PUTTING THE POWER IN PEOPLE'S HANDS

Distributed Energy Resources – a key contributor to the clean energy transition

nexa ADVISORY

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About Nexa Advisory

Nexa is a full-service advisory firm. We work with public and private clients including renewable energy developers, investors and climate impact philanthropists to help accelerate efforts towards a clean energy transition. We've been shaping the energy industry for over 20 years. With a proven track record across policy creation, advocacy, political risk assessment and project delivery, we're holistic in our approach and deliver solutions with commercial intent.

The Nexa Advisory team is a collaboration of passionate energy specialists, all committed to the successful transformation of Australia's energy markets. The team is focused on helping clients grasp the unpredicted opportunities the energy transformation will bring with trusted and innovative thinking and advice.

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Disclaimer:

Summary of recommendations

Accelerating the take up of Distributed Energy Resources (DER) in Australia could help Australia meet its renewable energy and emissions reductions targets, by circumventing the bottlenecks being faced in developing and connecting large-scale renewable energy generation and its associated transmission.

Australia is a world leader in both rooftop solar photovoltaic (PV) deployment and in its research and development. We have the world-beating skills and resources to leverage DER as a complimentary approach to achieving our targets to generate 82 per cent of our electricity from renewable sources by 2030, and to reduce our carbon emissions by 43 per cent, and therefore be net zero, by 2050.

If DER is to help accelerate Australia's decarbonisation, we need a coordinated national energy strategy. A key part of that strategy would be removing some of the barriers to DER take-up by households and businesses.

We are calling on federal and state energy ministers to endorse the following recommendations at their next meeting:

Recommendation 1- National DER Policy and Coordination Office:

- The immediate establishment of a national DER body with appropriate funding to:
    i. deliver a coordinated national strategy and policy plan to accelerate DER.
    ii. direct the market bodies, including the operator, on the technical and regulatory approaches to DER.

In parallel with the establishment of the National DER Policy and Coordination Office, federal and state governments should prioritise energy programs and reforms in three key areas so as to elicit a step change in DER take up, as well as support for broader consumer accessibility:

- 'export' management and tariffs
- publicly available network data
- network voltage standards

Recommendation 2- Provide direction and steer on distribution network tariff design:

- The Australian Energy Regulator (AER) should adopt a 'flexibility first' approach to network development, ensuring that Distributed Network Service Providers (DNSPs) deploy non-network solutions before building new assets.
- Re-examine the recent rule change that allowed DNSPs to charge an export tariff.
- The Australian Energy Market Commission (AEMC) should re-establish the annual Electricity Networks Economic Regulatory Framework (ENERF) review.

Recommendation 3- Support for low-income earners and renters:

- Support accelerated take up of, and the broad distribution of the benefits arising from, DER with programs that allow people in social housing, renting, or on low incomes, to install solar PV. Assistance should also be given to commercial and industrial business owners to install small to medium-scale solar PV.

Recommendation 4- Network Data accessibility and transparency:

- The Federal government, working with state energy ministers and the Australian Energy Regulator, to enforce DNSPs to provide full and public access to network operations data.

Recommendation 5- Network voltage standards:

- The Federal Government working with state ministers and safety regulators should ensure that DNSPs are required to meet a 230V voltage standard.

Context

Australia's clean energy transition – situation report

The clean energy transition is critical to meeting Australia's climate targets, energy security and supply stability, and controlling and abating cost of living pressures on Australians.

Australia has set goals to be net zero by 2050 (requiring a 43 per cent reduction in carbon emissions), and 82 per cent renewable electricity generation by 2030. Australia is behind in this task to deliver a low-emission power system.

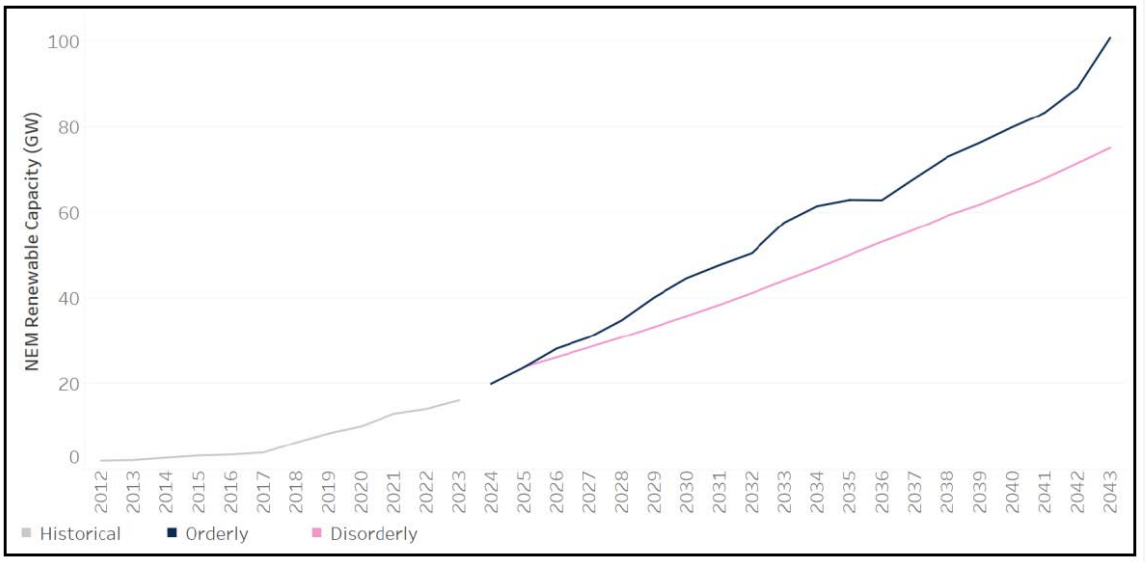


Figure 1: Required renewable generation (dark blue) in the NEM as recommended in the 2022 ISP Step Change scenario versus projected future delivery of renewable generation (pink) based on past delivery rates (grey) showing the significant and escalating shortfall in delivering renewable generation required[1]

The scale of renewable power generation (of all types and size) that will need to be built is unprecedented. The Australian Energy Market Operator (AEMO)'s Integrated System Plan (ISP) 2022 Step Change scenario implies that we will require an additional 138.5 TWh of wind and solar generation by 2035, and 197 TWh by 2042, to replace the retiring coal power stations.

The transmission build that will be required to fully connect the new large-scale decentralised generation, rather than centralised fossil fuel power stations, is the equivalent of 25 per cent of today's entire grid. It will now need to be built in less than 7 years.

Although key transmission projects have been identified, across the country we are a long way behind on their development. The five regulated Primary Transmission Network Service Providers (PTNSPs) have yet to demonstrate they have sufficient capabilities or scale to mobilise the resources necessary for Australia's transmission build out. Lack of engagement with communities in the early-stage processes of major projects has evoked severe resistance which has become a practical and political dead weight to progress. As such, development of transmission has been identified as a potential bottleneck to new renewable generation capacity[2,3].

1 https://nexaadvisory.com.au/site/wp-content/uploads/2023/07/Nexa-Advisory-Eraring-can-be-closed-on-schedule-Report-24072023.pdf

2 https://www.aemc.gov.au/markets-reviews-advice/review-of-energy-market-frameworks-in-light-of-cli

3 https://www.aemc.gov.au/market-reviews-advice/transmission-planning-and-investment-review

The issues facing our energy transition are exacerbated by the global race to decarbonisation. New programs in the United States of America, European Union, and Asia are accelerating the clean energy transition by providing clear financial incentives (e.g., the Inflation Reduction Act, USA; the Green Deal Industrial Plan, EU). These programs mean that Australia will need to move quickly to ensure it can attract funding, materials, and skilled people.

DER's role in the clean energy transition

To meet our 2030 renewable generation target, the 2022 ISP[4] suggested that we need a total capacity of 79 GW, 35 GW of rooftop solar PV and 44 GW of large-scale wind and solar generation.

With 21 GW[5] rooftop solar PV already installed, and 25 GW of large-scale renewable generation built[6], we need a further 33 GW of renewable generation to reach the 79 GW needed - 14 GW of rooftop solar PV and 19 GW of large-scale renewables.

As such, Australia needs to add approximately 6 GW[7] of new renewable generation each year. The combination of DER, particularly rooftop solar PV, and large-scale renewable generation (and storage) development is almost meeting this requirement in total, but the balance between generation scales is different to those indicated in the 2022 ISP.

In 2022, Australia added 2.8 GW of new large-scale renewable generation and storage, and 2.7 GW of residential scale rooftop solar PV[8] (3.3 GW in 2021[9]).

As noted above, accelerating the build and connection rate of large-scale wind and solar generation is proving difficult. A key roadblock is the associated transmission build for these remote wind and solar farms.

The current rate of annual rooftop solar PV installations of above 2.5 GW per year[10], means that in the next seven years, DER could 'take up the slack' and contribute a minimum of 18 GW of additional renewable generation capacity, which is over 55 per cent of the 33 GW required the 82 per cent target[11], but there are roadblocks to achieving even that goal.

Rooftop solar PV and other DER is not a national focus or priority, and there are still some barriers to the broader take up of DER. This includes a lack of consumer trust in the corporates and regulators that make up the energy system. Resolving the barriers would accelerate rooftop solar PV, helping to achieve targets and reduce energy costs for Australians.

4 https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-isp-infographic.pdf?la=en

5 https://www.energycouncil.com.au/media/bytccxig/australian-energy-council-solar-report-q2-2023.pdf

6 https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information

7 https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en

8 https://assets.cleanenergycouncil.org.au/documents/Clean-Energy-Australia-Report-2023.pdf

9 https://assets.cleanenergycouncil.org.au/documents/resources/reports/clean-energy-australia/clean-energy-australia-report-2022.pdf

10 https://assets.cleanenergycouncil.org.au/documents/Clean-Energy-Australia-Report-2023.pdf

11 https://www.accc.gov.au/system/files/public-registers/documents/Expert%20report%20of%20RystadEnergy%20%20-%2028.07.23%20-%20PR%20VERSION%20-%20MA1000024%20Brookfield%20Origin.pdf

Opportunities of DER

DER is not subject to the same development delays as large-scale renewable generation and batteries, or its associated transmission, and is the only renewable energy technology that has achieved installed rates per year that the AEMO ISP forecasts is necessary to achieve 82 per cent renewable energy by 2030[12].

Australians have demonstrated a significant appetite for household investment in PV in order to take control of and reduce their electricity bills. As a result, Australia is a global leader in the uptake of rooftop solar with the highest per capita installed capacity[13]. Australia is also a leader in solar PV research and development. This, along with our existing deep small-scale installer skill base, means we can leverage our unique position to accelerate our clean energy transition through distributed rooftop solar PV[14].

In addition, it has already been proven that widespread rooftop solar PV reduces wholesale electricity prices for all customers (whether they have DER or not), as it floods the market with zero cost (to the market) electricity, displacing large-scale generation, both fossil fuel and renewable[15,16]. This exported clean electricity also reduces emissions from the generation sector.

There are significant growth opportunities for DER in the commercial and industrial sector. Yet this sector, with vast untapped roof space, only exceeded the annual installed capacity for residential deployment for the first time in 2022[17]. This is because connecting larger commercial and industrial solar PV systems that can export to the grid involves more complex interactions with the DNSP and retailers. Additionally, building structural engineering requirements, ownership and tenancy agreements, and long-term finance arrangements[18] can act as a barrier.

Why do Australians invest in DER?

Australians are investing in DER for three main reasons[19]:

- To save money
- To be less dependent on mains electricity
- To protect the environment

Saving money and protecting the environment were the top two issues that influenced swing voters at the 2022 federal election[20]. Australians are reducing their reliance on mains electricity due to record levels of distrust of the energy sector[21], with only 36 per cent of Australians thinking that the energy market currently works in their favour, dropping to 31 per cent when thinking about the future market[22].

12 With 21 W of rooftop solar already installed, a further 14 GW is required to 2030, which is 2 GW per year for 7 years.

13 https://www.globalaustralia.gov.au/industries/net-zero/solar-energy

14 https://apvi.org.au/wp-content/uploads/2023/07/APVI-PV-in-Australia-Press-Release-2023_Final.pdf

15 https://www.accc.gov.au/system/files/Inquiry%20into%20the%20National%20Electricity%20Market%20-%20June%202023%20Report.pdf

16 https://www.accc.gov.au/system/files/Inquiry%20into%20the%20National%20Electricity%20Market%20-%20June%202023%20Report.pdf

17 https://apvi.org.au/wp-content/uploads/2023/07/APVI-PV-in-Australia-Press-Release-2023_Final.pdf

18 https://assets.cleanenergycouncil.org.au/documents/consumers/CEC_SOLAR_BUS_0114_v10_JUNE2020v2_WEB.pdf

19 https://ecss.energyconsumersaustralia.com.au/behaviour-survey-oct-2022/purchase-intentions-2022/

20 https://www.theguardian.com/australia-news/2022/nov/28/climate-concern-the-main-reason-voters-swung-to-independents-at-federal-election-study-finds

21 https://www.edelman.com.au/trust/2023/trust-barometer#download

22 https://ecss.energyconsumersaustralia.com.au/sentiment-survey-june-2023/

Barriers to DER

DER deployment is largely driven through popular state-based incentives, but without any clear strategy on how it contributes to overall emission reduction and clean energy targets, in contrast to strategies around the deployment of large-scale renewable generation and storage.

This lack of strategies on the role for DER in the clean energy transition at the state level is further compounded by limited national coordination that would crystalise both Australia's opportunity to be world-leading in the use of DER to achieve state and national targets.

Additionally, there are barriers to the acceleration in the growth of DER capacity that fit into two categories – 'demand'/customers side, and 'supply'/network or generator side:

- **Demand side - the 'trust deficit' and returns on DER investment**

The future clean electricity system will need flexibility, through management of 'excess' power generation being exported to the national grid. However, customers with and without DER are not interested in working with aggregators or retailers through Virtual Power Plants (VPPs)[23].

Having gained agency over their energy costs by making electricity themselves, customers are reluctant to let that go again[24], especially to entities that they do not trust – survey data show that only 6 per cent of customers are prepared to handover full control[25].

In addition, those with DER receive a financial return directly from their investment in the form of (a) self-consumption and the avoidance of purchasing electricity from a retailer and currently (b) a feed-in-tariff for the energy they send to the grid. As such, compensation for ceding control will need to at least match these benefits. However, industry indicates that there is not the value customers desire through VPPs[26].

- **Supply side – market development in a regulated monopoly**

DER has a negative impact on the business models of most incumbent participants in our current energy markets.

DER means that less electricity needs to be purchased from the market, reducing the income of electricity distribution and transmission networks, retailers, large-scale generators (of all types) and the AEMO.

This market power has demonstrably impacted the shape of the market, including the formulation, and updating of regulations and standards, and a lack of market innovation. These have impeded progress in the energy transition generally and the expansion of DER generation capacity specifically.

23 https://aemo.com.au/-/media/files/initiatives/der/2023/project-edge-qualitative-insights-for-customers-in-a-vpp.pdf?la=en

24 https://aemo.com.au/-/media/files/initiatives/der/2022/community-perceptions-of-der-and-aggregation-services.pdf?la=en

25 https://ecss.energyconsumersaustralia.com.au/behaviour-survey-oct-2022/how-people-use-energy-2022/

26 https://ieefa.org/media/3962/download?attachment

Details

Barriers to DER

Demand side - export management and the 'trust deficit'

System planning indicates that dispatchable DER reduces overall system costs, with DER flexibility underpinning a clean electricity system. However, while Australians are investing in DER enthusiastically, they are not embracing the models that would create the greatest economic value for the DER owners and overall power system. For example, they are rejecting third party control or exposure to sharper, more cost-reflective price signals that guide the optimal operation of DER. Many studies have shown that customers are investing in DER to actively protect themselves[27] from the failings of 'the system', taking control of their electricity costs and reducing dependency on a market that they feel does not operate in their interests[28].

The Energy Consumers Australia sentiment surveys show that confidence in the energy market fell 11 points between 2022 and 2023[29]. General trust metrics for Australia show that the energy sector is one of the least trusted, dropping 6 points between 2022 and 2023[30].

The DER integration work for the Australian electricity market was undertaken as part of the Energy Security Board's (ESB) post-2025 project. The reforms arising from this work are being operationalised through rule change proposals at the AEMC and guidelines/schemes at the AER. It is the view of Nexa Advisory that this underpins a system-centric view of DER as a 'problem' rather than a critical part of the clean energy transition.

The focus of the market bodies, networks and AEMO work is on direct control of DER, rather than on securing social licence through collaboration with the owners.

The technical approaches to DER have been developed by the DNSP to support 'flexibility for free' via flexible export limits (e.g., South Australia). In exchange for granting the DNSP control of the inverter of the solar PV, customers have no static limit on the amount of electricity they can export.

Direct control means that when the DNSP believes network capacity is reduced, they ramp down the inverter to reduce export. As more solar PV connects to the network (whether flexible or not) the capacity of the network will naturally reduce, with the consequence that the DNSP will be reducing customers' exports more often. This reduction of 'excess' power export to the market will negatively impact the both the emissions and cost reduction benefits of DER to all Australians[31].

The issues with the 'flexibility for free' approach are compounded by DNSPs not having a clear idea of the network capacity that they are rationing (discussed below).

27 https://ecss.energyconsumersaustralia.com.au/behaviour-survey-oct-2022/

28 https://ecss.energyconsumersaustralia.com.au/sentiment-survey-june-2023/key-indicators-national-sentiment-june-2023/

29 http://ecss.energyconsumersaustralia.com.au/wp-content/uploads/2022/11/2704_-ECSS-W14-Dec22-Household-Toplines-10_22.pdf

30 https://www.edelman.com.au/trust/2023/trust-barometer#download

31 https://www.accc.gov.au/system/files/Inquiry%20into%20the%20National%20Electricity%20Market%20-%20June%202023%20Report.pdf

Demand side – returns on DER investment

The bulk of the value of DER is derived from consumption of self-made electricity and avoiding buying electricity from the market. However, the pricing structure for the return of electricity to the grid is also important. New network tariffs (the money paid by the DER owner to the network for the exported power) in effect penalise rooftop solar PV export, reducing the downward pressure on wholesale prices and emission reduction, with the latter now a key part of the National Electricity Objective.

In addition, there is little financial benefit for a customer that has invested in DER to provide support services to the system. Customers that allow their DER to provide services to support the network or system operation (for instance, as part of a VPP), must be appropriately rewarded. Currently, DER is forced to compete in the wholesale market, with complex and costly technical compliance requirements.

In order to get better value for DER owners and the power system, customer flexibility through demand response needs to be accommodated into the design of the National Electricity Market. A market that is designed to accommodate these small-scale assets would unlock local system benefits, reduce overall costs, and accelerate the take up of renewable energy and support further DER deployment.

As such, it is imperative that urgent attention be paid to the tariffs for using the distribution network. Distribution network tariffs for both import and export need to be updated to reflect the changing nature of the power system – particularly the rapid growth of electricity generation at the consumer end of the system. To ensure that community energy resources and DER are being treated appropriately, network tariffs should reward the efficient operation of these resources.

The AEMC previously undertook an annual review of the Electricity Network Economic Regulatory Framework (ENERF). However, the last ENERF review was in 2020, with the AEMC unilaterally deciding to suspend the review for 2021 and '2022 and beyond' to focus on the ESB post-2025 reforms[32].

The requirement for the ENERF review was a 2016 request from the COAG Energy Council in response to the growth in DER[33]. The ENERF review was an important tool for the federal government and state energy ministers to monitor and direct work on distribution issues. Without the ENERF review, and in a DER environment that is arguably changing more rapidly than in 2016, outcomes that are to the detriment of consumers are increasingly likely.

Many of the ARENA-funded innovation projects and academic research projects have identified that DNSP tariff design and a lack of network data are limiting the opportunity for new approaches and new service offerings to consumers and communities[34,35,36].

32 https://www.aemc.gov.au/sites/default/files/documents/epr0085_-_enerf_2020_-_final_report_for_publication_1_oct_2020.pdf

33 https://www.aemc.gov.au/market-reviews-advice/electricity-network-economic-regulatory-framework-review-2020

34 https://arena.gov.au/assets/2020/12/implementing-community-scale-batteries-bsgip.pdf

35 https://racefor2030.com.au/wp-content/uploads/2023/03/N2-OA-Project-FINAL-Report-2021.pdf

36 https://www.aer.gov.au/system/files/Argyle%20Consulting%20and%20Endgame%20Economics%20-%20Battery%20tariffs%20-%20Network%20tariffs%20for%20the%20DER%20future_0.pdf

Some Australians are unable to reap the benefits of DER

Rooftop solar PV reduces the electricity bills by reducing the amount of electricity that has to be purchased via the market. The addition of a behind-the-meter battery allows electricity generated during the day to be stored for use at night or when the sun isn't shining.

The cost of solar PV panels and inverters has reduced over time and while the cost of batteries is also reducing, they are still a significant investment with a long payback period.

Increased uptake of residential rooftop solar PV reduces electricity prices for everyone, with free excess generation displacing more costly large-scale generation from the market, but the ability to consume your own electricity has significantly more benefits[37].

Australians with shared rooftops, such as those in social housing and apartments, those that don't own their rooftop because they rent their home, and those who have low incomes, are among those not able to benefit directly from rooftop solar PV.

Within these groups, 'hardship customers' have the lowest deployment of solar PV at 9 per cent, versus 23 per cent for general customers[38]. Importantly, 'hardship customers' often use more electricity (61 per cent more on average) than general customers and pay a higher price for electricity[39].

DER is also important for the business sector. Small, and commercial and industrial businesses that do have solar can reduce their bills, but often businesses rent their premisses and are reliant on landlord permission to install solar PV. This sector is significantly underdeveloped in Australia, representing just 9 per cent of installed solar PV (small-scale rooftop is 88 per cent and large-scale is 3 per cent) and represents a huge opportunity to accelerate renewable generation deployment and reduce electricity bills for this sector.

While energy efficiency is an important approach to reducing electricity demand and hence bills, retrofitting homes and businesses with measures to increase efficiency is complex, disruptive and time consuming[40]. Addressing energy efficiency is critical but increasing energy efficiency should not be a prerequisite to installing rooftop solar PV, since solar PV is more rapid approach to reducing energy bills. Energy efficiency measures can be added in time, improving bill outcomes further.

37 https://www.accc.gov.au/system/files/Inquiry%20into%20the%20National%20Electricity%20Market%20-%20June%202023%20Report.pdf

38 ibid

39 https://www.accc.gov.au/system/files/Inquiry%20into%20the%20National%20Electricity%20Market%20-%20May%202022%20report%2813880615.1%29.pdf

40 https://link.springer.com/content/pdf/10.1007/s12053-013-9245-3.pdf?pdf=button%20sticky

Supply side - public network data

Publicly available electricity distribution network data would help identify where investment in poles and wires was genuinely needed to support increased capacity or whether a non-network alternative, such as a flexibility service from the customer side would be a lower-cost alternative.

Publicly available data on network performance and constraints would identify where community-owned batteries and VPPs could be located to provide network support. There is a currently a significant information asymmetry that means only the DNSPs have access to this information. This means that they can place a network-owned battery in the best location to maximise their profit, rather than providing benefits to customers.

Publicly available data on network performance, such as voltage, would identify whether more rooftop solar PV could be installed without constraints or curtailment. Network data would also allow new businesses to develop innovative approaches to the energy transition that would not otherwise be discoverable.

Electricity customers, large and small, have already paid for the collection of raw network data, through the use of system charging elements on their electricity bills. Customers have also supported DNSP investment in smart data approaches and data processing. As such, customers should have ready and free access to that data.

Separately, the current Distribution Annual Planning Reports (DAPRs) are no longer fit-for-purpose. While they do identify needed investment, they do so at a very high level in the distribution system, typically the zone substation, when much of the customer investment in DER is at lower voltages. The DAPR is currently the only data sharing requirement that DNSPs have to meet. The DAPR should be reoriented to identify network needs much deeper into the system, sharing opportunities for non-network solutions including flexibility services from the customer side.

DNSP plans should also include a commitment to digitise, with a digital strategy and action plan for each DNSP. Smart modern electricity networks will be heavily reliant on data and the hardware, software and communications technology to manage that data. The networks, both distribution and transmission, and the AER, need to be better able to assess and progress investment in ICT assets.

The UK has a adopted a 'presumed open' data model for network data[41], with the UK regulator, Ofgem, placing a licence requirement on all regulated electricity networks to share all system data[42]. This has facilitated the strong development of 4.6 GW of non-network alternatives, for example through the flexibility market[43], that allows networks to pay for services (operational costs) rather than invest in assets (capital investment), which is estimated to save over $720 million (£400 million) over 5 years for a single network business[44].

Australian Model: Neara and Networks in NSW

The NSW government has developed a 'digital twin' of NSW. Essential Energy and Endeavour Energy, two of the DNSPs in NSW, have leveraged this platform to develop a digital twin of their electricity networks. Using these models, Endeavour Energy was able to efficiently manage outages during flooding[45]. Essential Energy has been able to identify unused network capacity that will allow for the increased deployment of rooftop solar PV[46].

41 https://www.ofgem.gov.uk/sites/default/files/2021-11/Data_Best_Practice_Guidance_v1.pdf

42 As an example: https://ukpowernetworks.opendatasoft.com/pages/home/

43 https://www.energynetworks.org/newsroom/great-britain-reaches-new-record-in-contracted-flexibility

44 https://www.ukpowernetworks.co.uk/news/new-opportunities-announced-by-distribution-system-operator

45 https://www.endeavourenergy.com.au/news/media-releases/endeavour-energy-wins-energy-networks-australia-2022-industry-award-for-australian-first-innovation

46 https://neara.com/australian-financial-review-how-ai-unlocked-capacity-across-nsws-energy-grid/

Supply side - network performance and standards

When installing rooftop solar PV, the customer must secure a connection agreement with the local electricity network. That agreement with the DNSP often includes a fixed 'export' limit, typically 5 kW. In some, albeit rare, cases network capacity is limited to zero.

Typically, the DNSP constrain rooftop solar PV because the increased export of electricity from solar PV is said to increase network voltage, potentially pushing the voltage close to its safe upper limit. However, a number of studies[47] have identified that, while rooftop solar PV does slightly increase network voltage, the major issue is that networks are maintaining the legacy average system voltage of 240 V, rather than adopting the general voltage standard of 230 V (AS61000).

The impact of operating the distribution electricity network at the legacy threshold of 240 V is that it takes only a small amount of additional electricity generation to approach the upper limits of the current (230 V) standard, which is 253 V (see box below)

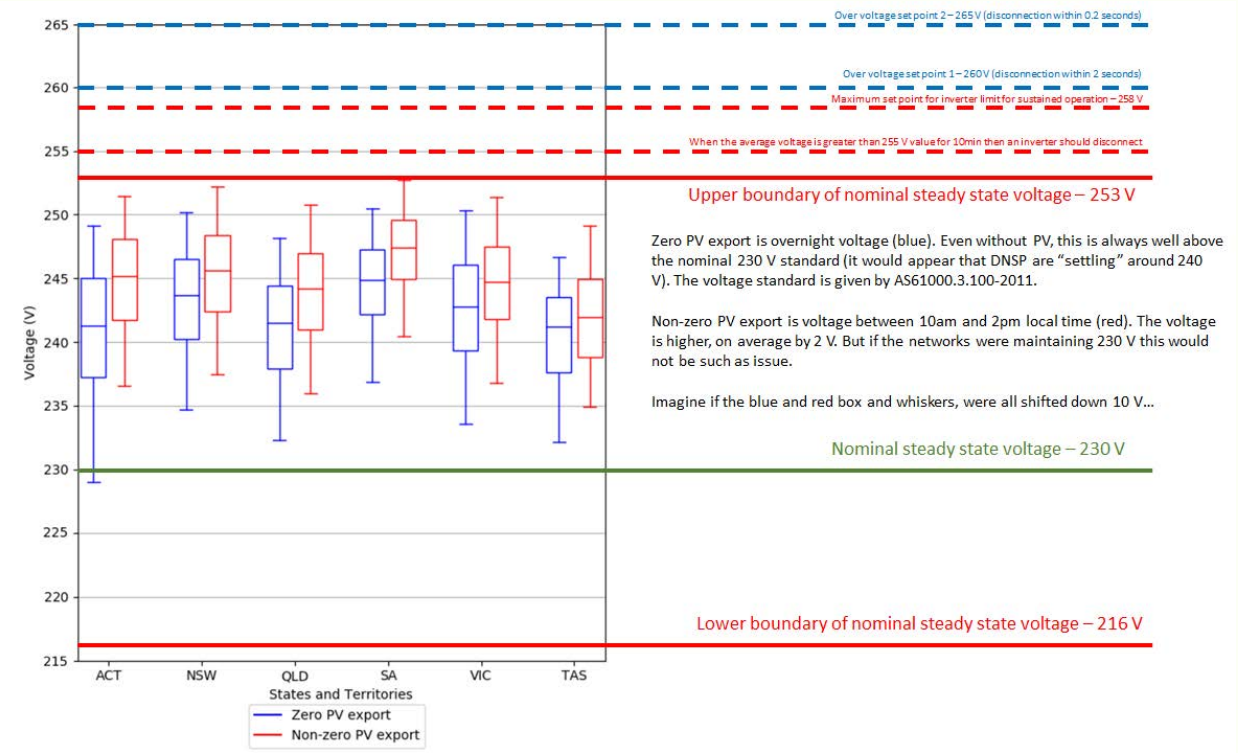
The requirement to meet a voltage standard is not regulated through the AER but is managed by the state electricity regulators. The Victorian Government has been assessing network-wide voltage using customer smart meter data.

The DNSPs were found to be operating at a high voltage. As a consequence, the Victorian Government has required the DNSP to reduce their voltages. This has been happening incrementally over the past year[48], but is still above the Australian standard of 230 V.

47 https://www.ceem.unsw.edu.au/sites/default/files/documents/ESB%20Report%20Voltage_Master_040520_Final_0.pdf

48 https://engage.vic.gov.au/voltage-management-in-distribution-networks-consultation-paper

Network voltage – situation report



It can be seen in the figure above that for this network, the average night-time voltage (in blue, when there is no solar PV generation) sits above 240 V, rather than around the green line of 230 V.

During the day, the average voltage varies and is dependent on electricity demand and generation (in red). At times, the upper 'whisker' of the red data is very close to the upper boundary of 253 V.

If networks operated at 230 V, then there would be a lot more 'headroom' for solar PV generation and increased capacity in the networks to host more rooftop solar PV. The red data points (and blue data points) would sit on the green horizontal line and would not approach the upper boundary. The lower boundary could be a concern, but this is narrower (230 V less 6 per cent, versus the upper boundary which is 230 V plus 10 per cent). Internationally, consideration is being given to a symmetrical standard of 230 ±10 % V to help resolve the lower boundary concern[49].

Additionally, in the UK, DNSPs have invested in dynamic voltage control assets[50], that allow the network voltage to be adjusted remotely and dynamically in response to changing network conditions. However, DNSPs need real-time voltage data to remotely monitor voltage. Historically DNSPs have not had good monitoring or insights into the real-time operation of their networks. The AEMC Review of the regulatory framework for metering services has proposed that metering operators shared voltage data freely with the DNSPs[51], which may resolve voltage visibility issues.

49 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/943700/electricity-engineering-standards-review-technical-analysis-topic-areas.pdf

50 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/943700/electricity-engineering-standards-review-technical-analysis-topic-areas.pdf

51 https://www.aemc.gov.au/market-reviews-advice/review-regulatory-framework-metering-services

Recommendations

Recommendation 1- National DER Policy and Coodination Office:

At their next meeting, federal and state energy ministers should endorse the establishment of a national body or corporation and appropriate funding, similar to Rewiring the Nation Office, within the commonwealth government to:

i. deliver a national strategy and policy plan to accelerate DER deployment that supports consumer value and rewards flexibility in services.

ii. provide direction to the market bodies and the market operator on the technical and regulatory approaches to DER.

In the meantime, the federal government should pause all legacy work on DER and assess current reforms approaches in Australia and elsewhere that do deliver flexibility locally and to the wider system, to determine how best to progress to the responsive clean power system of the future.

In parallel to the establishment of the DER Office within the commonwealth government, federal and state governments should focus on programs and reforms in three key areas, so as to prioritise a step change difference to DER take up, as well as support for broader consumer accessibility. These are: - 'export' management and tariffs, publicly available network data, and network voltage standards.

Recommendation 2- Provide direction and steer on distribution network tariff design:

Flexibility from customers will be essential to support a high-renewable power system. Trust in the power system is low and distribution network tariffs actively inhibit the responsiveness of DER. Additionally, DNSPs make a regulated income on their Regulated Asset Base (RAB) and favour capital investment over the operational expenditure that could be used to purchase flexibility services from customers large and small. This reduces costs for customers, while providing a market for new flexibility. The federal government, working the Ministerial Council on Energy and the AER, should adopt a "flexibility first" approach to network development, ensuring that DNSPs deploy non-network solutions before building new assets.

- The federal government, working the Ministerial Council on Energy and the AER, should adopt a 'flexibility first' approach to network development, ensuring that DNSPs deploy non-network solutions before building new assets.
- The federal government should re-examine the recent rule change that allowed Distribution Network Service Providers (DNSPs) to charge an export tariff, and ensure electricity retailers provide transparency and choice to customers.
- The federal government should direct the AEMC to re-establish the ENERF. The ENERF review provides an important tool and transparency for the federal government and state energy ministers to monitor and direct work on distribution issues. Without the ENERF review and in a DER environment that is changing more rapidly, outcomes that are to the detriment of consumers are increasingly likely.

Recommendation 3- Support for low income earners and renters:

To ensure that all Australians can participate in the clean energy transition, and to maximise the impact of DER for those that will most benefit from reduced energy costs, support to help low income earners and renters adopt it is needed.

- The federal and state governments should support programs that allow those in social housing[52], on low incomes, and renting to install solar PV. It should also assist commercial and industrial business owners to install small to medium-scale solar PV.

52 https://www.energy.nsw.gov.au/households/rebates-grants-and-schemes/rebate-swap-solar

Recommendation 4- Network data transparency

Publicly available electricity distribution network data would help identify where investment in poles and wires was genuinely needed to support increased capacity or whether a non-network alternative, such as a flexibility service from the customer side would be a lower-cost alternative. DER deployment can be facilitated by ensuring that network data is publicly and freely available. The federal government should direct the AER to:

- develop open access to network data by the end of 2023.
- ensure the provision of network operation data openly must be a regulated requirement for all Network Service Providers.
- should immediately commence a review into the DAPR template to ensure that it represents a fit-for-purpose signpost for future network and non-network investment at all levels in the distribution system.
- should require each network business to provide an annual digitisation roadmap as a part of the DAPR.
- work with jurisdictional licencing bodies, should require free and public access to network data, including voltage, as a licence condition for regulated electricity networks.

Recommendation 5- network voltage standards

The requirement to meet a voltage standard is not regulated through the AER but is managed by the state electricity regulators. While the Victorian Government has required the DNSP to reduce their voltages, they are still above the Australian standard of 230 V.

- The federal government working with state ministers and safety regulators should ensure that DNSPs are required to meet the 230 V voltage standard, ensuring that the AER supports investment, where required, as this will increase the hosting capacity for solar PV.

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