14 December 2024

AEMC
Level 15
60 Castlereagh St
Sydney NSW, 2000

Submission to EPR0097 | The pricing review: Electricity pricing for a consumer-driven future

Dear AEMC,

Thanks for the opportunity to make a submission to the pricing review. My responses to the consultation questions are below.

I will also submit the Summary Report of a project I undertook in 2020–22 when I was working at Renew, which I refer to in my submission. This report has not yet been approved for public release; however I have been given authority by Renew to share where useful to contribute to policy processes and change. I've marked the pdf of the report as confidential, please refer to it as necessary in this review but do not make it available for public distribution. If you have any questions about this, please reach out to me.

Yours sincerely

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Responses To Consultation Questions

Question 1: Do you consider that we should make any changes to our proposed approach to this review?

Nothing that comes to mind.

Question 2: What are your views on our proposed Consumer Preference Principles?

Principles should be expressed in terms of desired outcomes, not customer wants. E.g. rather than Availability – customers want electricity to be available when they need it, say "Electricity is available when customers need it". This aligns with the review's approach of working backwards from the desired future.

An additional principle could be this one which is implied to a certain extent by CPP 3 but is so important it should be clearly stipulated: "Customers do not have to actively engage with the market to access an affordable ongoing supply of electricity."

a) Are you aware of additional existing research that could help us refine the CPPs?

Not strictly research, but Renew's paper "Empowering the future: appropriate regulation and consumer protection in emerging energy markets" develops a solid principle for how consumer protections should be identified and applied with respect to new and emerging energy products and services:

> *To drive good consumer outcomes in the changing energy market, appropriate energy specific consumer protections should not be limited to situations where volumes of energy are purchased and delivered through the conventional grid. Rather they should be applied based on:*
>
> - *the extent to which the service or product in question is being relied on by the consumer to deliver the essential service of a continuous supply of electricity; and*
> - *the impact on the consumer of experiencing payment difficulties and hardship.*
>
> *The absence of basic protections for products and services that aren't currently under NECF will lead to a perverse outcome where, for example, a consumer with a product or service provided by a retailer or network business has a higher standard of customer protection than one with the same product obtained from another provider. Further, the current approach of limiting the reach of regulation to where energy is metered and traded runs the risk of creating loopholes. For example, the provider of a product or service could avoid complying with some consumer protections and other requirements simply by not selling energy on a per-unit basis – thus avoiding the need for an exemption." (p. 6)*

This principle should inform assessing decisions, frameworks, policies, etc. with respect to how they deliver on CPP 5 – appropriate protections.

b) How might the CPPs help us in assessing whether our decisions will lead to good consumer outcomes?

Decisions should be explicitly assessed on how and to what extent they are capable of producing the desired outcomes expressed in the principles.

Question 3: What are your views on our proposed Consumer Archetypes?

a) For the purposes of this review, do the Consumer Archetypes capture the diversity of future energy consumers?

I would use the term 'agency' rather than 'resources' – it encompasses resources as well as other factors that affect capacity to act (such as, most obviously, housing tenure; but also other less tangible factors such as mental load, education and expertise, access to information, etc.). With this change, the proposed Consumer Archetypes do capture key aspects of the diversity of future energy consumers with respect to their levels of engagement and their level of agency.

b) For the purposes of this review, do you agree that engagement is the primary axis of differentiation among electricity customers?

No, though it is important. But equally important is customers' load profiles – these can be grouped into a number of different shapes and have a huge bearing on how time-variant pricing impacts customers energy costs, and on the value of CER and other energy products and services for households. Victorian DNSP AusNet Services identified five distinct usage patterns among its residential customers, and five sub-segments of the most common pattern. A similar approach was used in the Joint Victorian DNSPs project to analyse the impact of time-variant tariffs on residential customers while developing their tariff proposals for the 2026–31 EDPR.

Question 4: We want stakeholders to help us imagine the widest range of possible future products, services, and pricing structures. How might they look in the future? For example, you might consider:

a) How have products and services evolved in similar markets that were disrupted by new technologies, for example, in telecommunications and point-to-point transport?

There are two particular evolutions that stand out:

- A shift from paying per unit to paying for a level of service. This is particularly evident in mobile phone retail offerings, that shifted from charges per call and SMS,

to tiered offerings based on number of minutes of calls or, increasingly, speed and capacity (monthly data allowance). Similar pricing is used in audio and video streaming services where tiered pricing gives access at a certain level of quality (resolution of audio and video, number of concurrent streams, presence or absence of ads) irrespective of how much or little the service is used.

- Real-time dynamic demand-based pricing. This is most evident with taxi-like and ride-sharing services such as Uber, but can also been seen to a certain extent in some other industries such as concert tickets. These rely on real-time demand and locational data and are also associated with oligopolistic markets, where consumers have little choice of alternatives with fixed pricing. Uber and other taxi-like services are particularly interesting examples because other key aspects are prices usually lower than the conventional alternatives, but with surge pricing much higher; and surge pricing often correlating with time periods and/or locations when/where other alternatives (such as public transport) are not viable.

Electricity is a service, not a product (this is why it's post-paid, not pre-paid), and it's not hard to imagine how these modes of pricing and supply could be applied to electricity.

b) What new innovations are we starting to see in current offerings?

There's been surprisingly little innovation in energy retail products. But the instances of innovation that have occurred align with the offerings I discussed above and are likely to be more broadly realised in the future. In particular:

- 'All You Can Eat' pricing: this was offered by Origin in Victoria (if not elsewhere) several years ago – I'm not sure if it is still offered. Customers were offered a fixed monthly cost irrespective of their usage.

- Discounted pre-payment option: Powershop offered an energy usage app, updated daily form smart meter data, and enabled customers to pre-purchase quantities of energy at a discount, credited against future usage.

- Real-time dynamic pricing: Amber Electric offering aimed at engaged consumers with CER, which charged a monthly fee plus import and export at wholesale market rates. Like most innovative services, reliant on access to smart meter data.

- Hybrid provision as a fixed price service: an evolution of Origin's 'All You Can Eat' model. This has been provided by Sonnen and possibly (?) other equipment vendors. Sonnen's model was an upfront cost for a solar and battery installation (with variations for households with existing solar and/or batteries), with a monthly fixed price for electricity usage up to a threshold. As part of the arrangement, Sonnen could operate the solar and battery as part of a VPP or otherwise to provide ancillary services.

c) *What electricity products and services are available internationally that aren't available here?*

I'm not familiar enough with energy products and services outside of Australia to answer.

d) *Which technological trends may impact the electricity market, beyond those already discussed in this paper?*

The existing technological development of CER (solar, batteries, and EVs – but also dynamically controllable appliances, virtual power plants, home energy management systems, and so on), which will see a continued rapid uptake of CER in an increasingly diverse cohort of customers, will emphasise what is already true but not often recognised: that energy is a service, not a product; and that people generally care less about the details of the products and services that deliver energy and more about the utility and amenity that energy delivers. It's already happening, but increasingly more and more households will get their energy needs met by a mish-mash of different products and services. Retail offerings that guarantee to deliver an agreed utility or amenity outcome (such as daily or monthly kilometres for EVs, or maintaining internal temperatures within a specified range) for an agreed price, or other approaches that are more evidently service delivery rather than selling units of electricity, are likely to become more common.

e) *What types of pricing structures might align well with the proposed Consumer Preference Principles?*

Offerings of guaranteed prices for tiers of service delivery appear to align well with the CPPs as expressed – matching value for money and affordability with different levels of availability or capacity. But this does risk financially vulnerable households self-disconnecting or self-sacrificing basic amenity (as many with prepayment electricity meters already do) by lowering their expectations and under-consuming in order to avoid unaffordable prices. This will be a challenge to CPP 5 (Appropriate Protections), especially if CER and novel energy service remain outside the regulatory scope of energy-specific consumer protections.

It's important here to distinguish between network and retail pricing. While retail tariffs usually reflect the structure of the underlying network tariff, they don't have to. Retail pricing rarely reflects the variability and volatility of wholesale pricing. As cost-reflectivity in the energy system becomes more important – in order to best convey the value of CER at different times and locations (see Energeia's technical report from Renew's CER Enablement Project) – alignment with the Consumer Preference Principles will increasingly require retailers to manage network pricing variability across their portfolios in order to offer small customers appropriate and manageable pricing. A key aspect of this is likely to be pricing that reflects the levels of complexity and load shape of customers' energy usage, rather than simple unit pricing.

Question 5: How could electricity products, services, and pricing structures be presented to serve future consumers?

Ideally, electricity products and services need to represent the diversity of customer needs. Default offers that represent fair price and conditions are ideal for un-engaged or low engagement customers (such as the standing offer was supposed to embody, and as the DMO and VDO seem to be attempts to replicate) – but we need to ensure that these don't become the 'price to beat' and thus the most expensive offers in the market (as happened to the old standing offer in Victoria). We also need to ensure that a default offer is implemented in such a way that it doesn't prevent more complex product + service offers aimed at more engaged consumers from being available (as happened to an extent with the VDO, which seemed to make Powershop's pre-purchase discount approach unviable).

Since the advent of retail competition, the policy approach seems to have been to provide a default offer as a backstop measure, for customers to be given if absolutely necessary. This was never a good fit with the reality, supported by much customer sentiment research, that most people just want the energy they need for the things they need and want to do, and don't really want to engage with the energy market. Going forward, an approach that makes default offers the standard, with the opportunity for more engaged customers to adopt more innovative and complex offers, is a better fit.

This does not obviate complex underlying pricing. Rather, it puts the onus on retailers and other energy service providers to manage the complexity and risk of the underlying cost stack – as they are best placed to do – and craft offers that meet the varying needs and capacities of different customers.

Question 6: How could consumer protections be balanced to enable further innovation in a future retail electricity market?

The consumer protection framework must embody the principle (mentioned above) identified in Renew's 2016 paper "Empowering the future: appropriate regulation and consumer protection in emerging energy markets" in order to safeguard consumer outcomes with respect to new and emerging energy products and services:

> *To drive good consumer outcomes in the changing energy market, appropriate energy specific consumer protections should not be limited to situations where volumes of energy are purchased and delivered through the conventional grid. Rather they should be applied based on:*
>
> - *the extent to which the service or product in question is being relied on by the consumer to deliver the essential service of a continuous supply of electricity; and*
> - *the impact on the consumer of experiencing payment difficulties and hardship.*

> *The absence of basic protections for products and services that aren't currently under NECF will lead to a perverse outcome where, for example, a consumer with a product or service provided by a retailer or network business has a higher standard of customer protection than one with the same product obtained from another provider. Further, the current approach of limiting the reach of regulation to where energy is metered and traded runs the risk of creating loopholes. For example, the provider of a product or service could avoid complying with some consumer protections and other requirements simply by not selling energy on a per-unit basis – thus avoiding the need for an exemption. (p. 6)*

A key rationalisation for this principle is the recognition that now and in the future, a household's 'essential energy supply' may be provided by privately owned or leased CER and energy services, as well as grid-supplied energy. This is particularly pertinent as state governments in several jurisdictions heavily promote and subsidise CER as a way to reduce energy costs and contribute to the social good of emissions reduction. The old wisdom that solar and battery owners were wealthier and more engaged consumers who could look after themselves, is no longer true (if it ever was).

As the paper discusses, this does not mean that new and emerging energy products and services need the same customer protection regulations as traditional energy retail. Rather, it should be appropriate to the nature of the product or service and the potential consumer harm that can occur. The New Energy Tech Consumer Code used a principles-based approach when drafting its industry good practice code of conduct, which articulated the consumer outcomes needed (e.g. that a supplied product or service is fit for purpose, that an evidence-based estimate of value provided is given, that a vendor has a process for managing payment difficulties if an ongoing payment or payment arrangement is used, that a clear explanation of installation timeframes and locations is given, etc.), and these have different implications for different types of products or services. This was done so that the code could accommodate different types of products and services, including ones that were not yet available.

A key element of this approach was that by the time new types of products and services are no longer novel and become established, the ways that consumer harm from them become sufficiently understood that a guidance document can be developed articulating in more detail what practical things need to be done for it to align with the consumer principles – essentially, a guide to interpreting how the principles-based obligations in the code can be met by retailers of that specific product or service. A similar principles-based approach to energy consumer protection regulation would give the flexibility needed to allow innovation without leaving customers at risk.

Question 7: What barriers will need to be addressed to deliver future consumers a meaningful and beneficial range of products, services, and pricing structures? How might we consider addressing those barriers?

The primary barrier will be one that already exists – people unable to adopt new energy technologies due to limited access to financial resources, and tenure – renters being unable to invest in technologies that need to be installed at a property. Many new energy products and services are likely to be offered to those with access to or capacity to install CER, as the need for flexibility in the energy system will drive these markets. Those without CER will not have access to these services.

At the same time, some new pricing structures will be appropriate for households without CER, such as 'solar-soak' tariffs that will be essential in minimising the risks of shrinking minimum demand. Analysis by the Victorian DNSPs as part of their tariff proposals for the 2026–31 EDPR showed that most non-solar households, across all types of load profiles – and even without responding to tariff price signals – paid less in network charges on a time-variant tariff with a cheap solar soak period and high-priced evening peak, while solar households paid more (p.33); and that this partly unwound the inequitable impact of flat tariffs that see most solar households underpay network charges, subsidised by non-solar households (p.p.29–30).

This raises the issue of another potential barrier – government intervention that undermines the benefits of new types of products and services or pricing. This is currently happening in Victoria with the state government preventing default assignment to the time-variant network tariffs that would benefit most non-solar households.

Question 8: What should network tariffs look like in the future?

I'd refer again to Renew's CER Enablement project, which modelled a 2050 NEM with the maximum amount of CER that could be integrated in a cost-effective manner (i.e. cost less to integrate than the benefits to all NEM consumers that it enabled), articulated what CER integration strategies/solutions were needed to enable it, and thus identified what the current barriers were to enable it. The results are detailed in the technical report published by Energeia, which did the modelling, and summarised, along with policy recommendations, in the summary report (which has not been publicly released but which I can share with you confidentially).

A major barrier identified was aspects of the energy system (chiefly regulatory and market systems) that obscure the true value of CER to the system – which ultimately discourages efficient investment in CER. Key recommendations to address this were to accelerate and broaden the approach to tariff reform – network and retail, import and export. With respect to network tariffs, recommendations were:

- More regulatory oversight and guidance on calculating long-run marginal costs, because the approaches generally taken to calculate LRMC typically take a very conservative approach to classifying costs as marginal, overstating residual costs and weakening price signals.
- Ensuring network tariffs properly reflect network congestion periods (considering low as well as high demand) to properly incentivise investment in generation, storage, and load/production shifting where valuable.
- More specifically, ensuring network tariffs reflect CER-integration economics, with consideration of time and location.
- Tariff assignment policies that ensure cost-reflective tariffs apply to all CER.

Network tariff reform is also needed to unwind the inequitable cross-subsidies between households with and without CER. Analysis done by the Victorian DNSPs when developing tariff proposals for the 2026–31 EDPR found that currently, non-solar customers pay up to twice as much in network charges than solar customers with the same cost to serve (p.29); and that as solar penetration increases from around 25% to 33% (as forecast) the average non-solar customer will be paying an additional $75 more per annum compared to solar customers (p.30). The Victorian DNSPs' proposed time-variant tariffs partly unwound this, reducing the network charges of most non-solar customers (even if they did not respond to the price signals) and increasing those of solar customers, compared to existing flat tariffs.

Networks around the NEM are starting to shift to default time-of-use tariffs with low-cost daytime prices and high-cost evening (and in some cases morning) peaks to address these issues, and while this shift is being slowed in some states by government restrictions on tariff reassignment, it is likely that the shift will accelerate by the early 2030s. At the same time, several networks are introducing CER tariffs that charge for exports during times of low demand but pay for exports during peak demand times.

These networks tariffs align with the recommendations of the above-mentioned Renew project, unwind inequitable cross-subsidies, and allocate the costs of CER enablement investment by networks more fairly. I expect these will be the typical network tariffs of the next decade and beyond.

a) What are the key choices and trade-offs we should consider?

While well-designed tariffs will not adversely impact most vulnerable households, there is still a risk of adverse impacts for some, especially those with extremely high evening peak use due to poor thermal performance of housing and inefficient heating and cooling appliances. This is still a better outcome than having many more vulnerable

households continuing to cross-subsidise CER households – but it's a trade-off. It can be addressed in a few ways:

- The most effective is government regulation and support programs to improve the thermal performance of vulnerable households' dwellings and the energy efficiency of their appliances – but this seems outside the scope of this review. Important to recognise, though, that pricing does not create affordability: it provides a framework within which to address affordability problems where they occur. And pricing that signals efficient investment and reflects cost drivers enables the most strategic affordability interventions because it aligns energy productivity – for the end user and for the system – with price outcomes.
- Within the scope of this review: time-variant network tariffs do not necessarily imply time-variant retail tariffs. Retailers do not simply reflect wholesale pricing (which is also time-variant) with retail pricing – they hedge the risk and volatility across their portfolios. They could do the same with time-variant network pricing. They may need to develop new instruments to do this, but this is an inevitable part of the evolving market.

During the last decade or so of network tariff reform, there has been a large emphasis on network pricing being readily comprehensible by small consumers, and on linking network tariffs to affordability issues for small consumers. Both of these overlook the role of retailers. Consumers never see network tariffs, only retail tariffs. Retailers need to embrace their role of managing the risk and volatility in the energy supply a system and giving their customers retail tariffs and prices they can understand and afford.

Network tariffs are for retailers, not customers.

Question 9: How should the role of energy supply businesses evolve to meet customer and energy system needs in the future?

In question eight above I discussed a changing role for retailers – noting though that it is less a change in their role than fully embracing the role they already have.

As for DNSPs: the shift to DSOs is already in train, and is inevitable due to the requirement to more actively and dynamically manage the interplay between large and medium scale generation and storage, and distributed energy resources. But the other changing role I expect to see is greater engagement with smaller customers with respect to their energy usage. I already discussed, in my response to the previous question, the impact of thermal performance of housing and energy efficiency of appliances on consumers' electricity bills. These also impact stability and power quality in networks – and increasingly a case could be made for DNSPs to work directly with end-users to better match their loads to improve network performance and increase network utilisation. This has always been done to some extent – controlled loads, for example, as

well as cycling of air conditioners such as the program managed by Queensland DNSPs. But as DNSPs more fully adopt the DSO role, more of this will be an important aspect of managing the network. This will be especially important as households increasingly move away from gas: ensuring all-electric homes are well insulated and have efficient heating appliances will be critical for managing the impact on the distribution network. AusNet in Victoria is conducting the 'Electri-fair-cation' project with a dual aim of identifying barriers to electrification for low income households, and measuring the impact of a significant shift to all-electric homes on a feeder.

Question 10: What changes might be required in the future to the interfaces between different energy supply businesses?

I do not have detailed knowledge of B2B systems in the NEM. However, with respect to the discussion above about breaking the nexus between network and retail tariff structures: some DNSPs I have worked with have proposed that a way to do this is for networks to use bulk tariffs with retailers – charging them on an aggregated basis for their whole portfolio, rather than on a per-customer basis. This would incentivise retailers to manage their exposure to time-variant network pricing on a portfolio basis, leading to new approaches and (as noted above) new financial instruments. This also provides an opportunity for third parties to offer service directly to consumers that provide value to both the customer and their retailer.

Question 11: Do you have any feedback on our proposed assessment criteria?

No, these are appropriate criteria.

Better Enabling Community Energy Resources in Electricity Networks

Final report of the CER Enablement Project (Phase 2): December 2022

renew.

Better Enabling Community Energy Resources in Electricity Networks – Final report of the CER Enablement Project (Phase 2)

Prepared for General Release

This project was funded by Energy Consumers Australia (www.energyconsumersaustralia.com.au) as part of its grants process for consumer advocacy projects and research projects for the benefit of consumers of electricity and natural gas. The views expressed in this document do not necessarily reflect the views of Energy Consumers Australia.

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Promoting Renewable Energy, Energy Efficiency and Water Conservation since 1980

Executive Summary

Community Energy Resources (CER) such as rooftop solar PV offer considerable value to both the households that own them and to the broader community. But electricity being fed back into the grid from DER can also cause technical problems. Cost-effectively managing these issues is critical to fully realising the benefits of distributed generation.

Renew's CER (Consumer Energy Resources) Enablement Project[1] arose from a desire to better understand these technical problems and the strategies that can mitigate them in order to map a way forward that maximises consumer benefits while still maintaining safe, secure and reliable operation of the grid.

We obtained funding from Energy Consumers Australia (ECA)[2] for an initial scoping project to help us better understand the technical problems caused by surplus solar exports in distribution networks, and the range of techniques that can be used to mitigate them. This led to a follow-up project to identify the policy, regulatory, market, and technical barriers to maximising consumer benefit by enabling more CER integration into the energy system.

The first project

Renew engaged the consultancy firm Energeia to investigate the range of technical problems associated with high rates of CER feed-in, understand the remediation options for these problems, and identify the types of approaches that deliver maximum customer benefit while remediating the problems. Working with key stakeholders, we documented around two dozen problems and a similar number of remedial strategies. Importantly, the economic analysis found that costs of CER enablement were at a level likely to be outweighed by the resultant benefits to all consumers.

The second project

This project used the findings of the first project to inform whole-of-system modelling to determine optimal CER integration pathways to maximise consumer benefits while maintaining network security and reliability. This enabled us to identify the policy, regulatory, market, and technical barriers to maximise consumer benefit by enabling CER integration into the energy system.

Whole-of-system modelling

Energeia consulted with a range of stakeholders to develop a modelling approach to compare the expected growth of CER under current policy and regulatory settings with an idealised optimal *Consumer High DER* scenario consistent with achieving a least-cost mix of CER, network and generation resources and limited only by cost-effective CER integration strategies. "Estimating the size of the prize without considering the associated barriers… [can inform] the prioritisation of any policy, regulatory, industry and institutional reforms needed to achieve… optimal levels of DER investment."[3] The *Consumer High DER* scenario has more than 90% of grid-connected energy customers with solar PV and batteries by 2050, with 127 GW of rooftop solar (more than six times what we have today) and 136 GWh of behind-the-meter (BTM) batteries (nearly 100 times BTM battery capacity today) – all integrated into the grid at less cost than the benefits flowing to all customers.

[1] The project was originally called the DER (Distributed Energy Resources) Enablement project using the industry-standard terminology for behind-the-meter energy resources installed on consumer premises and connected through the meter to the distribution network. We have switched the term DER to CER to align with Energy Consumers Australia's decision to change the terminology to better reflect the consumer's perspective. In this report we still use the term DER where it is used as part of a title or in a verbatim quote.

[2] This project was funded by Energy Consumers Australia (www.energyconsumersaustralia.com.au) as part of its grants process for consumer advocacy projects and research projects for the benefit of consumers of electricity and natural gas. The views expressed in this document do not necessarily reflect the views of Energy Consumers Australia.

[3] Energeia (2021) *Renew DER Optimisation (Stage II): Final Report*, p. 21

The *Consumer High DER* scenario yields a $25b benefit to consumers over a 15-year period and a $69b benefit over 30 years.[4] The savings to consumers overwhelmingly come from reduced network charges and lower wholesale electricity prices, from unlocking the value of CER to provide network support services (reducing capital expenditure) and replace large-scale centralised generation.

Identification of barriers

Energeia identified three main types of barriers to achieving the *Consumer High DER* scenario:

- Things that devalue CER
  - tariffs that don't reflect network cost drivers or the value of CER
  - investment optimisation methodologies that do not reflect value of CER
- The absence of systems that enable CER
  - holistic distribution resource plans
  - CER orchestration systems
  - distributed market systems
- Industry incentives that discourage leveraging CER to support networks

Recommendations

1. A comprehensive approach to tariff reform

- that understands the customer experience of tariffs in order to fully assess potential impacts and identify measures needed to mitigate them where required
- that considers network and retail tariffs, import and export tariffs, and accounts for network congestion, local use of system, minimum demand, and wholesale market signals
- that is cognisant of the future drivers of demand, supply, and flexibility in the distribution such as growth in electric vehicles and batteries, increased penetration of controllable loads, continued growth in solar PV, and the emergence of aggregators and virtual power plants
- that is not constrained by limitations in incumbent energy retailers' billing or other systems
- that addresses social licence for tariff changes, CER curtailment, and the orchestration of CER domestic appliances

2. Prioritising the enablement of CER orchestration

- a comprehensive approach with a strong focus on standards compliance and interoperability
- designed to allow for response to signals from networks, ancillary services and the wholesale market with appropriate prioritisation among them
- with coordination and leadership by an appropriate body (perhaps ARENA, which has already taken some leadership on CER integration and dynamic operating envelopes)

3. Commencing regulatory reform for distribution networks

- Better defining how LRMC should be calculated
- Implementing holistic LV and CER-integrated planning over 20+ year period
- A framework for local use of system tariffs and/or local consumption credits
- An approach to applying the regulatory investment test for distribution (RIT-D) at the LV and HV level
- Aligning treatment of capital and operational expenses in the regulatory system

4. Better enable the Integrated System Plan to support CER enablement

- Recalibrate the range of scenarios to place the baseline scenario (in line with current trends) in the middle of the range of scenarios, and include one or two scenarios that have progressively higher CER adoption and consumer participation than expected on current trends.

[4] Compared to the *Step Change* scenario from the 2020 ISP. The updated 2021 *Step Change* scenario developed for the 2022 ISP was published too late to be included in the modelling. The quantum of consumer benefit would be lower compared to the 2021 *Step Change* because it has significantly more CER penetration. However, the consumer benefit measured against this higher baseline would still be considerable.

- Change the treatment of demand response and CER adoption in the ISP to align it with the treatment of other energy resources – as active players to be incentivised, rather than simply an input assumption.

5. Develop a more comprehensive consumer response to the modelling

- to develop more detailed recommendations and plan a comprehensive and nuanced advocacy strategy to ensure consumer outcomes are prioritised in the reforms needed
- grounded in the ourPower framework and articulate a vision for a managed transition to the future energy system designed to deliver clean, healthy, secure, reliable and affordable energy to Australian households irrespective of the degree to which they are able to play an active role in the system.

Contents

Glossary

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ARENA	Australian Renewable Energy Agency
BTM	behind-the-meter
CCGT	closed cycle gas turbine
CES	Capital Efficiency Sharing Scheme
CER	community/consumer energy resources
DAPR	Distribution Annual Planning Report
DER	distributed energy resources
DERMS	Distributed Energy Resource Management Systems
DMIS	Demand Management Incentive Scheme
DNSP	Distribution Network Service Provider
DOE	Dynamic Operating Envelope
ECA	Energy Consumers Australia
EV	electric vehicle
FiT	feed-in tariff
GW	gigawatt
GWh	gigawatt–hour
HV	high voltage
ISP	Integrated System Plan
kVA	kilo-volt-ampere
kW	kilowatt
Li-Ion	lithium-ion battery storage
LRMC	long-run marginal cost
LV	low voltage
NEM	National Energy Market
OCGT	open cycle gas turbine
PFiT	premium feed-in tariff
PHES	pumped hydroelectric energy storage
Prosumer	an energy consumer with CER installed
PV	photovoltaic
RIT-D	Regulatory Investment Test – Distribution
VPP	Virtual Power Plant

1. Introduction

Renew's CER (Consumer Energy Resources) Enablement Project[5] arose from a desire to better understand the technical problems that can arise when increasing numbers of rooftop solar PV systems (and other CER) lead to high levels of electricity exports into local networks. (CER refers to equipment owned by energy consumers and installed on their premises that generates or stores electricity or can deliver a demand response.) We were concerned that some of the strategies electricity distribution networks were using to manage the problem were negatively impacting households more than necessary, so we wanted to better understand the problems and the potential solutions in order to form a view on a way forward that maximised consumer benefits while still maintaining safe, secure and reliable operation of the grid.

To do so, we obtained funding from Energy Consumers Australia (ECA)[6] for an initial scoping project to help us better understand the technical problems caused by surplus solar exports in distribution networks, and the range of techniques that can be used to mitigate them. This first project gave us a much clearer understanding of the complexity of the issue and led us to scope out a follow-up project to identify the policy, regulatory, market, and technical barriers to maximising consumer benefit by enabling higher levels of CER integration into the energy system. This second project was also generously funded by ECA. This report summarises the findings of the second project and makes recommendations for further work.

[5] The project was originally called the DER (Distributed Energy Resources) Enablement project using the industry-standard terminology for behind-the-meter energy resources installed on consumer premises and connected through the meter to the distribution network. We have switched the term DER to CER to align with Energy Consumers Australia's decision to change the terminology to better reflect the consumer's perspective. In this report we still use the term DER where it is used as part of a title or in a verbatim quote.

We also note that DER can refer to energy resources connected to a distribution network but not in a household or business premises – for example, a shared community battery. The term *Community Energy Resources* – also CER – could encompass these in addition to those resources located within household and business properties, and may be a more preferable term overall.

[6] This project was funded by Energy Consumers Australia (www.energyconsumersaustralia.com.au) as part of its grants process for consumer advocacy projects and research projects for the benefit of consumers of electricity and natural gas. The views expressed in this document do not necessarily reflect the views of Energy Consumers Australia.

2. The first project

For the first stage of the project, Renew engaged the consultancy firm Energeia to:

- investigate the range of technical problems associated with or surfaced by high rates of CER feed-in;
- understand the range and costs of remediation options for these problems; and
- identify – as much as possible –the types of approaches that deliver maximum customer benefit while remediating the problems in different types of networks and at different levels of CER penetration.

Working with key stakeholders, we documented around two dozen problems and a similar number of remedial strategies. Modelling identified a number of strategies that were most cost-effective in most situations, but also determined that situational factors lead to significant variance in both the problems that manifest and the solutions that work. More detail is available in the Technical Report and Summary Report.

Importantly, the economic analysis found that costs of CER enablement were at a level likely to be outweighed by the resultant benefits to all consumers.

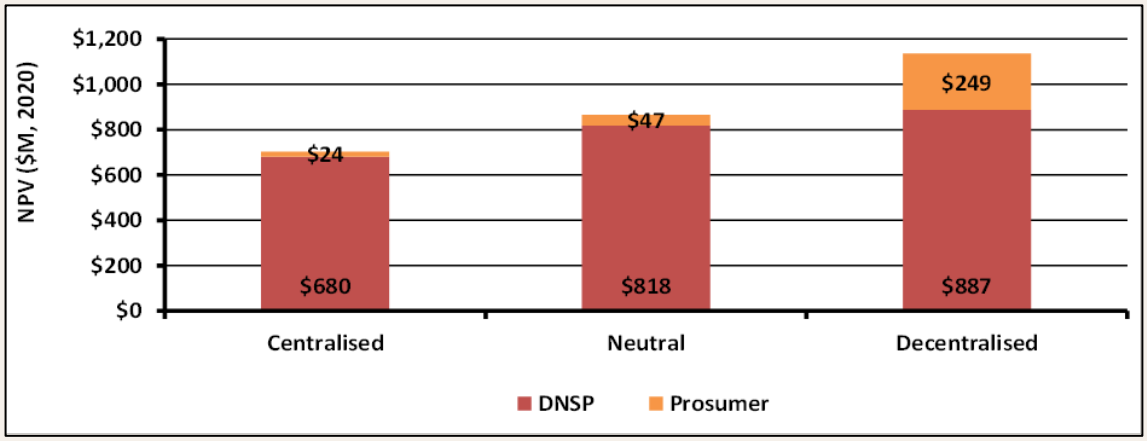

Figure 1 – CER integration costs (to consumers) in three different scenarios, expressed in terms of who the costs are paid to – DNSPs, or prosumers (consumers with CER).[7]

Ultimately the project identified that more sophisticated system-wide and forward-looking modelling was needed to fully examine the issue and to map the whole suite of approaches – technical, policy, regulatory, and market – needed to reach a future where CER penetration is at the optimal level for maximum consumer benefit in a safe, secure and reliable grid. This was the purpose of the second project.

[7] Energeia (2020) *Distributed Energy Resources Enablement Project – Discussion and Options Paper*, p. 12

3. The second project

The second stage of the project built on the findings and recommendations of the first project by using its CER abatement cost and efficacy data to inform whole-of-system modelling to determine optimal CER integration pathways to maximise consumer benefits while maintaining network security and reliability. This enabled us to identify the policy, regulatory, market, and technical barriers to maximise consumer benefit by enabling CER integration into the energy system.

Phase 1 was the whole-of-system technical modelling undertaken by Energeia after extensive engagement with key stakeholders. Phase 2 will be a series of engagements with consumer, industry, and government/regulatory stakeholders to guide Renew in interpreting the implications of the technical report and developing recommendations for future advocacy and systemic change to unlock the optimal future for Australian households.

3.1. The technical report

The technical report describes the outcomes of the modelling conducted by Energeia for Renew for the stage 2 project and discusses the main barriers to achieving optimal CER enablement.

3.1.1. The modelling outcomes

The modelling approach compared the expected growth of CER with the current policy and regulatory settings (based on the *Step Change* scenario from AEMO's *Integrated System Plan*[8]) with an idealised optimal *Consumer High DER* scenario based on plausible favourable technology development and price paths consistent with achieving a least-cost mix of CER, network and generation resources and limited only by cost-effective CER integration strategies. **The Consumer High DER scenario is not a forecast**, but a theoretically plausible 'best of all possible worlds' future state for 2035 and 2050.

> *By estimating the size of the prize without considering the associated barriers, it can be used to inform decision-making regarding the prioritisation of any policy, regulatory, industry and institutional reforms needed to achieve the identified optimal levels of DER investment.*[9]

And the size of the prize is pretty big: the *Consumer High DER* scenario has more than 90% of grid-connected energy customers with solar PV and batteries by 2050, with 127 GW of rooftop solar (more than six times what we have today) and 136 GWh of behind-the-meter (BTM) batteries (nearly 100 times BTM battery capacity today) – all integrated into the grid at less cost than the benefits flowing to all customers.

Key findings from the modelling are that, in reaching this possible future:

- The optimised rate of CER adoption is lower than the current rate of adoption, but increases over time
- Optimised CER adoption reduces distribution and transmission network capacity requirements significantly (by 23%)
- Significant curtailment of solar PV and wind occurs, but there is still economic value in rooftop solar exports on average
- Wholesale spot prices become increasingly negative during periods of high solar PV generation, relatively low load and inflexible generation
- Managed (orchestrated) CER plays a major role in shifting load to the middle of the day and minimising curtailment[10]
- Annual NEM consumption declines in steps from 2036, in step with the exit of inflexible coal generators, which reduces the curtailment of the higher rooftop solar PV capacity in this scenario.[11]
- Enabling VPPs to meet reliability and security of supply will support timely exit of aged generation, e.g. coal and gas

[8] The 2020 ISP – the 2021 revised *Step Change* scenarios came out too late to be included in the modelling.
[9] Energeia (2021) *Renew DER Optimisation (Stage II): Final Report*, p. 21
[10] Paraphrased, Energeia (2021) *Renew DER Optimisation (Stage II): Final Report*, p. 21
[11] Energeia (2021) *Renew DER Optimisation (Stage II): Final Report*, p. 31

The amount of curtailment predicted means it's critically important to have more sophisticated control that can curtail exports without curtailing self-consumption.

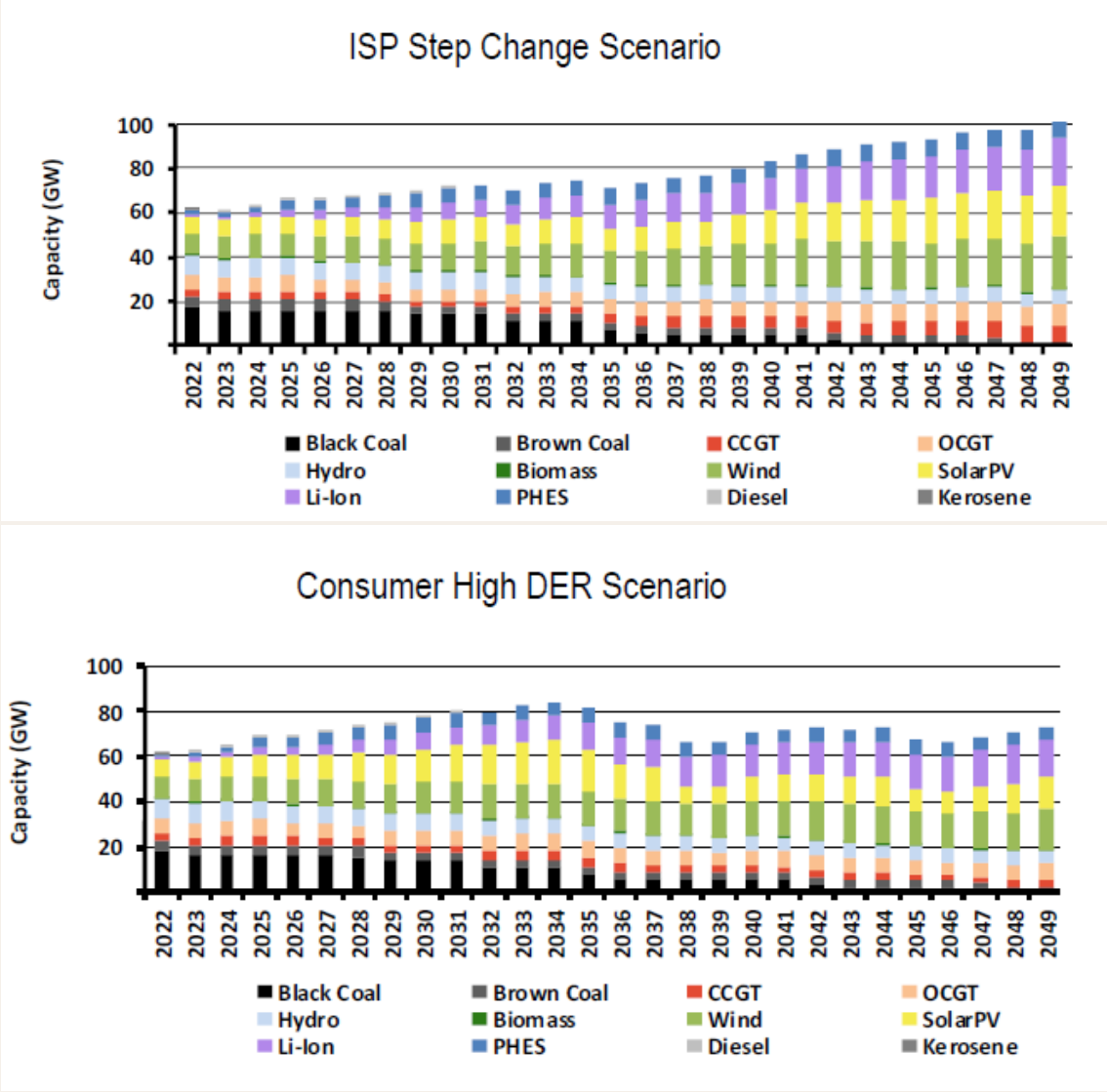

Figure 2 – Generation capacity in the NEM 2022–2049: ISP Step Change and Consumer High DER scenarios[12]

[12] Energeia (2021) *Renew DER Optimisation (Stage II): Final Report*, p. 41

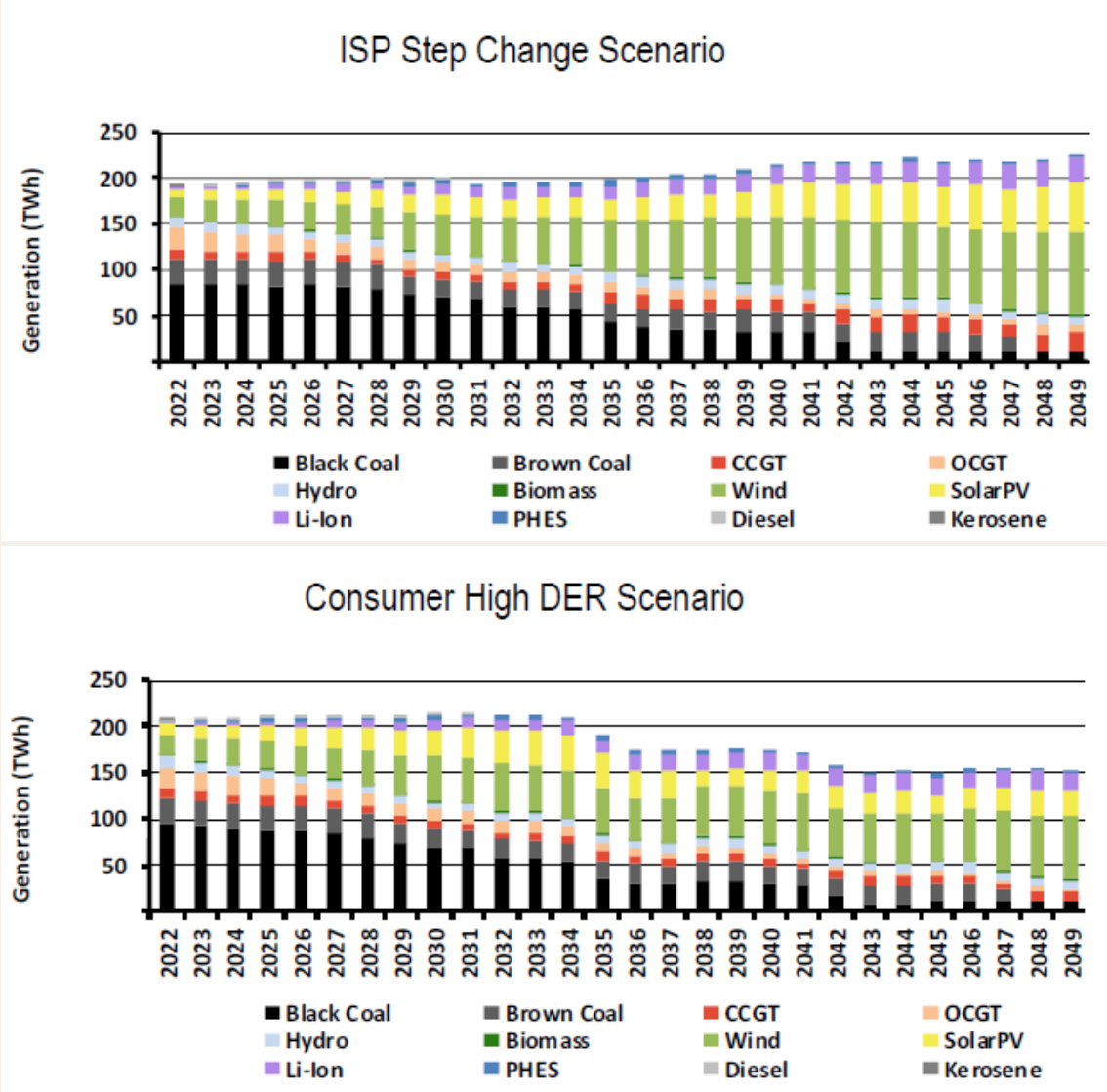

Figure 3 – Generator supply in the NEM 2022–2049: ISP Step Change and Consumer High DER scenarios[13]

3.1.2. The value of CER enablement to energy consumers

The *Consumer High DER* scenario yields a $25b benefit to consumers over a 15-year period and a $69b benefit over 30 years.[14]

The savings to consumers overwhelmingly come from reduced network charges and lower wholesale electricity prices, from unlocking the value of CER to provide network support services (reducing capital expenditure) and replace large-scale centralised generation. While the energy consumption and costs to networks of accommodating electric vehicle (EV) charging and household electrification are included in the modelling, the savings to households of not purchasing petrol and natural gas are excluded due to the additional complexity of doing so – these would undoubtedly add to the net benefits.

[13] Energeia (2021) *Renew DER Optimisation (Stage II): Final Report*, p. 41

[14] Compared to the *Step Change* scenario from the 2020 ISP. The updated 2021 *Step Change* scenario developed for the 2022 ISP was published too late to be included in the modelling. The quantum of consumer benefit would be lower compared to the 2021 *Step Change* because it has significantly more CER penetration. However, the consumer benefit measured against this higher baseline would still be considerable.

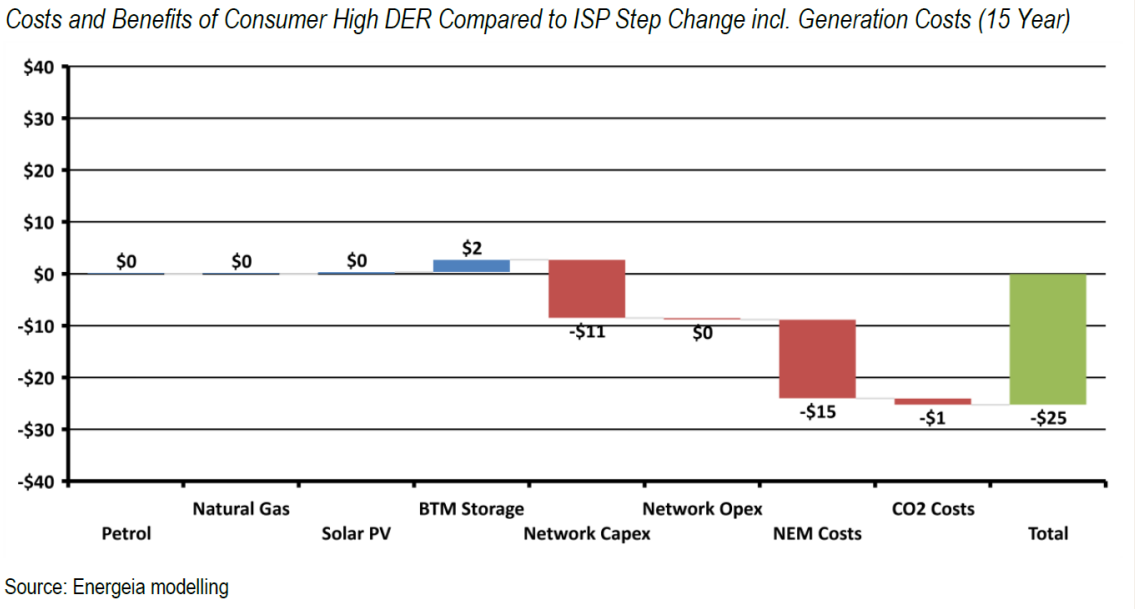

Figure 4 – Breakdown of costs and benefits by 2035[15]

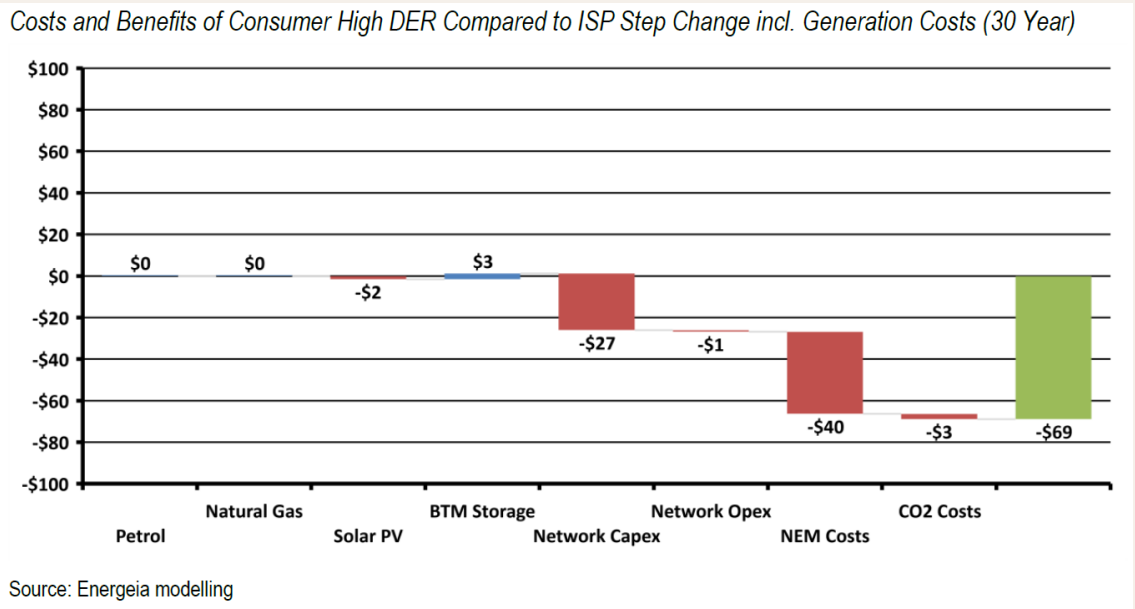

Figure 5 – Breakdown of costs and benefits by 2050[16]

This scenario is an idealised possible future – it's not necessarily achievable. But the modelling clearly shows that enabling a much greater penetration of CER than current regulatory and policy settings allow yields a material benefit to consumers and, by virtue of enabling greater renewable energy, a clear carbon benefit.

3.1.3. Key barriers

Our consultation with key stakeholders and analysis of the current state of the energy market and policy framework identified a number of barriers that work against fully realising the potential of CER and making material progress beyond the current trajectory toward the Consumer High DER possibility. Developing a policy, regulatory, and market change strategy to address these barriers is critical if we are to maximise the benefits of CER to Australian households and businesses.

[15] Energeia (2021) *Renew DER Optimisation (Stage II): Final Report*, p. 55
[16] Energeia (2021) *Renew DER Optimisation (Stage II): Final Report*, p. 55

Energeia identified three main types of barriers to achieving the *Consumer High DER* scenario.[17]

3.1.3.1. Things that devalue CER

These regulatory and industry barriers obscure the true value of CER in the system, discouraging investment in CER and CER enablement

Tariffs that do not reflect long-run marginal cost (LRMC)

- Approaches used to calculate LRMC typically take a very conservative approach to classifying costs as marginal, overstating residual costs and weakening price signals

Tariffs that do not reflect network congestion periods

- Time-variant import tariffs are often poorly aligned with peak demand, and flat import tariffs ignore it – further obscuring price signals
- Retail feed-in tariffs are generally not time-variant, obscuring the wildly different energy value of exports at different times

Tariffs that do not reflect CER integration economics

- CER exports can both drive need for enablement investment and offset demand-driven costs (varying by time and location), but are not given appropriate price signals – export pricing done right can address this *(through the recent Pricing and Access rule change, if sufficiently nuanced)*
- local consumption of CER exports attracts the full network tariff despite the much lower cost to serve – local use of system charges would address this

Tariff assignment policies that do not require cost reflective tariffs for CER

- assigning CER connections (solar, batteries, EVs) to appropriate cost-reflective tariffs from the outset is fundamental to being able to realise their value in the system *(this is beginning to happen and the recent Pricing and Access rule change, if sufficiently nuanced, should further drive this)*

Investment optimisation methodologies that do not reflect potential value of CER

- the *Regulatory Investment Test* – Distribution (RIT-D) generally applies only to zone substation and sub-transmission projects, but the higher LRMC of HV and LV assets would likely favour more non-network solutions including those involving CER strategies.

3.1.3.2. The absence of systems that enable CER

Planning and operational systems that, when absent, act as barriers to optimal investment and operation CER until they are addressed.

Holistic distribution resource plans, e.g. a DAPR inclusive of the LV Network

- Distribution planning obligations (e.g. the *Distribution Annual Planning Report,* DAPR) and associated regulatory requirements (e.g. the RIT-D, noted above) only cover a fraction of total network investment – largely the sub-transmission and zone substation levels – thus obscuring much CER opportunity. Leading international jurisdictions, require publicly available holistic distribution system plans that can factor in the value of CER and guide CER investment.

Distributed Energy Resource Management Systems

- The *Consumer High DER* scenario requires significant orchestration of loads and CER exports to handle the high levels of CER. Currently some orchestration is possible via networks and Virtual Power Plants (VPPs) working with retailers, Dynamic Operating Envelopes (DOEs) are being explored by networks, and rudimentary export curtailment possible by adjusting voltages to trip PV systems. But overarching Distributed Energy Resource Management Systems (DERMS) will be needed to enable the more widespread and sophisticated orchestration required.

[17] These are discussed in much greater detail in chapter 5 of the technical report (Energeia (2021) *Renew DER Optimisation (Stage II): Final Report*), pp. 42–53

Distributed Market Systems

- The wholesale electricity market has mechanisms that account for time and locational factors in the value of generation. These do not exist for distributed generation. Establishing network and industry capability to convey the real value of distributed energy to the market is necessary to achieve optimal levels of CER investment and operation.

3.1.3.3. Industry incentives that discourage leveraging CER to support networks

Regulatory tools that are structured such that they disadvantage CER indirectly but could become a strong driver of optimal CER investment and operation were they to be addressed.

Regulatory incentive schemes and revenue determination

- Network pricing regulation uses various incentive schemes to encourage networks to pursue capital and operating cost efficiencies, meet performance targets, and encourage innovation and non-network solutions (which often make use of CER) that deliver real value to users. But while the Demand Management Incentive Scheme (DMIS) – which encourages non-network solutions such as using CER to reduce demand on the network – is worth twice as much per avoided dollar than the Capital Efficiency Sharing Scheme (CESS) – which encourages efficiencies in capital expenditure on assets – DMIS allowances make an insignificant contribution to network revenue: dwarfed by CESS allowance, which in turn are dwarfed by returns on capital expenditure. This appears to be partly due to the low cap on DMIS payments, and partly due to the much greater revenue contribution of capital expenditure that adds to the regulated asset base, a key factor in determining allowable revenues. Regulatory reform is desperately needed to remove barriers to and increasing caps for DMIS, and delinking network valuation from revenue determinations.

3.2. Putting it together

The barriers identified by Energeia point to possible recommendations, in that each of a series of recommendations can be to overcome each on the series of barriers. These recommendations needn't necessarily have arisen from the modelling – recommendations to pursue tariff reform, enable better orchestration, and restructure the regulatory framework for electricity distribution could be made in the absence of the modelling we have done.

However, the modelling has contextualised the recommended reforms in two important ways:

- By estimating the value of the benefits of a high-CER future to energy consumers, it demonstrates the value *to consumers* of the reforms needed to enable it. Previous reform attempts (such as the Multiple Trading Relationships and the first Demand Response Mechanism rule change proposals) failed partly because the value to consumers was not recognised. Tariff reform has also been slowed down by a lack of clarity around the material benefits to consumers, which leaves the risks unbalanced.
- By showing which parts of the value stack contribute most to the ultimate consumer benefit and which CER enablement measures are most critical in getting there, it provides an evidence base for decisions of prioritising and sequencing reform.

Additionally, in undertaking the modelling Renew and Energeia encountered knowledge and data gaps and identified shortcomings in some established industry methodologies and metrics. This has identified reforms needed to better plan and value energy system reform and value assessments – such as better LRMC calculation methodologies and forecasting.

3.2.1. Initial recommendations

The first set of recommendations is focused on overcoming the identified barriers

1. A comprehensive approach to tariff reform

So far, tariff reform has been compromised by a number of factors:

- Legitimate concerns about the consumer impacts of cost-reflective tariffs – but with a failure to both usefully model those impacts and factor in the benefits. Potential impacts of tariff changes are also not understood in the broader context of energy usage and costs:

    - an impact is only experienced if all else stays the same – if a new tariff is applied when a customer opens an account at a new premises or connects new CER, the impact of the tariff change is softened by the other changes
    - payment difficulties arise from numerous factors of which the energy cost is only one; and energy retailers are obliged to support customers in payment difficulties
    - impacts from network tariff structure changes interact with changes in wholesale costs, the retail component, and the underlying network charges
- Failure to definitively articulate the purpose of tariff reform – 'encouraging load shifting' and 'allocating costs more fairly' are used interchangeably when in fact they have significantly different implications for implementation.
- Failure to articulate which party network tariffs are aimed at – retailers or customers? The answer seems obvious (retailers, because customers don't even see network tariffs), but network tariff innovation is continually hampered by requirements that tariff structures are simple enough for customers to understand and consistent across regions.
- Tariffs have been considered in isolation. Network tariffs are absorbed by retail tariffs and will interact with export charges and feed-in tariffs. Export charges and feed-in tariffs further interact with each other.

A comprehensive approach to tariff reform is needed that considers the interplay between different types of tariffs within and between different levels of the tariff stack, considers costs and benefits more broadly, and models the customer experience of tariffs in order to fully assess potential impacts and identify measures needed to mitigate them where required. Part of this involves recognising that for many households, moderate increases in costs are no more than an annoyance – cost impacts can be mitigated in a nuanced way driven by consideration of the risk of adverse impacts.

Such an approach should consider network and retail tariffs, import and export tariffs, and account for network congestion, local use of system, minimum demand, and wholesale market signals. It should take a nuanced approach to locational variance in tariffs by retaining a commitment to cross-subsidisation of energy provision to high cost-to-serve customers by low cost-to-serve customers in the context of giving the right price signals for CER investment on a locational basis. It should also be cognisant of the future drivers of demand, supply, and flexibility in the distribution such as growth in electric vehicles and batteries, increased penetration of controllable loads, continued growth in solar PV, and the emergence of aggregators and virtual power plants.

We should also ensure that proposed cost-reflective network tariff structures are not constrained by limitations in incumbent energy retailers' billing or other systems. Ultimately, network tariffs are for retailers, not end-users. The retailer does not need to pass on the same tariff structure to their customers – and in fact tariff reform will only be fully successful when retailers offer customers on the same underlying network tariff a range of different tariffs based on their appetite for engagement, ability to respond, and other customer needs and preferences. Networks need to lead on tariff reform and not be bound by incumbents' limited capacity or appetite for change. We have seen in recent years that new entrants have a great appetite for innovative retail tariffs and customer engagement; and it is also clear that we are entering a new era in which customers will be engaging with a wider range of businesses – not just energy retailers – to meet their energy needs.

Importantly, a comprehensive approach to tariff reform also needs to address social licence for tariff changes, CER curtailment, and the orchestration of CER domestic appliances.

2. Prioritising the enablement of CER orchestration

The modelling shows that orchestration of CER exports and loads is a critical part of enabling higher levels of CER. Dynamic operating envelopes and virtual power plants are currently being trialled or developed in some jurisdictions. Taking a comprehensive approach to these with a strong focus on standards compliance and interoperability is critical – as is ensuring that orchestration is enabled in a way that allows response to signals from networks, ancillary services and the wholesale market with appropriate prioritisation among them. Enabling orchestration in the near future will not happen by chance – leadership by an appropriate champion (perhaps ARENA, which has already taken some leadership on CER integration and dynamic operating envelopes) will be needed.

3. Commencing regulatory reform for distribution networks

The technical report identifies the approach to calculating LRMC, the restriction of regulatory investment tests and planning obligations to the sub-transmission and zone substation level, the limited scope and materiality of innovation and demand management incentives, and the strength of the nexus between business valuation and shareholder returns as aspects of the distribution regulatory system that constrain the cost-reflectivity of tariffs and devalue network architecture changes that would support measures to unlock the value of CER.

This reform process could begin with issues/briefing/direction papers leading to potential rule changes on:

- Better **defining how LRMC should be calculated**, including greater clarity around how 'long term' is defined (e.g. the period over which *all* costs are variable, not just the most variable ones). The AER should give clear guidance on how LRMC should be determined and the principles by which tariffs should reflect it.
- Implementing **holistic LV and CER-integrated planning** over 20+ year period, so that CER can tap into all potential benefits, and overall efficient CER portfolios can be identified.
- A framework for **local use of system tariffs and/or local consumption credits** to drive decentralised consumption economics – including considering how sunk costs can be allocated, and how to manage the distributive impact of LuoS tariffs on network revenue and cost recovery.
- An approach to **applying the regulatory investment test for distribution (RIT-D) at the LV and HV level** (scaled appropriately for smaller projects) to enable more accurate CER option assessment taking non-network benefits and achievable potential into account.
- **Aligning treatment of capital and operational expenses** in the regulatory system, to remove barriers to using operational measures instead of capital upgrades where it's more efficient.

Regulatory reform takes many years to develop and implement. These processes need to start soon if they are going to be in place in time to support then transition.

3.3. Stakeholder insights

A range of stakeholders from consumer and community groups, energy businesses, universities and research/policy bodies, sector peak bodies, energy regulators and other market bodies, and state government departments were involved with the project at all stages. This reference group[18] made significant contributions to the development of the modelling and many members gave extensive feedback on drafts of the technical report.

We sought additional stakeholder feedback on the final report by circulating the report among the reference group and beyond, targeted engagement with some key stakeholders, and two stakeholder workshops with energy industry stakeholders (led by Energeia in March 2022) and consumer advocates (led by Renew in June 2022).

We were unable to hold the full series of stakeholder workshops and targeted consultation sessions we had originally planned due to circumstances outside our control – however further engagement and ongoing dialog with stakeholders is planned for the 2023.

Stakeholder insights included thoughts on our initial proposed recommendations, suggestions for additional recommendations, recommendations on how to prioritise advocacy (which aligned with the prioritisation we had already identified, as noted above), and thoughts on what next steps would be most useful and effective; as well as some more general thoughts and suggestions about the merits of otherwise of the approach we took in this project and the modelling. Key insights are collated here.

3.3.1. Support for recommendations

All stakeholders supported the emphasis on pursuing tariff reform, as despite the problems progressing it for the last decade, it is the lowest hanging fruit. The overwhelming need is to overcome the anxiety around customer impacts, with a combination of properly assessing potential net impacts and developing an approach to manage impacts where necessary. There is also a need to remove the most unhelpful perverse incentives in the system, such as premium feed-in tariffs (PFiTs) that reward solar exports during minimum demand periods and grid consumption during peak demand periods.[19] Consumer stakeholders largely agreed that an implementation focused

[18] A full list of stakeholders can be found in Appendix D of the technical report.

[19] It was suggested that PFiT customers could be compensated for early cessation of PFiT revenue by being paid out the foregone value in cash or via a discount on a battery that would enable them to shift their unused solar generation into the peak demand period.

more on rewarding useful investment or behaviour than penalising unhelpful behaviour was more likely to succeed – especially considering the limitations in many households' capacity to shift energy usage manually.[20]

Related to this: consumer stakeholders recognised that load-shifting in households is more likely to succeed if it is automated or remotely controlled rather than relying on people to actively turn things on or off at certain times. This supports the recommendation around a coordinated and accelerated approach to enabling orchestration in networks. This was also supported by industry stakeholders, with some noting that there is insufficient focus on ensuring standards development and compliance and other enablers of interoperability are being appropriately implemented.

Industry and consumer stakeholders broadly supported regulatory reform, but there was a range of views on the best path forward and not a lot of confidence that it was achievable.

3.3.2. Additional recommendations

4. Better enable the Integrated System Plan to support CER enablement

During the initial scoping of the modelling, Energeia noted that the 'Step Change' scenario in the ISP, ostensibly the 'high CER' scenario, was generally in line with current trends. This was why they used it as their baseline scenario. There was no higher CER scenario that was sufficiently beyond expectations to constitute a higher bound, though there are lower CER scenarios that seem unlikely but do represent a lower bound.

Energeia also noted that while the ISP considers generators, retailers and networks as proactive players that needed to be incentivised to invest in ways that supported future energy needs, consumer demand and CER investment are treated as factors that need to be accommodated. The modelling demonstrated that demand orchestration and CER will play such an active role in the future grids that they should also be considered active players to be incentivised.

Both of these issues were independently identified by the consumer stakeholders. This led to a suggestion for an additional recommendation for AEMO to:

- Recalibrate the range of scenarios to place the baseline scenario (in line with current trends) in the middle of the range of scenarios, and include one or two scenarios that have progressively higher CER adoption and consumer participation than expected on current trends.
- Change the treatment of demand response and CER adoption in the ISP to align it with the treatment of other energy resources – as active players to be incentivised, rather than simply an input assumption.

5. Develop a more comprehensive consumer response to the modelling

This project has highlighted the size and significance of the change that's coming to the energy system next two to three decades. While the recommendations are well supported by the technical support, there is considerable complexity in implementing them and especially in managing the consumer acceptance and consumer impact of such fundamental changes. For example, the expected future (even if it comes materially short of the Consumer High DER scenario) includes a degree of consumer participation in the energy system that is orders of magnitude larger than we have today. Facilitating consumer acceptance of this change and ensuring that groups of consumers don't get left behind or materially disadvantaged by it is no small task.

Over the last few years, a number of consumer organisations led by the Australian Council of Social Service and the Total Environment Centre have been heavily engaged in policy development and energy market reform processes to facilitate a just transition to a zero-emissions energy grid and equitable integration of CER. A key element of this work was the development of a set of consumer principles for energy market reform and development, which culminated in the *ourPower* platform to which Renew is a signatory.

The consumer workshop was in broad agreement that a more detailed and consolidated consumer response to Renew and Energeia's work is required, to develop more detailed recommendations and plan a comprehensive and nuanced advocacy strategy to ensure consumer outcomes are prioritised in the reforms needed. This response would be grounded in the *ourPower* framework and articulate a vision for a managed transition to the future energy system designed to deliver clean, healthy, secure, reliable and affordable energy to Australian households irrespective of the degree to which they are able to play an active role in the system.

[20] For example, see L Nicholls & Y Strengers (2015) Peak demand and the 'family peak' period in Australia: Understanding practice (in)flexibility in households with children.

3.4. Next steps

Renew intends to undertake some more targeted stakeholder consultations with network businesses, energy retailers, new energy businesses such as solar, battery, and EV vendors, researchers/energy analysts, and state governments to flesh out our recommendations.

We also intend to work with other consumer advocates on the more comprehensive response referred to above, as a basis for developing a joint advocacy strategy to pursue the other recommendations of this project. As there is already some considerable work being done on dynamic operating envelopes and orchestration, we expect to focus first on the challenging but important work of getting tariff reform back on track.