Powering homes, empowering people:

A national Consumer Energy Resources roadmap

CLEAN ENERGY COUNCIL

June 2024

Executive Summary

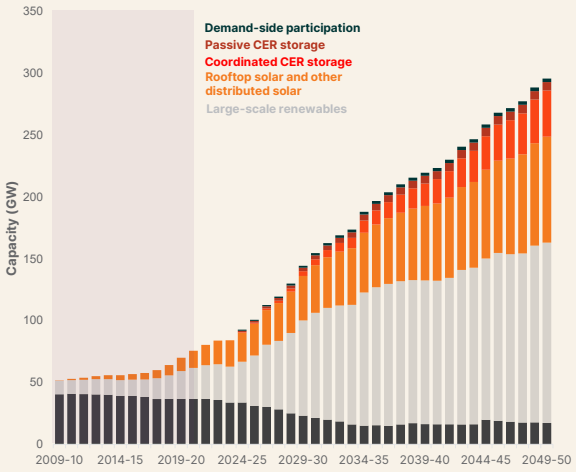
The report contains modelling showing the value of rooftop solar, home batteries and other Consumer Energy Resources (CER) to Australia's energy transition and describes the priorities needed to empower all Australians to take up CER and save on energy bills.

Rooftop solar and batteries are critical to renewable energy and emissions targets

Australia is a world-leader in rooftop solar with one in three homes hosting panels on their roof.

It's an Australian success story, driven by government incentives, industry innovation, and Australian businesses and homeowners embracing opportunity.

Australia's electrification journey is just beginning however. The least-cost pathway to meeting Australia's renewable energy and emissions targets, as modelled in the Australian Energy Market Operator's draft 2024 Integrated System Plan (ISP) Step Change scenario, requires four times more rooftop solar, 34 times more distributed battery capacity and 135 times more orchestrated battery capacity by 2050.



Capacity, NEM (2009-10 to 2049-50, Step Change), AEMO Draft 2024 ISP

The value of Consumer Energy Resources

Our modelling estimated the cost of not meeting CER forecasts under the Step Change scenario by replacing shortfalls in CER with large-scale renewable energy generation and storage, and building out the distribution network to manage large amounts of rooftop solar. Not meeting CER forecasts risks losing:

Over $22bn
in savings for Australian taxpayers.

$35-71 off
average annual energy bill for all Australians.

Up to 3.8m
more homes and businesses with orchestrated batteries.

18,200 jobs
in selling, designing and installing CER.

Explainer

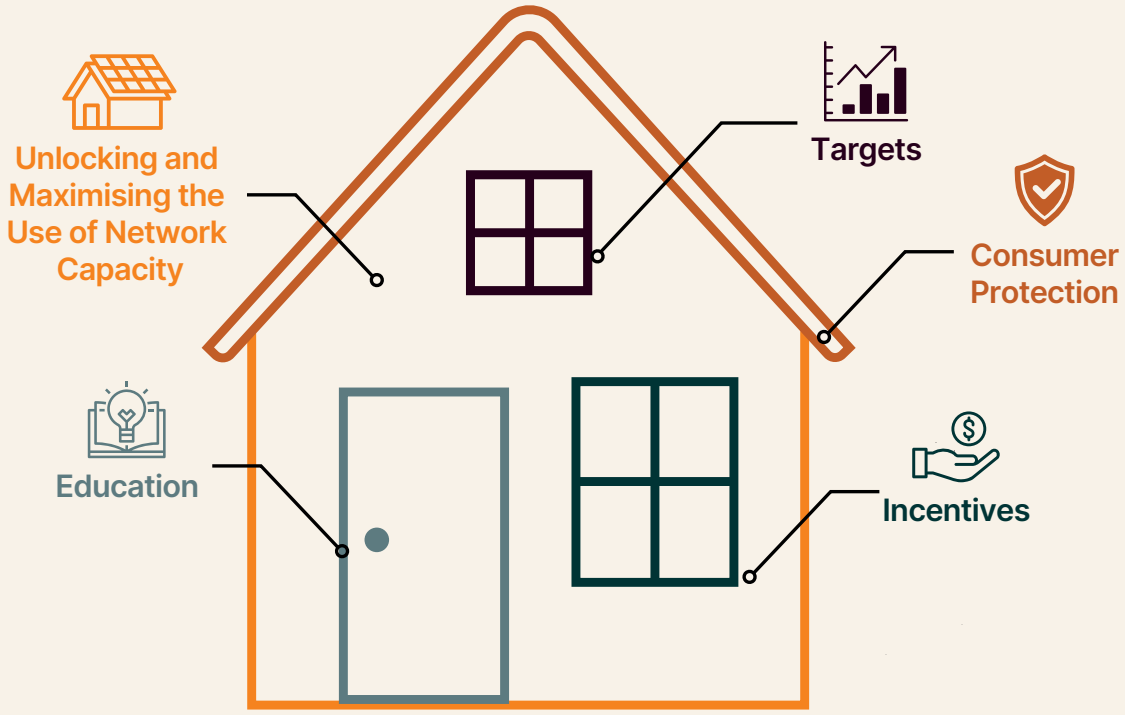
Consumer Energy Resources (CER) are products and services behind-the-meter that help generate or manage energy use in homes or businesses. They include rooftop PV solar and home battery systems.

Orchestrated batteries can offer significant benefits to consumers, the distribution network and the energy and Frequency Control Ancillary Services (FCAS) markets.

The Roadmap: recommendations to empower consumers and maximise CER uptake

It is critical we get the policy settings right to encourage as many Australians as possible to adopt CER including homeowners and small businesses, renters, public housing tenants and commercial and industrial customers.

In consultation with Clean Energy Council Members, industry associations and stakeholders, 5 themes have been identified to empower consumers along each step of the consumer journey.



Education targeted at helping consumers cut through the complexity of the electricity market and the technologies available. This can give consumers the confidence they need to make decisions that will have good outcomes.

Targets published as part of government policy can provide a strong signal to the CER industry and consumers that the take-up and use of CER is an important part of achieving the country's de-carbonisation goal.

Incentives can assist customers reduce high-upfront costs and reinforce the value of CER in management of energy bills. This also drives greater system benefits and savings for all consumers.

Consumer protection can be an important means for enhancing confidence is emerging technologies and markets. This signifies to consumers that CER products and services can be trusted and they will be supported with a robust dispute resolution process.

Unlocking and maximising the use of network capacity by providing customer choices where the value of CER to the local network can be recognised and customers are rewarded in accordance with the value their assets provide.

Priorities

	Priority	Responsibility	Timeframe
Education	$100 million CER Community Empowerment Fund to support consumers to understand how CER can work for them	Federal Government funding and delivered through local governments, community groups, consumer and social organisations, small business groups	Ongoing 2025-2035
	Training program for communities and organisations to build trusted advocates	Federal Government, state chambers, community & regional groups, local councils	Ongoing 2025-2035
	Review into household and business energy futures to better understand consumer attitudes and behaviours with CER	DCCEEW, universities, consumer and social organisations	Completed by end of 2026
Targets	Target on government-owned CER assets to demonstrate support and leadership	Federal Government, state governments, local governments	Introduce by 2025
	Government target for the orchestration of CER	Federal Government, state governments, local governments	Introduce by 2025
Incentives	National Home Battery Saver to accelerate uptake of batteries and orchestration	Federal Government	Introduce by 2025, ongoing 2025 - 2040
	National Energy Productivity Scheme to broaden energy efficiency schemes to include CER	ECMC	Introduce by 2025
	Encourage market-based incentives to open up new revenue opportunities for consumers	AEMC as rule-maker and Aggregators as developers and providers of services	Ongoing
	Provide opportunities for renters to participate in CER and incentivise landlords to upgrade	Federal and state governments	Introduce by 2026, ongoing 2026-2040
Consumer Protection	Raise consumer protection awareness to improve consumer trust	Federal and state governments, Clean Energy Council	Ongoing
	Expansion of the NETCC to establish a national trusted protection scheme for consumers	Federal and state governments, local governments, community groups, ACCC	2024-25
	Specified dispute resolution under the role of the Ombudsman to provide consistency for consumers	Federal and state governments, local governments, NETCC Council and administrator	Introduce by 2025
Unlocking & Maximising Network Capacity	Participation options for consumers to match their choice of and use for CER	ECMC, AEMC	Ongoing
	Network visibility to ensure customers can actively participate and provide system-network services	ECMC, distribution businesses, retailers, aggregators	2024-25
	National Technical Standards Governance Body to ensure products and services deliver on consumer promise	ECMC	Introduce by 2024, operational by 2025
	Nationally consistent and genuine last resort Emergency Backstop Arrangements to ensure consumers get full value from their assets.	ECMC	2024-25

Contents

Acknowledgement

We respectfully acknowledge Aboriginal and Torres Strait Islander people as the Traditional Custodians of the lands and waters on which we work and live. We commit to collaborate with First Nations communities, to promote sustainable practice, protect ancient sites and culture with equitable access to the benefits of clean energy. Sovereignty has never been ceded.

We acknowledge Elders, past and present, and their continuing culture and connection to Country.

About the Clean Energy Council

The Clean Energy Council is the peak body for the renewable energy and storage industry in Australia. We represent around 1,000 businesses working in all aspects of Australia's renewables industry including solar, wind, hydro, bioenergy, energy storage, hydrogen, energy markets, ancillary services and consumer energy resources.

We also manage leading industry compliance and education programs to help drive best-practice standards in rooftop solar and batteries.

We are committed to accelerating the transformation of Australia's energy system to one that is smarter and cleaner by:

- **Providing a strong voice for our members**
- **Standing up for and promoting the clean energy industry**
- **Developing and driving effective policy and advocacy**
- **Working with industry to continually improve standards and maintain integrity**
- **Working closely with local, state and federal governments to increase demand for clean energy products**
- **Providing services and initiatives to members and the wider industry that help to grow the sector.**

A large part of our policy and advocacy work in consumer energy resources is produced by our Distributed Energy Policy team, in collaboration with our Distributed Energy Leadership Forum and Distributed Energy Directorate, composed of Clean Energy Council members working in the sector.

Foreword

Australia is a world-leader in rooftop solar, with one in three Australian homes now generating renewable power from their roof. Our recent Rooftop Solar and Storage Report H2 2023 highlights that more rooftop solar panels were installed in New South Wales in 2023 than in any state in any year before, and Queensland became the first state to surpass one million installations.[1]

Talk to almost anyone with a rooftop solar system, even a climate change cynic, and they'll proudly tell you how it's helping lower their energy bills and adding value to their home.

It's an undeniable Australian success story, driven by federal and state government incentives, industry innovation and competition. Importantly, Australian businesses and households have embraced the opportunity to increase their energy security and reduce their energy bills and emissions.

Yet, this is just the beginning. Solar power is beginning to drive a new wave of electrification across Australian homes and businesses. In 2023, purchases of heat pumps, electric vehicles, and batteries soared, signalling a growing appetite for more Consumer Energy Resources (CER) to cut costs and emissions.

The next chapters of Australia's electrification journey will not write themselves, however. Eight years ago, Morgan Stanley forecast that batteries would be in approximately one million Australian homes by 2020.[2] By 2023, the real figure was just over 150,000 homes.[3]

The least-cost pathway to meeting Australia's renewable energy and emissions targets, as modelled in the Australian Energy Market Operator's (AEMO) Integrated System Plan Step Change scenario, requires approximately four times more rooftop solar, 34 times more distributed battery capacity and 135 times more orchestrated battery capacity by 2050. It's a monumental task and one that's far from guaranteed.

The rewards for achieving strong growth in CER are clear: significantly lower energy bills for consumers at a time when retail energy prices are at historical highs, greater energy security as ageing coal-powered stations close, more opportunities for businesses and workers, and the reward of reaching our renewable energy and emissions reduction targets. This report adds another compelling incentive, revealing potential savings of over $22 billion if we achieve AEMO's forecasts.

It is critical we get the conditions for such growth right. This roadmap offers comprehensive policy recommendations to encourage adoption of CER. Unlike similar reports that focus on supply-side challenges for CER and the grid, this roadmap focusses on unlocking consumer benefits to empower as many Australians as possible to take up CER. Drawing from literature reviews and industry consultation, we identify clear priorities to help consumers with each step of their decision-making process.

By empowering homeowners, renters, social housing tenants and business owners to understand and adopt CER, we can build an Australian energy system that is cheaper, cleaner and fairer for everyone.

A big thank you to the organisations that have contributed to this report. We hope readers find the insights and analysis informative. Please reach out to us if you wish to explore the recommendations in more detail.

Kane Thornton
Chief Executive
Clean Energy Council

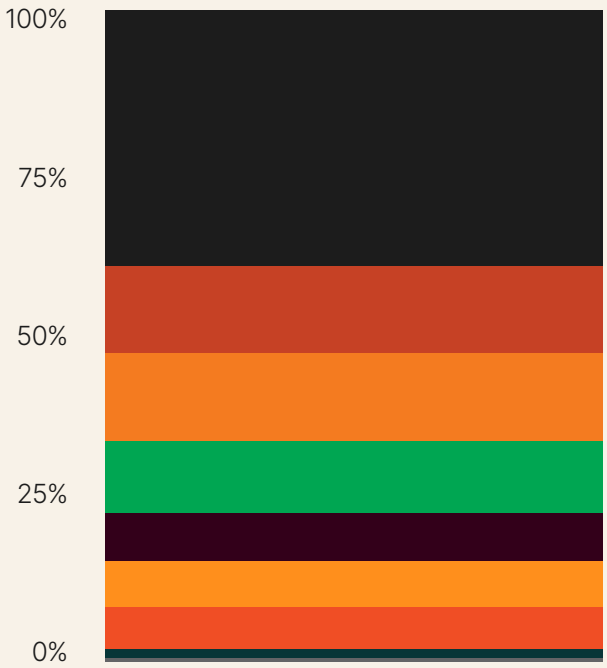
[1] Clean Energy Council Rooftop Solar and Storage Report H2 2023
[2] Morgan Stanley, Asia Insight: Solar and batteries, 2016
[3] Clean Energy Council Rooftop Solar and Storage Report H2 2023

Introduction

In 2023, rooftop solar was the fourth-biggest generator, and second-largest renewable generator in the National Electricity Market, with 26.6 GWh, making up 11.2 per cent of total electricity generation mix in 2023.[4]

The Australian Energy Market Operator's (AEMO) draft 2024 Integrated System Plan (ISP) Step Change forecasts that rooftop solar generation capacity will increase to 72 GW; and that home storage combined with orchestration will deliver 27 GW of flexible energy from consumer owned assets by 2050. To put this into perspective, 27 GW is more than the current brown and black coal generators combined capacity in the NEM.

Australia's electricity generation mix in 2023 (fuel types by MWh)



Type of Fuel	Total MWh	MWh %
Black coal	92,843,404	39.3%
Brown coal	31,682,666	13.4%
Wind	31,559,920	13.4%
Rooftop solar	26,553,206	11.2%
Gas	17,267,583	7.3%
Solar	16,478,113	7.0%
Hydro	15,306,966	6.5%
Bioenergy	3,248,732	1.4%
Non-metered fossil	1,218,230	0.5%
Liquids	111,998	0.0%
Total	236,270,819	100.0%

[4] Clean Energy Australia 2024, p12

Deployment of rooftop solar, home storage and orchestration will deliver significant benefits to consumers who invest in these types of products and services, as well as to the wider system and will be a significant part of Australia's decarbonisation ambitions.

There is much debate on the pace and speed of reform to unlock the potential benefits of connecting these assets to homes and businesses. However, the pace of rooftop solar provides useful insights as to what motivates consumers to invest in these products and services. The key to future reforms is to lean into and understand these motives.

The success to date has been driven by consumers understanding the value of rooftop solar to themselves and having the agency to get the most out of their investments.

It is clear that Consumer Energy Resources (CER) will reduce cost of living pressures by:

Offering immediate energy bill relief

Delivering broader public benefits, which will result in longer term bill savings to the whole market.

CER will:

- **Suppress wholesale price spikes and volatility due to additional generation in the market, especially if the batteries are orchestrated.**
- **Reduce and defer network expenditure at the distribution level (lower peak demand) and the transmission level (less need for large-scale generation assets).**
- **Increase distribution hosting capacity, through better minimum demand management and improved voltage control.**
- **Increase provision of Frequency Control Ancillary Systems (FCAS).**
- **And in future, the possibility to unlock more transmission opportunities through the System Integrity Protection Scheme.**

What is also clear, the reform program must unlock this value and deliver it to consumers. This Roadmap focusses on how best we achieve this.

First, this Roadmap models what value CER will deliver to Australia's energy decarbonisation ambitions. Second, the roadmap outlines the priorities that will drive greater consumer agency, trust and participation, ensuring we achieve the full value of CER to the individual as well as the wider system.

From a system wide perspective, effective integration and consumer participation will increase network reliability by addressing minimum load challenges against growing risks from weather, global trade shocks and ageing assets.

Further, rooftop solar already makes up over 11 per cent of renewable energy generation and its growing popularity along with the wider suite of CER will enable the delivery of critical policy outcomes. In particular, it will increase certainty in reaching the Federal Government's 82 per cent renewable energy target and the 43 per cent national emissions reduction target by 2030.

Importantly, CER is complementing and doing the early, heavy lifting of decarbonisation as the large-scale renewable deployment works through planning, environmental, financial and community engagement requirements.

Now is the time to put the right policy settings in place to unlock CER.

The Clean Energy Council therefore recommends a targeted policy program to enable Australia to enjoy the full benefits of a coordinated CER roll-out.

The value of Australia's Consumer Energy Resources

The modelling

Purpose

The modelling examines the degree to which the economically efficient deployment and use of CER technologies could reduce total electricity system costs, while also contributing to the achievement of Australia's decarbonisation goals.

This modelling was carried out by Oakley Greenwood on behalf of the Clean Energy Council. The full report can be accessed at **cleanenergycouncil.org.au/poweringhomes**

Approach

For the past several years, the Step Change scenario in the Australian Energy Market Operator's (AEMO) Integrated System Plan (ISP) has been considered the most likely path along which Australia's energy sector will develop. It is also the scenario aligned to Australia's 82 per cent renewable energy target and net zero emissions target. The most recent version of the Step Change scenario in the 2024 Draft ISP shows CER playing a significant role, as summarised in Table 1 below.[5,6]

Item	Absolute value at 2050	Contribution in the ISP at 2050
Energy production	85.87 GWh	21.5% of total energy produced will be behind-the-meter (BTM) solar photovoltaic (PV)
Installed capacity – BTM PV	71,533 MW	57.6% of total capacity installed will be BTM solar PV[7]
Installed capacity – Storage (total)	33,519 MW	84.0% of all storage capacity (inc. small, large and hydro) will be BTM storage
Installed capacity – Storage (orchestrated)	26,663 MW	80.7% of all BTM storage will be orchestrated

Table 1: Overview of the role of CER in the 2024 Draft ISP Step Change scenario (as at 2050)

[5] AEMO, *Draft 2024 Integrated System Plan*, 15 December 2023. Available at https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp. The final 2024 ISP is scheduled to be published by 28 June 2024.

[6] AEMO defines CER as "devices that can generate or store electricity as individual units and which may be passive but also may have the 'smarts' to actively manage energy import and export. It can also refer to consumer shared devices, such as community batteries and other resources that enable greater demand flexibility". The CER forecasts in the ISP include "small-scale embedded generation such as residential and commercial rooftop PV systems (less than 100 kW), battery storage, and EVs". In this report, the term CER includes rooftop PV, behind-the-meter (BTM) batteries (both orchestrated and un-orchestrated) installed on residential and small non-residential buildings. Electric vehicles are not included in this report, though they are included (as a separate category) in the ISP. Larger PV systems between 100 kW and 30 MW (referred to as PV non-scheduled generation, or PVNSG) are addressed separately in the ISP and are not included in this report (AEMO, 2023 *Inputs, Assumptions and Scenarios Report*, September 2023, pp 67-68).

[7] Based on information from the ISP which cites the generation system as being comprised of 58,830MW of existing generation, 8,269MW of committed generation, 6,642 MW of anticipated and additional generation and the retirement of the entire 21,000 MW of coal generation in the current generation fleet. The percentage shown is the proportion of CER PV capacity as compared to of total generation capacity (both central and CER).

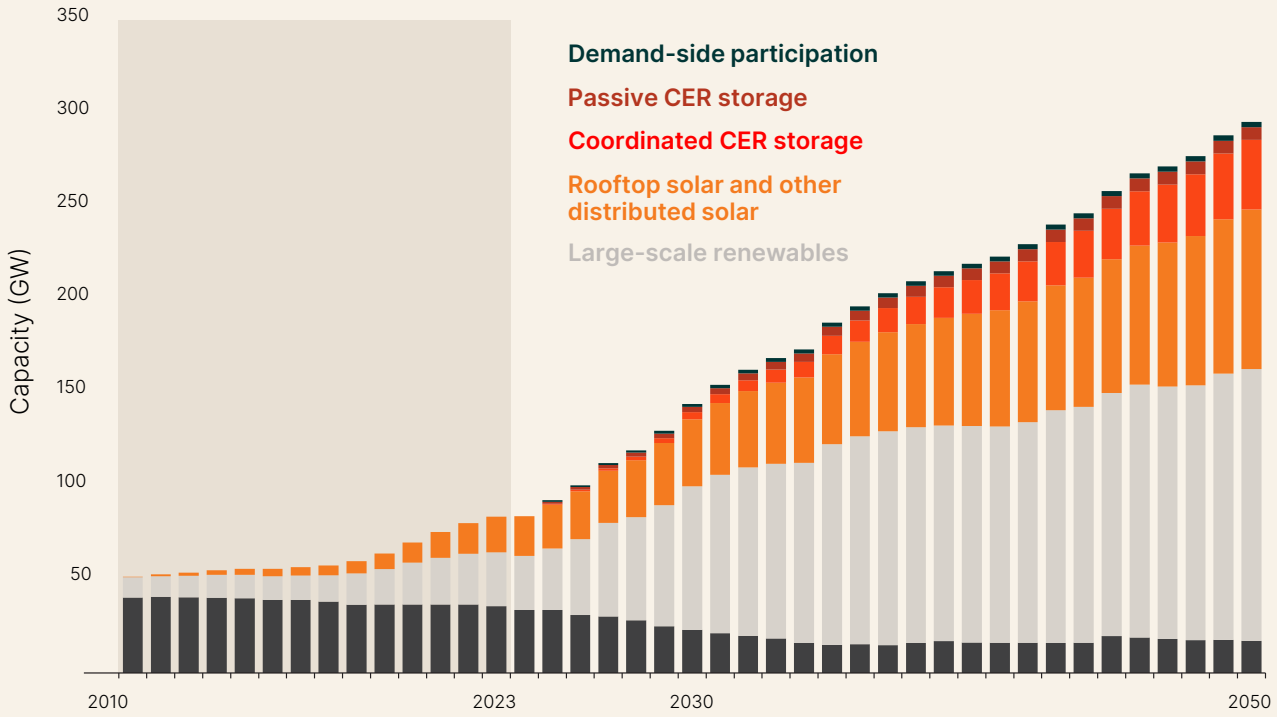


Figure 1: Capacity, NEM (GW, 2009-10 to 2049-50, Step Change Scenario), AEMO Draft 2024 Integrated System Plan

In simplified terms, the ISP identifies the least-cost means for meeting Australia's aggregate energy requirements under four different scenarios. The scenarios themselves are defined by a large number of factors, but among the most important are assumptions about (a) the economy, (b) the level and profile of electricity demand, (c) the costs and time required to build different types of power stations and (d) the costs of the fuels used to generate electricity in those power stations.

The ISP also ensures the models meet government targets regarding the use of renewable energy. The amount of emissions reductions are taken as constraints within the ISP modelling.[8]

The amount of CER and how it is used – including how much is from rooftop solar systems without battery storage, and what percentage of the battery storage capacity is orchestrated as compared to un-orchestrated, as well as the size of the PV and battery systems being put place – has become, in recent years, an increasingly important determinant of the aggregate demand that the central electricity system will need to meet in the future.

AEMO consults with industry and consumer groups and commissions studies about each of the factors mentioned above – including the type, size and level of orchestration of the CER systems expected to be installed over the 30-year ISP planning horizon. Once AEMO decides on the value of each of the factors, they are used as inputs to inform the preferred pathways for the development of the electricity generation sector for each scenario.

AEMO commissioned two forecasts of the amount of PV, BTM battery and the level of orchestration of that battery capacity. The two forecasts from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Green Energy Markets (GEM) were very different, reflecting the inherent uncertainty in forecasting the take-up of an emerging technology. In the ISP, AEMO also identified several factors that could impact the level of CER included in the Step Change scenario.[9] The forecast that AEMO used in the Step Change scenario is approximately the average of the two forecasts that were commissioned. That averaged amount still represents a high rate of growth, particularly for battery storage and its orchestration:

- **Total CER storage capacity is expected to grow from just under 1GW in 2023-24 to 34 GW in 2050**
- **Orchestrated CER storage capacity it expected to grow even more strongly – from 0.2GW now to 27 GW in 2050 – a factor of 135 times**
- **Orchestrated BTM battery capacity as a percentage of total BTM battery capacity is also forecast to grow very strongly, from under 18% at present to 80% in 2050.**

[8] This is done by setting the levels of renewable energy utilisation and carbon emissions that have been set in policy as constraints that the electricity supply system must meet.
[9] AEMO, *Draft 2024 Integrated System Plan for the National Electricity Market*, 15 December 2023, p 76.

The outcome of the Step Change assumes these levels will be met, but given the divergence of the forecasts that were produced for the ISP, it is reasonable to ask:

- **If we don't achieve the AEMO Step Change CER forecast, what large-scale renewable infrastructure would we need to build in its place to meet demand?**
- **What would the cost of building that infrastructure be?**

These questions were addressed by:

- **Considering the lower CER forecast commissioned by AEMO as a credible level of take-up below that used in the Step Change scenario; Table 2 opposite shows the difference in those two forecasts.**
- **Assuming that less PV generation, and battery (both orchestrated and un-orchestrated) were installed behind customers' meters that amount of energy production and dispatchability would need to be provided by the central system.**[10]

  Given the profile of that generation and dispatchability, the most direct substitution for shortfall in CER could be represented by central PV with storage.[11]

The cost of the central PV generation and associated battery storage that would need to be built to make up for the CER shortfalls – 18.0 GW of large-scale PV generation and 18.9 GW of large-scale battery storage – can be seen as the value of CER to the electricity sector. This is because these assets would need to be built by the electricity sector (i.e., investors who would seek to recoup their investments from electricity users) whereas the BTM CER assets would have been funded privately.[12]

CER	AEMO ISP Step Change scenario	CSIRO Step Change scenario	Difference
PV capacity (GW)	71.5	66.4	5.1
Total BTM battery capacity (GW)	33.5	15.5	18.0
Orchestrated BTM battery (GW)	26.7	7.8	18.9
Percent of BTM battery capacity that is orchestrated	79.7%	50.3%	N/A

Table 2: Potential difference between two forecasts of CER as at 2050

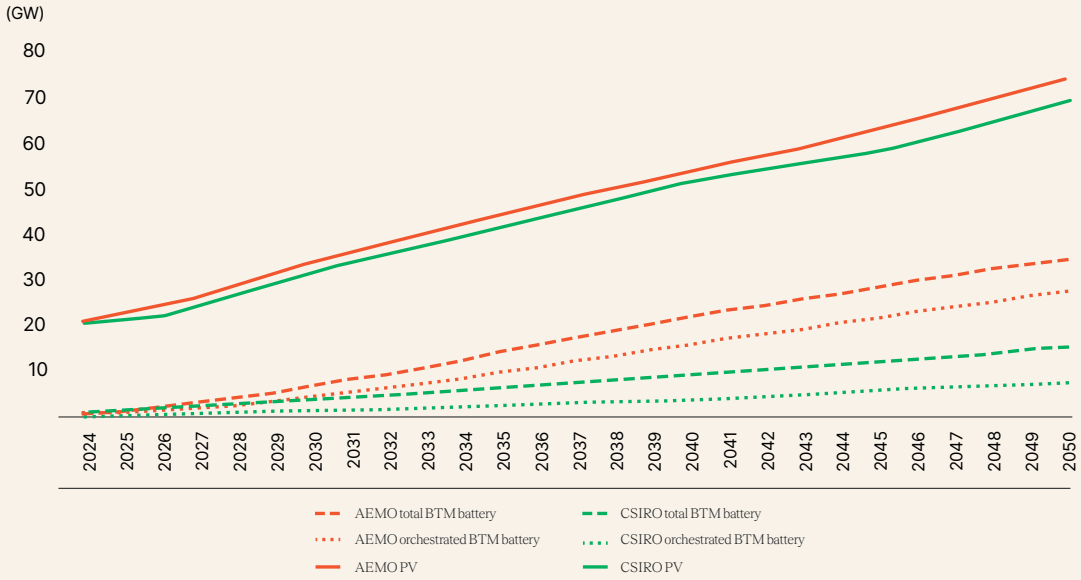


Figure 2: Potential difference between AEMO and CSIRO forecasts of CER (2024-2050)

[10] Some adjustments were made to the amount of central generation and storage that would be needed to account for certain technical factors, such as it being likely to be sited in places where it receives more and more constant sunlight than the average rooftop system.

[11] This is where the simplification comes in. If a different CER forecast were to be used in the ISP itself, it would change the level of aggregate demand to be met by the large-scale system and a full generation system optimisation run would have been undertaken, which might have replaced all of the unrealised CER with large-scale PV and storage, but it might have been able to find a lower cost central system solution that still met all applicable renewable energy utilisation emissions constraints. This project did not have the budget or time resources to undertake that level of simulation. Therefore the large-scale PV and battery substitution used here should be seen as a plausible but not necessarily least-cost solution to the lower CER forecast. Full details of the modelling and how it was done can be found in the Modelling the Value of CER to Energy Consumers Report (cleanenergycouncil.org.au/poweringhomes.)

[12] Incentives provided for the installation of rooftop solar and BTM batteries may or may not impose a cost that is recovered in the electricity sector. The Small-scale Renewable Energy Scheme (SRES) incentives, for example, are paid for by electricity retailers who are required to surrender certificates. It can be assumed that this cost is recovered by retailers from their customers. State government incentives, such as Victoria's Solar Home Program, by contrast, are funded through general tax revenue. It is worth noting that the ISP assumes the SRES will end in 2030 as currently legislated, so most of the CER installed under the Step Change scenario is not forecast to receive incentives that would be recovered through customers' bills.

Results

Over $22bn in savings

Large-scale generation infrastructure

The cost of building 18 GW of large-scale solar photovoltaic (PV) generation plant and 18.9 GW of large-scale battery storage was developed using the costs published in the ISP for additional capacity in a Renewable Energy Zone.[13] Figure 3 below shows those costs.

In summary, ensuring that the market achieves AEMO's Step Change forecast of CER take-up and use would result in $20 billion less cost than if additional large-scale generation and storage had to be built for a plausible shortfall in CER, as represented by the CSIRO forecast.

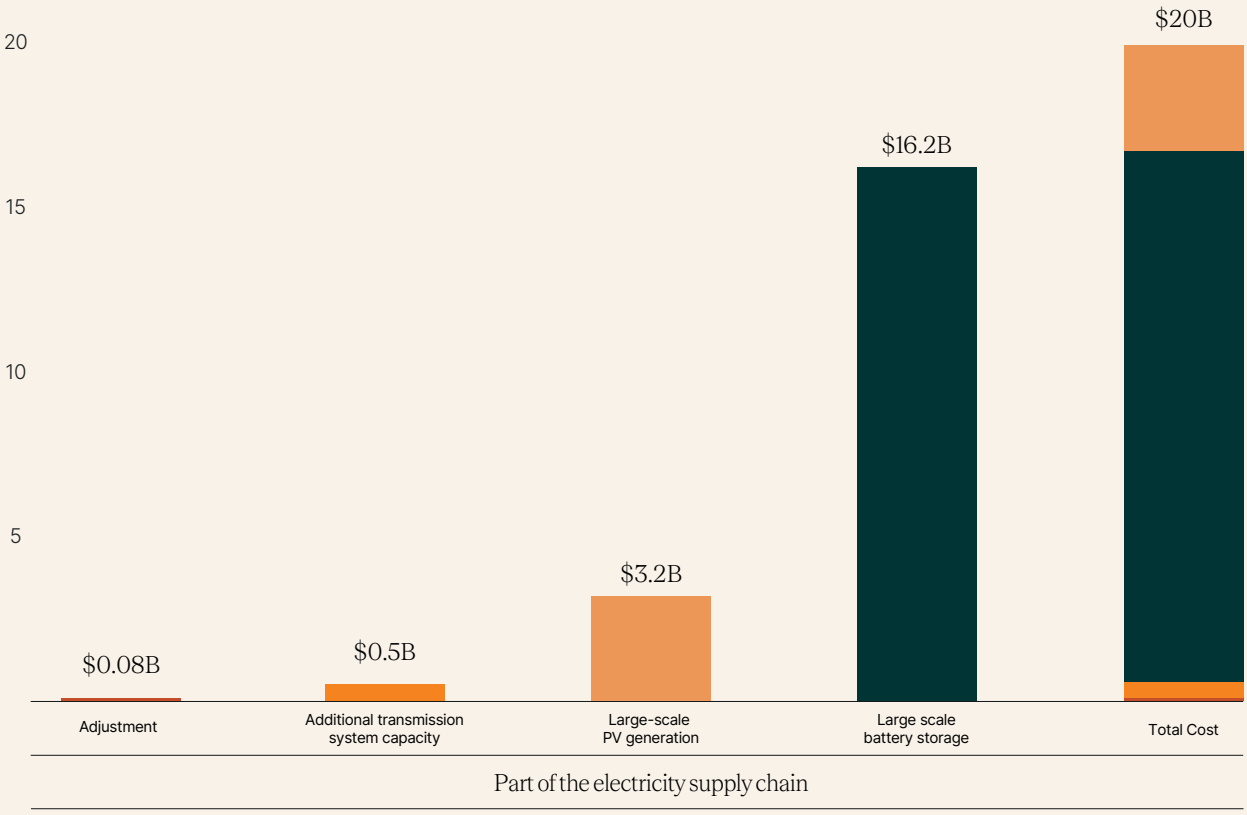


Figure 3: Costs required in the central system to make up for a lower take-up of CER (NPV to 2050, 2023 $ billions)

Distribution Network Infrastructure

To assess the impact that an alternate CER forecast might have on the distribution part of the electricity value chain, we asked SA Power Networks (SAPN) to use their network planning model.[14] They estimated the impact of adopting CSIRO's CER inputs (e.g. rooftop PV, uncoordinated Battery Energy Storage Systems (BESS), and Virtual Power Plant (VPP) BESS) compared to AEMO's inputs. SAPN needed to determine the level of service it would provide its customers, as this drives the required level of expenditure. A unique aspect of AEMO's ISP is that it assumes a fully unconstrained distribution network, despite various levels of curtailment currently experienced by most distribution businesses, including SAPN. Instead of assuming an unconstrained future network, SAPN modelled a scenario where only 5% of customers are curtailed for more than 5% of the time, ensuring a 95% export service level for 95% of customers.

SAPN's model identifies the investments needed to deliver this level of service from 2025 to 2030, and then assumes continued investment from 2030 to 2050 to maintain the desired service level as PV adoption grows and adds to constraints, absent further network investment. This analysis was conducted using both AEMO and CSIRO inputs.

The difference between the AEMO and CSIRO scenarios was $291.6 million. This was prorated based on solar customer numbers to estimate the National Electricity Market (NEM)-wide impact as $2.37 billion.

[13] The annualised capital costs and fixed annual operation and maintenance costs for the Central West Orana REZ were used.
[14] More information on the SAPN CER methodology is available here: SAPN - 5.7.9 - CER Integration Modelling Methodology - January 2024 | Australian Energy Regulator (AER)

State	Total customers	Total solar customers	Network expenditure (95% service levels) per solar customer
NSW	3,772,155	985,778	$712,761,214
VIC	2,946,155	749,575	$541,975,969
SA	906,435	403,357	$291,645,000
QLD	2,373,964	1,031,662	$745,937,381
TAS	293,472	55,487	$40,119,562
ACT	211,951	57,263	$41,403,689
Total	10,504,132	3,283,122	$2,373,842,813

Table 3: Infrastructure costs required in the NEM distribution network to make up for a lower take-up of CER (NPV to 2050)

Savings for all electricity customers

Achieving AEMO's ISP Step Change would result in average annual energy bill savings of $35-71 for all residential and small-business NEM customers until 2050. **This is based on savings of $8.25 per MWh**[15]**.**

Distribution Business	Average annual residential electricity consumption (MWh)	Average annual residential savings at $8.25 per MWh ($)	Average total residential savings over the course of the ISP (2024-2050) ($)
ACT	6.407	52.86	1374
Ausgrid	5.529	45.61	1186
Endeavour	5.981	49.34	1283
Essential	5.477	45.19	1175
Energex	5.481	45.22	1176
Ergon	5.588	46.10	1199
SAPN	4.950	40.84	1062
Tasnetworks	8.619	71.11	1849
Ausnet	5.023	41.44	1077
Citipower	4.350	35.89	933
Jemena	4279	35.30	918
Powercor	4.879	40.25	1047
United Energy	4.544	37.49	975
National Average		45.13	1173

Table 4: Average residential savings over the course of the ISP (2024-2050) if AEMO forecast level of CER take-up is met.

Up to 3.6m more home batteries

Achieving AEMO's ISP Step Change would have the following impacts on home battery installations:[16]

- **1.5m to 3.6m more home batteries (equivalent to 18 more GW).**
- **1.7m to 3.8m more orchestrated home batteries (equivalent 18.9 more GW)**

[15] $7.50 per MWh is derived from the $20 bn savings from the Oakley-Greenwood analysis of the extra large-scale generation and transmission required to fund the shortfall in CER uptake between CSIRO and AEMO Step Change. An additional and $0.75 is for the $2.4 b required in additional distribution network investment due to the shortfall between CSIRO and AEMO Step Change CER forecast

[16] This is based on batteries ranging in capacity from 5KW to 11KW.

18,200 additional jobs

The higher volume of CER under AEMO's forecasts necessitates more workers in manufacturing, installation and maintenance.

FTE positions supported over the period 2025-2050

AEMO forecast
32,700

CSIRO forecast
14,500

Greater chance of achieving renewable energy and emissions targets

Whilst the modelling assumes that differences in the uptake of CER will be substituted by large-scale central PV and battery storage, the timing of large-scale projects is likely to be considerably longer than installation of CER. Not achieving the ISP Step Change CER forecasts presents the risk that, emissions reductions are delayed while additional larger scale projects are constructed to make up for the shortfall in CER. Therefore, achieving CER uptake closer to the CSIRO forecast may result in an extended reliance on fossil fuel plants, such as Eraring in New South Wales, while additional renewable projects are in the planning and construction phase. Whilst both CER and large-scale PV and battery will displace fossil fuel emissions by 2050[17], the longer timeframe for large-scale renewable infrastructure may result in additional emissions in the interim.

Achieving the CER uptake forecast in the ISP Step Change Scenario will better support Australia in meeting its commitments to renewable energy targets and emissions targets.

[17] This is well-supported by ongoing CEC advocacy work through the Market, Investment and Grid Directorate as well as the large-scale Storage and Generation Directorate. CEC advocacy includes work programs on the Connections Reform Initiatives (Connections Reform Initiative | Clean Energy Council) ; social license and community engagement (Community engagement | Clean Energy Council); support for states on renewable energy zone development; and recommendations for Australia's large-scale clean energy transformation (Clean-Energy-Council-Power-Playbook.pdf (cleanenergycouncil.org.au)).

Summary

Achieving the Step Change scenario forecasts for CER can generate overall system savings, reduce consumer energy bills, create jobs and help Australia meet its renewable energy and emissions targets. It could save Australians on average $35-$71 off annual energy bills and generate much higher savings for up to an additional 3.8 million homes with orchestrated batteries. Large growth in batteries and orchestration in particular is needed to deliver those benefits, yet uptake in these areas is slow.

AEMO acknowledges there is a risk that CER will not be "adequately integrated into grid operations" and will conduct a "low orchestration sensitivity to explore the impacts of low orchestration of consumer energy resources on the optimal development path". The principal reason AEMO gives for low adoption of battery orchestration is consumer confidence, proposing that, for consumers to enter into orchestration arrangements they need to be able to "see the benefits of orchestration, overcoming both technical complexity and a lack of perceived value, [and] then trust the energy sector to deliver those benefits".[18]

The next Chapter of this roadmap identifies the reforms needed to meet this challenge, to empower consumers to adopt CER and to achieve the full suite of economic, climate and social benefits.

[18] AEMO, *Draft 2024 Integrated System Plan for the National Electricity Market*, 15 December 2023, p 76.

A National Consumer Energy Resources Roadmap

Methodology for determining policy priorities

Focus on the consumer

Most of the policy work to date on Consumer Energy Resources (CER) has been on making sure the supply side is ready to manage the increasing uptake of consumer energy resources. This top-down approach overlooks the agency of consumers as primary decision-makers in this space and is unlikely to maximise CER uptake.

This Roadmap focuses on policies and measures needed to drive uptake of CER through the decision-making lens of the consumer.

To assist in determining the policy themes, four principles were developed that are aimed at driving consumer engagement.

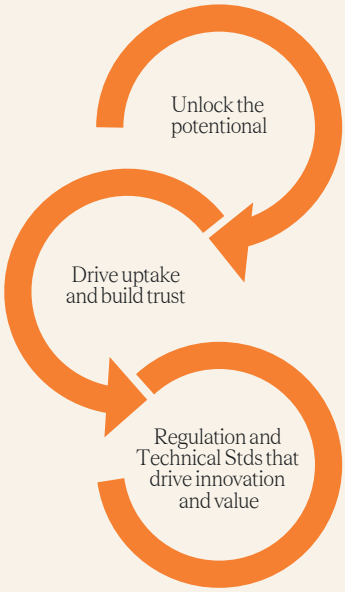
Achieving the roadmap will mean there is clarity on how CER and associated services will reduce energy bills, reward consumers for participating in wholesale and ancillary services markets, and how distribution businesses pay for access to the assets to provide network system services through charging and access arrangements.

Enhance consumer choice and participation.

Reduce/no impact on energy costs for non-participants.

Value to consumer for services provided.

Build social license and trust.



Educate consumers on the products and services best suited for their energy needs and objectives.

Provide consumers with control over their energy use and comfort levels, and save money by transparently and fairly rewarding them for utilising their devices to provide wider system services

Develop the right policy, regulatory and technical standards environment that incentives market participants to develop and offer products and services that support consumers manage their energy demand

The consumer journey

To ensure the focus of the policy priorities were on the consumer, use cases that looked at the consumer journey, touch points and their motivators to take up CER in their homes or businesses were designed. Four consumer journey maps were developed, being:

Typical household and small business

Renters

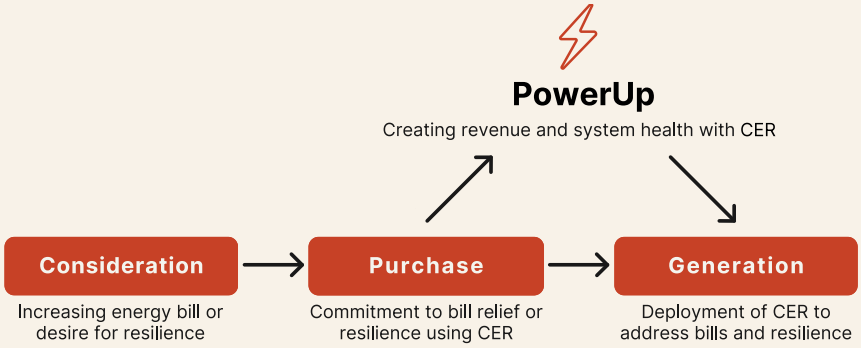
Those living in social or public housing

Large industrial and commercial users

These use cases were mapped from the start of the journey, being the point of considering the take up of CER through to disposing of the assets at the end of their life. The following maps outline these journeys.

Household customers and small business

- Choice
- Empowerment
- Awareness

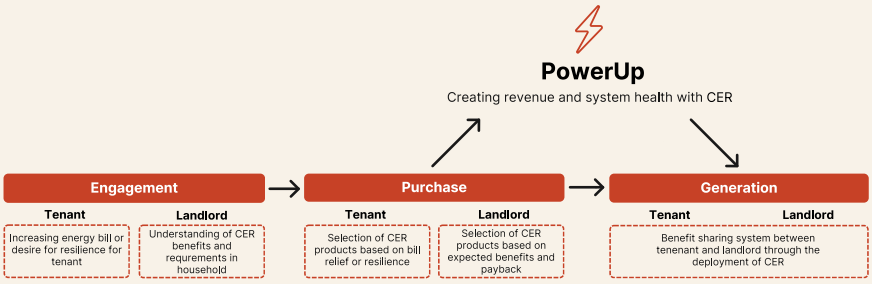


Social and public housing residents

- Communication
- Empowerment
- Awareness

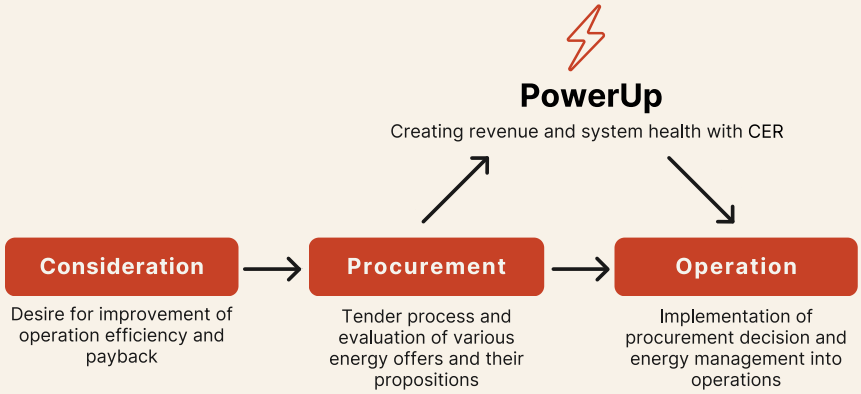
Renter households

- Fairness
- Empowerment
- Communication



Commercial and industrial

- Secure
- Reliable
- Affordable
- Aware



Identifying policy themes

A literature review was also undertaken to identify the range of policy options raised to effectively connect CER to the grid.

There were 16 policy themes identified, being:

Policy theme	Description
Targets	Federal or jurisdictional targets relating to renewable energy or decarbonisation (e.g. the Federal Government setting a target on amount of behind the meter (BTM) solar PV and/or storage by a certain date).
Incentives	Federal or jurisdictional incentives such as rebates or discounts on renewable energy small-scale generation and storage to diffuse upfront costs, where rebate size maximises CER adoption and use without adding upward pressure to electricity prices.
Roles & responsibilities	Ensure the roles of various parties in the electricity sector including AEMO, distribution businesses, retailers and aggregators are clear, readily available to customers and their agents, and result in making it easier for customers to get CER technologies connected and integrated with the grid.
Economic regulation – pricing/tariff	Ensure distribution business tariffs (e.g. flat rate, time of use, demand) incentivise consumers to use their assets for bill savings but also wider system benefits.
Economic regulation – network expenditure review	Introduce approaches in the Australian Energy Regulator's 5-year expenditure review process that incentivise network investment in assets that properly integrate CER with the grid and markets.
Network operations	Encourage the identification, implementation and use of Flexible Exports and Dynamic Operating Envelopes to ensure system productivity is improved and consumers get maximum benefit from their BTM assets when helping reduce electricity system costs.
Technical standards	Establishment and oversight by a National Standards Body of a set of technical standards regarding CER that will include consistent technical criteria, methods, processes, and practices, including safety, functionality, connections, interoperability, cybersecurity, and communications protocols.
Consumer protection	Creation and enactment of laws and requirements to protect consumers surrounding renewable energy products, installations, and data collection.
Data exchange platform	Establish a single and shared platform to allow for the exchange of relevant data between market participants to ensure the use of CER can be recognised and managed to maximise its efficient use within the electricity supply system.
Access to data	The type of data required and market participants that can access data to function. For example, what type of data and information do consumers and their nominated representatives require about electricity supply chain operations and costs that are material for decisions regarding investment in and operation of their BTM assets. Alternatively, what type of data do distribution networks and market participants need so the market functions effectively.
Interoperability	The ability of CER products or energy systems to cooperate with other products or systems to enable consumers to choose their preferred products, suppliers and services with minimal switching time and cost.
Building standards	Integrate BTM meter resources into building standards (e.g. National Construction Code updates requiring solar installations on commercial buildings) where the costs associated with upfront installation outstrip retrofitting premises.
Education & awareness	Improve consumer education and awareness to promote informed entry relating to CER purchases and installations (e.g. Star Ratings).
Product stewardship	Determine roles and responsibilities for the entire lifecycle of CER products including end-of-life management processes such as reuse or recycling.
Greater use of CER on government owned assets	Increase commitment to expanding accessibility of BTM resources for consumers in rental/public housing leasing arrangements (e.g. rooftop solar and/or storage installation on affordable, social, and public housing; and businesses in leasing arrangements).
Nationally coordinated CER policy	A nationally consistent view and creation of supporting policies for the integration of BTM resources.

Determining key policy themes through consultation

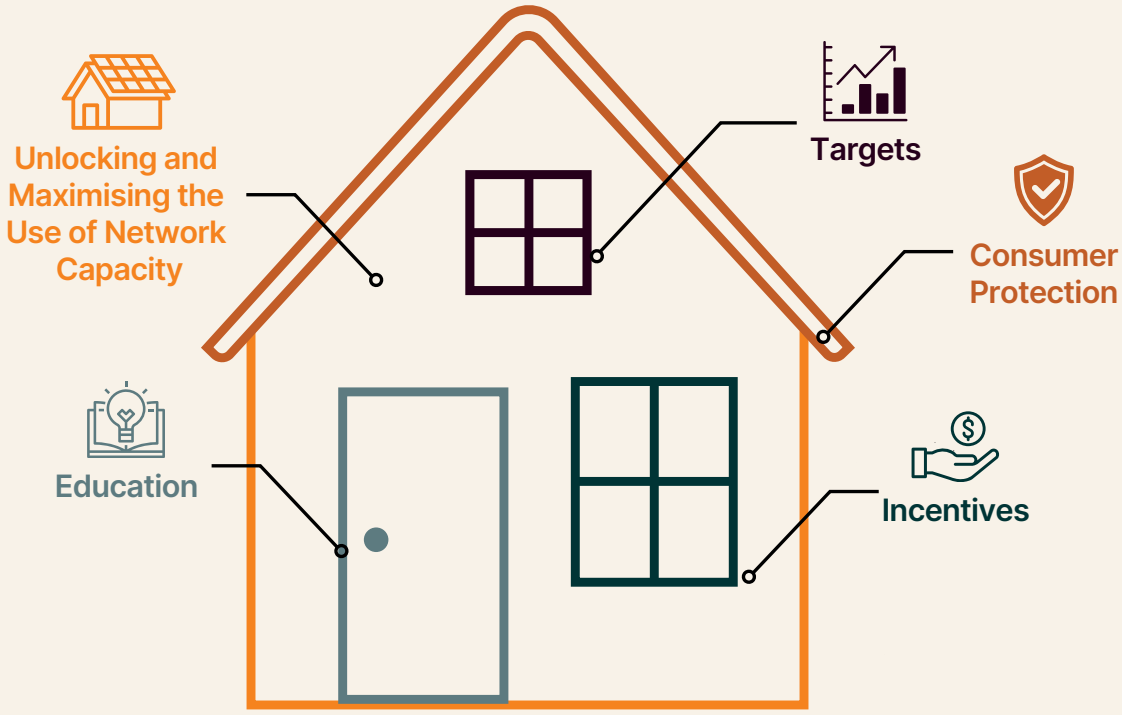
A group of industry associations and stakeholders, with specific expertise in understanding what motivates consumers to participate in the energy transition were brought together. These stakeholders participated in two forums, completed two surveys, and provided direct feedback on developing the Roadmap. The Clean Energy Council is very grateful for their time and knowledge sharing. While their views and feedback were taken into consideration in shaping the Roadmap, the views in this report are Clean Energy Council's alone.

Along with external stakeholder input, the Clean Energy Council's Distributed Energy Leadership Forum (DELF) was the main member body that was involved in developing the Roadmap. The DELF is a committee that comprises members along the supply chain of distributed energy and industry experts. Participation of DELF is by member nomination and invitation for industry experts.

To assist the evaluation, we integrated the four consumer engagement principles, developed on page 18, within our stakeholder consultation. An in-depth explanation of our consultation process, including stakeholder activities, can be found within Appendix A.

Based on this consultation, five policy priorities were identified. These priorities are about making the consumer journey as seamless and easy as possible. If these priorities are not addressed there is a risk that supply side reforms alone will not generate greater consumer participation and will not achieve the full economic benefits.

The Roadmap: recommendations to empower consumers and maximise CER uptake



Policy themes

The five policy priorities are the key areas that need addressing to assist customers in considering the purchase of CER. They will also provide the best opportunities to unlocking the full economic value of CER.

Education

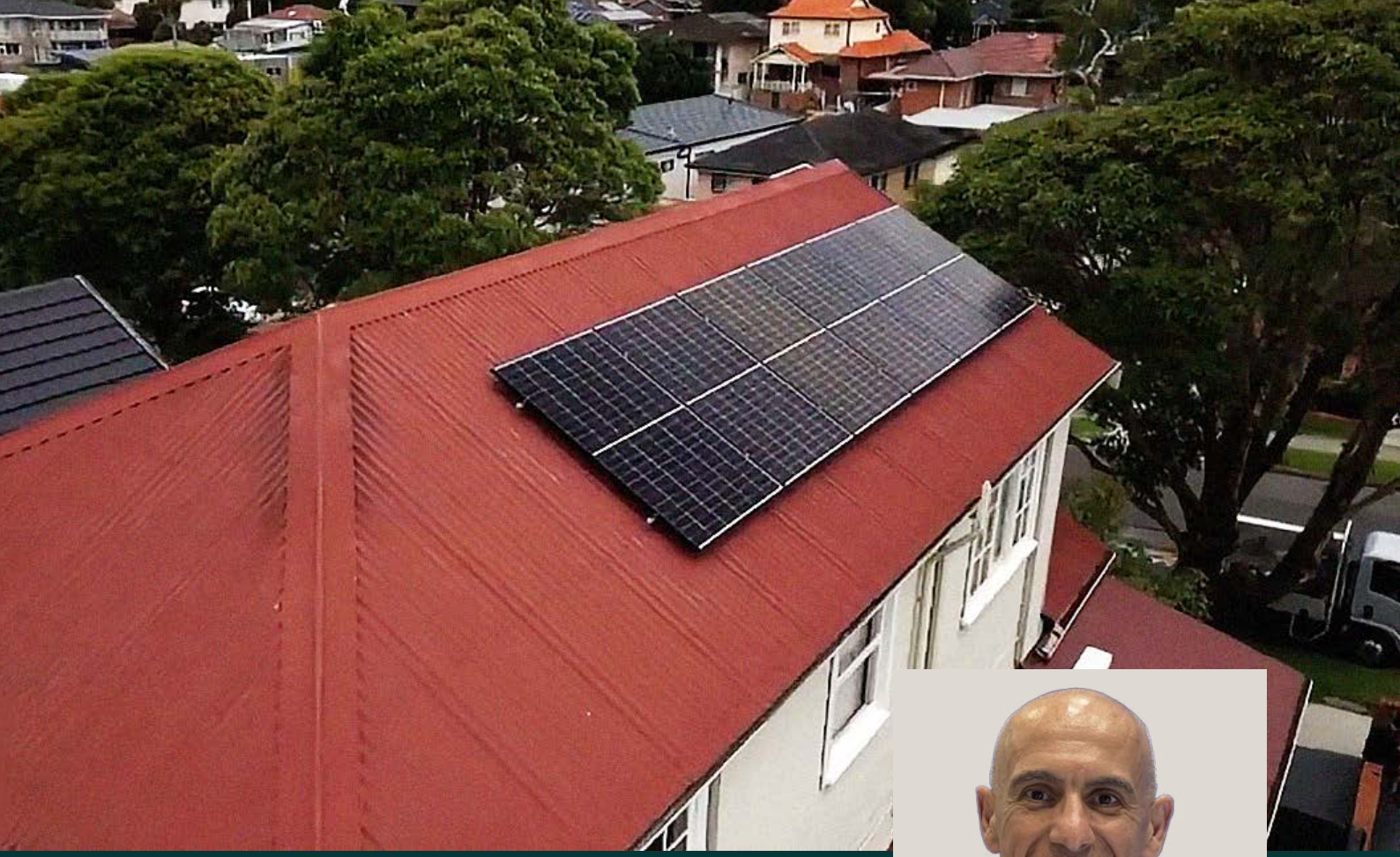
The electricity market is complex. Trying to understand it and the various products, services and pricing options that can be used to manage electricity costs without undue capital investment and/or negative impacts on the household's lifestyle can be confusing. Oddly, the problem isn't a lack of information; in fact, many customers complain that there's too much information, and much of it seems to be contradictory or to only address part of the consumer's situation and questions. This can make it harder to make an informed decision.

The risk of making a bad decision can leave consumers feeling that doing nothing is the safest thing to do. Investing a potentially large sum of money in CER when they have uncertainty over the savings they will make on their electricity bill is a large barrier. Others – particularly those that rent their homes or places of business – may not be permitted to invest in certain types of CER even if they can afford to do so.

What is needed:

- Authoritative information from sources that customers trust.
- Information that addresses the questions customers may have about managing their electricity bills without:
    - Undue or ineffective capital expenditure.
    - Having to undertake changes in their lifestyle that outweigh the saving they produce on their bill.

Education that meets these criteria can assist customers in cutting through the complexity of the electricity market and the technologies available in the market. It can give customers the confidence they need to make decisions that will have good outcomes.



CASE STUDY

Aldo

Mortdale, NSW

Aldo is a mechanical engineer. He largely works from home and uses a reasonable amount of heating and air conditioning in the winter and summer months.

In 2023, as energy prices climbed, he began looking at ways he could reduce his bills by using rooftop solar and a home battery.

After getting numerous quotes, he was still a little unsure of which rooftop solar retailers to trust and turned to Facebook for recommendations, leading him to discover Reposit. Reposit are an innovative retailer, which offers a No Bills service, in which customers pay for the upfront costs of a rooftop solar and battery system but then pay no electricity bills for the length of their contract (typically seven years). Reposit cover customers' energy bills by managing their batteries to sell energy to the grid when spot prices are high and by charging the battery when spot prices and solar generation are low.

Before finding Reposit, Aldo had some uncertainty on the details of getting rooftop solar and a battery. What products were the best for his needs? What was the most efficient orientation and design for his solar system?

"With Reposit, a lot of those unknowns didn't matter", said Aldo. "It's in their interest to work that all out".

He occasionally checks his Reposit app which shows him the amount of money and emissions he's saved since using the service, but he doesn't need to pay much attention to how the system is performing nor does he worry about changing his home habits to maximise his rooftop solar.

"I also don't have to worry about connection charges, feed-in-tariffs, potential solar export fees or any of that", he adds.

He'd like to see more people consider rooftop solar and battery systems seriously and calculate the payback periods for their own circumstances.

"A lot of people believe it doesn't add up, the payback periods are too long", Aldo said. "It's clichéd, but education is important."

Targets

Setting targets to electrify government owned assets and published as part of government policy can provide a strong signal to the CER industry and consumers that the take-up and use of CER is an important part of achieving the country's de-carbonisation goal. Targets make it clear that adopting and using CER is a positive aspect of the energy transition, decarbonisation of the economy and provides confidence for consumers and the industry.

Incentives

Energy efficiency, demand management and CER technologies all cost money – in fact, some have quite high upfront costs that may result in consumers not being able to afford to make a technology investment decision that would be in their medium to long term interests. Incentives can assist customers with these costs.

However, care needs to be taken in developing the level of the incentives to be offered. If the total cost of an incentive is larger than the savings it creates in the electricity grid it will likely increase the price of electricity. This in turn will result in cross subsidies from customers who do not use the technology to customers who do.[19] Where the technologies are much less likely to be adopted even with the incentive, for example by vulnerable customers or customers who are not legally able to put the technology on their residence (renters are an obvious example), the cross subsidies can also be socially inequitable or regressive.

The form of the incentive is also important. Experience has shown that a cash rebate is a far more effective incentive than a low interest loan, whose write-down value has the same present value in monetary terms as the rebate.

Further, creating the right market arrangements can result in actions from other parties that serve to enhance the incentives. For example, ensuring that price signals exist in the market can provide a value proposition that can be used by CER product or service providers. Access to the wholesale market prices signals and network price signals for voltage management or peak demand congestion reduction – while potentially very difficult for individual consumers to respond to – can allow CER aggregators to monetise the likely future value of CER flexibility and offer attractive arrangements such as monthly or seasonal cash payments to consumers with controllable CER.

Consumer Protection

Consumer protection plays an important role in facilitating the adoption of new technologies. Measures such as model contracts, product performance standards, certification of products and installers and warranties all play important roles in reducing the risk a consumer may face in purchasing CER. The speed at which consumer complaints are resolved is also an important factor.

As well as mitigating the impact of any problems for customers, strong consumer protection also serves as a demonstration of the maturity and security of the market to potential customers. Everyone understands that problems can occur. However, an industry that can demonstrate quick and positive resolution of problems when they occur will more likely attract new consumers to adopt its products and services.

[19] This is obvious, but again relates to the free-rider effect discussed above. The cost of the incentive will be determined by all the customers that receive it but the reduction in the cost incurred by the electricity sector is only that due to the impact of the customers who would not have taken up the battery or orchestration in the absence of the incentive.

Unlocking and maximising the use of network capacity through customer choice

As rooftop solar becomes more popular, there are signs that measures are being implemented which could discourage consumers from adopting CER.There are reports that some consumers have been told by their local electricity distribution business that they could no longer install rooftop PV systems, or that if they did, they would not be able to export any of the electricity generated by that system to the network. More recently, there have been concerns that CER users may be charged to export electricity or that the export of PV systems may be controlled and limited by the local electricity distribution business.[20]

On the other hand, the Australian Energy Regulator (AER) has developed a test whereby local distribution businesses can recover the cost of investments that enable additional export of electricity from rooftop solar systems where that additional export can be shown to result in cost reductions in the wholesale electricity market (and therefore put downward pressures on customers' bills) that exceed the cost of the distribution business' investment.

Clearly, this is a complex area. What is needed are mechanisms whereby the value that CER can provide to the local network can be recognised, acted upon and rewarded in accordance with the value provided. This will require initiatives in areas that are disparate yet complementary in their impact as:

- Providing more easily accessed and more easily used information on where the network has capacity to accommodate additional CER and where the ability to control CER's export and import of electricity can reduce the network's costs.

- Creating pricing arrangements and price signals that CER users can access that will reflect the impact of the use of their CER systems in ways that reduce or increase the costs the local network will incur in its current operation or in meeting customer energy requirements in the future.

- Setting technical standards regarding the functionality and performance of CER systems that reduce the potential for CER systems to cause problems in the electricity supply system but without reducing their ability to help reduce the customer's energy bill.

- Developing market mechanisms that will reduce the need for and guard rails that will strictly define and limit the conditions under which the output of CER can be curtailed by the local electricity distribution business. Most fundamentally this will only be allowed when all available market mechanisms have been exhausted and the alternative to that curtailment is a major disruption to electricity supply in and beyond the local area.

- Clear communication of all these measures to ensure customers and their agents understand:

    - The potential value to be derived from the use of CER to reduce costs in the local network as well as the benefits the customer can derive from these actions.

    - The conditions under which the output of their CER systems can be curtailed and the likely frequency and durations of these conditions in the local area and the loss of CER production that would result.

To best understand how these five priorities and their associated policy priorities could be used to overcome barriers to CER in the customer experience, they were mapped onto the existing consumer journeys, shown on page 27.

[20] These fears resulted from several sources. One was the decision rule change that allows networks to charge CER uses for exporting electricity where doing so can be shown to increase or bring forward network augmentation costs that would otherwise have to be recovered from all customers (AEMC, 2021). Another was the decision made by several state governments (Department of Energy and Climate, 2023; Department of Energy, Environment and Climate Action, 2023) to implement backstop mechanisms that could be used to curtail rooftop PV export at times when extremely low levels of electricity demand could threaten the stability of the electricity system potentially leading to catastrophic failures and outages – despite the fact that such events are likely to occur very rarely, particularly if other measures like the flexible export arrangements that SA Power Networks has put in place are used (SA Power Networks, 2024).

Household customers and small business

- Choice
- Empowerment
- Awareness

PowerUp

Creating revenue and system health with CER

Consideration

Increasing energy bill or desire for resilience

Consumer Protection

Expansion of the NETCC

Awareness of consumer protection

Education

$100m CER Community Empowerment fund

Train the trainer for business associations and community groups

Segmented research of households' and small business' understanding and expectations regarding future energy use

Purchase

Commitment to bill relief or resilience using CER

Incentives (to buy)

National Home Battery Saver

Nationally based energy productivity scheme

Generation

Deployment of CER to address bills and resilience

Consumer Protection

Specified dispute resolution under the role of the Ombudsman

Unlock and Maximise the Use of Network Capacity

Choices that match to the consumers' choice of CER

- Network Flexible Export Services
- Price Signals
- Network Support Contracts
- Solar Soak Tariffs
- Incentivise Consumers to Request Cost Reflective Tariffs

Network visibility

Emergency backstop arrangements as a genuine last resort

National Technical Standards and Governance body

Incentives (to PowerUp)

Encourage market-based incentives

Targets

Orchestration of CER

Social and public housing residents

- Communication
- Empowerment
- Awareness

Targets

CER uptake on government buildings

Engagement

Benefits and impacts of electrification in the household

Education

Segmented research of social and public tenant's understanding and expectations regarding future energy use.

$100m CER Community Empowerment fund

- Engagement in multiple languages.
- Community group involvement in communicating the benefits of CER.

Implementation

Installation of CER in Government owned assets

Unlock and Maximise the Use of Network Capacity

Price Signals

Generation

Deployment of CER to reduce bills and achieve decarbonisation targets

Unlock and Maximise the Use of Network Capacity

Emergency backstop as genuine last resort with AEMC establishing rules and parameters

Renter households

- Fairness
- Empowerment
- Communication

PowerUp

Creating revenue and system health with CER

Refer to Household Customers & Small Business Consumer Journey

Engagement

Tenant

Increasing energy bill or desire for resilience for tenant

Landlord

Understanding of CER benefits and requirements in household

Consumer Protection

Expansion of the NETCC

Awareness of consumer protection

Education

$100m CER Community Empowerment fund

Train the trainer for business associations and community groups

Segmented research of renter household's understanding and expectations regarding future energy use

Purchase

Tenant

Selection of CER products based on bill relief or resilience

Landlord

Selection of CER products based on expected benefits and payback

Incentives (to buy)

National Home Battery Saver

Nationally based energy productivity scheme

Providing Opportunities for Renters to participate in CER

- Incentives for landlords.
- Expansion of the Energy Efficiency Labelling Scheme.
- Expansion of Home Energy Efficiency Disclosure Program for renters.
- Minimum energy efficiency standards in rental properties.

Generation

Tenant

Landlord

Benefit sharing system between tenenant and landlord through the deployment of CER

Consumer Protection

Specified dispute resolution under the role of the Ombudsman in rented properties

Commercial and industrial

- Secure
- Reliable
- Affordable
- Aware

PowerUp

Creating revenue and system health with CER

Unlock and Maximise the Use of Network Capacity

Price Signals

Network Support Contracts

Consideration

Desire for improvement of operation efficiency and payback

Procurement

Tender process and evaluation of various energy offers and their propositions

Incentives (to innovate)

ARENA and CEFC sponsored projects seeking to promote innovation and commerciallisation of leading edge BTM solutions.

Operation

Implementation of procurement decision and energy management into operations

Key priorities

Further detail on the specific policies and other initiatives that are recommended within each of the priorities discussed above is provided overleaf.

KEY PRIORITIES

National CER Community Empowerment Fund

The implementation of a $100 million CER Community Empowerment Fund (with the option to be funded at $10 million annually for ten years) is high priority to support consumers to understand how CER can work for them.

Overview

Most of the investment made to date by governments has been on CER technologies and related infrastructure. While this has been quite successful in terms of the amount of rooftop solar that has been taken up, a very different type of investment will be needed to attain the level of take-up and orchestration of home battery capacity that is currently anticipated in (and an important component of) the ISP Step Change scenario. Of central importance will be an education effort to build awareness of the value of orchestrated CER and how it works, but also trust in not only the technologies, but importantly, the equipment manufacturers, installers, electricity retailers, aggregators, and other third parties that will be instrumental in delivering that value.

Education can significantly increase the number of consumers willing to consider CER technologies and make the initial part of their adoption and use journey smoother and quicker. As noted earlier, for education to be as effective as possible it needs to speak to the needs and concerns of different types of consumers and needs to come from a trusted source.

Specifically, a $100 million CER Community Empowerment Fund will be:

- Coordinated and funded by the Federal Government, with state governments able to top up the effort in their jurisdictions.
- Planned by a steering group comprised of consumer and CER industry representatives.
- Developed by expert parties through a tender process led by the steering group.
- Adapted for and delivered to local audiences by community, regional and small business groups.

Key priorities

Specific activities recommended as inputs to and means for delivering the educational campaign include:

Segmented research of households' and small business' current understanding and longer-term expectations regarding energy use in the future

The aim of this research will be to provide a better understanding of the current barriers to the take-up of CER and its orchestration. This should also consider the perceived impact of CER on non-participants, renters and social housing tenants and the willingness of participating CER consumers to support policies and programs that extend the benefits of CER to non-participants. The findings of this research will serve as an input to the development of educational campaign materials aimed at addressing misconceptions or knowledge gaps regarding CER and its use.

The research will seek to understand the attitudes and expectations that households and small businesses currently bring to the consideration of and decision process regarding the adoption and use of CER, as well as the experiences of those that have already purchased and used CER.

The research will also seek to understand consumers' expectations about the role that CER can and should play in Australia's energy transition including how that can be funded equitably. Findings in this regard will be used to build social license into the messaging of the education campaign and to provide input to further policy recommendations.

Consultation to guide the development of the educational and campaign materials

This consultation will ensure that a greater and more granular understanding of the drivers and expectations of different customer segments is brought to bear on the educational and campaign materials.

Train the trainer for business associations and community groups

Train the trainer programs will be developed and offered to community groups and small business associations through state level networks such as the local, regional business communities and State Chambers of Commerce.

These programs will aim at familiarising leaders in these organisations with the financial and long-term benefits of investment in, and use of CER by their constituents.

The programs will work with organisations to adapt the educational material for use with their constituents through a variety of channels, including printed material, online tools and workshops.

The Fund will also support these groups to trial CER solutions for their businesses, local communities or regional areas.

CASE STUDY

Haymes Paint

Ballarat, VIC

Born in Ballarat in 1935, Haymes Paint is the largest Australian Made and Owned paint brand. Haymes Paint started investigating rooftop solar back in 2018 as they looked for opportunities to lessen their environmental impact and it seemed a natural fit for a manufacturing business with large roof space and peak production times in the day.

Haymes Paint installed its first system in early 2019, generating 99MWh in that first year before expanding in 2024 to a system that now generates 493MWh per year.

“There has been movement in energy pricing so it’s complex to determine, but with the introduction of our expanded rooftop solar network we are forecasting that we will be able to halve the amount of our monthly energy bill,” said Rod Walton, CEO of Haymes Paint.

“This saving would be even greater if we could effectively use storage systems to better align our energy demand with renewable energy generation.”

As a paint manufacturer, reliable, affordable energy is critical to maintaining their competitiveness, and they have recently joined a local energy cooperative called the Ballarat Energy Network. The initiative, currently in the feasibility phase, aims to share consumer energy resources between a network of local homes and businesses across the whole of Ballarat. It’s a bold and ambitious plan that could help over 100,000 people save on their energy bills.

“This will include harnessing local renewable energy generation and increase access to commercially competitive renewable energy,” Rod Walton explained, “We are excited to see the opportunities that this will provide to Ballarat businesses and the wider community.”

KEY PRIORITIES

Targets for government use of CER

Overview

The Federal Government and each of the state governments have already set targets regarding de-carbonisation. Some have also established incentives (discussed in more detail below) for the installation of CER technologies as a means of helping to reach their de-carbonisation targets. The Oakley Greenwood modelling undertaken in this Roadmap shows that how CER is operated is critically important to ensuring the energy transition is achieved with the least disruption and at least cost to consumers. Targets considering the orchestration of CER in addition to its installation should be set as a means for assisting in reaching de-carbonisation targets in as orderly and economical way as possible.

Key priorities

A target for the orchestration of CER

Orchestrated CER plays a significant role in the Step Change scenario of the ISP, which has been considered the most likely path on which the electricity sector will develop to meet announced policy positions.

Specifically, the Step Change scenario assumes that 80% of the 33.5 GW of BTM batteries installed by 2050 will be orchestrated. At present, under 18% of BTM batteries are orchestrated.

Governments should establish targets for orchestration that recognise and put appropriate focus on its importance for ensuring the clean energy transition is as smooth and affordable as possible. The orchestration targets themselves should be set in reference to the ISP.

As in the case of any target, progress made against it should be reported regularly which will also be valuable for measuring efficacy.

CER uptake on government buildings

The federal and state governments should set targets for the installation and economic use of CER, including rooftop solar and storage, on all owned government assets and assets used under long-term leases. Schools, hospitals, social/community housing, public administration buildings and defence facilities (including housing) are all prime locations in which governments can target installation of CER technologies.

In the first instance, all new publicly funded buildings should include CER technology uptake in the planning phase. Governments should also set a date (preferably by 2030) to install CER technologies on existing publicly owned facilities, where feasible. In addition, when renting premises, governments can consider and express a preference for premises that are energy efficient and utilise CER technologies.

This is an important step in building consumer confidence in the value of CER technologies. Consumers will have greater confidence in the technology if they see governments leading. Further, consumers who use these facilities will get first-hand experience in the benefits of these technologies, which will support their understanding and decision-making.

KEY PRIORITIES

Incentives

Overview

Incentives have been used with success by the federal and state governments to drive the take-up of CER. The use of incentives should be extended to orchestration and materially strengthened in regard to rental properties.

Incentives for orchestration will need to be designed differently from those that have been used in the past to encourage the take-up of energy efficiency technologies and rooftop solar. Those incentives needed only to encourage the initial purchase and installation of those devices, as their impact on the energy consumption (and production) did not require active operation. As a result, the incentive can be developed based on the present value of the lifetime impact of the device. This increases the amount of the incentive, which increases its power to offset the first cost of the technology.

The benefit provided by orchestration, in contrast, comes from its active operation, which depends on the consent of the owner of the CER system. This makes providing an incentive to the system owner (or the installer of the system who then passes the value of the incentive on to the system owner) based on its lifetime benefit highly conjectural, as the owner may at any point simply stop using the CER in an orchestrated fashion. In addition, because orchestration requires the ability to receive, integrate and react to price signals and other information that varies on very short time intervals, it is virtually always undertaken by an agent on behalf of the CER owner. Under these conditions the most effective incentive may be one targeted at the agent, who can then use it to attract CER owners. In this case, the incentive will need to be able to be associated with the CER system and to be moved from one agent to another in the event the CER owner switches to a different agent or withdraws entirely.

Policy Priorities

National Home Battery Saver

This incentive will encourage the purchase, installation, and orchestration of rooftop solar and home battery systems. It will be structured in two pieces – the first for purchase and installation, which could be provided as an upfront rebate reflecting the lifetime value of an un-orchestrated PV and battery system, and the second will be provided annually (or on some other time interval basis) if the system is orchestrated.

The availability of a separate, recurring incentive for orchestration will be expected to build social license for, and continue engagement in orchestration, which is an important component of the Step Change scenario.

It is also sensible for the incentive to vary based on:

- The size of the PV array and battery capacity, as these factors determine how much energy the system can expect to be absorbed from the grid.
- The state in which the system is installed, as the value of the energy that system can export or absorb will vary based on the wholesale price in that state.
- The average annual level of solar radiation in the area where the system is installed, as this will also affect the amount of energy the system can export to or absorb from the grid.

The size of the incentive will be set to reflect the value of the system to the grid (i.e., the extent to which its operation in either an un-orchestrated or orchestrated fashion can be expected to reduce costs in the electricity supply system). However, to be cost-effective, the amount of the incentive will also need to take into account the number of systems that would have been expected to be installed even if the incentives were not available.

It is also the case that the wholesale market benefits of CER vary from state to state along with the price of electricity. Modelling taking these differences into account determined that incentives of the following amounts would be cost-effective[21] in increasing CER take-up and orchestration above the levels forecast by CSIRO:

State	Incentive for purchase and installation of a BTM battery	Upfront incentive to orchestrate the battery
NSW & ACT	$2,250	$1,000 (all states)
VIC	$2,500	
QLD	$3,000	
SA	$5,500	

Based on this modelling, the potential savings of achieving the AEMO forecast of CER take-up suggests that policies and programs should be considered to the extent that their incremental impact on CER take-up (as represented by the benefit provided by that incremental take-up) exceeds the costs of those policies and programs.[22]

Type of Solar PV and Battery Usage	Annual Bill Savings
Customers that install PV and an un-orchestrated battery	$900 to $1,000
Customers that installs PV and an orchestrated battery	$1,150 to $1,500

For further information see the Clean Energy Council's '***It's Time to Back Batteries***' policy.[23]

Nationally based energy productivity scheme

The intent of this scheme will be to encourage the take-up of CER products and services as part of the electrification of homes and businesses. It will also seek to capitalise on the operational efficiencies available through harmonisation of the various certificate-based energy efficiency obligation schemes that are already in operation.

The current state schemes have different features that are valued and should not have to be sacrificed. Rather, the purpose will be to develop an overarching national scheme that is broadened to support energy productivity through both energy efficiency improvements and decarbonisation with support of CER products and services. The following principles could help in the design of the national scheme, while keeping the integrity of current state schemes intact:

- A national scheme should leverage the achievements of the state energy efficiency schemes. A national working group could be established to align and standardise state schemes such as theSouth Australian Residential Energy Productivity Scheme, NSW Energy Efficiency Saver Scheme and the Victorian Energy Upgrade Scheme so that state-based certificates may contribute towards a national target.
- Administrative efficiencies could be built in so that state-based energy efficiency certificates are equivalent and liable businesses only deal with one regulator, undergo one compliance audit and have a single surrender date.
- Opening up state-based schemes so that all state certificates are equivalent (in terms of contribution to a national target) could increase certificate liquidity driving lowest cost abatement.
- To achieve the best emissions reductions outcomes, the Federal Government should encourage all states to participate and could negotiate with each state to assign proportional state certificate targets.

[21] This modelling was undertaken in a different study, but the assumptions used were consistent with the approach used in this project. For more details on other study see, PowerPoint Presentation (cleanenergycouncil.org.au)

[22] Incremental take-up is the key factor because if an incentive is offered it can be assumed that all consumers that were forecast to purchase or orchestrate a battery in the absence of the incentive will still do so and take the incentive. It is only the consumers that would not have purchased or orchestrated a battery without the incentive whose impacts can be counted as the result of the incentive. In sum the costs of an incentive must include the cost of all incentives paid, but the impact of the incentive is calculated based only on the incremental take-up resulting from the availability of the incentive. The effect of some incentives going to consumers who would have been expected to take the action even without the incentive is referred to as the free-rider effect.

[23] PowerPoint Presentation (cleanenergycouncil.org.au)

Encourage market-based incentives

Tariffs are targeted to – and need to be understood and responded to – by end consumers. Many (but not all) of the services that CER can provide to the grid are short-lived, are needed only intermittently and arise at relatively short notice. As a result, tariffs are not the best means for signalling the need for these services.

Aggregators can develop market incentives to mobilise the use of end-consumer owned CER but in some cases only where they are a market participant (i.e., a registered retailer) or are acting as an agent of a retailer. For example, aggregators can:

- Manage wholesale price fluctuations – but only where (a) the aggregator is a retailer, (b) the aggregator is acting as the agent of a retailer, or (c) the customer is on a real-time retail market offer.
- Provide FCAS services – but only where the aggregator is a retailer, is acting as an agent for a retailer, or is a demand response service provider (DRSP).
- Provide network management services – but only where the network voluntarily chooses to provide such a price signal or where the network enters into a support contract with the aggregator or where there is a tariff that the customer is assigned to or can elect to be on, such that the aggregator is essentially acting as the customer's agent with regard to the price signals provided by that tariff.

Regulatory attention should focus on ways to allow these price signals to be available to and acted upon by CER aggregators (and individual owners where they can do so).

Providing opportunities for renters to participate in CER

The ability for incentives to induce landlords to install CER systems or improve the energy efficiency of their properties may be limited while rental markets remain at tight levels. However, it is worth developing incentive designs that are likely to be effective when market conditions change. These could include:

- The provision of incentives for landlords to replace gas appliances with energy efficient electric appliances and electric appliances that can be controlled to operate only in 'solar soak' periods, when solar generation is high.
- In line with governments showing leadership by setting a target timeframe to install CER technologies on their assets, they should prioritise installation of CER technologies for social, community and public housing stock. Many state governments[24] provide programs to support electrification of social housing as well as for renters, and this recommendation will complement these programs with the installation of CER technologies. As identified in the previous chapter, CER technologies provide additional cost savings on bills. If governments sign these assets up to orchestration programs, this will drive even further consumer benefits.[25]
- Expand the Energy Efficiency Labelling Scheme[26]and make the Home Energy Efficiency disclosure program[27] available to renters. This will promote the use of a labelling scheme to inform potential renters of the energy efficiency, CER technologies and likely average monthly bill of rental units. This can incentivise landlords to improve the efficiency and take up of CER technologies.

In addition to incentives, there should be a commitment by governments for the implementation of minimum energy efficiency standards in rental properties. Minimum energy efficiency standards will assist households reduce their bills and speed up the phase out of gas appliances within homes. Standards should be in line with the National Energy Performance Strategy, seeking to coordinate long-term action that improve energy performance and health benefits.[28] Healthy Homes for Renters[29] outlines these requirements should come into effect for rental properties by the end of 2025, with a mandatory, enforceable, and inclusive (covering social and private rentals) scheme. These standards should be specified in regulation and could include rental properties to be assessed to a specific standard, similar to the Nationwide House Energy Rating Scheme for new builds.

[24] These include the Victorian Energy Upgrades program and Solar Homes Program (https://www.esc.vic.gov.au/victorian-energy-upgrades-program) and (olar.vic.gov.au/solar-homes-program), the NSW Energy Savers Scheme and Peak Demand Reduction Scheme (https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/energy-security-safeguard/energy-savings-scheme) and (https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/energy-security-safeguard/peak-demand-reduction-scheme), the South Australian the South Australian Retailer Energy efficiency Schemes (REES), and the ACT Energy Efficiency Improvement Scheme and Sustainable Household Scheme (https://www.climatechoices.act.gov.au/policy-programs/energy-efficiency-improvement-scheme) and (https://www.climatechoices.act.gov.au/policy-programs/sustainable-household-scheme).

[25] Social housing added to the Tesla virtual power plant - Australian Renewable Energy Agency (arena.gov.au)

[26] Equipment Energy Efficiency Program | Energy Rating

[27] National Framework for Disclosure of Residential Energy Efficiency Information (dcceew.gov.au)

[28] National Energy Performance Strategy - DCCEEW

[29] Final Community Sector Blueprint - Mandatory Minimum Rental Standards (squarespace.com)

KEY PRIORITIES

Consumer protection

Overview

Fit-for-purpose consumer protection can be an important means for enhancing confidence is emerging technologies and markets. The new Energy Tech Consumer Code (NETCC) is a voluntary code of conduct designed by peak industry and consumer bodies that builds on existing mandatory consumer protection regulations defined by the Australian Competition and Consumer Commission (ACCC).[30] At present, the Code applies to rooftop solar, battery storage, EV chargers, home energy management systems. Retailers and installers of these technologies are required to establish and maintain business practices that meet specified standard of consumer protection standards, including fair and honest quotes, ethical sales practices, and after-sales customer service.

While the AEMC and the AER have attempted to outline new fit for purpose consumer protection obligations for CER[31] this work has been largely completed by consumer and industry groups and provides a template.

This work commenced in 2017, when the COAG Energy Council requested that Energy Consumers Australia work with industry to cooperatively develop a single industry wide Code of Conduct. This was to encompass all behind-the-meter electricity supply services and products. The outcomes of this work served as a foundation for the establishment of the NETCC and greater consumer protections on CER.

In 2019, the Clean Energy Council, the Australian Energy Council, the Smart Energy Council and Energy Consumer Australia lodged an application[32] for ACCC authorisation for the New Energy Tech Consumer Code (NETCC) on behalf of themselves and future signatory providers of new energy technologies.

The Code[33] establishes minimum standards of good practice and consumer protection provided by signatories and applies to all aspects of the customer experience. This covers initial marketing and promotion, offering, quoting, contracts, finance and payments, installation, operation, warranties and dispute resolution processes.

The intention of the Code is to raise standards of consumer protection for residential and small business customers that purchase and install new energy technology products, thereby strengthening consumer confidence, and encouraging innovation and development of choice for consumers.

Signatories to the Code agree to comply with several obligations, including:

- Avoidance of high-pressure sales tactics.
- No offers of finance in unsolicited sales not regulated by the National Consumer Credit Protection Act (2009).
- Responsible provision of consumer finance products, with effective dispute resolution and avenues to address customer hardship.
- Clear and accurate advertising.
- Education to consumers on their rights.
- Provision of clear product performance and maintenance information.
- Extra steps taken to protect vulnerable consumers.
- Implementation of effective complaints handling processes.

[30] New Energy Tech Consumer Code | ACCC
[31] See the AEMC's National Energy Consumer Framework (https://www.aemc.gov.au/regulation/energy-rules/NECF-ACL/mapping/service-standards-quality#:~:text=The%20ACL%20provides%20general%20protections,other%20things%2C%20gas%20and%20electricity) and the AER's Review of consumer protections for future energy services (https://www.aer.gov.au/industry/registers/resources/reviews/review-consumer-protections-future-energy-services)
[32] AA1000439 - New Energy Tech Consumer Code - Application Received - 29.04.19 - PR.pdf (accc.gov.au)
[33] New-Energy-Tech-Consumer-Code.pdf (newenergytech.org.au)

The CER marketplace is rapidly evolving with new technologies and business models, the NETCC provides a quick and effective way to build consumer confidence in them.

Key Priorities

Raising awareness

There is a role for governments to raise consumer awareness of the NETCC and the protections it offers consumers when dealing with a NETCC signatory. Similar to the Heart Foundation Health Star Rating System[34], where consumers can confidently make decisions around food that is healthy, a well-constructed and publicly funded consumer awareness campaign for the NETCC can raise awareness of the program and provide consumers with confidence on the level of support they will have available to them when dealing with a NETCC signatory.

Expansion of the NETCC

Given the rapidly evolving nature of the market, there is also an opportunity to review the scope of the NETCC by (a) extending its coverage to include a greater variety of new energy products (e.g. hot water heat pumps), and (b) requiring all technology providers and installers participating in any federal or state-based incentives or program to be NETCC-certified.

Specified dispute resolution under the role of the Ombudsman

Establish the Energy Ombudsman as the entity responsible for resolving disputes regarding new and emerging energy technologies and establish a specific process for doing so. A specified dispute resolution pathway through one trusted source will ensure consistent handling of customer complaints and reduce confusion for consumers wanting to escalate any issues they encounter.

[34] Health Star Rating, http://healthstarrating.gov.au/internet/healthstarrating/publishing.nsf/Content/home

KEY PRIORITIES

Unlocking and maximising the use of network capacity through customer choice

Overview

The distribution network is largely a fixed asset. As such, the higher its utilisation, the more cost efficient it becomes; that is, the lower its capital cost per unit of electricity delivered.

The most important driver of the capital costs of the distribution network has traditionally been peak demand.[35] The size (and therefore the cost of the network) is determined by the largest amount of energy it needs to be able to deliver at a single point in time in each local asset area.[36] Recently, voltage management has also become a potential area-specific driver of the need for network capacity. The need for voltage management increases dramatically in the middle of mild, sunny days in spring and autumn in areas where there is a high penetration of rooftop solar systems. At those times, a high amount of solar-generated electricity will be exported but there will be relatively little demand in the local area to use it, resulting in an increase in voltage.

The use of CER can reduce both peak demand and voltage, thereby increasing utilisation of the network and reducing the need for capital expenditure to increase network capacity.

As reported in the previous Chapter, this outcome delivers real consumer price benefits for both the consumers who invest in CER technologies and other users by reducing their per unit costs for using the distribution network. Given distribution network costs make up around 40 to 50% of consumers' bills, these savings to consumers can be significant by unlocking and maximising the use of existing network capacity. Importantly, it should not be taken for granted that consumers who take up CER technologies will automatically provide access to their solar generation and storage for use at different times to better utilise the network. It will be incumbent on the energy sector to properly value and share these benefits. Further, it will be important for retailers and market intermediaries such as CER equipment providers and aggregators to develop simple value propositions to encourage consumers to be more flexible regarding how and when they use and export electricity.

Key priorities

Choices matched to the consumer's choice of CER

Different configurations of CER offer different levels of potential for increasing the utilisation of the network. More choices should be available that reflect this potential and customers' varying levels of willingness to allow their CER systems to be operated by someone else in response to electricity sector costs.

The following options could be used to give CER customers more choice and benefits and that will also benefit other electricity users.

- **Network Flexible Export Services**

Flexible export arrangements – like the one offered by SA Power Networks[37] – give a customer with rooftop solar the choice of either a relatively low, fixed export limit that can be used any time, or a larger export limit that will be available to them whenever possible, but adjusted as needed based on the available network capacity.

SA Power Network has been offering flexible export arrangements in selected areas of its service territory for the past two years, and expect them to be available almost everywhere in its service territory by the end of 2024. Experience has shown that their flexible export arrangement has been strongly preferred by CER customers to the fixed export limit option. It is also the case that these tariffs allow a greater amount of rooftop solar to connect to the grid and a greater amount of solar-generated electricity to be exported to the grid than does

[35] More recently the replacement of aged assets has become a very significant driver of network capital expenditure.

[36] This is because the distribution network is actually comprised of a large number of smaller, local network areas, including zone substations that step down the voltage received from the transmission (or sub-transmission system) to 22 or 11kV, HV feeders that distribute electricity from the zone substations to the distribution substations that convert electricity to the voltage used in homes and small businesses. Where peak demand exceeds the capacity at any of these levels in a local area, capital expenditure will be needed to augment the asset (or demand management will be need to keep local area demand with the capacity of that asset).

[37] An infographic explaining SA Power Networks' flexible export arrangements is available at https://www.sapowernetworks.com.au/public/download/?id=324009. Additional information can be found at https://www.sapowernetworks.com.au/your-power/smarter-energy/flexible-exports/flexible-exports-eligibility/.

a fixed export limit. This results in greater utilisation of the available network capacity, greater use of de-centralised renewable energy, a better outcome for CER owners, and potentially lower network charges for all network users.

These arrangements are particularly well-suited to a CER customer who has a PV system but not a battery, although will also work for CER customers with batteries.

Greater use of flexible export arrangements should be considered by more distribution businesses and encouraged by the AER. Distribution businesses offering these arrangements could be required to publish the level of export they allowed CER customers to enjoy in the previous year and what they are expected to allow in the future. The SAPN proposal to achieve current export service of 95% for 95% of customers, is a good example of how distribution businesses can provide more certainty to consumers of expected access to the network for their flexible energy.[38] Publication of the actual export and export capacity realised under the flexible export tariff will provide current and prospective CER owners with more information about the likely outcome of its use for their CER system. This will build social license and trust by giving customers an indication of how constrained the network is in their local area and how often and how much curtailment of their export they should expect.

- **Price signals**

Distribution businesses can provide price signals that reflect real- or near real-time conditions in the network. These signals can be both area- and time-differentiated, allowing the network to reflect the value of a change in the customer's load or export (either up or down) to the network at that time and in that place.

These sorts of price signals will be best suited to CER customers with orchestrated batteries because they allow the CER system (and some controllable loads) to be used at short notice, for different durations and in different directions (i.e., flex up or flex down).

Price signals are already used by some retailers and aggregators to allow customers with CER systems (and demand response capabilities) to respond to wholesale electricity and ancillary services price signals. Distribution businesses could use price signals to encourage flexibility for peak demand and voltage management.

Ausgrid's recent Project Edith[39] provides an example of how dynamic network prices can be used to support customers better maximise their CER assets through a retailer or aggregator managing the consumer's battery in a VPP.

- **Network support contracts**

Distribution businesses can contract with consumers (or their agents, which is the more usual approach for small customers) to alter certain loads in exchange for compensation, which generally takes the form of a reduced tariff or direct payments. A significant advantage of network contracting is that it can be used in the specific parts of the network where flexibility is needed and can reflect the different types and amount of flexibility needed in different parts of the network.

Network demand response programs are an example of network contracting, though some CER systems can provide either demand reductions or demand increases – both of which can be valuable to the distribution business and the wholesale electricity market at different times.

In March 2024, CitiPower and Powercor announced a partnership with Piclo, a flexibility services and market access service provider, to deliver a cloud-based local flexibility platform.[40] The development of such platforms is a positive step by distribution businesses in exploring options to solve network constraints through seeking flexible energy capacity from CERs across their networks.

Network support contracts (like price signals) will be best suited to CER customers with orchestrated batteries because they allow the CER system to be used at short notice, for different durations and in different directions (i.e., flex up or flex down).

Orchestration services could be provided by the customer's retailer or a third party such as an aggregator.

- **'Solar Soak' tariffs**

Some tariff arrangements could allow customers without CER to also help increase network utilisation. A prime example is the solar soak tariff, which is already being offered by a number of distribution businesses and retailers.

Solar soak tariffs provide a low (in some cases very low) price for electricity consumption in the middle of the day – those hours during which export from rooftop solar systems can raise voltage levels in the local network area and result in negative wholesale electricity prices and stability issues in generation and transmission systems.

Solar soak tariffs will encourage consumers without CER to move discretionary or semi-discretionary loads like clothes or dishwashing to the middle of the day, with benefits to the consumer, the electricity supply system, and other customers. Some changes will be exceedingly simple – like moving the time-controlled water heaters are charged from night time to the middle of the day – which is already being done by Energy Queensland and some other distributors.

[38] See page 74, SAPN 2025-30 Regulatory Proposal Overview - January 2024.pdf (aer.gov.au)
[39] Project Edith - Ausgrid
[40] Piclo launches grid flexibility solution in Australia through partnership with CitiPower and Powercor.

- **Incentivise Consumers to Request Cost Reflective Tariffs**

Approval for mechanisms that incentivise customers to try more cost reflective network tariffs. For example, the South Australian REPS program incentivises residential consumers to switch from a single rate electricity tariff plan to a Time of Use or prosumer electricity tariff plan[41]. Such a policy response can be captured in a national energy productivity scheme. See page 33 for more discussion.

Further examples of incentives could include stop-loss arrangements that allow the consumer to try a cost reflective network tariff for a period of time with a guarantee that they will not incur a loss by doing so, before having to make a decision whether to stay on the new tariff or revert to the old one. This 'try it' approach was used successfully in California to allow customers to find out that they could relatively easily manage and save money on a critical peak day tariff which includes very high prices on about six days a year that the customers are warned about a day in advance.

Emergency backstop arrangements must be used as a genuine last resort

Emergency backstop arrangements have been put in place or announced in several states and provide a fundamentally important means for ensuring that the electricity grid remains stable and secure under minimum demand conditions.

In the near future, a combination of storage, pricing and dynamic operating envelopes for rooftop solar will be the leading solutions to addressing minimum demand conditions. As a result, clearly defining an emergency backstop response with appropriate guard rails as to when it will be triggered is needed. This will better complement market-based solutions for managing minimum demand events and will be consistent with the arrangements already in place for distribution area load shedding during shortfalls of generation or transmission capacity. Clear definition of when emergency backstop arrangements will be used will allow customers to understand the extent to which their use of CER is likely to be interrupted, which will increase confidence and acceptance of those arrangements.

The AEMC, with input from AEMO and other stakeholders, should take the lead on establishing the rules about under what conditions and how emergency backstop measures can be invoked. Some principles that will be useful in doing so include:

- National consistency: As Australia is a relatively small market, national consistency is a key criterion in keeping industry implementation and ongoing management costs as low as possible.
- Interoperability: this should be a core driver to ensure consumers can switch service providers without any constraints or additional cost.
- Consumer empowerment: encourage industry to innovate and drive service improvements based on consumer preferences on how they like to use their rooftop solar and storage assets, as well as ensuring consumers are rewarded to use their energy as flexibly as possible, and industry only take control of CER as a genuine last resort emergency.

In addition, the use of a lack of demand signal – similar to AEMO's lack of reserve notifications – could provide early information that could assist the market (especially CER aggregators) in reducing the potential for harm caused by breaching minimum demand thresholds.

Network visibility

More and better accessibility to and visibility of the ability of the local network area to accommodate additional solar export will:

- Give current and prospective CER owners and CER aggregators better information and more confidence in making investment and business decisions.
- Provide a better basis on which distribution businesses could consider and employ price signals and contracted service arrangements to manage voltage and peak demand at the local level in the LV network.

At present, the best information of this type for all distribution networks is available from the Network Opportunities Maps.[42] As noted on the website, the maps "provide consistent, transparent annual planning data to identify opportunities for distributed generation, energy storage and other non-network solutions to address network capacity constraints and reduce costs for customers". The maps provide information on the current installed capacity, peak demand and planned augmentations and deferral value of transmission and distribution networks down to the zone substation level."

This is valuable information, but most CER owners and CER aggregators will be more interested in available capacity in the LV network (i.e., below the zone substation level). One distribution business, AusNet Services, has developed information at the distribution feeder level (i.e., the level just below the zone substation) as part of its data for the Network Opportunity Maps. Another network, Essential Energy, has already established a publicly available portal through which customers and aggregators can identify the level of network capacity available in the LV network at a very local level.[43]

[41] REPS specification (energymining.sa.gov.au)
[42] See https://www.energynetworks.com.au/projects/network-opportunity-maps
[43] See https://www.essentialenergy.com.au/connections/about-essential-connections.

The AER is currently conducting a project[44] exploring the feasibility of different means for and the benefits of the provision of increased network visibility. That project has issued a Consultation Paper[45] and provided the opportunity for interested parties to provide submissions. The next step in the project will be to conduct several demonstrations of how enhanced visibility of the LV network could be provided. Outcomes and learnings can be expected to significantly assist in making this information more widely and easily available.

The AER could also consider requiring network businesses to:

- Publish whatever level of visibility they currently have (including information on the confidence level of that information).
- Develop and submit plans describing how they intend to improve visibility of information on their network operating capacity as part of their regulatory submissions (noting that the AER will also need to have a means for assessing the cost/benefit of the expenditure required to provide that incremental visibility).
- Outline how they will engage in collaborating on procuring non-network solutions.

National technical standards and governance body

The lack of national oversight in setting technical standards has resulted in jurisdictions imposing different technical standards solutions that fragment the CER supply industry unnecessarily driving up costs and complexity for consumers.

A set of national standards, overseen by a central body such as the Clean Energy Regulator, should be established and maintained. To the extent that these national standards improve aggregate CER system performance, they could be expected to:

- Improve value for CER customers.
- Reduce customer concern about sub-standard outcomes, thereby increasing take-up of CER technologies.
- Result in fewer occurrences of poor outcomes for customers that install CER systems, thereby increasing consumer confidence.

Compliance with the standards should focus on certification and ensuring compliance at the time of installation through the installation and commissioning process, rather than relying on assessments of compliance post installation (i.e., after problems have occurred).

Apart from the need for national consistency and coordination, the national body will also require a set of hierarchy of priorities that are focussed on delivering the right consumer outcomes and therefore encouraging consumer take up and participation.

As a starting point, the body should have the authority to clearly outline the roles and responsibilities of all market participants as well as the correct processes of who is authorised to develop the appropriate technical requirements and oversee their implementation. The AEMC 2023 review into CER Technical Standards[46] is an example of when there is no clear roles and responsibilities of how well intended standards are not implemented in the most effective manner and lead to poor customer outcomes and costly industry rectification.

An improved national governance structure will help to ensure ongoing compliance issues raised are prevented or managed better in the future. The following principles should drive the design and development of a governance framework for CER technical requirements:

- Promote a structure that supports industry to innovate and unlock CER revenue streams for consumers.
- Acknowledge that consumers are the investors and owners of these devises.
- Cede control over the functionality of the devices to the consumer/owner.
- Reward the consumer for consenting that their devices provide wider system support services.

A recent AEMC study determined that nationally consistent standards, with clear roles, responsibilities and processes for CER could be expected to generate at least $500 million in net benefits to consumers.[47]

[44] See https://www.aer.gov.au/industry/registers/resources/reviews/network-visibility.
[45] ESB - Consultation paper - Network visibility - Benefits of increased visibility of networks - July 2023 | Australian Energy Regulator (AER)
[46] Review into consumer energy resources technical standards | AEMC
[47] AEMC, Final Report, *Review into Consumer Energy Resources Technical Standards*, 21 September 2023. Available at https://www.aemc.gov.au/sites/default/files/2023-09/RCERTS%20Final%20Report.pdf

Summary of Priorities

	Priority	Responsibility	Timeframe
Education 	$100 million CER Community Empowerment Fund to support consumers to understand how CER can work for them	Federal Government funding and delivered through local governments, community groups, consumer and social organisations, small business groups	Ongoing 2025-2035
	Training program for communities and organisations to build trusted advocates	Federal Government, state chambers, community & regional groups, local councils	Ongoing 2025-2035
	Review into household and business energy futures to better understand consumer attitudes and behaviours with CER	DCCEEW, universities, consumer & social organisations	Completed by end of 2026
Targets 	Target on government-owned CER assets to demonstrate support and leadership	Federal Government, state governments, local governments	Introduce by 2025
	Government target for the orchestration of CER	Federal Government, state governments, local governments	Introduce by 2025
Incentives 	National Home Battery Saver to accelerate uptake of batteries and orchestration	Federal Government	Introduce by 2025, ongoing 2025 - 2040
	National Energy Productivity Scheme to broaden energy efficiency schemes to include CER	ECMC	Introduce by 2025
	Encourage market-based incentives to open up new revenue opportunities for consumers	AEMC as rule-maker and Aggregators as developers and providers of services	Ongoing
	Provide opportunities for renters to participate in CER and incentivise landlords to upgrade	Federal and state governments	Introduce by 2026, ongoing 2026-2040

	Priority	Responsibility	Timeframe
Consumer Protection	Raise consumer protection awareness to improve consumer trust	Federal and state governments, Clean Energy Council	Ongoing
	Expansion of the NETCC to establish a national trusted protection scheme for consumers	Federal Government, state governments, local governments, community groups, ACCC	2024-25
	Specified dispute resolution under the role of the Ombudsman to provide consistency for consumers	Federal Government, state governments, local governments, NETCC Council and administrator	Introduce by 2025
Unlocking & Maximising Network Capacity	Participation options for consumers to match their choice of and use for CER	ECMC, AEMC	Ongoing
	Network visibility to ensure customers can actively participate and provide system-network services	ECMC, distribution businesses, retailers, aggregators	2024-25
	National Technical Standards Governance Body to ensure products and services deliver on consumer promise	ECMC	Introduce by 2024, operational by 2025
	Nationally consistent and genuine last resort Emergency Backstop Arrangements to ensure consumers get full value from their assets	ECMC	2024-25

Thank you

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Appendix

Appendix A: Stakeholder engagement process

To best evaluate the 16 themes (identified on page 23) in terms of importance and alignment with principles, a survey of external stakeholders and Distribution Energy Leadership Forum (DELF) members was conducted, where stakeholders rated each policy theme in terms of relevance to each principle. An example of the survey questionnaire can be found below.

Rate the below policy option against each principle using the scale. The rating is based on how relevant the policy options is against achieving the principle.

Targets: Federal or Jurisdictional targets relating to renewable energy or decarbonisation (e.g. the Federal Government setting a target on amount of behind the meter (BTM) solar PV and/or storage by a certain date, potentially aligning to AEMO's ISP Step Change Forecast.)*

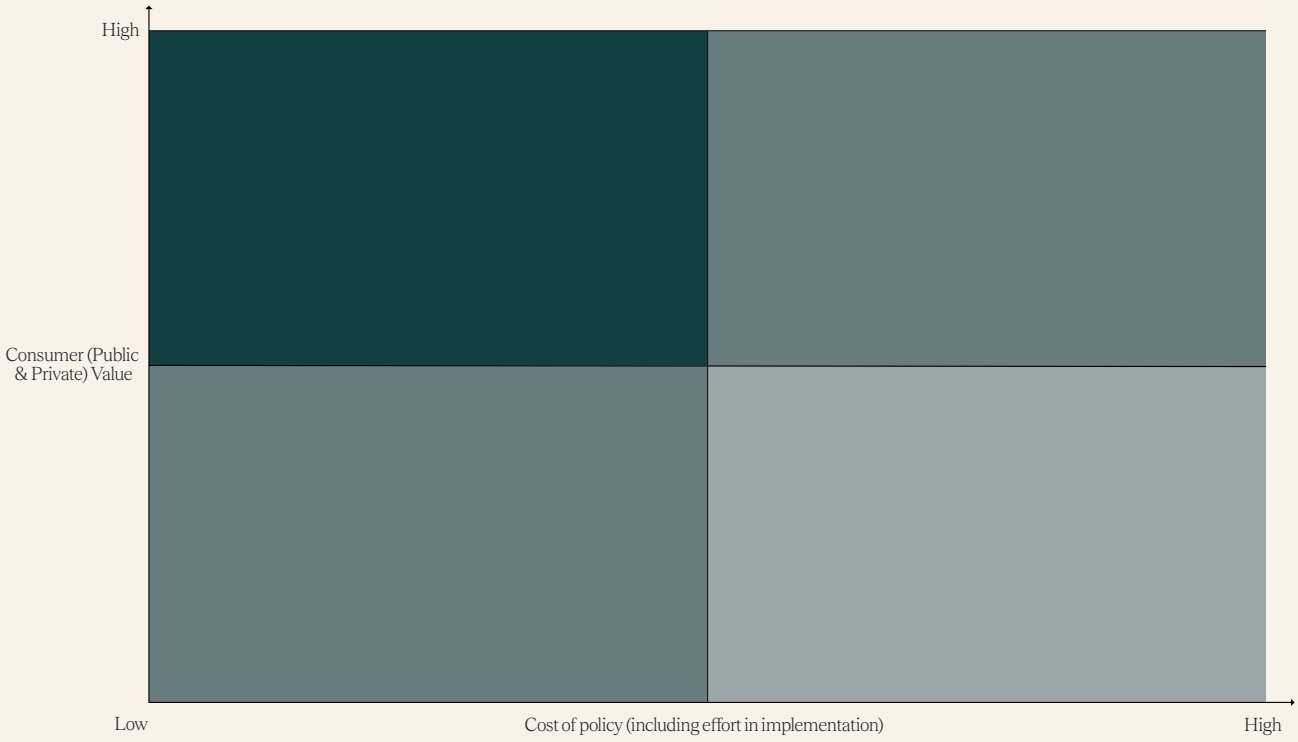
	Not Relevant	Partially Relevant	Relevant
Enhance Customer Choice and Participation	☐	☐	☐
Value to Customer for Services Provided	☐	☐	☐
Reduce/No Impact on Energy Costs for Non-Participants	☐	☐	☐
Build Social License & Trust	☐	☐	☐

Survey participants were asked to rank the four consumer principles in order of importance.

After completion of this task, external stakeholders and DELF members were asked to assess the policy themes against an evaluation matrix that considered each policy theme by its perceived consumer value (both private and public) and its cost (including implementation).

If a participant rated a policy as 'relevant' against each of the four consumer principles this would be considered as high consumer value.

Evaluation Framework: Policy Options

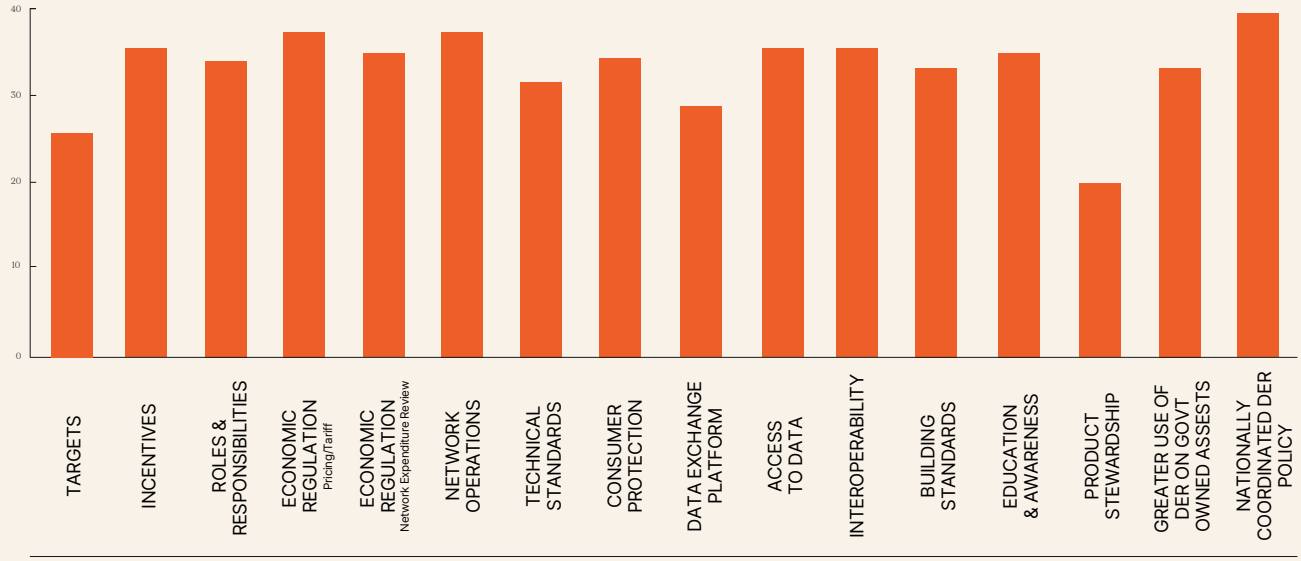


Targets	Incentives	Roles & Responsibilities	Economic Regulation Pricing/tariff
Nationally Coordinated Der Policy	Network Operations	Technical Standards	Consumer Protection
Economic Regulation Network Expenditure Reviews	Data Exchange Platform	Access To Data	Interoperability
Building Standards	Education & Awareness	Product Stewardship	Greater Use Of Der On Govt Owned Assets

The aim of the work was to identify the policy themes that were most important in unlocking the consumer barriers along the decision-making process. Specifically, the work focused on policies that addressed demand side barriers as opposed to supply side.

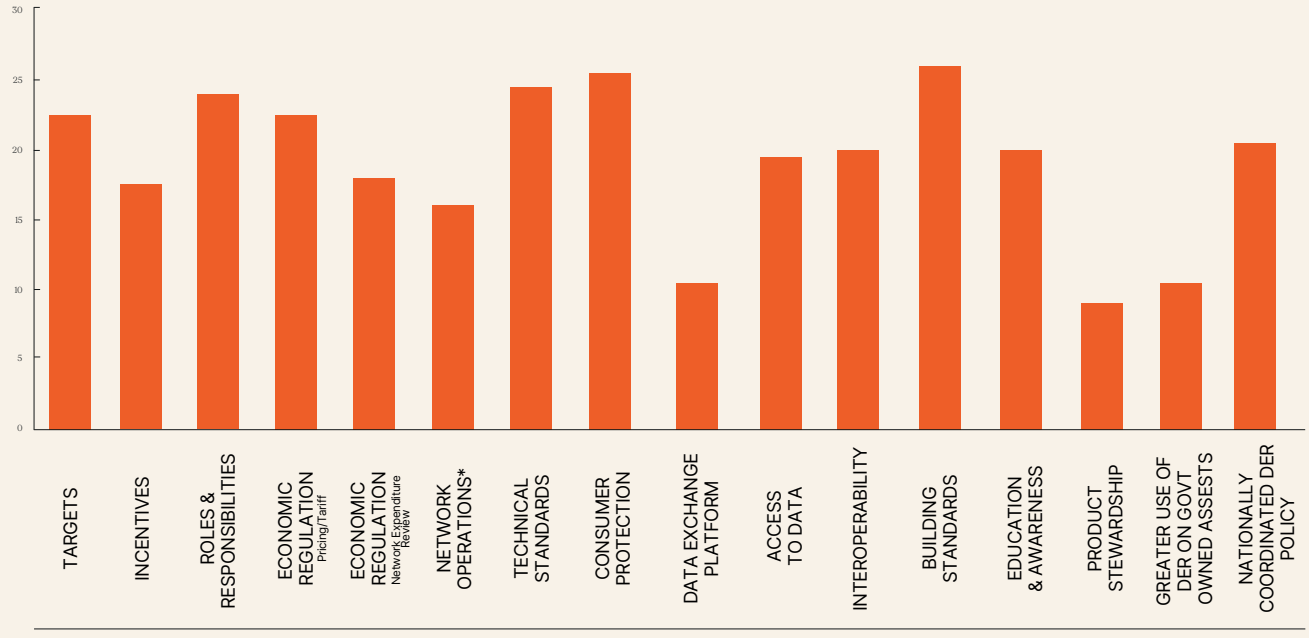
Survey Results

The overall Survey results analysing the 16 proposed policy themes indicated incentives, economic regulation, network operations and nationally coordinated CER policy as the top policy themes:



The evaluation map reinforced network regulation and operations as generating high consumer benefit. The evaluation framework also identified consumer protection, education and building standards as areas of policy that can drive high consumer uptake and value.

Policy evaluation framework results



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