under the Guidelines may be more focused on connection points between transmission and distribution and won't get to the level of granularity proposed in this rule change request. The improved data collection that this rule change request seeks to achieve could feed into demand-side factors statements in future ISPs, which may require a change to the AEMO guidelines, which the draft determination noted would be flexible and may be changed by AEMO in the future.

The National CER Roadmap,[66] published in July 2024, outlines national reform priorities to maximise the potential of CER. Two key reform priorities being progressed by the CER Taskforce, which is being chaired by the Commonwealth DCCEEW, particularly align with the goals of this rule change request and will be supported by its outcomes:

- M.2 Data sharing arrangements to inform planning and enable future markets (Data Sharing Arrangements Workstream), and
- M.3/P5 Redefining roles for power and market operations (DSO Workstream).

We note the rule change request from the Honourable Lily D'Ambrosio MP, Victorian Minister for Energy and Resources on including distribution network resilience in the National Electricity Rules.[67]

[65] AEMC, 2024 – Improving consideration of demand-side factors in the ISP
[66] Energy and Climate Change Ministerial Council, 2024 – National Consumer Energy Resources Roadmap: Powering Decarbonised Homes and Communities
[67] AEMC, 2024 – Including distribution network resilience in the National Electricity Rules

Considering its focus on DNSP expenditure proposals, we consider that the IDSP requirements would complement any changes.

We note the Commonwealth DCCEEW's recent call for consultation on streamlining network connection processes for consumer energy resources and electric vehicle supply equipment.[68] As outlined in our submission on this issue,[69] there is often a lack of visibility at the local level, making it difficult for non-network participants to know where the efficiently access the network. This issue would be mitigated by the CER hosting capacity maps that would be required under our rule change request.

[68] DCCEEW, 2024 – Streamlining network connection processes for consumer energy resources (CER) and electric vehicle supply equipment (EVSE)
[69] Energy Consumers Australia, 2024 – Streamlining network connection processes for CER and EVSE submission p 2.

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