Appendix 1.5

Distributed Energy Resources (DER) Integration Strategy

Regulatory proposal for the ACT electricity distribution network 2024–29

DISTRIBUTED ENERGY RESOURCES (DER) INTEGRATION STRATEGY

This strategy outlines the context and driving forces behind Evoenergy's efforts to integrate Distributed Energy Resources (DER) into its electricity network.

This is part of Evoenergy's ongoing transition from a traditional Distribution Network Service Provider (DNSP) to a contemporary Distribution System Operator (DSO).

It captures the line of sight to corporate strategy in addition to defining a clear set of actions and measurable targets which are designed to achieve this transition.

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CONTENTS

ACRONYMS

ADMD	After Diversity Maximum Demand
ADMS	Advanced Distribution Management System
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
BESS	Battery Energy Storage System
CAPEX	Capital Expenditure
CECV	Customer Export Curtailment Value
DER	Distributed Energy Resources
DM	Demand Management
DMIA	Demand Management Innovation Allowance
DMIS	Demand Management Incentive Scheme
DNSP	Distribution Network Service Provider
DOE	Dynamic Operating Envelope
DSO	Distribution System Operator
ENA	Energy Networks Australia
ENSMS	Electricity Network Safety Management System
EPSDD	Environment Planning and Sustainable Development Directorate
ESB	Energy Security Board
EV	Electric Vehicle
FCAS	Frequency Control Ancillary Services
HV	High Voltage
ICE	Internal Combustion Engine
ICRC	Independent Competition and Regulatory Commission
ICT	Information and Communication Technology
IEEFA	Institute for Energy Economics and Financial Analysis
IHC	Intrinsic Hosting Capacity
IPART	Independent Pricing and Regulatory Tribunal
ISP	Integrated System Plan

LCTAS	Least Cost Technically Acceptable Solution
LV	Low Voltage
MASP	Market Ancillary Service Provider
MWh	megawatt hour
NEM	National Electricity Market
NER	National Electricity Rules
NMI	National Meter Identifier
OLTC	Online Tap Changer
PV	Photovoltaic
QoS	Quality of Supply
RERT	Reliability and Emergency Reserve Trader
SA	South Australia
SCADA	Supervisory Control and Data Acquisition
TSS	Tariff Structure Statement
UTR	Utilities Technical Regulator
VPP	Virtual Power Plant
ZEV	Zero Emission Vehicle

INTRODUCTION

1. SCOPE

This strategy document describes the coordination and prioritisation of business-wide actions required for Evoenergy to integrate Distributed Energy Resources (DER) into its network. Effective DER integration, and the transition to a DSO more broadly, will enable Evoenergy to operate in an environment where the network is managed dynamically to enable efficient utilisation of both customer and network assets with a focus on positive customer experiences.

The strategy does not focus on enabling large scale renewable energy developments (i.e., transmission scale), rather it focuses on the timing of actions required to ensure that as the customer led broad-based rollout of Distributed Energy Resources (DER) occurs across the network, the capability to manage this DER is deployed in parallel to enable and optimise it. Although this strategy is not specifically focused on demand management or quality of supply, there are actions within this strategy which align with the objectives specified within the Evoenergy Demand Management Strategy and Quality of Supply Strategy.

The strategy primarily focuses on the integration of residential DER with an emphasis on rooftop solar photovoltaic generators (PV) and batteries. Rooftop PV accounts for the majority of DER on the Evoenergy network and this trend is forecast to continue across the National Electricity Market (NEM).[1]

2. PURPOSE

This strategy links Evoenergy's corporate strategy and external drivers to the actions required to enable Evoenergy to transition from a traditional Distribution Network Service Provider (DNSP) to a contemporary 'DSO' through effective DER integration.

As a DSO we will dynamically manage capacity and operate the network to maintain a safe, efficient, and reliable service while optimising value to our customers and the energy system and supporting the renewable energy transition.

This strategy defines a set of measurable targets which are designed to realise this transition in support of ongoing business activities. The strategy has been developed to identify the threats and opportunities posed by the integration of DER into the distribution system and outline the strategic actions and enablers required to address these threats and take advantage of these opportunities.

This purpose of this iteration of the DER Integration Strategy is to address the short-term threats while outlining the long-term framework for leveraging DSO capabilities as feasible, customer-centric, and sustainable network solutions.

3. BACKGROUND

The NEM is undergoing a significant and sustained transition in response to decarbonisation initiatives driven by government and industry. Distribution Network Service Providers (DNSPs) are rapidly adapting and adjusting operating models to account for regulatory and market reforms incentivising the uptake of DER and changing consumer behaviour, usage, and demand patterns.

[1] 2022 AEMO Integrated System Plan

Australian consumers have led the charge on the decentralisation of the energy supply chain by embracing DER – in particular, rooftop photovoltaics (PV) systems. One-quarter of Canberra households have rooftop solar and with around 250 MW of embedded solar capacity. Generation output from embedded solar is expected to grow in the ACT from 300 GWh currently to 1200 GWh (300% growth) by 2045.[2]

Behind the meter (home) batteries are expected to reach around 25% of eligible ACT households by 2045 representing 270 MWh of storage.[3] The ACT also leads the nation in EV uptake with 9.5% of new car sales being EVs. The number of EVs registered in the ACT is expected to reach at least 25,000 to 42,000 in 2030.[4] EV batteries are currently six to ten times larger than standard household batteries and are expected to provide Vehicle-to-Grid (V2G) and Vehicle-to-Home (V2H) services in the future.[5]

The rapid uptake of this technology is presenting new challenges. Home and EV batteries which are part of a Virtual Power Plant (VPP) within the same low voltage (LV) network may result in unconstrained discharges in response to market signals creating export spikes.[6] Additionally, with inflation and interest rates on the rise, and stagnant wage growth, cost of living is now front and centre for Australian households with particular attention on electricity prices. Multiple media sources indicate electricity prices are forecast to increase materially over the near term. Higher electricity prices are likely to further drive customer uptake in DER. This will include further uptake of rooftop solar photovoltaics (PV), battery energy storage systems (BESS) and electric vehicles (EVs) as energy consumers look to contain their energy costs.

This significant uptake in DER presents technical challenges for Evoenergy's existing electricity network. Distribution networks that were built to bring electricity one-way to consumers are now being used by consumers to export electricity to the grid. While a network built for one-way traffic has a basic level of capacity to support exports (intrinsic hosting capacity), this capacity is rapidly being exhausted while also creating system-wide grid stability issues.

Despite the technical challenges faced by DNSPs with integrating DER into their electricity networks, policy makers and regulators are recognising the various value streams offered by DER including:

- Additional wholesale market benefits from avoided marginal generator short run costs, avoided generator capacity investment and other market services (e.g., Frequency Control Ancillary Services)
- Additional network benefits from avoided or deferred transmission and distribution network augmentation, avoided losses and improved reliability.
- Environmental benefits from avoided greenhouse gas emissions.
- Customer benefits from changes in DER investment and energy cost management.

The recent rule changes described below mean DNSPs must pivot towards enabling more DER to efficiently connect to the grid and provision of export services.

4. RECENT RULE CHANGES

The National Electricity Rules (NER) were initially drafted to facilitate and manage wholesale market operation within the NEM based on large, centralised generation. The emergence of DER and two-way flow of electricity through the distribution network has challenged the implicit assumptions underpinning the NER.

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[2] ACT Government Utility Impact Statement - Gas Transition

[3] GHD on behalf of EPSDD (ACT Government), Economic and Technical Modelling of the ACT Electricity Network – Base case Report, 26/04/2022

[4] ACT Government EV Charging Outlook for the ACT, December 2021

[5] V2G/H is technically feasible but remains immature and currently not supported by most OEMs. To date, V2G/H technology has been limited to demonstration trials.

[6] The IEEFA suggests that in the future, retailers without VPP capabilities will struggle to be profitable , therefore VPPs may become an issue for DNSPs as the size and distribution of VPP fleets grow overtime (https://ieefa.org/wp-content/uploads/2022/03/What-Is-the-State-of-Virtual-Power-Plants-in-Australia_March-2022_2.pdf)

Successive rule changes over the past 10 years have attempted to address the barriers to connecting DER by streamlining the connections process and facilitating an increase in market opportunities through reforms such as:

- Creation of the small generator aggregator (SGA) participant category which simplifies market participation for small scale solar farms and other DER[7].
- Creation of the market ancillary service provider (MASP) participant category which allows service providers to offer capacity into ancillary services markets from loads (including home batteries) on the distribution network[8]. There are currently multiple providers using DER such as residential and commercial batteries or interruptible loads to provide hundreds of megawatts in aggregate capacity into contingency FCAS markets.
- Improvements and extensions to the reliability and emergency reserve trader (RERT)[9], a mechanism which enable non-market participants to offer demand response capacity to AEMO in periods of low generator reserve margins.
- Creation of the demand response service provider (DRSP) participant category[10] which allows for parties outside the customer's financially responsible market participant (FRMP) to offer demand response capacity directly into the wholesale market.

These rule changes, and demand response programs from traditional retailers, have supported the growth of DER providing services into energy markets. This rewards energy users from making their capacity available to the market, and ultimately lowers energy costs and improves reliability for all energy users in the NEM. Due to the increase of DER participation in markets, networks must adapt to support customers who would like to use the network to deliver these services, and efficiently plan and operate the network with fleets of DER dynamically changing output in response to market signals or obligations.

In 2021, the Australian Energy Market Commission (AEMC) made a rule change for the Access, Pricing and Incentive Arrangements for DER which makes it clear that export services are now part of the core services to be provided by DNSPs. The final rules introduce a package of measures summarised in Table 1 that are designed to support more DER to efficiently connect to the grid.

Under the new rules and guidance notes, Evoenergy needs to explain its proposed approach to export-related planning and investment against alternative options. Evoenergy also needs to present information specifically relating to how DER integration is managed through the different elements of its regulatory proposal (i.e., connection services, pricing, expenditure) and how its proposal is appropriate to meet expected consumer outcomes.

TABLE 1 – RECENT NER CHANGES, GUIDANCE NOTES AND RELATED

Rule Change / Guidance Note	Summary
Access, Pricing, and Incentive Arrangements for DER Rule (2021)	This rule amends the NER to define export services as a core service to be offered by DNSPs by banning static zero export limits (unless justified) and removing the restriction for export pricing. The Rule enables DNSPs to plan for the increased penetration of DER through extending planning and investment arrangement to exports and requiring DNSPs to develop export pricing options, including offering a basic export level in all tariffs.

[7] https://www.aemc.gov.au/rule-changes/small-generation-aggregator-framework
[8] https://www.aemc.gov.au/rule-changes/classification-of-loads-as-ancillary-service-loads
[9] https://www.aemc.gov.au/market-reviews-advice/review-reliability-and-emergency-reserve-trader-guidelines-2019
[10] https://www.aemc.gov.au/rule-changes/wholesale-demand-response-mechanism

DER Integration Expenditure Guidance Note (2022)	This guidance note outlines the expectations for how DNSPs should develop business cases for increased capex and opex investment through regulatory proposals and quantifying values for network investment and promoting DER integration.
Export Tariff Guidelines & Explanatory Statement (2022)	These guidelines outline how DNSPs should structure export tariffs, and proposals for two-way pricing. The guidelines also outline expectations for stakeholder engagement, assessing customer impact and supporting documentation including an overview paper that will provide a tariff structure statement and outline the export transition strategy.
Customer Export Curtailment Value (CECV) Methodology (2022)	This paper outlines the approach the AER will take in interpreting CECV Methodology and estimating CECVs and how they are to be applied for expenditure and contribute to overall benefits of proposed DER integration investments.
Demand Management Incentive Scheme (DMIS) and Innovation Allowance Mechanism (2017)	The AER's DMIS and Innovation Allowance provides DNSPs with an incentive to undertake efficient expenditure on non-network options relating to demand management (DM). There are synergies with DM and DER integration, and now that exports are a recognised service under the rules, DMIS and DMIA can now be applied to DER integration initiatives.

5. REGULATORY REQUIREMENTS

Evoenergy will need to invest in new capability and resources the satisfy the regulatory requirements imposed by the new rule changes. A summary of these new requirements is outlined below.

Network Hosting Capacity

Evoenergy needs to provide clear explanation how it has assessed and allocated the level of DER hosting capacity on the network. This includes:

- Determining the intrinsic hosting capacity of the network and basic export levels (i.e., the export capacity of the network to the extent it requires minimal or no further investment).
- Network specific forecasting for DER penetration and the expected demand for export services.
- The extent of DER export curtailment, now and into the future, due to a lack of hosting capacity.

Planning and Investment

If Evoenergy identifies a need for capital expenditure to alleviate current or emerging export constraints (i.e. to increase the hosting capacity), Evoenergy will need to explain its proposed approach to export-related planning and investment against alternative options, including:

- Developing DER curtailment alleviation profiles for proposed network investments.
- Demonstrating all credible investment options are considered, including non-network options.
- Identifying a credible base case that reflects the business-as-usual operation of the network.
- Quantify the DER value streams in accordance with the CECV methodology and values.
- Selecting the option that maximises the net economic benefit across the NEM.

Export Tariffs

Evoenergy is now able to prepare for export tariffs in tariff structure statement (TSS) proposals in accordance with the AER pricing principles (noting export tariffs are optional). Export tariffs are a long-term initiative as they require transitional measures and customer protections. Even if export tariffs are not

proposed in the short-term, Evoenergy will need to develop an export tariff transition strategy for transparency about its long-term intentions.

Mandatory assignment to export pricing options is not allowed until after 1 July 2025 for existing customers and export tariffs need to be included in Evoenergy's stakeholder engagement and feedback as part of the TSS consultation process. Further, the basic export level must be offered to all exporting customers for a 10-year period. Export tariff trials should also be conducted to inform future TSS proposals and transitional measures to manage change.

Regulatory Submissions

Evoenergy will need to include the following additional information in its overview paper for ongoing regulatory submissions:

- an explanation of the approach to identifying demand for (and providing for) distribution services for supply from DER.
- the trade-offs between different options the network considered and why the network has proposed the particular approach around DER integration and management.
- a comparison of the DNSP's proposed capital expenditure to support the provision of export services against its actual or committed capital expenditure and an explanation of any material difference.

Further, the AER suggests DNSPs should supplement their approach to DER integration with the following:

- Network voltage analysis
- DER penetration forecasts and the expected forecast demand for export services.
- Evidence of how DNSPs will structure their tariffs to meet the forecast increase in demand for export services (supported by consumer behaviour modelling).
- Demonstrate how their proposed pricing structures will manage the demand for consumption and export services and make best use of existing hosting capacity.
- Summary of the various elements of DER integration expenditure (augex, ICT capex, opex, etc).
- Details of the plan (if any) for the implementation of dynamic operating envelopes (DOEs), which may include the timing of trials, methods for capacity allocation and consumer engagement.
- Details of activities undertaken and actual expenditure in the current regulatory period to manage DER integration.
- Transparent references to expenditure items in the reset RIN.

6. NATIONAL REFORM AGENDA

The National Reform Agenda represents a series of reforms enacted by various market and regulatory bodies under the auspices of the Energy Security Board's (ESB) Post 2025 market reforms. The Post 2025 Electricity Market Design initiative provides a package of reforms directed at addressing existing problems and developing a pathway of options to address emerging and potential future challenges.

The ESB has developed a DER Implementation Plan that details the technical, regulatory activities that are scheduled to be delivered over the next three years by the market bodies and agencies with direct responsibility for these activities.

The DER Implementation Plan (Figure 1) developed by the ESB identifies reform activities over a three-year horizon. A key action is the introduction of Dynamic Operating Envelopes (DOEs) through trials under Horizon One. The capability to introduce and manage DOEs is further expanded under Horizon Two through the phased implementation and guidelines to support DOEs. The process to implement DOEs continues through Horizon Three where the new DOE standards and guidelines are applied to new DER connections. These activities occur in advance of the development of a full Distribution System Operator (DSO).

The inherent uncertainty associated with the final design of the ESB Post 2025 market reforms and DER Implementation Plan, particularly with respect to DOEs and the DSO model, Evoenergy needs to take a balanced and cautious approach towards DER integration that:

- Keeps real options open (i.e., invest in 'no regret' options)
- Manages risk to acceptable levels

- Can be incrementally developed and scaled for an increasing DER customer base
- Innovative technologies are trialled before a scaled deployment if deemed appropriate in the network
- Ultimately prepares Evoenergy for increasing adoption of DER and other emerging future market and industry models

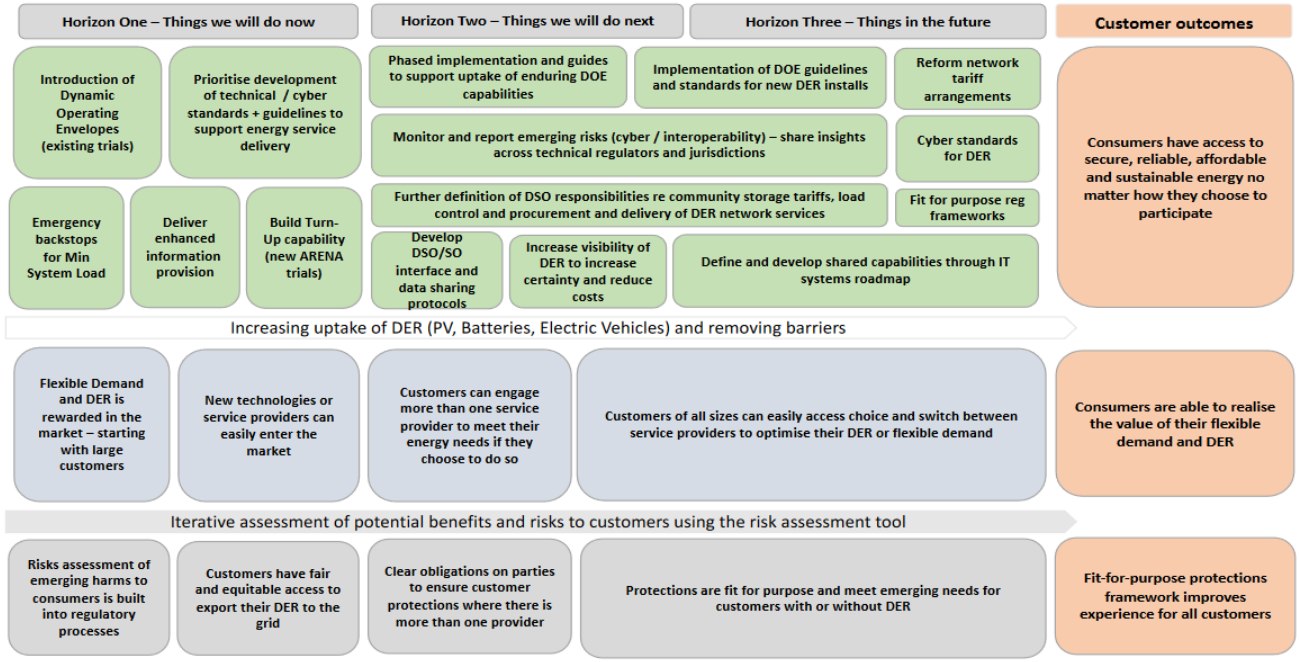

FIGURE 1 – DER IMPLEMENTATION PLAN – SUMMARY VIEW

CONTEXT

7. THE NATIONAL ENERGY LANDSCAPE

The NEM was designed and operated around the premise of large scale, centrally generated and dispatched energy that is transmitted to end users across the country. Over the last 10 years this has been changing, albeit at different rates across the NEM. One clear theme that has emerged is that no matter what this rate of change, central generation and passive consumption are no longer the norms for the NEM.

This trend is best demonstrated by the rapid rate of decentralisation occurring and projected for the Australian electricity system which is driven by:

- the retirement of large-scale generators that are reaching 'end of life'
- falling technology costs, changing the mix in the levelised cost of energy for generation sources
- Australians' appetite for technology (such as PV) and energy independence
- energy policy, federal (i.e. RET) & jurisdictional (i.e. net zero carbon emissions targets)

These factors have resulted in Australia being at the forefront of the transition to decentralisation as outlined in Figure 2.

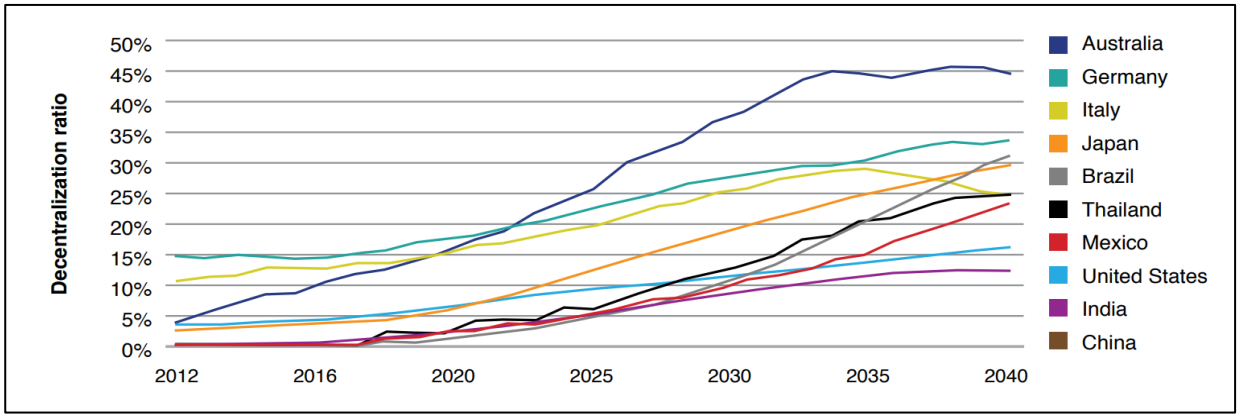

FIGURE 2 – Global rate of Energy Market Decentralisation[11]

The decentralisation within Australia is accelerating due to the planned retirement of traditional dispatchable market generators as outlined in Figure 3. The retirement of capacity has an inverse relationship with the growth of DER - specifically distributed PV - as outlined in Figure 4.

[11] ENA Open Energy Networks Consultation Paper

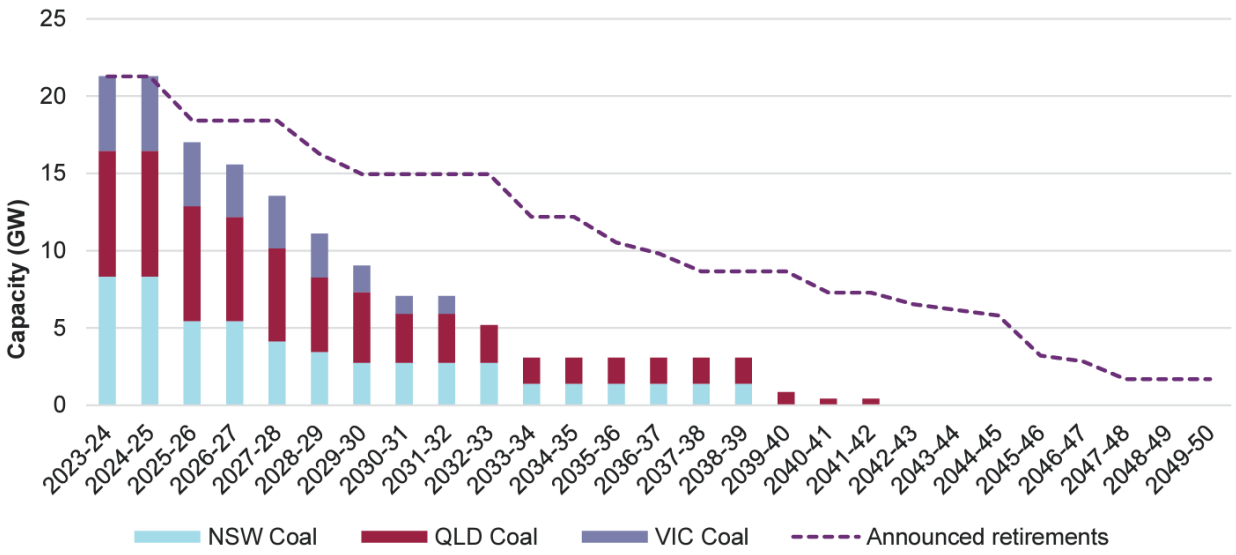

FIGURE 3 – ANNOUNCED RETIREMENT OF NEM GENERATORS COMPARED TO STEP CHANGE SCENARIO[12]

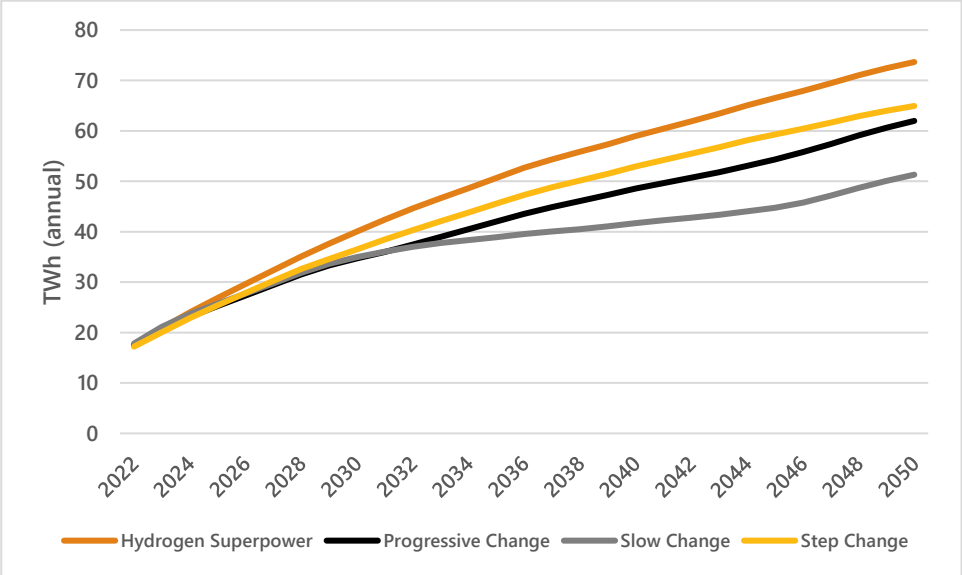

FIGURE 4 – FORECAST RESIDENTIAL AND BUSINESS PV GENERATION[13]

This transition is leading to an ever-increasing pool of flexible and distributed resources that are fast becoming a key provider of energy and system services within the NEM. As this occurs the traditional role of the distribution network begins to change, becoming blurred between both the connected transmission system and the system operator.

This transition is considered as almost certain to occur within the industry, Figure 4 demonstrates this with the credible range of forecasts for DER from the system operator. It outlines a significant and material amount of distributed generation for all scenarios on a national level. As a result, the transition to a DSO is more of a matter of 'when' it is going to occur, rather than 'if' this shift is going to occur.

[12] 2022 AEMO Integrated System Plan
[13] 2022 AEMO Integrated System Plan

8. THE LOCAL ENERGY LANDSCAPE

Decarbonisation is a dominant theme in the ACT's policy objectives. The *Climate Change and Greenhouse Gas Reduction Act 2010* sets a target for the ACT to reduce greenhouse gas emissions in the ACT to zero net emissions by 30 June 2045. The *ACT Climate Change Strategy 2019-2025* sets the initial pathway for the Territory to achieve this objective.

Figure 5 outlines the ACT emissions targets between 2020 and 2045, with the majority of the current reduction in emissions from the 1990 levels attributable to reverse auctions to secure 100% renewable electricity for the ACT. Subsequently, the main emissions sources across the ACT economy are now transport (64%) and natural gas combustion (22%). The current ACT Government's position is to electrify and decarbonise these energy systems which will place significant pressure on Evoenergy's electricity network over the next 20 years due to new demand (and exports) from electrification and DER more broadly.

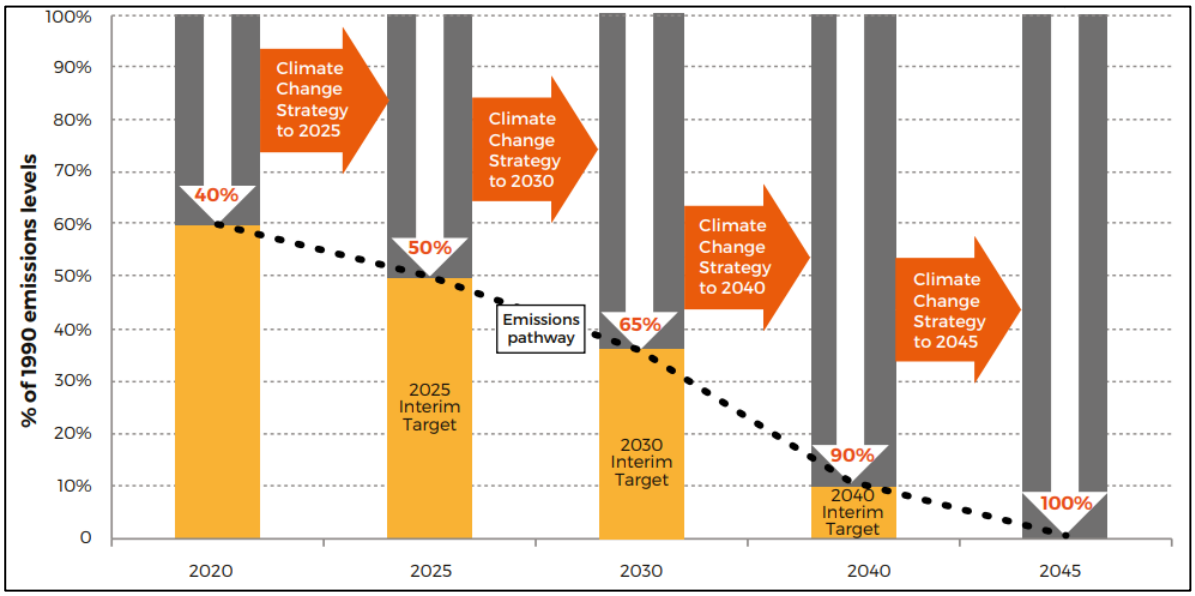

FIGURE 5 – ACT EMISSION REDUCTION TARGETS[14]

As part of its decarbonisation efforts, the ACT Government has introduced the following policies and programs that have the potential to accelerate the uptake of DER:

- **Gas transition activities**[15] including encouraging ACT households and businesses to transition to full-electric setups and abolishing gas connections, new suburbs no longer require a gas connection and regulation to prevent new gas connections to commence in 2023.
- **Zero Emissions Vehicles (ZEV) Strategy**[16] for making Electric Vehicles (EVs) more affordable, expanding the ACT public EV charging network, transitioning the ACT Government fleet to EVs, and banning the sale of new internal combustion engine (ICE) light vehicles from 2035.
- **Electrification of the ACT bus fleet**[17] and developing zero emissions depots for bus fleet charging by 2040 (upgrades to Woden, Belconnen, and Tuggeranong depots and one new depot).
- The **ACT Government's Sustainable Household Scheme**[18] provides zero-interest loans of up to $15,000 to eligible households, to help with the upfront costs of investing in rooftop solar, battery storage,

[14] ACT Climate Change Strategy – 2019-2025
[15] ACT Government - our pathway to electrification
[16] ACT's Zero Emissions Vehicles Strategy 2022-30
[17] ACT Government Zero Emission Transition Plan for Transport Canberra
[18] ACT Sustainable Household Scheme

hot water heat pumps, electric cooktops, EV chargers and EVs. This will reduce the barrier associated with upfront cost which is the biggest barrier reported by 60% of ACT households for transitioning to all-electric setups and DER take-up. Around 23.91 MW of rooftop solar in the ACT was installed in less than 12 months under this new Scheme.

- **Next Gen Energy Storage Program**[19] provides rebates for eligible ACT homes and businesses to purchase a battery.
- The **Big Canberra Battery**[20] could potentially power over one-third of the ACT and will be delivered in three streams to develop a 250 MW battery ecosystem consisting of multiple battery sizes including behind the meter batteries located at ACT Government sites, community/network standalone batteries and large-scale batteries.

The **ACT's Planning Strategy 2018**[21] outlines that the ACT Government is targeting the future breakdown of housing supply to include 70% infill and 30% greenfield between 2018 and 2041. This 'urban infill' coupled with the planned transition to all-electric infill and greenfield suburbs[22] will result in increased household electricity consumption across the ACT. Evoenergy has already begun to experience the effects of this policy with localised constraints arising from urban intensification. Whether or not the demand increase resulting from this infill will offset DER is currently unknown.

9. THE REGULATORY LANDSCAPE

In addition to the national changes summarised in Section 4, Evoenergy is subject to jurisdictional technical regulation through the ACT Government Utilities Technical Regulation team (UTR) under the *Utilities (Technical Regulation) Act 2014.* Although the UTR has not indicated any upcoming regulatory changes there is an increasing focus on Evoenergy's management of existing network performance obligations as the amount of network DER continues to increase. Other jurisdictional regulators such as the NSW Independent Pricing and Regulatory Tribunal (IPART) have commenced state-based reviews of DNSP obligations regarding DER integration[23].

The ACT Government's Gas Transition Utility Impact Statement[24] states in addition to current regulatory requirements, Evoenergy will be asked to develop lead indicators to monitor and track system performance to predict potential problems before they have an impact and report on non-network solutions to address areas where solar PV output curtailment is likely to be occurring. It is anticipated that these reporting requirements will be formalised through updates to current annual utility licence reporting requirements, legislative instruments, or technical codes.

The UTR's assessment of compliance against Evoenergy licence conditions has been primarily focused on Evoenergy's Quality of Supply obligations as outlined in the Evoenergy Quality of Supply Strategy.[25] The primary area of concern for the UTR has been compliance with the voltage standard due to the increase in the number of customer complaints in recent years as outlined in Figure 6.

[19] Next Gen Energy Storage Program
[20] Canberra Big Battery
[21] ACT Planning Strategy 2018
[22] Parliamentary & Governing Agreement – 10th Legislative Assembly
[23] IPART Electricity Distribution Reliability Standards Review - 2020
[24] ACT Government Utility Impact Statement - Gas Transition
[25] Evoenergy Quality of Supply Strategy – PO07495 – Appendix 1.6

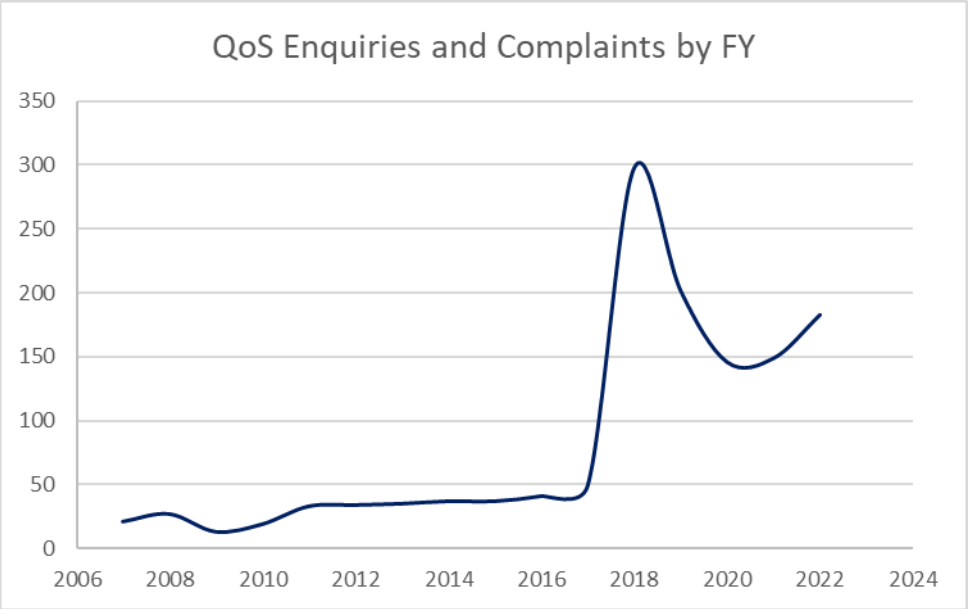

FIGURE 6 – EVOENERGY QUALITY OF SUPPLY[26]

Although Evoenergy have begun to undertake a variety of remediation activities to maintain voltage compliance, the UTR is likely to take a more active approach regarding power quality parameters and other licence requirements as DER penetration continues to increase.

This strategy has been developed on a 'no-regrets' basis such that Evoenergy maintains flexibility in response to changes to jurisdictional, market and regulatory structures from the current state, without pre-empting any major changes. Any major changes to these structures should trigger a revision of this strategy and associated actions as outlined in the Governance section of this document.

10. THE EVOENERGY NETWORK

The Evoenergy network has undergone significant changes over the past decade in response to the drivers outlined above in addition to the evolving network technology. The current state of the network has been summarised with reference to the Evoenergy context below.

Network Operating Philosophy

Evoenergy's network, like others within the NEM, is operated based on the premise that for all credible contingency events (i.e., loss of single network element), the remaining network has the capability of continuing to operate in a satisfactory state. For this to be achieved using the currently limited real-time network feedback and primarily human centric operation, all credible contingency events are considered using a 'firm rating' that is reduced below the thermal rating of the assets involved to provide additional 'headroom' for reconfiguring the network. This consideration occurs during network connection, planning and expansion, rather than in real-time. This has the effect of limiting the flexibility of the network's operation with the worst-case condition, that may only occur for limited period each year, defining the network size and 'default' operating state.

While this terminology is commonly used when referring to the HV network, it is important to consider that the same principles cascade down further to the low voltage (LV) network, with one key difference – the visibility, information, and processes to make informed decisions during network connection, planning and expansion are limited with respect to the LV network. The LV network is designed to continue to operate in a

[26] The downward trend in the number of complaints over the past three years is due to several proactive actions including lowering the 'float' voltage of zone substation transformers. Additional information is in Appendix 1.6 (PO07495).

satisfactory state with minimal visibility and control room operation. It has effectively been operated as a 'set and forget' component of the distribution system for 100 years.

Network Visibility

As outlined above, Evoenergy's network has a comprehensive level of visibility at the 132 kV level, operational level of visibility at the 11 kV level, and limited visibility on the low voltage network. These measurements are operated via Evoenergy's SCADA network and Advanced Distribution Management System (ADMS), with the primary driver being to inform real-time decision making during planned switching and supply restoration, as well as to ensure sufficient information is available to undertake long term planning and options development. Until recently, there has been no value driver beyond this, which has resulted in a relatively static level of network visibility.

Recent developments have included testing several network monitoring devices and procuring NMI or device level data from 3rd parties as part of trial programs to increase visibility at the low voltage distribution substation and household level as outlined in Figure 7. These trials have informed the development of a plan to expand the rollout of distribution substation monitoring and data procurement more widely across the network, including data from smart meters and DER aggregators. This program and its alignment with the overall business objectives will form part of the actions within this strategy.

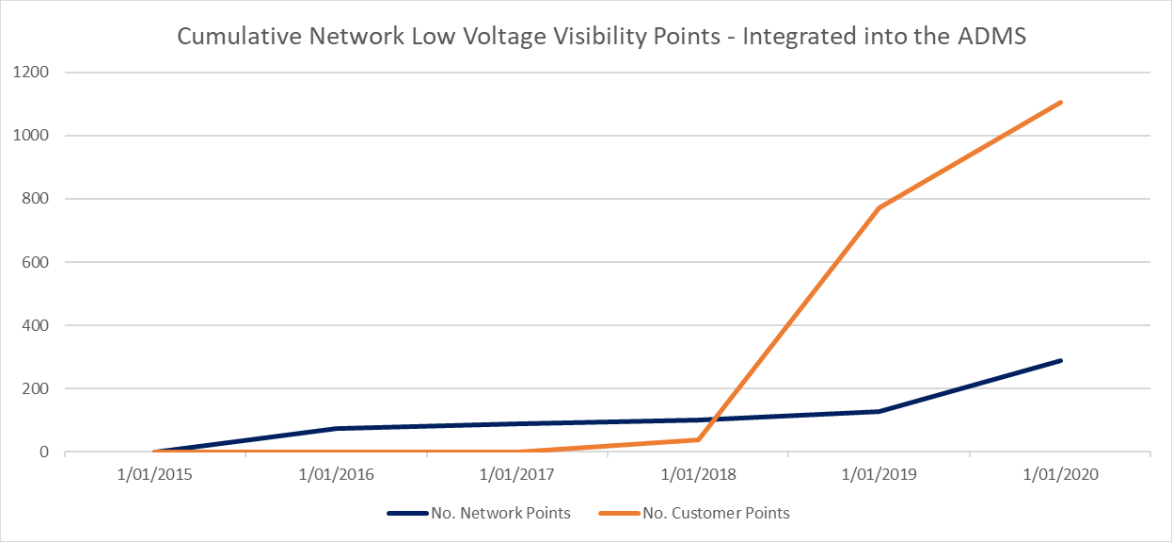

FIGURE 7 – CUMULATIVE NUMBER OF ACTIVE LOW VOLTAGE POINTS

DER Uptake

Evoenergy's network has experienced a significant increase in DER uptake over the past ten years, the majority of which is residential rooftop photovoltaic generation. This uptake was initially driven by the introduction of a jurisdictional feed-in tariff in 2009 and remained constant until 2016/17 when falling costs and increased system sizes resulted in shorter payback periods for customers.

As outlined in Figure 8, the number of systems installed has continued to increase significantly since 2016/17 and this trend is expected to continue. Figure 9 displays the linear increase in average system size by year, with the average system installed in 2019/20 having a capacity of 6.5kW.

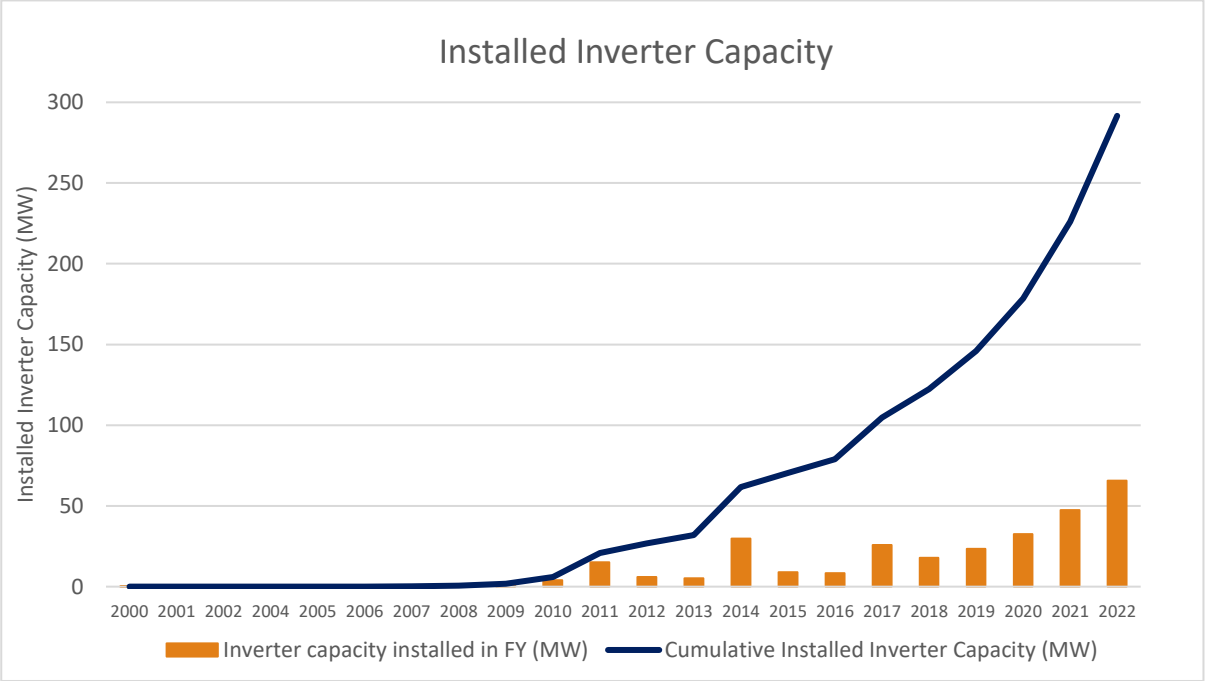

FIGURE 8 – INSTALLED INVERTER CAPACITY BY FINANCIAL YEAR

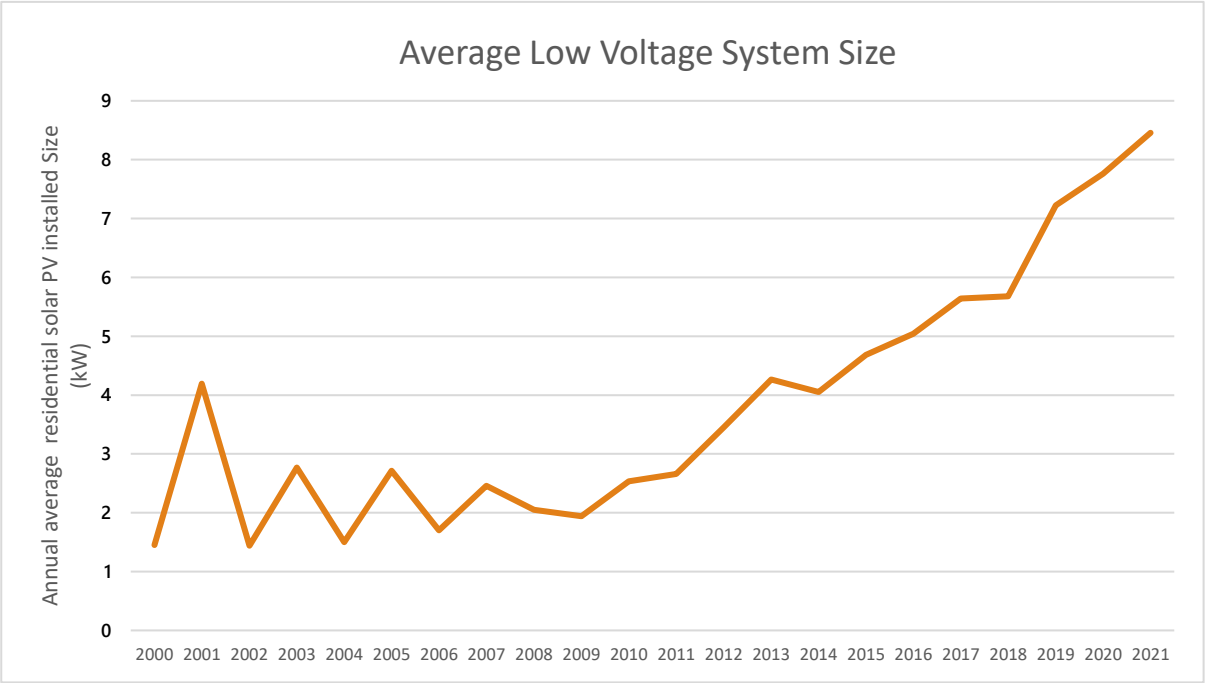

FIGURE 9 – AVERAGE LOW VOLTAGE SYSTEM SIZE BY FINANCIAL YEAR

The ACT government has encouraged the growth of residential PV through the rollout solar PV incentivised greenfield suburbs such as Denman Prospect and Strathnairn, contributing to a non-uniform uptake across the ACT as outlined in Figure 10.

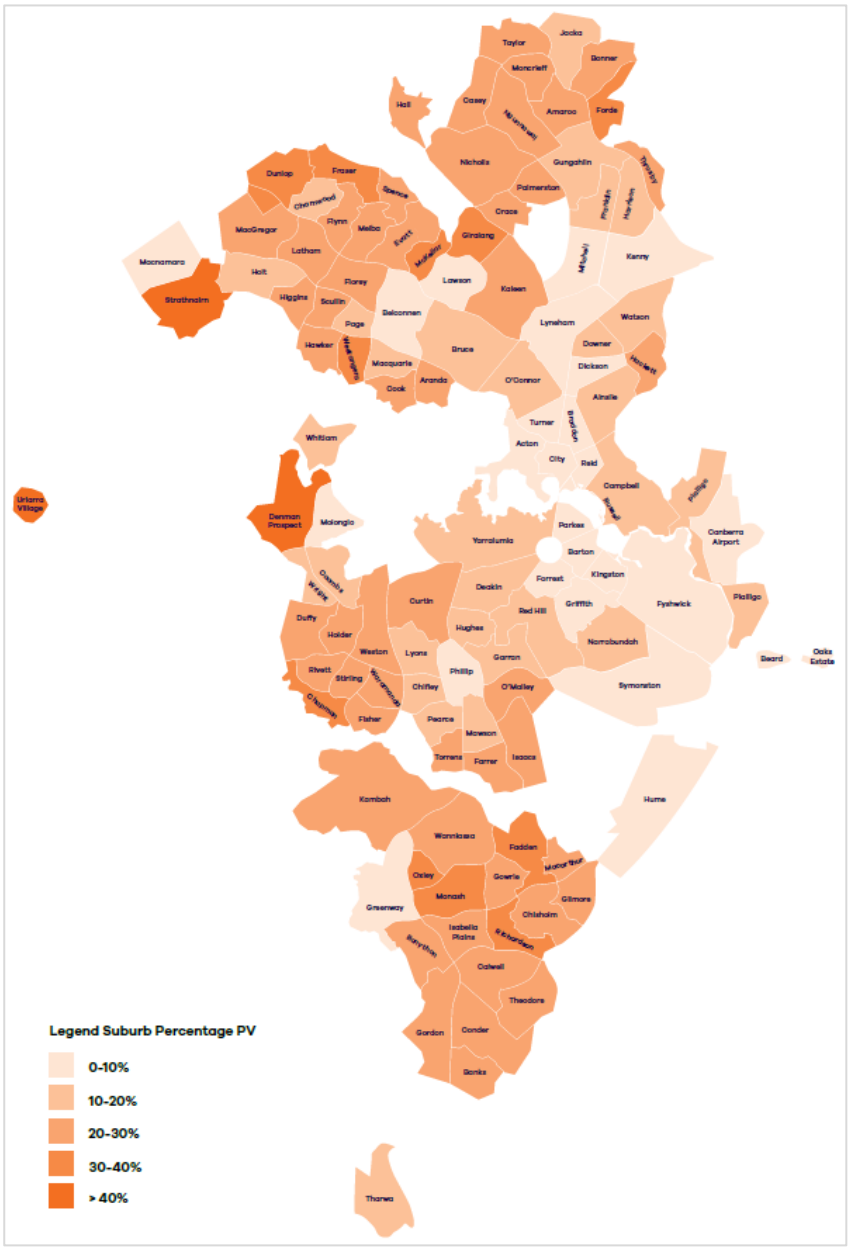

FIGURE 10 – PV CONCENTRATION BY SUBURB[27]

Evoenergy has been able to manage DER penetration in greenfield suburbs through negotiations with developers to implement solutions that address the technical issues associated with mandated PV. Although this approach has been implemented over the past five years, there is risk in relying on this approach in the future where developers may elect to not negotiate with Evoenergy. This would result in the cost of network solutions to manage the technical issues associated with high-penetration greenfield sites being shared by customers who are not residents of these suburbs.

As outlined in Figure 11 there is currently no established process to identify and proactively manage the organic growth of DER in brownfield suburbs. Currently these installations are assessed individually against Evoenergy's embedded generation requirements.[28] These requirements allow up to 5kW to be exported on any phase without an assessment of surrounding installations.

[27] 2022 Evoenergy Distribution Annual Planning Report
[28] Evoenergy documents PO0843, PO0844 and PO0845

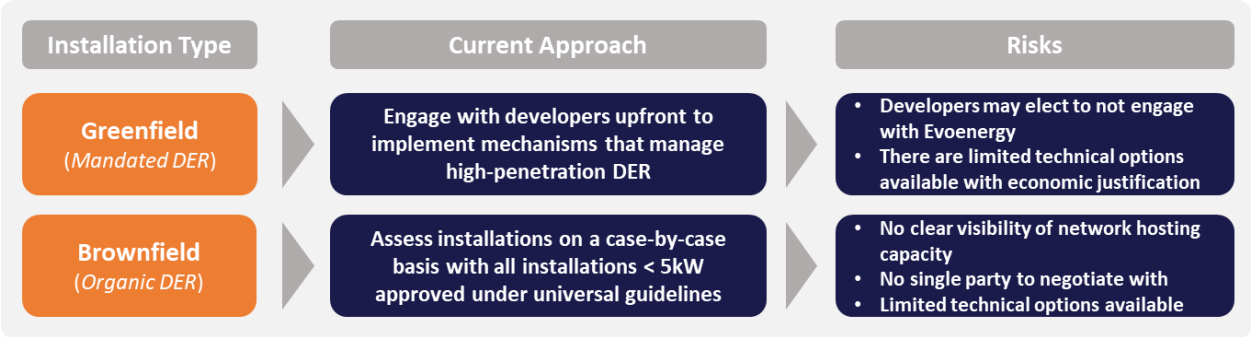

FIGURE 11 – CURRENT APPROACHES TO DER INTEGRATION

As the ACT Government's urban infill initiative continues and the cost of DER decreases, the penetration in established suburbs is expected to increase. The lack of uniform uptake and inability to engage with developers in these areas poses a significant risk to Evoenergy's ability to manage the technical impacts of high-penetration DER.

Low Voltage Technical Limitations

The Evoenergy network was designed for one-way power flow from transmission connections through to end consumers. The design practices to support this system were based on a small number of slow-moving variables that resulted in the application of general 'rules' to facilitate network activities.

After Diversity Maximum Demand (ADMD)[29] is the approach used when performing network planning to determine the network capacity required to supply forecast demand. Table 2 outlines the historical and current ADMD values used for residential installations in addition to the current static limit for DER exports at a residential level.

TABLE 2 – EVOENERGY CURRENT AND HISTORICAL RESIDENTIAL ADMD AND GENERATION VALUES

	PRIOR TO 2020	CURRENT
ADMD Value for Residential Installations (per installation)	2.5 kVA – 5 kVA[30]	1.4 kVA – 7.1 kVA[31]
Static Export Limit for Residential Installations (per installation – 3 phase)	15 kVA	

These figures outline a key issue with the integration of DER in the system when the network has been designed and constructed to service 2.5 kVA – 5 kVA per installation however there is a maximum of 15 kVA of power per installation that can be exported onto the network. Solar PV generation profiles in the same geographic area have very little diversity as environmental and solar irradiation conditions are common to all installations in the area. This increases the likelihood that peak solar generation is greater than ADMD for residential installations. This concept is illustrated in Figure 12.

Therefore, the combined effect of a high penetration of solar PV on a LV feeder increases the likelihood of reverse power flows which can threaten the thermal limits of the power system at certain times of the year and day. If thermal limits are breached for too long, network assets can degrade or fail completely and then need to be replaced. This is dictated by the temperature of the asset, which can be calculated as a function of the ambient temperature, installed configuration, asset specifications and duty cycle of the asset.

[29] The amount of network capacity required per customer after the diversity between the customers is considered
[30] Legacy values for ADMD were 2.5 kVA for < 450m^2, 3 kVA between 450m^2 and 1000m^2 and 5kVA for over 1000m^2
[31] Current ADMD values include modifiers for gas connections, batteries, EV chargers and electric hot water units

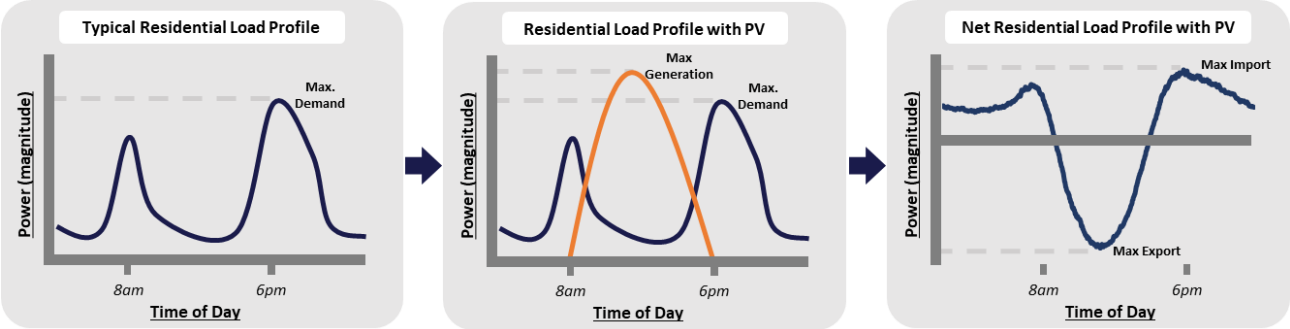

FIGURE 12 – DIFFERENCE IN MAXIMUM DEMAND AND GENERATION

In addition to the risk of thermal limits being exceeded by uncontrolled DER, exporting systems contribute to voltage rise on the network. This effect is the primary one currently experienced by Evoenergy and is responsible for most Quality of Supply complaints and an increased level of public and regulatory scrutiny.

To export generated power DER must have a voltage higher than the Evoenergy network. Evoenergy's legacy supply requirements, network design and commissioning processes were designed to enable a calculated voltage drop from the transformer supplying a circuit to the last customer. Higher penetrations of DER result in a rise of the voltage of this circuit as outlined in Figure 13.

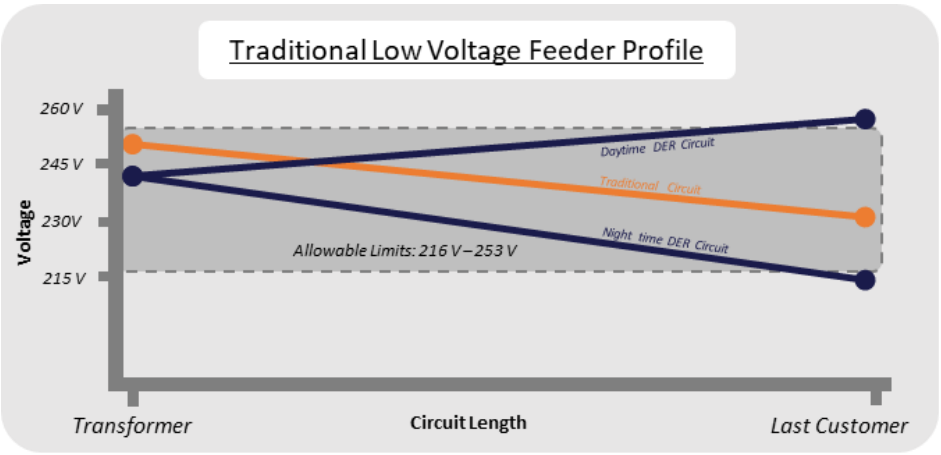

FIGURE 13 – ILLUSTRATION OF LOW VOLTAGE FEEDER PROFILE

Figure 13 has been developed to demonstrate the potential results of high-penetration uncontrolled DER in certain circumstances.[32] Low diversity circuits such as those in residential areas could experience a significant rise in supply voltage during the daytime and a corresponding drop in night-time voltage where there is a limited amount of DER generating. Both these values may be outside of the supply standard limits of 216 V to 253 V. Falling outside of compliant voltage limits can damage customer and network equipment.

The increased number of Quality of Supply complaints outlined in the previous section and the sharp increase in 2017/18 is partly due to a change in the reporting process[33] but is also a function of increased DER. The corresponding downward trend in the following years is a result of one-off actions such as reducing the float voltage on zone substation transformers. While actions such as this have a high benefit in the short term, they are only able to be performed once as the level of penetration continues to increase.

[32] Initial modelling for three distribution substations in the PV mandated suburb of Ginninderry performed for the 2019/24 regulatory submission Distribution Substation Quality of Supply Monitoring Program identified this was a risk without the implementation of On Load Tap Change (OLTC) enabled substations.
[33] Additional detail is outlined in the Evoenergy Quality of Supply Strategy – PO07495 – Appendix 1.6

The technical limitations of the distribution network with regard to DER integration are primarily summarised as either:

- Thermal Limits; or
- Voltage Limits

Using these limits to define the amount of DER that can be accommodated within the network is known as calculating the hosting capacity. Analysis published by South Australia Power Networks[34] in a hosting capacity assessment outlined the following findings regarding residential LV PV behaviour:

- Approximately 60% of rated inverter capacity was exported to the grid during peak solar generation output.
- For all feeder categories the voltage limit was breached prior to the thermal limit being reached[35].
- Voltage limits were breached on average when rated DER exceeded 25% of maximum demand on new underground low voltage circuits.

This analysis was performed on a subset of low voltage feeders and did not include the effects of battery storage or electric vehicles. While the findings are useful in informing Evoenergy's approach and providing basic principles, there is merit in

- conducting intrinsic hosting capacity (i.e., the physical capability of the network to accept exports with minimal or no further investment) analysis;
- conducting hosting capacity (i.e., combining IHC and daytime minimum load to determine point in time ability of the network to accept exports) analysis; and
- developing sub-categories of low voltage feeder and behaviour profiles specific to the Evoenergy network.

These are outlined in additional detail in the Strategy section of this document.

Although voltage limits are the main symptom of DER penetration, there are additional technical limitations that are yet to be experienced on a large scale by any utility, these include:

- **DER Phase Balancing** – The majority of residential DER is connected to a single phase beyond the connection point and Evoenergy do not currently have a process for specifying or validating DER phase connection. This has the potential to produce phase-balancing issues in the future.
- **Additional Quality of Supply Attributes** – A significant increase in DER penetration could result in additional quality of supply parameters, such as harmonics, being introduced to the network.
- **DER effect on Asset Lifespan** – As Evoenergy network assets experience reverse power-flow conditions, and are subject to a modified duty cycle, there is a likelihood that certain asset classes will suffer a reduction of expected asset life.
- **Protection and Control Philosophies** – Instances of reverse power flow will require the re-design of protection and control philosophies especially regarding directional systems such as reclosers and line drop compensation schemes. Some traditional network protection schemes, such as overcurrent protection, have technical limitations operating in an environment with a high proportion of DER[36] and reduced system strength.

Although these technical limitations have not yet been experienced by Evoenergy, it is expected that they will become more significant in the future. The Strategy section of this document outlines the actions associated with each of these items.

High Voltage Technical Limitations

The impacts of DER penetration on the HV network are beginning to be experienced by Evoenergy and other distributors within Australia. Due to the growth of solar-mandated greenfield suburbs in the ACT,

[34] SA Power Networks LV Management Strategy AN 1 DER Hosting Capacity Assessment
[35] SA Power Networks used the transformer rating as the thermal capacity – this is not always correct as network assets downstream of the transformer may carry a rating less than that of the distribution transformer.
[36] Impact of Recloser on Protecting Blind Areas of Distribution Network in the Presence of Distributed Generation (https://www.mdpi.com/2076-3417/9/23/5092/htm)

Evoenergy is one of the first distributors to experience localised power quality issues on the high voltage network due to reverse power flows from the low voltage network[37].

DER also poses a threat to power system security[38]. As DER penetration increases it lowers energy demand on the network. This effect, called minimum system load, can create scenarios where not enough large-scale synchronous generation can operate to maintain system security, and voltage can become more difficult to maintain within safe operating levels on the transmission network. South Australia has implemented mechanisms to reduce DER output during minimum system load periods[39], with Queensland following in 2023[40].

The Evoenergy network is expected to experience a continual decline in minimum demand over the coming decade as outlined in Figure 14. These low levels of system demand are unprecedented within the Evoenergy network and could result in localised voltage issues or contribute to system security issues in the NEM.

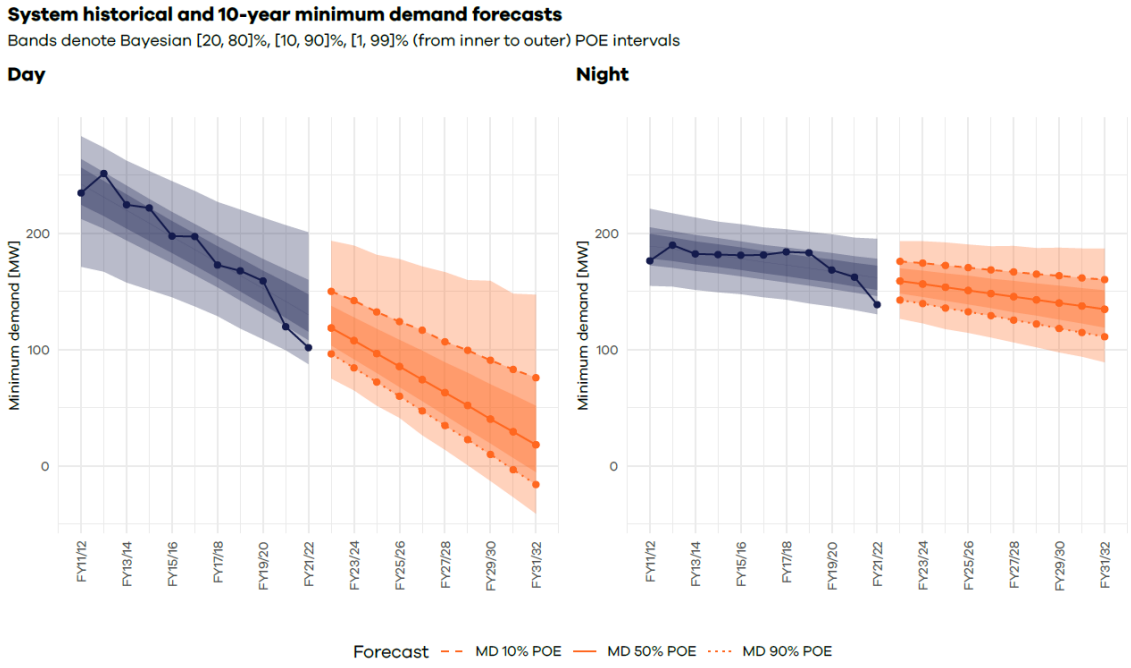

FIGURE 14 – 10-YEAR SUMMER AND WINTER MINIMUM DEMAND FORECAST IN THE EVOENERGY NETWORK[41]

Historically Evoenergy has not been required to take a proactive approach to maintaining power system security due to the geographical location of the ACT in the centre of an interconnected part of the NEM and lack of market connected generators. As minimum system load and other transmission or system level impacts emerge in the NSW region, Evoenergy may be called on by AEMO or the transmission operator Transgrid to take actions, such as maintaining operational demand at or above a specified level to help alleviate the system level challenges occurring at the time.

Commercial Limitations

As a regulated business, Evoenergy must maintain the construction, replacement, and operation of the electricity network within the regulatory framework. The regulatory framework combined with Evoenergy's

[37] Technical studies for greenfield sites such as Ginninderry outline that traditional standard designs would result in power quality issues on both the LV and HV network (Ref: *Ginninderry Estate Stage 1A Power System Analysis – Project 20005708*)
[38] Power System Security is defined in the National Electricity Rules
[39] This includes both the "Relevant Agent" framework which requires new solar installations to be able to reduce output remotely during minimum system load events, and increasing network voltage to curtail output from inverters through their AS4777 volt response modes
[40] https://www.epw.qld.gov.au/about/initiatives/emergency-backstop-mechanism
[41] 2022 Evoenergy Distribution Annual Planning Report

connection policy and Tariff Structure Statement (TSS) outline the approach to cost recovery from consumers in accordance with the National Electricity Objective (NEO).

Evoenergy's revenue is recovered through tariffs and capital contributions (in specific instances).[42] Tariffs are set annually in accordance with the framework outlined in the TSS. Most of the distribution revenue recovered under the tariffs is through electricity usage (kWh) with smaller components recovered through fixed supply and maximum demand charges.[43] As more customers install DER, increased levels of self-consumption by consumers with DER is likely to result in an overall decrease in energy consumption and an increase in the price per kWh charged by Evoenergy as outlined in Figure 15.

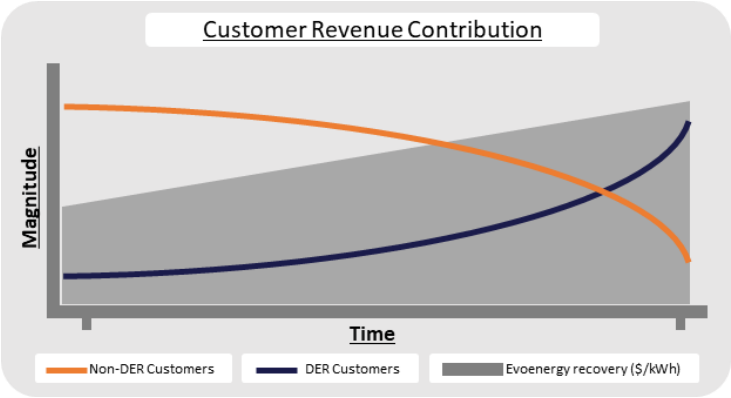

FIGURE 15 – RELATIONSHIP BETWEEN TARIFF REVENUE AND DER CUSTOMERS[44]

This increases the cross subsidisation between consumers where customers who do not have DER are effectively subsidising the cost of assets for those who do (especially without appropriate export tariffs). Analysis of consumption per customer has identified that with increasing levels of DER, consumption per customer is decreasing for every customer segment.

The Access, Pricing, and Incentive Arrangements for DER Rule (2021), and associated Export Tariff Guidelines & Explanatory Statement (2022), have removed the restriction preventing DNSPs from introducing export tariffs and recovering costs from consumers due to the export of power. This, however, is limited to the extent that the costs incurred are for enabling additional export service capacity.

Further, the Customer Export Curtailment Value (CECV) Methodology (2022) will be used to calculate CECVs each year. CECVs will capture the detriment to customers and the market when DER exports are curtailed and help guide efficient levels of investment for export services.

The recent rule change provides Evoenergy's some ability to actively manage the revenue risk of DER integration, prevent cross-subsidisation and make the electricity network more equitable for customers who do not have, or are unable to access DER.

In addition, Evoenergy has historically negotiated with customers under set and forget connection agreements whereby a customer signs a supply contract and the terms remain largely unchanged for the duration of the relationship. Evoenergy has not historically had ongoing connection agreement discussions with proponents of DER. This is an existing commercial risk that is outlined further in the Strategy section of the document.

[42] Evoenergy Connection Policy – effective from 1 July 2019
[43] A residential demand tariff was introduced as the default option for new customers connecting the to the network. In FY2019/20 this accounted for 5% of residential DUoS
[44] Note – this representation does not account for the potential effects of mass-electrification (although this is likely to be offset through additional capital expenditure driving tariffs higher) or for export tariffs

LINE OF SIGHT

11. LEGISLATIVE AND REGULATORY REQUIREMENTS

Evoenergy is required to comply with rules, regulations and other instruments under the *National Electricity Law*, *National Electricity Rules* and jurisdictional legislation such as the *Utilities Act 2000* and *Utilities (Technical Regulation) Act 2014*. These instruments place certain obligations on Evoenergy regarding the economic and technical management of the distribution network.

Historically the economic and technical regulation of Evoenergy has been separated between two main entities; the Australian Energy Regulatory (AER) acts as the primary economic regulator[45] and the ACT Government Utilities Technical Regulation team (UTR) as the technical regulator. Due to the magnitude of change caused by the integration of DER, these traditional economic and technical boundaries have been blurred, with the AER and other Commonwealth entities beginning to take a more active role in the technical management of distribution networks.

Evoenergy's key requirements under the relevant instruments at a national and jurisdictional level are outlined below.

National Electricity Law

The National Electricity Law is the key source of statutory powers for the Australian Energy Market Commission (AEMC) in Australia and Chapter 7 outlines the National Electricity Objective which 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:

- *price, quality, safety and reliability and security of supply of electricity*
- *the reliability, safety and security of the national electricity system."*

This objective provides the framework for the management of the National Electricity Rules.

National Electricity Rules

Sections 6.5.6 and 6.5.7 of the National Electricity Rules outline the requirement for Evoenergy to develop forecast operating and capital expenditure budgets for regulatory control periods to achieve operating and capital expenditure objectives. These objectives involve:

- Meeting or managing expected demand for standard control services
- Compliance with all applicable regulatory obligations and requirements associated with standard control services
- The maintenance of quality, reliability and security of supply of standard control services
- The maintenance of the safety of the distribution system through the supply of standard control services

In addition to these objectives Evoenergy must comply with the requirements of all regulatory information instruments and allocate expenditure in accordance with the principles and policies set out in the cost allocation method.

Utilities Act 2000

The *Utilities Act 2000* (The Act) is jurisdictional legislation that establishes the framework to regulate the provision of services by Evoenergy and defines the utility licencing structure. The Act empowers a number of

[45] The ACT Governments Independent Competition and Regulatory Commission (ICRC) also plays a role in the economic regulation of Evoenergy.

associated legislative instruments in the form of codes and directions including the *Utilities (Consumer Protection Code) Determination 2020* which specifies the consumer rights of customers within the ACT.

The Act is primarily an economic instrument that is administered by the Independent Competition and Regulatory Commission (ICRC).

Utilities (Technical Regulation) Act 2014

The *Utilities (Technical Regulation) Act 2014* provides the regulatory framework for the ACT Government to ensure Evoenergy designs, constructs, maintains and operates the distribution network to meet safety, reliability, and functional requirements.

In addition to establishing the Utilities Technical Regulation team, the Act also contains several legislative instruments. The most prescriptive of these for Evoenergy in the context of DER integration is the *Utilities (Electricity Distribution Supply Standards Code) Determination 2013* and the *Utilities (Management of Electricity Network Assets Code) Determination 2013*.

The *Utilities (Electricity Distribution Supply Standards Code) Determination 2013* specifies the requirement to maintain voltages within AS 60038 Standard Voltages and defines the allowable limits for additional quality of supply parameters. The code also contains specific reliability targets that are independent of those developed by the AER to incentivise performance under the Service Target Performance Incentive Scheme.

The *Utilities (Management of Electricity Network Assets Code) Determination 2013* requires electricity distributors to protect the integrity and reliability of the electricity network and to ensure the safe management of the electricity network without injury to any person or damage to property and the environment. This is achieved through the implementation and maintenance of an Electricity Network Safety Management Systems (ENSMS) compliant with Australian Standard AS 5577.

Evoenergy's ENSMS is outlined in the ENSMS Guide[46] and associated Formal Safety Assessments that specify the controls that are implemented to prevent and manage the risks of electricity network. Evoenergy has an obligation to identify and control the risks associated with DER integration through the ENSMS.

[46] Evoenergy ENSMS Guide – PO06155

STRATEGY

12. ASPIRATION

The DER Integration Strategy has been developed to achieve the following aspiration.

"Enable DER flexibility that optimises the value of customer DER investments while balancing the efficient utilisation and reliable operation of the two-way electricity network"

Evoenergy's approach for DER Integration include:

- **Improved customer connection experience:** focusing on streamlined DER registration and flexible access services (including dynamic operating envelopes (DOE)) that tangibly increase the hosting capacity and optimise how Evoenergy manages its network.
- **Pricing incentives:** to encourage the efficient utilisation of our existing network assets, including deploying tariff trials to inform future tariff proposals, engaging stakeholders and obtaining feedback, developing an export tariff transition strategy and engaging retailers and aggregators to develop mutually beneficial and customer centric value propositions.
- **Network analysis, planning and forecasting:** that results in efficient and prudent network investments to accommodate the rising demand in export services valued by customers
- **Network innovation:** testing new options for managing and increasing hosting capacity such as community batteries and static synchronous compensators (STATCOMs)

The challenge for Evoenergy is to develop the capabilities that realise these attributes and enable value generated by DER at the customer level to be realised in a variety of markets. The regulatory framework is signalling the adaptation of current processes and systems to enable this to occur as outlined in Figure 16.

FIGURE 16 – EVOENERGY'S ROLE AS A DSO

There are a number of challenges to achieving the aspiration for integrating DER, however once these are addressed there are also significant opportunities for Evoenergy to leverage aspects of the transition to minimise cost and risk while maintaining network performance. The DER Integration strategic objectives have been structured to reflect the complexity of these challenges while leveraging short and long term opportunities.

13. STRATEGIC ALIGNMENT

As Evoenergy is focusing on improving how it performs its core business with a focus on preparing for the future, there is strong alignment between the DER Integration strategy and the Evoenergy corporate strategy. The Evoenergy strategy is built around the organisation being a sustainable business that meets future challenges through four strategic pillars as outlined below.

FIGURE 17 – EVOENERGY STRATEGIC OBJECTIVES

The development and implementation of the DER Integration Strategy has been identified as one of the eight key initiatives that support the objectives of the strategy, with key deliverables expected over the short, medium and long term. The DER Integration Strategy is supported by the Demand Management (DM) Strategy and Quality of Supply (QoS) Strategy. An overview of how these strategies align with the DER Integration Strategy is presented in Table 3.

TABLE 3: DER INTEGRATION STRATEGY ALIGNMENT WITH OTHER EVOENERGY STRATEGIES

Strategy:	Description:	Objectives / Goals:	DER Integration Strategy Alignment:
Evoenergy Business Strategy	The Evoenergy Business Strategy outlines strategic pillars and initiatives for Evoenergy	▪ Build our net-zero carbon future ▪ Elevate customer experience ▪ Optimise our assets and networks ▪ Efficient and targeted investment	▪ Creates positive customer experiences as DER integration enables customer choice and flexibility that allows customers to optimise their DER investments. ▪ Enables more DER connections to support decarbonisation efforts. ▪ Allows for the optimisation of network utilisation as DER penetration grows.
DM Strategy	Outlines Evoenergy's approach to managing peak demand.	Deploy DM solutions that are: ▪ fit-for-purpose ▪ accepted by customers ▪ effective at alleviating network constraints ▪ proven to be credible alternatives to network investment	▪ DER can be leveraged to provide grid services and alleviate peak demand.
QoS Strategy	Outlines Evoenergy's approach to managing QoS.	▪ Maintain QoS performance	▪ Increasing levels of distributed solar PV is a key issue identified in the QoS strategy. ▪ DER integration strategies and initiatives will be key to managing QoS.

14. OBJECTIVES

This strategy has been developed to achieve two key objectives; manage integration of DER into the network and leverage DER to maximise value to customers and shareholders. These objectives are expected to be achieved while maintaining core service obligations, adhering to all aspects of the corporate strategy, and continuing to meet customer expectations.

The objectives are outlined in Table 4, the strategy section of this document details the alignment of actions with these objectives to ensure these outcomes of this are linked to specific, time-based tasks with accountabilities.

TABLE 4 – DER INTEGRATION STRATEGY OBJECTIVES

REFERENCE	DESCRIPTION
DER1	Manage the integration of increasing levels of Distributed Energy Resources (DER) into the Evoenergy network while maintaining core service obligations in accordance with corporate and customer expectations
DER2	Leverage DER to support network functions in accordance with corporate and customer expectations

15. FRAMEWORK AND PRINCIPLES

To ensure that the objectives of this strategy are achieved, a strategic action framework has been developed to associate specific goals and actions with each objective. A current state assessment has been performed against each goal and a series of time-based targets have been developed to provide a roadmap to the required level of maturity. A representation of this framework is displayed in Figure 18.

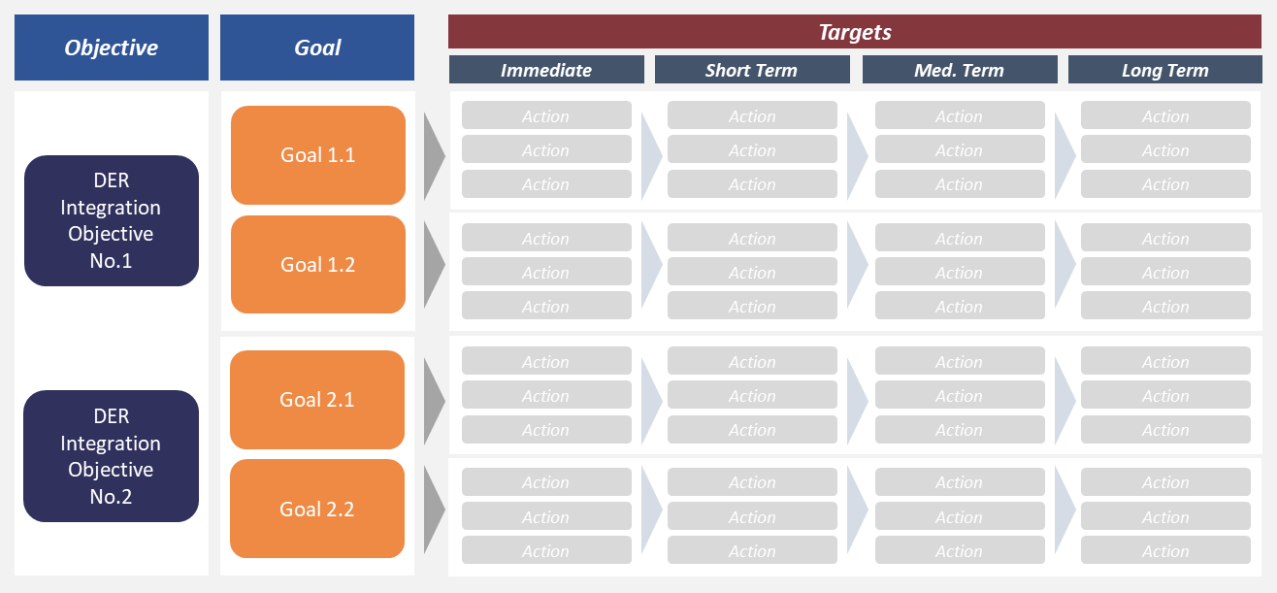

FIGURE 18 – STRATEGIC ACTION FRAMEWORK

The goals associated with each DER objective are outlined in Table 5 and the targets are detailed further in Table 8.

TABLE 5 – DER INTEGRATION OBJECTIVES AND GOALS

OBJECTIVE	GOAL
DER1- Manage the integration of increasing levels of Distributed Energy Resources (DER) into the Evoenergy network while maintaining core service obligations in accordance with corporate and customer expectations	**DER1.1** – Analyse, monitor, and optimise Hosting Capacity
	DER1.2 – Develop DER forecasts and increase network visibility, and utilise these in uplifting network planning and network operation functions
	DER1.3 – Maintain network quality of supply and thermal issues attributed to DER within required limits
	DER1.4 – Deliver value and equitable outcomes for all customers
DER2 - Leverage DER to support network functions in accordance with corporate and customer expectations	**DER2.1** – Develop feasible non-network options to defer or remove the requirement for network expenditure
	DER2.2 – Utilise DER to reduce network safety risk, increase network reliability and to inform asset health and utilisation

The implementation of this strategy has been separated into three phases as outlined in Figure 19:

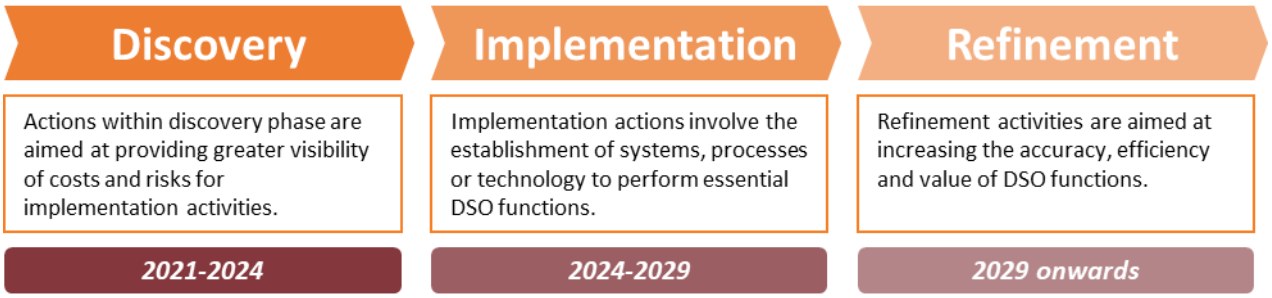

FIGURE 19 – STRATEGY PHASES

The aim of the discovery phase is to complete key enablers and refine implementation actions. These 'no-regret' activities will assist Evoenergy in specifying the requirements for the implementation phase and defining organisational risks and opportunities. The discovery phase of this strategy is essential in accurately defining the risks associated with DER integration to a level that enables detailed cost benefit analysis to be performed.

16. CURRENT PERFORMANCE AND TARGETS

The current performance of Evoenergy has been assessed against the goals associated with each DER Integration objective. These are outlined in Table 6 and Table 7. This iteration of the strategy has been developed using qualitative statements to describe current and target performance, future iterations of the strategy will contain quantitative metrics associated with each target.

TABLE 6 – DER1: CURRENT PERFORMANCE

OBJECTIVE	GOAL	CURRENT PERFORMANCE
DER1	**DER1.1** – Analyse, monitor, and optimise Hosting Capacity	• Evoenergy has completed intrinsic hosting capacity analysis on the network. A readily accessible value of hosting capacity on all parts of the low voltage network does not currently exist.
	DER1.2 – Develop DER forecasts and increase network visibility, and utilise these in uplifting network planning and network operation functions	• Evoenergy has developed ACT specific forecasts for solar PV, batteries and EVs using 2022 AEMO ISP[47] and ACT Government[48] forecasts (adjusted for ACT). There is limited visibility at the low voltage network level and limited visibility of directional power flows in the HV network.
	DER1.3 – Maintain network quality of supply and thermal issues attributed to DER within required limits	• There is significant amount of quality of supply incidents attributed to DER that occur on the low voltage network and no processes are in place to manage DER related thermal risks.
	DER1.4 – Maintain the commercial viability of the Electricity Distribution Network	• The electricity network is currently commercially viable. However, there is growing inequality between DER and non-DER customers that could result in revenue risks within the regulatory framework.

TABLE 7 – DER2: CURRENT PERFORMANCE

OBJECTIVE	GOAL	CURRENT PERFORMANCE
DER2	**DER2.1** – Develop feasible non-network options to defer or remove the requirement for network capex	• Evoenergy does not have any instances of using DER to defer or indefinitely delay capital expenditure.
	DER2.2 – Utilise DER to reduce network safety risk, increase network reliability and to inform asset health and utilisation	• DER is not used to provide any information regarding network safety risk, network reliability or asset health and utilisation.

To determine the necessary level of performance against each objective the DSO drivers outlined in the context section of this document have been considered. Staged targets across the immediate, short, medium, and long terms have been developed. For the purposes of this strategy these time periods are defined as[49]:

- **Immediate** - Prior to the end of **2023**
- **Short Term** – Between **2023** and **2024**
- **Medium Term** – Between **2024** and **2029**
- **Long Term** – From **2029** onwards

These timeframes have been defined to reflect the Evoenergy regulatory control periods. The targets associated with each goal are outlined in Table 8.

[47] https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2022-integrated-system-plan-isp

[48] GHD on behalf of EPSDD (ACT Government), Economic and Technical Modelling of the ACT Electricity Network – Base case Report, 26/04/2022

[49] All years are financial years

TABLE 8 - CURRENT AND TARGET STATES FOR EACH GOAL ASSOCIATED WITH DER INTEGRATION OBJECTIVE 1 AND OBJECTIVE 2

		DER Objective 1			
	Goal	**DER1.1:** Analyse, monitor, and optimise Hosting Capacity	**DER1.2:** Develop DER forecasts and increase network visibility, and utilise these in uplifting network planning and network operation functions	**DER1.3:** Maintain network quality of supply and thermal issues attributed to DER within required limits	**DER1.4:** Deliver value and equitable outcomes for all customers
	Current State	Evoenergy has completed intrinsic hosting capacity analysis on the network. A readily accessible value of hosting capacity on all parts of the low voltage network does not currently exist.	Evoenergy has developed ACT specific forecasts for solar PV, batteries and EVs using ACT Government forecasts and the 2022 AEMO ISP (adjusted for ACT). There is limited visibility at the low voltage network level and limited visibility of directional power flows in the HV network.	There is a significant amount of quality of supply incidents attributed to DER that occur on the low voltage network and there is a risk that DER related thermal issues would occur in the future.	There is growing inequality between DER and non-DER customers that could result in disproportionately higher charges for non-DER customers. Tariff trials are being conducted to increase cost-reflectivity of tariffs for DER customers.
Targets	**Immediate**	Initial static hosting capacity that identifies areas of the network with thermal and voltage constraints **(DER1.1-A)**	A network visibility program which is to be implemented in the Medium to Long Term. **(DER1.2-A)**	Management of network quality of supply and thermal constraints using existing systems and data and management using available tools and methodologies. **(DER1.3-A)**	Connection Policy, connection agreements, and export tariff transition strategy that ensure equitable outcomes for all customers and support the two-way operation of the network. **(DER1.4-A)**
	Short Term	Development and trials of tools for assessing hosting capacity dynamically **(DER1.1-B)**	Detailed, actionable DER penetration and behaviour forecasts identifying system impacts that are validated against available visibility data. **(DER1.2-B)**	Proactive identification of DER related QoS issues using hosting capacity and development of 'at risk' areas using forecast outputs. System architecture for Dynamic Operating Envelope (DOE) platform. **(DER1.3-B)**	Stakeholder engagement, especially retailers and aggregators, on export tariffs and two-way pricing. TSS is informed with engagement and tariff trial outcomes. **(DER1.4-B)**
	Medium Term	Detailed dynamic hosting capacity across the network to enable Dynamic Operating Envelopes (DOEs) **(DER1.1-C)**	20% operational visibility across the LV network. Mature short, medium and long term forecasts in addition to 'nearcasts' for operational decision making hours and days in advance at all network levels **(DER1.2-C)**	Management of network quality of supply and thermal performance through DOEs. Trials of innovative technologies, including community batteries and STATCOMs **(DER1.3-C)**	Tariffs include export pricing, solar-soak, and EV charging elements. Tariff trials to inform future tariff structures and TSS with technical analysis and stakeholder feedback. **(DER1.4-C)**
	Long Term	-	Detailed forecasts and ongoing optimal operational visibility across the network, embedded into network planning and operations **(DER1.2-D)**	Refinement and application of DOEs to proactively manage DER related QoS and thermal issues. Rolling out proven innovative technologies where efficient to do so. **(DER1.3-D)**	Tariffs are further refined to drive autonomous behaviour from emerging technologies that benefits both the customers and the network. **(DER1.4-D)**

		DER Objective 2	
	Goal	**DER2.1:** Develop feasible DER-based - options to defer or remove the requirement for network capex	**DER2.2:** Utilise DER to reduce network safety risk, increase network reliability and to inform asset health and utilisation
	Current State	Evoenergy does not have standardised DER-based options to defer or indefinitely delay capital expenditure.	DER is not used to provide any information regarding network safety risk, network reliability or asset health and utilisation.
Targets	**Immediate**	Developed register of feasible options for the deferral or indefinite delay of capex with ongoing trials in place. **(DER2.1-A)**	Developed register of use-cases and implementation plan **(DER2.2-A)**
	Short Term	Standardised roll out of non-network options implemented by design and network planning **(DER2.1-B)**	Trials of solutions to manage network safety and reliability risk and asset health using network visibility data **(DER2.2-B)**
	Medium Term	Continued implementation and ongoing refinement of DER options. **(DER2.1-C)**	Identification of network safety risk and reliability and asset health informed using network visibility data **(DER2.2-C)**
	Long Term	-	Ongoing refinement, expansion, and system integration **(DER2.2-D)**-

17. STRATEGIC ACTIONS

Detailed actions must be developed as per the strategic action framework to assist with the implementation of this strategy. These actions will be allocated to specific owners and reference to the specific time-based targets which reflect the dependencies between actions. As outlined in the governance section of this strategy, annual reviews will result in ongoing updates to targets and actions to reflect changes in the external environment. Based on the actions identified till date for the medium-term and associated detailed modelling and cost-benefit analysis, a DER Integration Program for the 2024-2029 regulatory control period has been developed for the Medium-Term actions.

An outline of the relationship between an individual action, a goal and the subsequent objective is displayed in Figure 20.

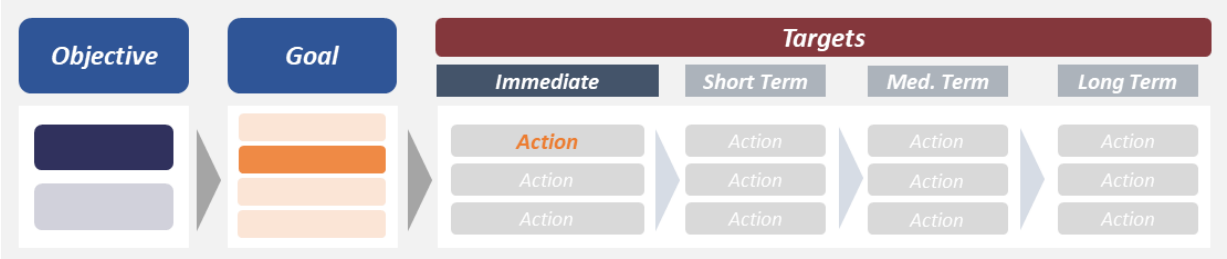

FIGURE 20 – RELATIONSHIP BETWEEN ACTION, GOAL AND OBJECTIVE

The level of effort associated with each action must be determined based on the enablers required to achieve the action. These enablers are separated into the following areas.

- **People** – capabilities associated with people who are required to complete an action and reference the Evoenergy capability framework.
- **Process** – contracts, processes or other relevant documentation required to complete an action.
- **Technology** – all software and hardware (including physical assets) required to complete an action.
- **Data** – information required to complete an action.

Enablers must be assessed against the current baseline, with a tiered approach to assessing the level from the baseline as detailed in Table 9.

LEVEL	DETAIL
1	Enabler currently available within Evoenergy
2	Enabler that would require development within Evoenergy business-as-usual activities
3	Enabler that would require specific investment to develop in the form of a project or external expertise
4	Enabler that would require significant investment to develop in the form of a project or external expertise

TABLE 9 – ENABLER ASSESSMENT LEVELS

Detailed information regarding the actions, including indicative costs and dependencies will be in the Strategic Actions Register[50].

[50] This will be a live document and number of actions within each time period is expected to evolve with future iterations of the strategy

GOVERNANCE

18. ROLES AND RESPONSIBILITIES

There are a number of stakeholders involved in the implementation of the DER Integration Strategy with varying levels of responsibilities. Each action identified under the Strategy would contain specific information regarding the roles and responsibilities associated with that action.

19. REPORTING

To ensure the performance and progress associated with the DER Integration Strategy is monitored, there will be quarterly reporting on the performance of goals against targets and timeframes.

The monitoring and reporting requirements for the implementation of the individual strategic actions would be captured against each action within the strategic actions register.

Responsibilities regarding the development of a reporting mechanism and register are the responsibility of the strategy owner.

20. REVIEW CYCLES

In addition to ongoing performance monitoring and minor annual updates, this strategy requires a major revision annually or when triggered by external changes. Examples of triggers that would result in the need for revision are:

- Changes to the organisational structure
- Regulatory or legislative changes (both jurisdictional and national)
- Changes to business risk and valuation tools such as the value framework and network risk register

As outlined in the RACI, the responsibility for identifying a trigger for review and undertaking the review sits with strategy owner under the Planning and Future Networks section.

The strategy is expected to undergo ongoing minor updates during implementation as actions are completed and new information is obtained. Table 10 provides guidance around the classifications of major and minor reviews.

TABLE 10 – REVIEW CYCLE CATEGORIES

Update Category	Detail
Minor	Examples of minor updates involve refreshing data sources, updating administrative items or amending/adding actions.
Major	Examples of major updates include revision of DER Integration objectives, goals or any updates that are initiated by the triggers outlined above.

21. VERSION CONTROL

VERSION	DETAILS	APPROVED BY	DATE
0.1	Initial draft for review	Future Networks Manager	30/10/2020
0.2	Revised draft from review	Future Networks Manager	16/12/2020
1.0	Final draft for approval	General Manager Evoenergy	12/03/2021
2.0	Revised draft for approval (Changed title from DSO Strategy to DER Integration Strategy)	Group Manager Strategy and Operations	20/01/2023