

RACE for 2030

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Consumer Grid Summit 2026

Summit Introduction & Expert Discussion Papers

Acknowledgement

The Expert Discussion Papers have been developed by the following subject matter experts who are acknowledged with appreciation.

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Acknowledgement of Country

The authors of this report would like to respectfully acknowledge the Traditional Owners of the ancestral lands throughout Australia and their connection to land, sea and community. We recognise their continuing connection to the land, waters, and culture and pay our respects to them, their cultures and to their Elders past, present, and emerging.

What is RACE for 2030?

Reliable, Affordable Clean Energy for 2030 (RACE for 2030) is an innovative cooperative research centre for energy and carbon transition. We were funded with $68.5 million of Commonwealth funds and commitments of $280 million of cash and in-kind contributions from our partners. Our aim is to deliver $3.8 billion of cumulative energy productivity benefits and 20 megatons of cumulative carbon emission savings by 2030. racefor2030.com.au

Disclaimer

The Expert Discussion Papers contained herein are *discussion* papers, not *position* papers. They are provided for the purpose of expanding the range of possibilities considered by the Summit. They do not, however, reflect the official position of RACE for 2030 or any entity associated with the Consumer Grid Summit initiative.

The authors have been provided latitude to consider the assigned topics widely. They have used all due care and skill to ensure the material is accurate as at the date of this report consistent with the above purpose and status. Neither RACE for 2030 nor the authors accept any responsibility for any loss that may arise by anyone relying upon the contents of the individual papers or report as a whole.

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1 Introduction

1.1 Document Purpose

This document provides a brief introduction to the Consumer Grid Summit 2026 initiative for participants.

It also provides a selection of four Expert Discussion Papers (EDPs) that address several topics relevant to the Summit. While the topics covered are not exhaustive, they are provided as a reference set that may be of assistance to Summit participants in preparing for and during the Summit.

1.2 Expert Discussion Papers

The four Expert Discussion Papers have been developed by invited subject matter experts and are designed to provide participants an informative and thought-provoking overview of the following topics:

- NEM Economics, Investment and Incentive Frameworks
- NEM Legal and Regulatory Frameworks
- NEM Governance Mechanisms
- NEM CER/DER Value Ecosystems

While these four topics are not exhaustive, they do explore areas that substantively influence the ability to advance timely grid transformation for customer and societal benefit. For ease of readership, each EDP considers its topic in a broadly similar structure as follows:

- Overview of the existing arrangements in the NEM
- Perspectives on the fitness of the existing arrangements in the NEM
- International developments that may inform the transformation of the NEM
- Recommended priorities for consideration in the transformation of the NEM

Importantly, it should be noted that these are *discussion* papers, not *position* papers. They are developed for the dual purposes of ensuring a sufficient understanding of the current arrangements and proposing a range of future areas for consideration that are relevant to the topic. It is expected there will be a wide diversity of opinions on much of the content explored – it is hoped the material supports the Summit's constructive *contest of ideas*.

1.3 Summit Preparation

While recognising that not all Summit participants will have the opportunity to read the full set of EDPs beforehand, it would be helpful for attendees to at least familiarise themselves with the content.

Each of the four EDPs include an executive summary that enables a time-efficient review. In addition, a quick scan of the content in each paper will also provide an overview of the material that can be referenced during the Summit event. A hard copy will also be provided to each participant at the Summit.

Where time allows, it is expected that a deeper dive into one or several EDPs will strengthen the contributions individual participants are able to make at the Summit. In addition, those who did not participate in the preceding Grid Transformation Masterclasses may also chose to review some of the content covered in the series. A link to the materials is provided in Section 2.2.

2 About the Consumer Grid Summit

Australia's electricity systems are experiencing a decisive transformation driven by policy imperatives and consumer investment choices. In this context, the Consumer Grid Summit convened by RACE for 2030 brings together a diverse cohort of current and emerging leaders to build capacity for navigating change, develop visions of the future grid we need, and explore pathways for accelerating whole-system transition.

2.1 Australia's Grid Transformation

Australia's electricity systems are undergoing the most significant transformation in their more than 100-year history. From a centralised, one-directional past, power systems are rapidly moving toward an increasingly decarbonised, decentralised and participative future.

The transition is characterised by rising shares of renewable generation, growing proportions of customer-owned energy resources (e.g. solar PV, batteries, EVs, etc) and increasingly bi-directional power flows and multi-party exchanges. This scale and pace of change represents a true systems transformation challenge.

In more stable periods, change could be successfully managed through a series of comparatively isolated, targeted initiatives. Today, however, multiple parts of the system are transforming at the same time. Changes made to one area often drive intended and unintended consequences in several others. This dynamic typically intensifies as transformation accelerates – requiring new ways of designing and implementing change.

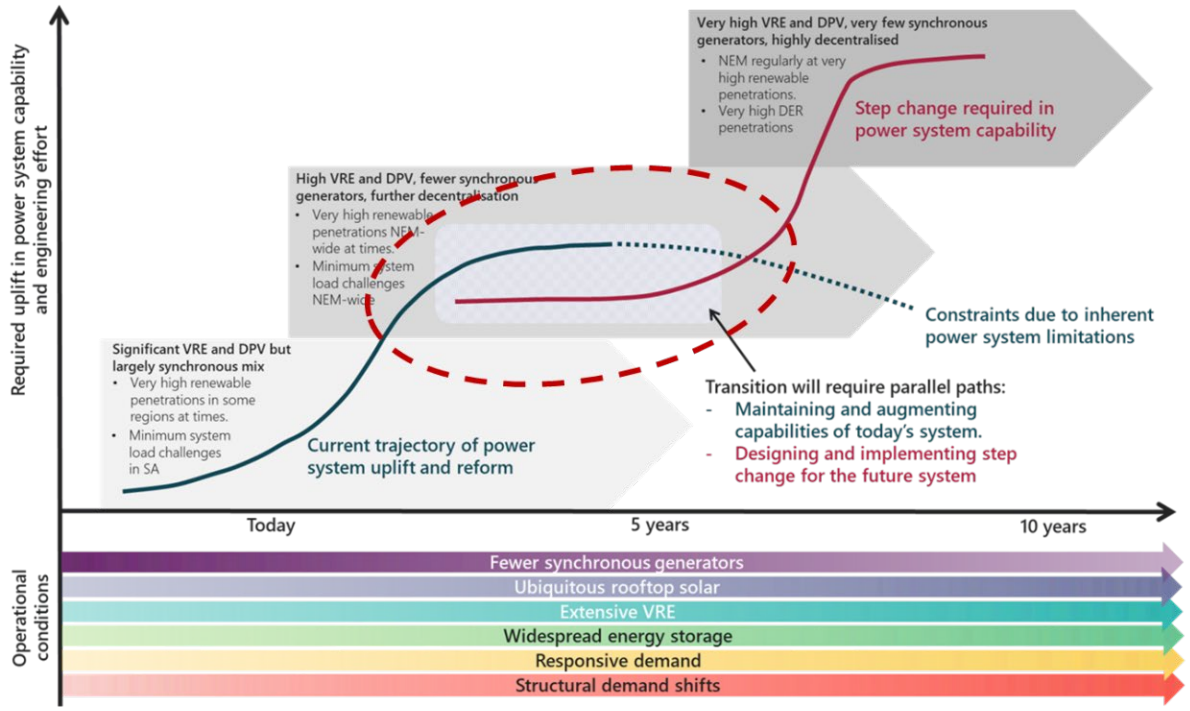


Figure 1: The Summit focuses on applying the knowledge, tools and capabilities required for navigating from the historic system arrangements (aqua S-curve) to those required by the future system (maroon S-curve).[1]

A comparatively new aspect of faced by the sector is that a growing cohort of consumers are driving the transformation, and not only the traditional system actors. Further, from the perspective of consumers, electricity is not primarily an infrastructure to be optimised but an essential service evaluated by reliability, affordability and ease of access and participation.

[1] Image: Engineering Framework – Interim Roadmap, AEMO, 2021; adapted from A Gambit for Grid 2035 – A systemic look into the disruptive dynamics underway, Pacific Energy Institute, 2021

A growing body of research shows that while some Australians are increasingly able to participate through solar PV, batteries and electric vehicles, many others face rising costs, limited choices and growing uncertainty about what the transition means for them. Affordability pressures, uneven access to benefits, and declining trust are emerging as critical fault lines. The Consumer Grid Summit will engage directly with this consumer reality and seek practical pathways toward a grid capable of enabling a more balanced set of customer and societal outcomes.

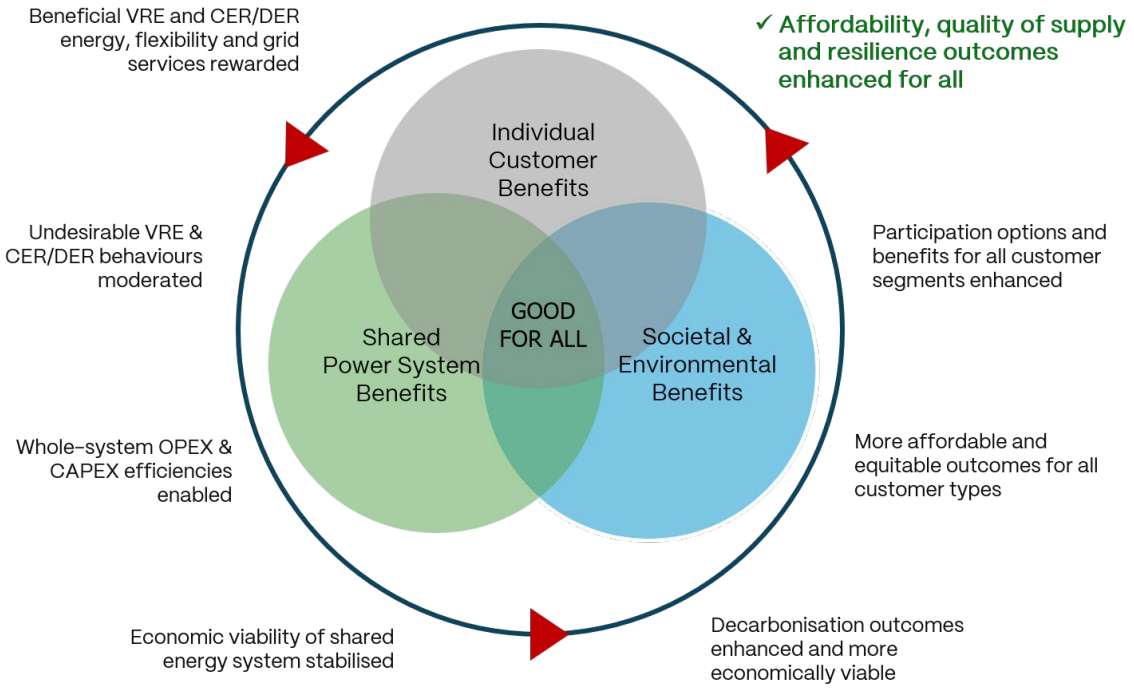


Figure 2: Australia's future grids must deliver a balanced set of outcomes for diverse customer types, and society as a whole while maintaining operational security and efficiency.[2]

2.2 Building Capacity for Navigating Transformation

Successfully navigating this scale of transformation requires not only new tools, but a shift in how change is organised, governed and implemented. Entrenched *business-as-usual* approaches – optimised for safety, reliability and supply-side efficiency – must be complemented or transformed to become more agile and future-facing, capable of enabling exploration, learning and coordinated action.

The Consumer Grid Summit establishes a unique and independent context for building shared capability to reimagine the longer-term future of Australia's National Electricity Market (NEM)[3]. The process is distinguished by the following six characteristics.

A. **Human-centred:** Our electricity systems exist to serve the diverse needs and priorities of Australians – and this must be at the very centre of reimagining their future. No longer just the 'right thing to do', it becomes increasingly urgent as the viability of alternative supply options grows over time – a classic lead indicator of strengthening disruptive forces.

B. **Sector/Societal-led:** The transformation of large, complex systems like the NEM is a 'team sport' that requires representation from across the sector and society. Top-down models are necessary but no longer sufficient for building sector-wide vision, alignment and action.

[2] Image: Energy Catalyst

[3] This term is used generically to mean the entire power system serving Australia's eastern seaboard, including the technological infrastructure, market, participants and supporting social and political institutions. While primarily focused on the NEM, much of the content will have direct application to other GW-scale power systems experiencing large-scale transformation.

C. **Whole-of-system:** The once dominant supply-demand bifurcation is eroding as power systems move from a unidirectional past to a bidirectional and networked future. Secure, efficient future grids will require entirely new levels of two-way interdependence between what were traditionally called the demand-side and supply-side.

D. **Longer-term Focus:** The conventional present-forward model of targeted changes remains necessary to address near-term issues. It is, however, ill-suited for navigating the longer-term structural shifts now occurring. A parallel future-back approach that simultaneously interrogates longer-term, medium-term and short-term time horizons to converge on transformation pathways is also required.

E. **Multi-stakeholder**: The future of electricity is very different from its past - no single entity or process has all the answers. The 'wisdom of the crowd' must be harnessed via dynamic, collaborative processes which will become increasingly important as Australia navigates a decade or more of transformational change.

F. **Transformative:** Beyond just 'keeping the lights on' in the near-term, new sector-wide focus and expertise for navigating and designing transformational, structural change must be developed. Conventional issue-in-isolation problem solving remains necessary but no longer sufficient as transformative forces escalate.

In preparation for the two-day Summit, a diverse cohort of over 100 stakeholders participated in five Masterclasses during May – June 2026. These online events were designed to build shared understanding of systems thinking, futures thinking and transition design. Key outputs of the group workshopping will inform the Summit, and a selection of Masterclass participants have been invited to participate in the Summit.

For Summit participants who did not participate in the Masterclasses, the content covered can be reviewed here: https://www.racefor2030.com.au/masterclasses-2026/

Present-forward Orientation	Future-back Orientation
Primarily focuses on 'what is'	Primarily focuses on 'what could be'
Adapts and increments existing paradigm	Considers transformative paradigms and the possibility of step changes
Sustaining / Continuous / Linear	Transformative / Discontinuous / Non-linear
Assumes stability, certainty and clarity	Assumes turbulence, uncertainty and ambiguity
Analytical / Reductive	Imaginative / Creative / Systems Thinking
History, facts and data-driven	Assumptions and objectives-driven
Primarily targets and resolves individual issues in comparative isolation	Primarily targets and resolves systemic issues

Table 1: The Summit provides an opportunity to reimagine and positively inform the longer-term future of the NEM from both 'present-forward' and 'future-back' perspectives.[4]

[4] Content adapted from: M. W. Johnson and J. Suskewicz, Lead from the Future: How to Turn Visionary Thinking into Breakthrough Growth. Boston, MA, USA: Harvard Business Review Press, 2020.

2.3 The Consumer Grid Summit Event

The Consumer Grid Summit process culminates in a two-day, closed-door event for a representative group of 40 - 50 participants. Conducted under the Chatham House Rule to support open and candid dialogue, participants will:

- Work collaboratively in *three cross disciplinary teams* supported by subject matter experts
- Apply *present-forward* and *future-back* perspectives to consider and refine alternative visions of the future NEM
- Identify the priority set of *transition enablers* critical to accelerating progress
- Develop *least regrets* transition pathways toward 2035 en route to 2040/50

The respected Three Horizons[5] model illustrated in Figure 3 will provide a coherent organising structure for the two-day Summit. The model provides a powerful means for considering how large, complex systems like the NEM transform in practice, which is typically through a series of phases.

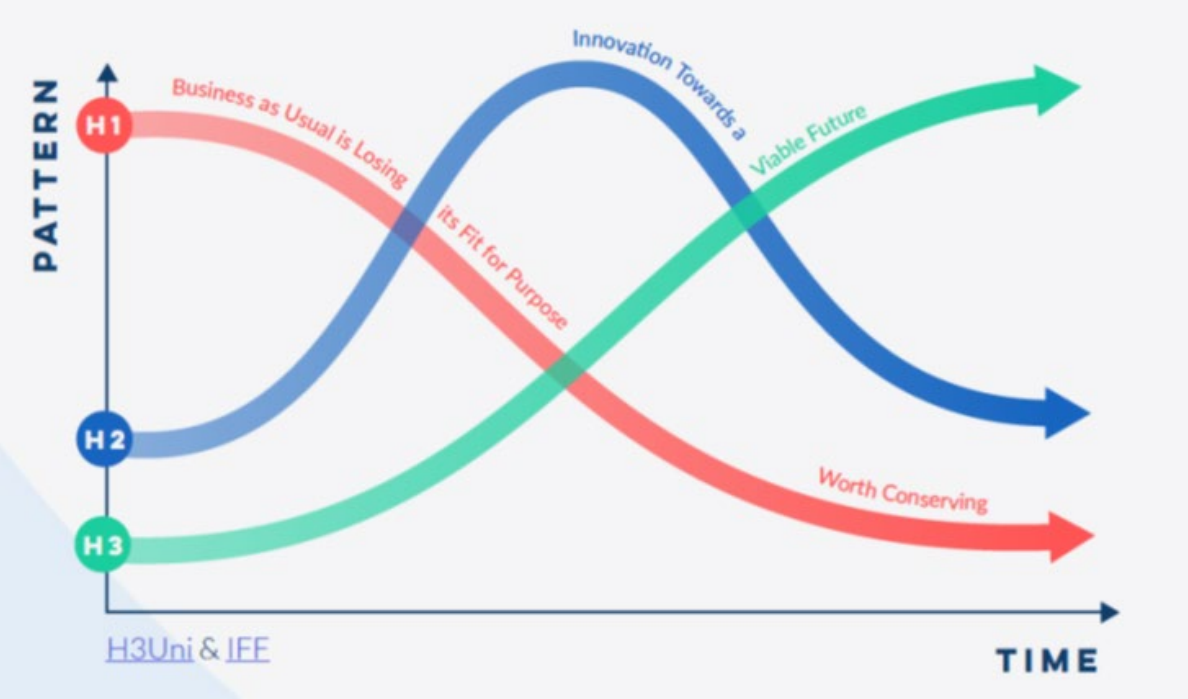


Figure 3: The Three Horizons model[6] provides a powerful tool for considering how large complex systems transform: from a stable historical state, through a transformative and hybridised phase that can endure for a decade or more, gradually stabilising into some new form of future state.[7]

For example, a long-established power system like the NEM (Horizon 1 – Red line) does not transform directly to its longer-term future state (Horizon 3 – Green line). Rather, as the original system continues to operate, albeit with declining fitness, it moves into an increasingly hybridized phase (Horizon 2 – Blue line). H2 involves a confusing *collision* of the declining legacy and emerging new worlds – neither of which dominate. The resulting intermediate condition reflects what Oxford University refer to as 'TUNA' characteristics: Turbulent, Uncertain, Novel, Ambiguous.[8]

[5] A. Curry and A. Hodgson, Seeing in multiple horizons: Connecting futures to strategy, *Journal of Futures Studies*, vol. 13, no. 1, pp. 1–20, Aug. 2008.

[6] Image: H3Uni and International Futures Forum

[7] It should be noted that 'gradually stabilising into some form of future state' is a comparative statement only. It does not assume that the H3 future state will be permanent and unchangeable – on the contrary, the nature of H3 may involve an ongoing level adaptation not seen in H1.

[8] Ramírez, R., & Wilkinson, A. (2016). Strategic Reframing: The Oxford Scenario Planning Approach. Oxford University Press.

While many strategic foresighting tools are conceptually rich, they can seem quite abstract. By contrast, the Three Horizons model is widely experienced as highly practical. It provides a simple, structured framework for turning long-term thinking into visual, step-by-step processes that inform transition design. Applied across the two-day Summit event, the model will help participants connect today's reality with tomorrow's possibilities through simple, stepwise map tools.

2.4 Summit Outputs & Outcomes

The Consumer Grid Summit process will culminate in a flagship report that sets out the transformation priorities and pathways identified through multi-stakeholder collaboration. Rather than simply diagnosing and restating long-standing challenges, the report will distil the tangible pathways for advancing grid transformation identified through co-design at the Summit event.

The Summit report will be supported by visually appealing collateral for senior briefings. It will also be designed to inform constructive public discourse about the transformation of the NEM with customer and societal interests at the centre.

Finally, a significant additional outcome of the Consumer Grid Summit process is the formation of a community of grid transformation leaders who use the knowledge and methods gained to advocate for and help lead the holistic transformation of Australia's power systems.

3 NEM Economics, Investment and Incentive Frameworks

Authors: Neil Lessem PhD (Regulatory Assistance Project) and Dylan McConnell PhD (UNSW)

Executive Summary

The National Electricity Market (NEM) is a complex system that has already adapted substantially, and often impressively, to one of the fastest electricity transitions in the world. Over the past decade, the NEM has shifted from a system dominated by fossil-fuel generation to one where renewables now provide around 45% of supply, with nearly one-third of that renewable generation located behind the meter. Rooftop solar, batteries, flexible demand, EVs and distributed resources are no longer marginal. They are becoming central to how the power system operates, invests and maintains reliability.

This is a major achievement. Parts of the NEM are now able to operate at very high, and at times near-total, renewable penetration. New services such as very fast FCAS have been created. System security frameworks are being strengthened as thermal generation retires. Distribution networks are connecting rapidly growing volumes of CER and DER. Inverter standards, emergency backstops and new operational tools have been developed. Several significant reform processes are also already underway. These are not signs of a static or broken market. They are signs of a market and regulatory framework that is evolving in response to new technology, new customer behaviour and new policy objectives.

The core message is one of disciplined optimism. The NEM is not broken, and many of its core arrangements continue to work well, but it must keep evolving. The wholesale market still provides strong real-time operational signals through five-minute dispatch, regional price formation and co-optimisation of energy and frequency control services. The network regulatory framework has supported world leading CER connections. Retail competition, while imperfect, is beginning to move beyond discounts and acquisition offers towards more innovative products for EV charging, wholesale pass-through, flexible tariffs and virtual power plants. The task is not to discard these foundations, but to adapt them for a more renewable, decentralised, flexible and participatory power system.

The wholesale market's energy-only gross pool design has been effective in coordinating dispatch and revealing short-term scarcity. However, its role in supporting long-term investment is under pressure. In practice, much new generation has relied on out-of-market mechanisms such as the Renewable Energy Target, the Capacity Investment Scheme, NSW Long-Term Energy Service Agreements and other jurisdictional schemes. This reflects persistent challenges including the "missing money" problem, political intolerance for reliability risk, the absence of a comprehensive carbon price and the mismatch between long-lived capital-intensive assets and short-term contracting appetite. The proposed Electricity Services Entry Mechanism is intended to bring long-term investment support closer to the market rather than leaving it entirely outside it.

Several wholesale market design questions therefore deserve continued attention. Zonal pricing provides weak locational signals and can contribute to curtailment, inefficient dispatch and poor siting decisions. The absence of a holistic carbon price means emissions are not fully internalised in operational and investment decisions. The NEM also remains largely one-sided, even as CER/DER and flexible demand become increasingly capable of responding to price signals. The Integrating Price Responsive Resources reforms are an important first step towards bringing flexible demand and aggregated distributed resources into dispatch and price formation, although the voluntary nature of the scheme will limit impacts.

Network regulation is the second major frontier. Transmission and distribution networks remain regulated natural monopolies, with revenue determined through five-year resets and tariffs used to recover allowed revenue. But the role of networks is changing. In a high-CER, high-electrification system, the goal is not only to build enough network capacity. It is also to make better use of existing capacity, enable efficient exports, support flexible demand and reward networks for helping customers use the grid in ways that reduce total system costs. Current incentives and tariffs do not always do this well. Network utilisation is low on available measures, and current tariffs can send blunt or distorted signals that discourage beneficial electrification, misallocate storage and overstate scarcity.

Smarter utilisation incentives and tariff reform could reduce costs, support flexible demand and give retailers more scope to develop attractive customer products.

Retail reform is closely linked to this. Retailers have historically competed through discounts and acquisition offers, but the next phase of competition could be far more valuable if managed correctly. Retail innovation is already emerging through EV charging products, wholesale pass-through offers, flexible tariffs and VPP models, but is not yet available to many customers. Network costs are a substantial portion of a residential customer's electricity bill. Network tariff reform that better aligns network costs and tariffs could substantially expand the value retailers can optimise for customers, expanding the benefits of competition to more customers.

International developments reinforce the case for practical evolution. ERCOT's operating reserve demand curve, UK scarcity pricing, reconductoring in the US and Europe, and UK/EU demand-side flexibility markets all offer useful lessons. The key priority is not revolution, but disciplined, future-resilient reform. The Consumer Grid Summit should help establish a shared counterfactual: what happens if reform stalls. Without that frame, stakeholders risk defending narrow interests and short-term impacts while overlooking the longer-term costs of inaction. The task now is to evolve competition, regulation and system management for a more decentralised, participatory and flexible NEM.

3.1 Introduction

The National Electricity Market (NEM) consists of competitive wholesale and retail markets, alongside regulated transmission and distribution networks. As illustrated in Figure 4, in the past decade electricity supply has transitioned from 87% fossil-fuel based generation to 45% renewable generation, nearly a third of which is located behind the meter. Approximately one in three households have rooftop solar and almost one in 25 now have battery storage.

Increasingly, parts of the system are instantaneously operating at near 100% renewables. New system services have been created to accommodate these high penetrations of renewable generation, such as very fast FCAS. A system security framework has been established to procure system stability services as thermal generation retires. Distribution network owners have been charged with connecting CER/DERs, and inverter standards and emergency controls have been established for distributed systems.

These are wins that should be celebrated. There is, of course, more work to do, and the good news is that much of this work is on the agenda, with several reform processes underway as outlined in Table 2.

In the following brief, we describe how economics, investment and incentive mechanisms work today and discuss some key debates on how these may need to change as the NEM continues to evolve. Our key observation is that we are doing a reasonably good job of transforming a complex system, and although more work is ahead of us, the key to moving forward is evolution, not revolution. While it feels like reform processes are slow and incremental, system transformation is happening at an astounding pace. Continuing and expediting this trajectory requires supporting and directing change for the system's good, not holding it up for narrower partisan interests.

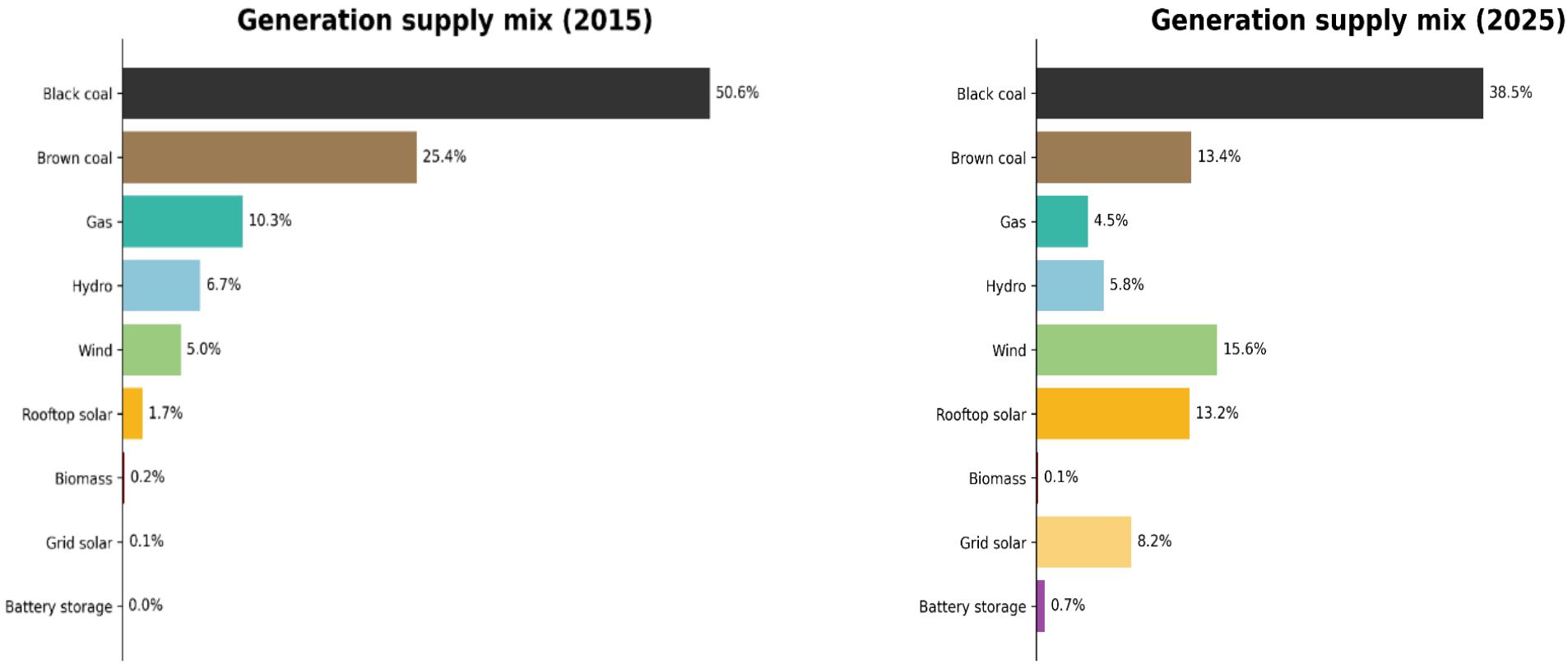


Figure 4: Changes in the NEM electricity supply mix from 2015 to 2025[9]

[9] Image: Openelectricity.org

Reform	Description	Status / timeline
National CER Roadmap / CER Taskforce	Developing the technical, data, market and operational arrangements needed to integrate CER/DER at scale, including interoperability standards, technical regulation, data sharing, and clearer roles for distribution-level market and system operation.	Implementation underway; work program mapped through to 2030, with annual updates and a 2027 review.[10]
NEM wholesale market settings review	Implementing longer-term wholesale market reforms, especially investment and contract mechanisms, to support firmed renewable entry as coal exits and as the CIS winds down.	Final report complete; Commonwealth-led implementation underway. NEL changes are expected to be progressed, so the framework is in place as CIS procurement winds down in mid-2027.[11]
AEMC pricing review	Completing a review of network tariff and retail pricing arrangements aiming to better support efficient electrification, equitable system outcomes and to promote retailers to compete in a way that better serves customer needs.	Draft report complete; final report expected June 2026; staged implementation expected over the following decade (once rule changes are requested).[12]
AEMC Electricity Network Regulation review	Initiating a review of network regulation to make sure network incentives are fit for purpose in a high CER/DER world, high electrification world.	Draft TOR released; consultation paper expected July 2026; draft report Q1 2027; final report Q4 2027.[13]
Better Energy Customer Experiences (BECE)	Reviewing whether retail energy consumer protections and customer-facing market rules remain fit for purpose as consumers face more complex products, electrification decisions, CER offers, dynamic tariffs, hardship risks and new service providers.	Initial consultation complete; reform design underway; further consultation expected; recommendations and implementation plan expected in early 2027.[14]
Connection standards for inverter-based loads	Updating NEM technical access standards so large inverter-based loads, including data centres and other large flexible loads, can connect faster and more predictably, while managing system security risks through requirements for disturbance ride-through, stability and visibility.	Draft rule published; submissions closed; final rule pending. Draft proposes raising the large inverter-based load threshold from 5 MW to 30 MW.[15]
Integrating Price Responsive Resources into the NEM (IPRR)	Creating a voluntary "dispatch mode" so price-responsive resources, including aggregated CER/DER, flexible demand and other currently unscheduled resources. can participate in NEM scheduling and dispatch rather than appearing as unexplained demand changes.	Final rule made Dec 2024; VSR guidelines finalised Nov 2025; dispatch mode originally due May 2027, but AEMO proposed a pause and reset in Apr 2026, with staged implementation to be developed.[16]

Table 2: A selection of major NEM reforms in progress

[10] DCCEEW, *National Consumer Energy Resources Roadmap: Implementation Plan Update*, August 2025

[11] DCCEEW, *Review of the National Electricity Market wholesale market settings* [Accessed June 03, 2026]

[12] AEMC, *Pricing review: electricity pricing for a consumer-driven future* [Accessed June 03, 2026]

[13] AEMC, *Electricity Network Regulation Review* [Accessed June 03, 2026]

[14] DCCEEW, *Better Energy Customer Experiences consultation paper,* March 2025

[15] AEMC, *Improving the NEM access standards – Package 2 – Draft Rule*, March 2026

[16] AEMO, *IPRR Frequently Asked Questions*, April 2026 pause and reset [Accessed June 03, 2026]

3.2 Overview of the existing arrangements in the NEM

3.2.1 Wholesale Market

The National Electricity Market (NEM) is centred on a competitive wholesale spot market. The spot market is designed to facilitate the efficient dispatch of electricity in real time, ensuring system demands are met at lowest cost, and to provide price signals to market participants.

The wholesale market can be characterised as an energy-only gross pool market. All electricity supply is offered into a central market (hence gross pool), and generators receive revenue based on the electrical energy delivered, without a parallel market for capacity (hence energy-only). In energy-only markets, the intention is for variable costs (for example fuel) and fixed costs (including capital costs) to be recovered from the value of energy output.



Figure 5: Key features of the wholesale spot market[17]

Prices are allowed to rise to extreme values during periods of scarcity, to allow generators to recover fixed capital costs and to signal that new entry may be warranted. In the NEM today, prices can vary from -$1,000/MWh to +$23,300/MWh. The market price cap (MPC) and other market price settings are set by the Reliability Panel to incentivise efficient entry into the NEM. Market participants use a variety of contracting and hedging strategies to manage these wholesale price risks, which in turn supports investment in energy supply infrastructure.

Several key features of the NEM wholesale market are now described.

[17] Image: Nelson, T., Conboy, P., Hancock, A., Hirschhorn, P., *National Electricity Market wholesale market settings review: Final Report*, Department of Climate Change, Energy, the Environment and Water, Canberra, December 2025, Figure 13

The spot market and dispatch engine

A primary function of AEMO as the market operator is to co-ordinate the efficient dispatch of sufficient generation to meet varying customer demand in real time, while meeting security constraints. In the NEM, this is achieved via a uniform-price auction, conducted on a 5-minute basis. Generation and load are offered into the market by participants, and conceptually, sufficient capacity is dispatched in "merit order" (from lowest to highest price). The last generator required to meet demand sets the uniform market price for that 5-minute dispatch interval, with all generators receiving the market price.

In practice, this process is much more complex. There are five distinct regional pricing zones, with frequency control also largely co-ordinated through the market, in ten parallel Frequency Control Ancillary Service (FCAS) markets. Frequency markets help keep electricity supply and demand in balance by quickly turning generation or flexible demand up or down. In the NEM, different FCAS markets require different response speeds ranging from very fast response in under a second to slower services that respond over 6 seconds, 60 seconds or 5 minutes. Dispatch across the 11 markets (10 FCAS, and energy market) and 5 regions is co-optimised for each dispatch interval, through a linear program known as the NEM Dispatch Engine (NEMDE). NEMDE also accounts for thousands of additional constraints (for example, related to transmission line ratings) to ensure that the power system is operating securely.

The frequency control markets are broadly broken into the categories of contingency services and regulation services as described below:

- Contingency services essentially stabilise the system when a 'contingency event' occurs. A contingency event typically involves the failure or sudden and un-expected removal of a generating unit (e.g. the trip of a large power plant), a load (e.g. the trip of an aluminium potline) or a transmission failure (e.g. loss of a transmission line due to weather). There are contingency markets, corresponding to four different timescales, with two different directions relating to the function (raise, or lower system frequency) each.
- Regulation services are used to correct for minor deviations in the demand and supply balance, within the 5-minute dispatch interval. The minor corrections required can be due to a range of factors, such as an error in demand forecast or a generator failing to meet its dispatch target. Similarly, there are separate raise and lower markets for regulation services.

The market price settings and the reliability standard

The wholesale market price settings are intended to ensure the spot market delivers sufficient investment in generation, storage and demand response in the NEM to meet the reliability standard. In theory, the market price settings should mean that the last generator needed to meet the reliability standard is financially viable and would therefore have sufficient incentives to enter. Conversely, settings below this threshold would theoretically result in insufficient supply to meet the reliability standard.

The reliability standard is set by the Reliability Panel, a quasi-independent panel chaired and supported by the AEMC, comprising members across the sector, including small and large consumers, generators, network businesses, retailers and AEMO. Despite its name, the reliability standard is less a standard than an ex-ante expectation of what an 'efficient' level of unserved energy would be in the long run.

In this context, efficient means that it balances out the incremental cost of a new generator or energy storage system with the incremental customer benefits of avoiding events where there is inadequate capacity to meet customer demand. Referred to as unserved energy, this would result in rotational load shedding, whereby customers are iteratively turned off for a couple of hours, rather than a blackout.

Conceptually, the reliability standard seeks to reflect that at some point customers would prefer the risk of rotational load shedding than paying for generation or storage capacity that is rarely used. The AER uses a sophisticated survey instrument to periodically calculate the value of customer reliability (VCR), an estimate of how much different customer types in different geographies would value avoiding, or need to be compensated for, an outage. In many jurisdictions this is called the value of lost load (VOLL). In 2025 the AER estimated the VCR at $43,060/MWh.[18]

The reliability standard is a probabilistic benchmark of what we expect the system to deliver. Actual delivery will depend on how market participants react to the market price signals and their own independent assessments of future market outcomes. To date, actual unserved energy has been well below expected levels.[19]

The Reliability Panel sets the market price settings to incentivise sufficient investment to realise the reliability standard, while managing customer risks.[20] To date the Panel has not taken into consideration jurisdictional schemes such as the Capacity Investment Scheme (CIS) in investment decisions in its market modelling. The Panel's rationale is that jurisdictional schemes are designed to complement, rather than substitute for, the reliability framework investment signals.[21] This may change in the future should the Electricity Services Entry Mechanism (ESEM) become a permanent feature of the market (discussed further in Section 3.3).

As a last resort, if AEMO forecasts that the reliability standard will not be realised, they can tender for out of market reserves through the Reliability and Emergency Reserve Trader (RERT) function. RERT is meant to make up the difference between the market price cap (MPC) and how customers are calculated to value reliability of supply (VCR).

Derivatives contracts

While price volatility in the spot market sends important scarcity signals to support efficient dispatch, it creates significant financial risks for both retailers and generators. Retailers cannot pass on significant price spikes to customers in real time and generator revenues are vulnerable to low spot prices.

The derivatives market operates alongside the wholesale spot market and enables participants to manage the financial risks arising from volatility in the spot market. Importantly, the derivatives market allows the value of firm capacity to be effectively priced. In this way, derivatives markets facilitate a decentralised capacity market within the NEM. The derivatives market is typically liquid (easily tradeable) up to two or three years into the future.

Updating the set of derivative contracts to better reflect the type of products needed to hedge in an increasingly renewable and distributed energy world is one of the recommendations of the NEM Wholesale Market Settings Review. Work on this is underway in an industry co-design process led by AusEnergy Services Limited (ASL). These standardised contracts will then feed into the ESEM procurement process (more details in Section 3.3).

[18] AER, *Values of Customer Reliability 2025 Annual Adjustment Summary*, December 2025

[19] See Appendix A3 in Reliability Panel AEMC, *2026 Reliability Standards and Settings Review – Issues Paper,* June 2025 for more information

[20]. The settings include the market price cap (MPC), market floor price (MFP), cumulative price threshold (CPT) and administrative price cap (APC). Collectively they create the expected revenue that a new entrant can earn and help determine market entry. The CPT is in place to cap the risk that participants face from prolonged high prices. The CPT is a limit on the cumulative number of high price periods in a week. Once it is hit, administered pricing is imposed which has a far lower administered price cap (APC). This limits the risk that generators face in selling cap contracts to retailers and lowers the cost of hedging.

[21] Reliability Panel AEMC, *2026 Reliability Standard and Settings Review – Draft Report,* November 2025

Out-of-market investment signals

The spot market, associated derivatives markets and contracting were originally envisaged to support investment in generation and energy service. Price signals from these markets were intended to provide requisite information to support investment decisions, and appropriate risk adjusted returns for the investments. The majority consensus is that this has rarely occurred in practice. Since the beginning of the NEM, most new bulk generation has been supported by out of market mechanisms (like the Renewable Energy Target which began in 2001). This perspective was shared by the NEM Wholesale Market Settings Review and many inter-related factors contribute to and drive this phenomenon as follows.

- Firstly, there is a well-documented and much discussed "missing money" or resource adequacy problem. Simply put, when generating capacity is adequate, energy only markets may result in prices that are insufficient to compensate asset owners for both fixed (capital) and variable (predominantly fuel) costs. Alternatively, electricity prices are required to rise to levels that become politically challenging, to support investment required.
- Secondly, the reliability standard acceptable to politicians is functionally 100%. Even though there is an independently set reliability standard, Energy Ministers have low tolerance for *any* unserved energy and sometimes intervene in ways to ensure higher reliability than would be supported by market settings alone. For example, the South Australian government backed diesel generators, and arguably Snowy's Kurri Kurri gas turbine, fall into this category.
- Thirdly, the political intractability of introducing carbon pricing has resulted in alternative mechanisms to drive investment in renewable energy and reduce emissions, most notably (and historically), the Renewable Energy Target (RET). This approach, with out-of-market revenue had the impact of suppressing wholesale market prices, and dulling market driven investment signals. Other government interventions (including, for example, State based Renewable Energy Targets), or State backed investments like Snowy 2.0 (or Kurri Kurri) also impact prices and increase risks for prospective new entrant investors.
- A further challenge that has been argued to support the need for out-of-market support is the so-called "tenor gap", widely discussed in NEM wholesale market settings review. The tenor gap is the mismatch between the long-term revenue certainty that developers of capital-intensive generation and storage need to finance projects (typically 10 to 30 years) and the much shorter contracting appetite of buyers like retailers and large C&I users (typically 3 to 7 years).

In combination, these factors have resulted in compounding (and escalating) interventions to ensure sufficient investment. While the RET is no longer driving material investment, several other mechanisms have arisen. At the State level, this includes Long-Term Energy Service Agreement (LTESA) contracts in NSW, and the Firm Energy Reliability Mechanism (FERM) in South Australia. At the Federal level, the Capacity Investment Scheme (CIS) is the dominant Commonwealth scheme to support new variable renewable energy and storage.

The abovementioned mechanisms vary in scope and implementation detail, but all make use of long-term contracts, awarded in competitive tenders. To greater or lesser degree, they partly address the above issues – namely ensuring revenue adequacy, reliability or emissions objectives, but outside of the NEM framework.

Some industry stakeholders have more positive views on the NEM's ability to attract investment without government intervention. One way of interpreting the RET is as a second-best proxy for carbon price – a correction rather than an intervention. From this perspective, once the carbon externality was corrected for bulk entry of renewables into the market was possible. Simshauser and Gilmore contend that the RET was effectively fully subscribed by the end of 2018 and that most renewable projects reaching financial close from 2019–2025 were supported through on-market transactions rather than government underwriting.[22]

3.2.2 Transmission & Distribution Networks

Electricity networks are natural monopolies regulated by the AER. They have large, fixed costs relative to the size of the market, meaning that costs per unit fall with each additional unit. The are what is referred to as natural monopolies because having multiple providers of the same service would increase the average cost of providing the service to customers. A corollary of this is that a natural monopoly has the market power and ability to decrease quantity and increase prices.

Economic regulation is, therefore, in place to ensure that both customers and the monopoly entity receive a fair deal. Regulated monopolies are being asked to make large long-term investments while handing over some of their decision-making parameters to the regulator. Ensuring that consumers receive the best possible prices and services means regulators need to maintain a stable and predictable investment environment for monopolies. While some degree of risk is needed to create the right set of incentives for efficiency, too much risk will deter new capital investments and drive-up costs.

Networks operate under a revenue cap, which is reset every 5 years. If they can find efficiencies to reduce expenditure below the revenue cap, they will earn higher profits in that regulatory period. These lower expenses will however feed into the next regulatory period, lowering the future revenue cap. Networks can also earn additional revenues through beating various performance benchmarks.

Several key features of the regulatory context for networks operating the NEM are now described.

5-year revenue reset

Networks propose to the AER efficient costs for the upcoming five-year regulatory period. The AER assesses the proposal based on:

- efficiency of costs
- quality of engagement with customers
- projected demand for energy
- age of infrastructure
- operating and financial costs
- network reliability and safety standards

The AER can accept or reject proposed costs. This regulatory reset determines the maximum amount of revenue that a particular network business is allowed to recover in the next five-year regulatory period. This revenue includes operating expenditure, a 'fair return' on capital and depreciation. Returns to capital are set by the AER in a separate process that applies to all utilities (gas and electric), which involves a framework to set a fair rate of return for a benchmark utility.

[22] Simshauser, P. & J. Gilmore, *The Counterfactual Scenario: are renewables cheaper?* June 2025

Networks have several ways to boost profitability above this fair rate of return in the regulatory period:

- **Cost outperformance:** they can reduce operating or capital costs below the levels forecast in the 5-year revenue determination and, subject to incentive-scheme rules, retain some of the benefit.
- **Financing outperformance:** they can finance themselves at lower cost than the benchmark assumed by the regulator, including through different debt costs, hedging, gearing, or capital structure choices.
- **Incentive payments:** they can earn rewards under incentive schemes that encourage efficient expenditure, reliable service, demand management, innovation, or other desired behaviours.

The regulatory process is a repeated game, with the intention that each round the AER 'pays' the network to reveal information about the costs and quality of its service. Higher profits in one period reveal information about underlying costs that will be used by the AER to set revenue in future periods.

Network tariffs

Network tariffs are the mechanism through which networks recover allowed revenue, but do not impact network revenue or profits. Networks correct for any revenue shortfalls or surpluses in a given year by adjusting tariffs in future periods.[23]

Under the current framework, each distribution network develops a Tariff Structure Statement (TSS) as part of its five-year regulatory reset. The TSS sets out the network's tariff strategy, tariff classes, tariff structures and approach to setting tariff levels for the regulatory control period. These tariff structures are required to be consistent with several pricing principles set out in the National Electricity Rules (NER). Each year, the network then submits an annual pricing proposal to the AER, which approves prices if they are consistent with the approved TSS and the applicable revenue controls.

Network charges account for about 40% of a residential customer bill on average, about the same magnitude as wholesale market costs. The structure of tariffs matters as it sends signals to customers that will impact both their CER investment decisions and when and how they use electricity. Although retailers are free to charge any pricing structure that they see fit, , many pass through the underlying network tariff structure directly. In some instances, customers who have had their electricity meter upgraded to a smart meter have unexpectedly been placed on a time of use or demand tariff retail offers, which they may not desire or be equipped to understand or respond to. Consequently, the AEMC put in place a rule requiring retailers to obtain a customer's explicit informed consent prior to changing the customers' retail tariff structure, following a smart meter upgrade.[24]

Capital investments in networks

The nature of electricity networks as natural monopolies is that they are geographic monopolies. As such, larger investment decisions are made not through a competitive market process but through a cost-benefit analysis overseen by the Australian Energy Regulator (AER). This process is called the Regulatory Investment Test (RIT) and is designed to identify investment options (both network and non-network) that deliver the greatest economic benefit to the system, in the long-term interests of consumers.

The test comes in two forms distinguished by network scale: the RIT-T for transmission and the RIT-D for distribution. These are triggered beyond a capital-cost trigger threshold, reviewed by the AER (currently set at $7 million). The RIT-T process runs through a lengthy consultation process, with the AER able to contest costs and assumptions, with input from other stakeholders. The RIT-D has a similar process, albeit with fewer consultation steps.

[23] This holds true, apart from the extreme circumstances where tariff changes spark grid defection and ensuing tariff adjustments result in a 'death spiral.

[24] AEMC, *National Electricity Amendment (Accelerating Smart Meter Deployment) Rule – Final Determination*, November 2024

In 2020, a new "Actionable ISP" framework was introduced, with a view to streamlining the regulatory process for key transmission projects identified in the Integrated System Plan (ISP).[25] Through the biennial ISP, AEMO designates projects as "actionable". These projects can fit into modified RIT-T (essentially skipping a stage). After completing that, a "feedback loop" ensures the preferred option from the RIT-T remains consistent with the ISP, and the project can proceed through "contingent project application" to determine a revenue allowance (also assessed by AER for cost efficiency).

3.2.3 Energy Retail

Retail is competitive in most NEM regions. The retailer's job is to repackage wholesale and network risks into offerings that consumers like. Retailers can hedge wholesale prices by owning generation, buying hedging products, or using customer sited resources to build a virtual power plant (VPP). While the big three 'gentailers' own about 40% of generation resources, VPP supply is less concentrated. The ACCC found that smaller retailers and non-retailer providers supply more than 75% of VPP customers, while the big three retailers account for less than 25%.[26]

Retailers have historically competed through acquisition offers that give one-off (or time limited) discounts/benefits to switching customers. Increasingly retailers are competing on more innovative customer offers such as free electricity at certain times of day, free/cheap EV charging and bundled services.

In 2019, following an ACCC inquiry into retail electricity pricing in the NEM, a default market offer (DMO) was introduced. The ACCC inquiry found, among other things, that the proliferation of confusing and conditional 'standing offer' prices had left many households and small businesses paying excessive amounts for electricity, especially those not actively engaged in tracking the best offers. The DMO is a basic offer that retailers charge customers on standing offer contracts in the regions where it applies. It functions as a safety net for standing offer customers, rather than a hard cap, and serves as benchmark for comparisons with market offers. The Victorian Default Offer (VDO) performs a similar role in Victoria.

3.3 Perspectives on the fitness of the existing arrangements in the NEM

3.3.1 Wholesale Market

The NEM's energy only wholesale markets generally work well in providing efficient operational signals for dispatch. Market arrangements could be improved upon by incorporating:

- more granular locational signals which better reflect actual grid conditions and congestion;
- the cost of carbon emissions so the true cost of dispatching a resource is accounted for; and,
- consideration of customer behaviour in dispatch processes as the demand side becomes more flexible.[27]

As discussed earlier, the effectiveness of the existing market's investment signal is less clear. We are not necessarily allowing the market price signal to operate in the way in which it was intended. Jurisdictional schemes and plans increasingly require the entry of renewables before the exit of coal, meaning market prices will not rise to the level required to encourage entry and additional mechanisms are required. The introduction of the Electricity Services Entry Mechanism (ESEM) is intended to help improve the investment signal but is not yet implemented.

Several key points of debate about the fitness of the existing arrangements are now described.

[25] The Integrated System Plan (ISP) is AEMO's roadmap for the National Electricity Market, prepared on a two-year cycle. The ISP aims to identify an 'optimal development path' for the generation, storage, and transmission infrastructure needed to maintain a reliable, secure, and affordable power system, while keeping within emission goal. It arrives at this path by conducting a large least-cost optimisation, to identify the least-cost mix of resources and investments to meet reliability standards and emissions targets, out to 2050. While transmission projects are built more or less directly to meet the ISP plan, generation and storage investment is left to the market, albeit with some jurisdictional support guiding it.

[26] ACCC, *Inquiry into the National Electricity Market – July 2025 report*, July 2025

[27] This becomes increasingly important and may even change how we think about the market and various existing frameworks. Initial steps are currently underway to incorporate flexible demand-side resources into price formation and dispatch.

Locational Marginal Pricing

The NEM uses zonal pricing, with price zones roughly corresponding to state boundaries. Market participants face a single, zone-wide price that does not reflect the marginal cost or benefits of injecting (or withdrawing) power at their actual location. Electricity flows according to the physics of the network, not according to market regions or price boundaries. Where market prices reflect the physics, markets work well. Zonal pricing is a poor reflection of the physics of the network and results in several poor outcomes, including:

- excessive curtailment of renewables as they unknowingly choose to locate in constrained parts of the network
- 'contra-flows' on interconnectors where electricity flows from a high-priced region to a lower priced region; and,
- inefficient dispatch where higher cost generators are chosen over lower cost resources as they all race to get dispatched at a high market price that doesn't reflect local grid conditions.[28]

The issues with zonal pricing have been understood since the beginning of the NEM. Indeed, the original design of the NEM envisaged further splitting zones, based on congestion criteria, to mitigate the issues associated with large zonal pricing areas. Discussion and reform efforts on this topic go back decades, with the 2018 "Coordination of Generation and Transmission Investment" (COGATI) review representing the most recent comprehensive effort, which proposed dynamic pricing regions alongside transmission rights.[29]

These reform options faced significant opposition and were ultimately not progressed. More recently, alternative options were proposed in an attempt to address the underlying issues, but without full nodal pricing. This included the Congestion Management Model for REZs, and then a voluntary Congestion Relief Market. The AEMC ultimately recommended against implementing these models too, again based on stakeholder opposition.

This issue was also discussed in the more recent NEM Wholesale Market Settings Review, but only very briefly. They acknowledged the inefficiency of uniform pricing within a zone and pointed to evidence of improved operational efficiency in other markets. However, the panel argued that that costs and complexity would outweigh benefits and recommended against implementing marginal locational pricing. They considered that that issues could be manageable within the current arrangements, including in the development of REZ's by individual jurisdictions. This remains to be seen, and the fundamental mispricing and resulting inefficiencies may continue to be an issue.

Carbon price signals

There is no carbon price that applies holistically in the NEM to enable efficient and decentralised decisions on operations and investments across the full length of the system. This lack of an emissions signal is costly as it creates investment uncertainty and focuses emission reduction actions narrowly towards certain sectors and technologies, rather than on the lowest cost actions.

[28] That is, supply exceeds demand (transmission capacity) at the zonal market price.

[29] AEMC, *Coordination of Generation and Transmission Investment – Final Report*, December 2018

In 2023, emissions reduction was added to the National Electricity Objective, National Gas Objective and National Energy Retail Objective (collectively referred to as the national energy objectives or NEO). These are statutory decision-making objectives under the national energy laws and guide the exercise of relevant functions by Australia's energy market bodies, the AEMC, AER and AEMO. The amendment requires emissions reduction to be considered alongside price, quality, safety, reliability and security in assessing the long-term interests of energy consumers. Alongside the new objective, the Energy & Climate Change Ministerial Council (ECMC) published an interim value of emissions reductions (VER) in 2024. This escalates from AU$70 in 2024 to AU$420 in 2050 (in real terms). This interim VER is set to expire on 30 June 2026, unless renewed or replaced.

Under the updated NEO, the AEMC can consider the value of emissions reductions when making rule change decisions. These emissions reductions can come from any sector of the economy, provided they occur within Australia.

Outside of the market bodies decision processes, the VER directly impacts network investments, but not generation or retail. Networks are regulated by the AER who apply the VER in assessing revenue determinations, RIT-D and RIT-Ts. Network can consider the benefits of emissions reductions alongside other costs and benefits in determining their investment plans.

Less directly, the VER will impact whole of system transmission planning in AEMO's ISP. Prior to the inclusion of emissions in the NEO, the ISP already included a carbon constraint that reflected a government target for net zero by 2050. The change to the NEO has meant that alongside the existing carbon constraint, AEMO include a variety of state and commonwealth emissions targets along with the VER in its modelling.

The Productivity Commission has proposed that the Safeguard Mechanism would be the best vehicle to create a national, market-based policy to drive electricity sector decarbonisation.[30] The Safeguard Mechanism is a tradeable emissions intensity scheme that covers Australia's largest industrial emitters. It already notionally applies to the electricity sector, although the baseline is set at a non-binding level.

An alternative proposal was submitted to the AEMC in December 2025, requesting that the electricity rules be amended to include a carbon price in market settlement. Generators would then need to internalise this cost in their market bids. This rule change request is still listed as pending on the AEMC's website as of June 2026.[31]

One-sided market and CER/DER integration

The NEM was predominantly designed as a one-sided market in which supply-side actors participate, namely merchant generators and increasingly utility-scale energy storage. As noted earlier, every five minutes AEMO forecasts demand and pays suppliers whatever price is necessary to meet forecasted demand, up to the market price cap. Under and over-forecasts of demand are met by paying resources to turn up or down respectively in the FCAS markets.

This one-sided orientation made sense when demand was comparatively stable, predictable and passive, with few customers willing or able to dynamically respond to market price incentives. This historical context, however, is changing dramatically asincreasing volumes of CER/DER emerge that can respond to spot prices in the form of batteries, EVs, flexible domestic and industrial loads and VPPs.

[30] Productivity Commission, *Investing in cheaper, cleaner energy and the net zero transformation, December 2025*

[31] https://www.aemc.gov.au/sites/default/files/2025-12/New rule change proposal - Dr Kerry Burke %28private individual%29 - Carbon rule change - 20251207.pdf

In 2024, the AEMC made the Integrating Price Responsive Resources (IPRR) rule change which created what is essentially a pilot project for a two-sided market. Under IPRR price responsive resources can voluntarily participate as scheduled resources,[32] forming part of the price setting mechanism, rather than being treated as unexplained movements in demand. Volunteer participants will be paid, as participating in market dispatch is costly and yields no direct benefits to them. Funding will last from program inception in 2026 through to 2031.

Fully moving to a two-sided market would be a large change to how we conceive of electricity markets. For example, the market price cap and reliability standard may be less critical as customers or their nominated agents may choose to lift or lower their demand (or supply into the grid) in response to certain prices.

The Electricity Services Entry Mechanism (ESEM)

A central recommendation of the NEM wholesale market settings review was the introduction of the Electricity Services Entry Mechanism (ESEM). Work is currently underway to implement the ESEM, with energy ministers agreeing to engage AusEnergy Services Ltd (ASL) to continue preparatory work related to its establishment.

The core logic of the ESEM is to keep investment signals *within* the market rather than alongside it (as distinct from the CIS or RET for example). However, it is largely targeted at addressing the tenor gap (rather than carbon pricing, or reliability concerns, both of which are discussed further in Section 3.3). In the proposed mechanism, a central buyer (the ESEM Administrator) contracts with new projects only for the later years of their life, while leaving developers to contract the front end de-centrally within-market. These contracts are intended to be standardised, fungible derivative contracts, with the central buyer progressively reselling them back to retailers and C&I users as time rolls forward. The resale is intended to keep the mechanism aligned with the market rather than displacing it, or sitting along-side the market.

Emerging challenges to reliability and market price settings

The nature of scarcity pricing has and continues to evolve. Historically, reliability concerns have been driven generally by capacity availability on high demand days (for example, very hot days in summer). As we move to a system dominated by VRE, reliability concerns are increasingly weather-driven or due to energy limitations. This includes so-called “dunkelflaute” condition periods (i.e. windless and dark periods, with limited generation from solar and wind) but can also include traditional resources running out of fuel.

Managing new extreme reliability challenges (which might include dunkelflaute conditions), may be difficult to manage with the existing market price settings. In isolation, the current market settings alone may not be sufficient to drive investment from the private sector to manage the risk of severe, low-probability events (sometime referred to as High Impact Low Probability, HILP, or Wide Area Long Duration Outage, WALDO). In 2024 the Reliability Panel concluded a review of the Form of the Reliability Standard, where they examined whether it needed to be changed to better account for rare, weather driven outages. As mentioned above, insufficient generation to meet demand is managed by rotational load shedding. This limits the customer impacts of many events. Using 83 years of historic weather data the Reliability Panel found that the current reliability setting limited the risk of an outage deep enough to extensively impact customers to be about 1 in 100 years.[33]

[32] These Voluntarily Scheduled Resource Providers (VSRPs) will be registered under the existing market participant framework, choosing the participant category that best fits their characteristics.

[33] Reliability Panel AEMC, *Review of the form of the reliability standard and administered price cap*, June 2024

Using the market settings alone to manage this risk would be expected to place an unacceptably high cost burden on consumers and might require higher risk tolerances than the private sector would be comfortable with. Additional measures, beyond the market price settings, may be better placed to manage these emerging reliability risks.

Strategic reserves could potentially be an alternative approach, though would require consideration of interaction with the market price settings and governance arrangements. They could present an avenue to increase reliability, with limited impact on the market dynamics and prices. If strategic reserves were explicitly and exclusively out-of-market, leaving price formation within the market unaffected (like the RERT) they could offer an option that minimally distorts wholesale market pricing and private sector activity. New technologies may give us opportunities to use truly out of market resources. For example, many customers may be reluctant to use vehicle to grid and vehicle to home charging (V2G and V2H) daily due to inconvenience or concerns over their warranty. However, if V2G and V2H are enabled as a strategic reserve, they can be called upon during a scarcity event.

3.3.2 Transmission & Distribution Networks

Transmission and distribution networks sit at the centre of Australia's energy transition. As CER/DER, energy storage and flexible demand reshape the grid, the regulatory framework must shift from simply funding network capacity to actively rewarding better network utilisation, export enablement and flexibility. The AEMC's forthcoming Network Regulation Review is therefore a critical reform moment. While it is expected to evolve rather than replace the existing framework, it opens the door to material changes in how networks are remunerated, incentivised, classified and held accountable for enabling a two-way, consumer-driven electricity system.

The core challenge is that current incentives do not sufficiently reward networks for making better use of existing infrastructure. Networks can recover efficient costs for export services, but they are not yet explicitly incentivised to maximise exports or optimise available capacity. At the same time, network tariffs often send blunt or distorted signals that discourage flexible demand, ration useful consumption, misallocate storage and fail to reflect localised network conditions. Reform should therefore focus on aligning network incentives, utilisation measures and tariff design so that networks help customers import, export, store and shift electricity in ways that reduce total system costs and unlock greater value from the grid.

Several key points of debate about the fitness of the existing arrangements are now described.

Network Regulation Review

The AEMC is about to undertake a review of electricity network regulation. The draft terms of reference note that changes in technology, notably CER/DER, are rapidly changing how customers use electricity networks which both provides new opportunities and the need for new services to accommodate them. The review will seek to evolve the existing regulatory framework rather than replace it but does not rule out material changes to the framework. The review is expected to examine:

- how networks are remunerated, incentivised and held to service obligations;
- where regulated network services should end and contestable services should begin; and,
- what role distribution networks should play in coordinating connected and behind-the-meter generation.[34]

[34] AEMC, *Electricity Network Regulation Review – Draft Terms of Reference*, December 2025, p.2

Incentivising better network utilisation

In 2022, networks were given an obligation to accommodate and manage customer exports to the grid. In return they were given the ability to recover the efficient costs of providing this service, with export charging arrangements first implemented in 2025. However, networks do not yet have any explicit financial incentive to maximise or improve upon export services. In fact, the existing incentive framework may encourage a more conservative approach to managing customer exports which may lead to limits being more constrained than would be socially optimal.[35]

This lack of incentives to promote exports can be solved independently or more holistically together with a second issue – insufficient distribution network utilisation incentives. Networks report network utilisation to the AER, and this data is used for performance benchmarking and assessing expenditure proposals. Networks do not have direct incentives to improve utilisation and current measures of network utilisation are information poor.

The AER reported that overall network utilisation in 2023 was 43% (the sum of non-coincident zone sub-station demand over the sum of zone-substation transformer capacity).[36] However this metric only measured the average utilisation in each zone substation for the highest half hour each year (non-coincident peak demand) as a share of the zone substation's transformer capacity. This tells us nothing about electricity exported to the grid, or how well that capacity is used in all other hours. So, on average, at each zone substation's busiest half hour of the year, less than half of capacity was used on average. This means that in most hours and most places, the network has substantial capacity available.

Using the network more intensively helps lower customer costs per kWh, both now and in the future. By spreading the largely fixed cost of the network over more units, costs can fall as soon as utilisation increases, and by shifting some usage away from peak demand, future capacity expansion costs can be avoided too. The AEMC Pricing Review Draft Report proposed introducing a utilisation incentive that would reward networks for better using existing capacity to facilitate both exports and imports.[37] Since tariffs act as a signal for when and where to import and export electricity, a network utilisation incentive could change networks from being indifferent to tariffs (which don't impact revenue) to supporting the development of tariffs that help customers get the most out of the existing grid. It would also support them working more closely with retailers to ensure that retailers can use these tariffs to develop products that are attractive to (some) consumers, who are willing and able to react to the underlying price signals.

Network tariff reform

As noted earlier, wholesale market prices vary every 5 minutes across a wide variation from negative prices to relatively high prices. This gives a clear signal to energy retailers of when procuring electricity is relatively cheap or expensive and creates different value propositions that they can pass onto their customers. For example:

- some customers (largely those with batteries) have elected to receive a wholesale pass through retail offer, where they can use or store grid electricity when it is relatively cheap and then self-supply or export back to the grid when prices are higher;
- others receive retail offers that have some aspect of flexibility – lower cost EV charging at night or in the middle of the day, free power in the middle of the day, or free power for yielding control of your battery and solar system.

[35] For example, networks can receive financial rewards when they exceed reliability performance benchmarks under the Service Target Performance Incentive Scheme (STPIS). If accommodating more customer exports increased the risks of outages, the utility would face a potential reduction or loss of STPIS revenues but receive no corresponding reward for enabling higher exports.

[36] AER, *State of the energy market 2024 – Chapter 3: Electricity networks*, November 2024, p. 130

[37] AEMC, Pricing Review Draft Report, p.108

This flexibility is important for better using abundant cheap renewable power when available and avoiding more expensive peaking capacity when it is not. Flexibly responding to wholesale prices benefits both participants, whose average cost of grid consumption falls, and non-participants, who see lower market prices in the nearer-term and lower network and system costs over the longer-term.[38] Current network tariffs, however, do not readily encourage this demand-side flexibility – and may at times hinder it.

Conceptually, under the Pricing Principles in the NER, networks should set the peak price to reflect the incremental cost to the network of future (long-run) capacity expansion. Economists call this the long run marginal cost (LRMC). This would encourage customers to use electricity in the peak period only when they value it more than the future costs this consumption may impose on the system. In practice however, network peak period tariffs are often far higher than the LRMC, as networks need to recover the costs of past investments. This results in several issues with current network tariffs that need addressing to achieve a grid that provides more value for all customers at lowest possible cost:

- **Costly rationing:** Deterring customers from using energy is not costless. Customers obtain value from their use of power, whether that be heating their homes or charging an electric vehicle. When customers ration their energy use to avoid more expensive peak periods, that value is lost. If the incremental cost of usage exceeds the benefit, society is better off. However, when the benefit of usage exceeds the incremental cost, society is worse off. While this sounds abstract, there are real world implications. Customers making real choices over when to heat their homes in winter may be choosing to forgo thermal comfort or safety to avoid more expensive peak prices. Customers choosing whether to electrify their homes may decide to stick with fossil gas. When network tariffs exceed LRMC, they are signalling false scarcity to customers, with costly societal implications.
- **Poor use of storage:** Time of Use tariffs may encourage customers to use scarce storage capacity during the TOU peak. This means that the same capacity may not be available at other times. If the actual incremental cost of the network is much lower than the TOU peak tariff, then more valuable opportunities to reduce system costs are being forsaken. This is particularly important because much of the cost savings that flexible CER such as storage can achieve may come through lowering wholesale costs rather than network costs. A 2025 study by Energeia for the AEMC found that most of the value for flexible use of CER came from reducing wholesale costs (88 per cent), with network cost savings and Frequency Control Ancillary Services (FCAS) providing 11 and one per cent of the benefit respectively.39 An equally important issue is that customers with storage can reduce their bills by more than the value they create for the system, creating a cost shift towards other customers.
- **Lost network cost savings:** While the majority of the network at most times can be used at no incremental variable cost, when variable costs do arise, such as congestion and voltage management, they tend to be locational and time varying. Current TOU signals which cover many hours across the year and are broadcast to almost all customers with smart meters, are a poor proxy for these costs. The increasing ability of 'smart' CER/DER to respond flexibly when and where needed is being wasted by 'dumb' tariff signals, with corresponding lost opportunities to reduce grid costs for all customers. Additionally, there is no network reward for exports, when even these may be beneficial to networks.

[38] Wholesale and network costs (energy and delivery respectively) are each about 40 percent of a residential customer's bill.

[39] Energeia, *Benefit Analysis of Load-Flexibility from Consumer Energy Resources: Final Report*, 2025

3.3.3 Energy Retail

As noted above, energy retailers have historically competed heavily through acquisition offers, using discounts to attract new or switching customers. More recently, there has been some world-leading product innovation and differentiation, but these benefits do not flow to all, or even most, customers. As more customers adopt CER, more households may become exposed to better and more tailored retail offers. However, this process can be expedited and deepened by increasing the value to retailers of developing innovative mass-market products. At present, retailers have more scope to innovate around the wholesale component of a customer bill than the network component. Each account for about 40% of a residential customer's electricity bill. By doubling the size of the cost stack that retailers can optimise over, network tariff reform has the potential to give retailers more room to differentiate their products and create value for customers.

The AEMC Pricing Review Draft Report supports this direction, recommending that network tariffs be designed for retailers to translate into diverse customer offerings, rather than being passed through directly to customers as complex charges. One of the options discussed was to introduce a network tariff structure negotiation process, using the TSS as a 'default' backstop if negotiations fail. Retailers would be able to negotiate new tariffs at any time, provided they satisfied the network pricing principles. These would then be made available to all retailers on an opt-in basis.

3.4 International developments that may inform the transformation of the NEM

3.4.1 ERCOT and reliability

The Electric Reliability Council of Texas (ERCOT) shares characteristics with the NEM and offers a useful point of comparison. Like the NEM, ERCOT operates as an energy-only market without a formal capacity mechanism, relying on scarcity pricing to signal the need for investment in capacity required to maintain reliability. It also faces similar challenges in managing reliability alongside a resource mix increasingly dominated by variable renewable generation.

Over a decade ago, ERCOT introduced an Operating Reserve Demand Curve (ORDC) to modify the scarcity signal. Rather than waiting for the price to reach an administrative price cap, the ORDC adds a price "adder" to the real-time energy price whenever available reserves fall below a threshold, scaled by the probability of a shortfall and the value of lost load. This produces a more gradual and continuous representation of scarcity than a hard cap and provides a more granular set of parameters to calibrate.

A comparable approach in the NEM would involve the introduction of an operating reserve demand curve together with lower price caps. While an ORDC would be a more substantial reform than simply adjusting the market price cap, it would equip the market with more nuanced settings to adjust, compared to the (relatively blunt) instrument of the cap. This could spread the value of scarcity pricing across longer time periods that could potentially better match characteristics of the emerging system needs.

Similarly, the UK implemented administrative scarcity pricing through the imbalance settlement mechanism in 2015.

3.4.2 Reconductoring

Reconductoring involves restringing existing transmission lines with advanced composite-core conductors that carry more current within the same towers and easements. This idea seems to receive relatively little attention in Australia but has gained some momentum internationally (particularly in Europe and the United States).

In the US, a 2024 UC Berkeley study found reconductoring could roughly double the capacity of many lines within existing rights of way at less than half the cost of new build. In addition, the study suggested that reconductoring could increase inter-regional transmission capacity by nearly four times (+280%) by 2035 versus greenfield expansion only, with only a 20% higher transmission expenditure over the same period. The US department of Energy recently announced a $1.6 billion loan guarantee to re-conductor almost 5000 miles of transmission lines. In the European Union, Italy is planning on reconducturing several of 380KV lines (as part of larger grid expansion program), and Belgium and Netherlands are upgrading several hundred kilometres of transmission line.

Given cost challenges, and challenges with approvals and community acceptance, this concept would seem to merit consideration in the NEM context.

3.4.3 Demand-side reforms and IPRR

There are two international developments worth highlighting in the context of the implementation of the IPRR reforms, namely participation thresholds and independent aggregator access.

In the United state requires regional transmission organisations and independent system operators to enable DER aggregators to participate directly in wholesale energy, capacity and ancillary services markets, with a minimum bid size of 100kW. They also don’t require those aggregators to be the customer's retailer or financially responsible party.

The European Union's 2024 Electricity Market Design reform similarly introduces independent aggregation. Independent aggregators are now recognised in the national legislation of 19 of 26 member states (and demand response available to small end-users in 22 states). France's NEBEF mechanism has allowed third-party aggregators to offer demand response into wholesale markets since 2014, and Great Britain's model permits independent parties (Virtual Lead Parties) to access most markets with wholesale thresholds as low as 100kW (and 50kW for distribution flexibility).

The IPRR retains a 1MW threshold and requires Voluntarily Scheduled Resource Providers to be the Financially Responsible Market Participant. This effectively limits wholesale participation of aggregated DER to incumbent retailers, limiting independent third-party aggregation model. While there are jurisdiction differences and consumer protection concerns, future reforms to IPRR could look to opening access to third party aggregators and lowering participation thresholds.

These developments relate to wholesale market integration. In some jurisdiction there is a move towards toward distribution-level flexibility markets, to support demand side flexibility. In Great Britain, distribution network operators now procure local flexibility services to manage congestion, defer reinforcement and support demand shifting, with participation increasingly opened to aggregators, batteries, EV charging, commercial loads and smaller distributed assets. Ofgem is also developing a single market facilitator to improve coordination across local and national flexibility markets. Across Europe, local flexibility platforms and DSO procurement models are emerging to manage congestion, voltage and redispatch pressures, although many remain at pilot or early-scaling stage.

3.5 Recommended priorities for consideration in the transformation of the NEM

As mentioned in the introduction, Australia has made significant progress in the last decade or so – including with respect to regulatory regime and rule changes. Many aspects of the system including the wholesale markets and networks continue to operate well despite relatively material and rapid changes in generation mix and demand. A solid foundation is being laid that will support ongoing reform and hopefully accelerate change moving forward.

3.5.1 Continuing the reform momentum

A narrative that we are stuck in the past, beholden to fossil fuel interests, and unable to make progress is not just incorrect, it is unhelpful. Acknowledging how far we have come and recognising that this is on the back of broad industry, market body and jurisdictional cooperation (including constructive disagreement) is key to moving forward and accelerating the transition.

Nevertheless, further regulatory and system reform is necessary to integrate renewables, make the best use of CER/DER, and to electrify transport, heat and human thought (AI). If we stand still the system will ultimately break. However, such change does not necessitate revolution. The electricity system is immensely complex with many different operational layers, objectives and stakeholder perspectives. We need the bravado to dream of something better and the humility to know we do not have all the answers. Widespread consultation and a focus on incremental measures that can be (somewhat) fully contemplated is necessary to evolve a complex system. Incremental change does not mean small, and it does not mean slow. A series of incremental changes to the existing system have already resulted in us running a secure electricity system with far higher penetrations of renewables and distributed resources than many would have thought possible 10 or 15 years ago.

3.5.2 The need for a shared counterfactual for system reform

As discussed in Section 3.1, several processes are currently underway to reform almost all aspects of the electricity system in preparation for an increasingly decarbonised and distributed NEM. Notwithstanding the progress made, a narrow focus on partisan issues and preserving favoured aspects of the status quo is slowing down important aspects of the transition and blunting reforms. Stakeholders, acting in good faith and trying to do best for the interests they represent, are oftentimes overly weighting shorter-term impacts over longer-term gains. This is perhaps because we collectively are looking at the wrong counterfactual – static changes to the status quo, rather than having a clear idea of what would happen in the future if reforms do not occur. Our challenge for the Consumer Grid Summit is to produce a consensus counterfactual demonstrating broadly the case for reform and the longer-term costs of inaction.

3.5.3 Recognise that the nature of competition, control and regulation are changing

Competition, control and regulation are being reshaped by a more distributed, flexible and participatory electricity system. As CER/DER expands, services once assumed to be natural monopoly functions may become contestable, regulatory frameworks must become more adaptive, and system management will need to shift from centralised control to coordinated delegation. Following are three relevant observations:

1. **The scope for competition is increasing.** In the future more parts of regulated network services will be open for competition. For example, remote parts of the grid are already starting to be served as Stand Alone Power Systems, being given the same (or better) levels of service at lower cost than a grid connection.

   Battery and solar systems make this cost effective and more reliable and allows the removal of aging powerlines traversing remote bushland and exposed to extreme weather events and bushfire risks. Increasingly, this could be a competitive service, with franchisees bidding to supply whole regional towns, at lower cost than replacement of grid assets. Thinking through deregulating services will require changes to our regulatory regimes and consumer protections framework, but can ultimately help deliver cheaper, cleaner, more reliable power.

2. **Regulatory reforms must be future-resilient.** Regulation is by its nature slow and stable whereas the pace of technological and business model innovation is accelerating. For example, the pace of battery adoption has far outpaced solar adoption as shown in Figure 6.

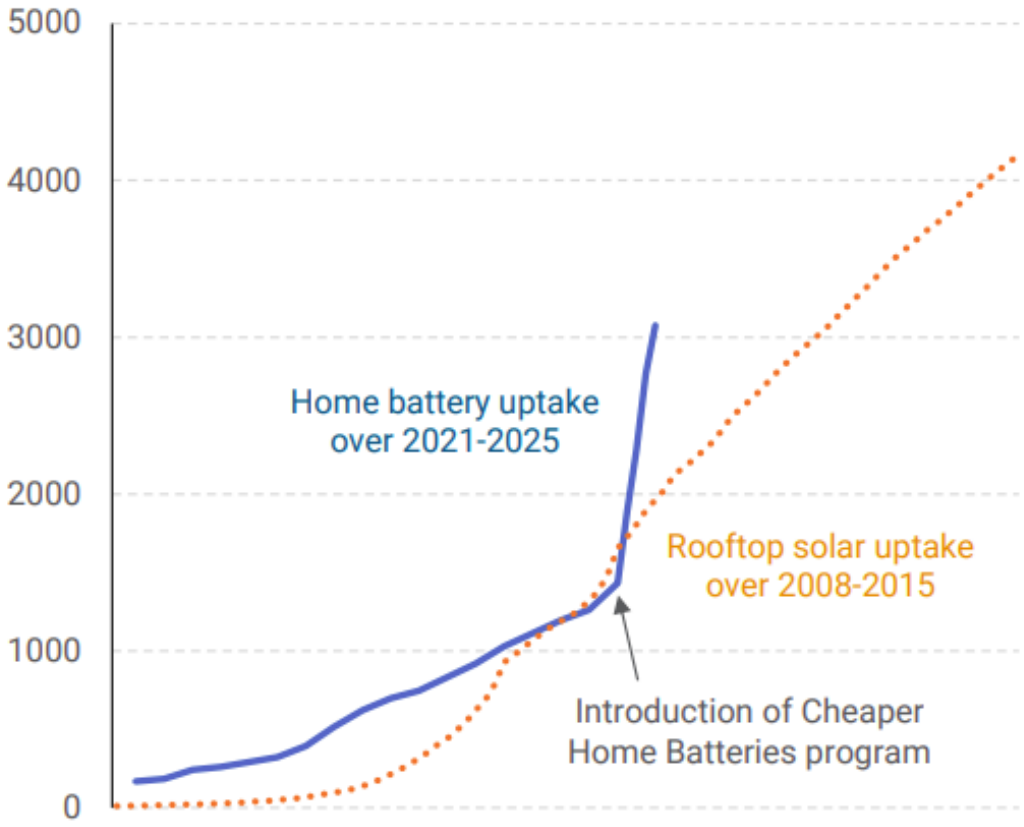


Figure 6: Residential battery vs. solar adoption rates – installed capacity across NEM regions (MW)[40]

Recognising this, policy makers and regulatory entities must recognise the need to future-proof reforms by designing and implementing them in a manner that is robust to alternative future scenarios. For example, this may include embedding options or pathways for further reform within the rules, so that future adaptive changes can be rapidly implemented, rather than having to initiate entirely new rule change processes.

3. **New models of system management are required.** The NEM is transitioning from a top-down bulk delivery system to an increasingly hybridised and participative system of supply, storage, exchange and consumption. Just as fit-for-purpose regulatory, economic and incentive structures are increasingly required, these will need to be complemented by more collaborative models of system management. As the system transitions from hundreds of large upstream generation plant to tens of millions of diverse participating energy resources, traditional command-and-control by the System Operator becomes increasingly implausible. AEMO cannot control Amazon, eBay or Temu. Customers will obtain and connect devices to the grid that shouldn't be there, or don't function in the way they should. Grid processes need to be set up to manage failure, not to control success. What the future system needs to manage this changing landscape is visibility, not control. There is still a critical need to forecast, plan and operate the grid securely, but system operation and coordination need not be delivered through compliance and direct command of consumer devices. A system designed with this in mind is more resilient to device misbehaviour, compared with compliance no one can enforce. The challenge will be to ensure shared visibility across a system with increasingly delegated responsibilities across system layers (e.g. Distribution System Operators, CER/DER aggregators, technology providers, etc.).

[40] Image: AEMC, Residential Electricity Price Trends 2025, December 2025, p.46

4 NEM Legal and Regulatory Frameworks

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Executive Summary

This paper assesses whether the legal and regulatory framework for the National Electricity Market (NEM) remains fit for purpose as the power system moves from a centrally dispatched, fossil-fueled system to an increasingly decentralised, decarbonised and digitalised future. Its central argument is that the NEM's legal and governance framework has reached the limits of incrementalism. The problem is not that the NEM has failed. It is that the legal framework that made the NEM successful in its original setting was designed for a different world, one that used large thermal generators to provide one-directional flows of electricity to relatively passive consumers, relying on a regulatory objective focused on economic efficiency, price, quality, safety, reliability and security.[41]

The energy system now operates very differently. Renewable generation, storage, consumer energy resources (CER), digital control systems, virtual power plants, flexible demand, electrification and climate resilience are no longer marginal features. They are increasingly core parts of the system. Australia has legislated economy-wide emissions reduction targets of 43 per cent below 2005 levels by 2030 and net zero by 2050, and the national energy objectives now require decision-makers to consider the greenhouse gas emissions reduction targets of participating jurisdictions.[42] The current legal framework is a product of cooperative federalism. That remains both its strength and its ultimate weakness. Cooperative federalism gives the NEM political legitimacy and allows participating jurisdictions to preserve state and territory autonomy over matters that are constitutionally, socially and economically significant. Yet it also makes reform slower, more complex and more vulnerable to fragmentation. The *National Electricity Law* (*NEL*), *National Electricity Rules* (*NER*), *National Energy Retail Law* (*NERL*) and *National Energy Retail Rules* (*NERR*) have expanded through technical amendments, jurisdictional modifications, derogations and special regimes. This has produced a dense legal structure that is increasingly difficult for governments, regulators, industry and consumers to navigate.[43] The Commonwealth Energy Minister and the Energy and Climate Change Ministerial Council (ECMC) should therefore treat the next phase of NEM reform as a legal design task, not simply a market design task. The question is not whether the NEM needs more rules. It is whether its core legal governance structure still allocates functions, powers, duties and accountabilities in a way that is coherent for a high-CER, low-emissions, climate-exposed and more consumer-participatory electricity system. The answer is increasingly no.

This paper recommends a staged but substantive legal reset. That reset should preserve the benefits of a national market but move beyond *ad hoc* rule change processes. At minimum, it should include:

- a disciplined review of the *NEL* and *NER*,
- a mapped and publicly maintained Derogations Register,
- a clearer statutory mechanism for strategic direction,
- a formalised framework for distribution system operation and transmission-distribution coordination,
- a legally robust CER data and interoperability framework, and a
- more consumer-centred regulatory objective and accountability structure.

In the medium term, governments should consider whether the NEL and NER should be re-drafted in a more coherent, modular and future-facing form.

[41] National Electricity (South Australia) Act 1996 (SA) sch 1 s 7 ('National Electricity Law'); Penelope Crossley, Energy Regulation in Transition (Research Paper No 2024-09, Parliamentary Research Service, Parliament of New South Wales, October 2024) 4–5.
[42] Climate Change Act 2022 (Cth) s 10; Statutes Amendment (National Energy Laws) (Emissions Reduction Objectives) Act 2023 (SA); National Electricity Law (n 1) s 7(c).
[43] Australian Constitution ss 51(i), 51(xx), 51(xxix), 51(xxxvii), 122; Anne Kallies, 'The Australian Energy Transition as a Federalism Challenge: (Un)cooperative Energy Federalism?' (2021) 10(2) Transnational Environmental Law 211; Australian Energy Market Commission, Guide to Application of the National Energy Customer Framework (Web Page, 2025) <https://www.aemc.gov.au/regulation/energy-rules/guide-application-necf>.

4.1 Introduction

Electricity law now sits at the centre of Australia's economic, environmental and social transformation. The legal rules that govern the NEM determine how electricity is generated, stored, traded, transported, consumed, exported, curtailed and valued. They also determine how risk is allocated between governments, market bodies, generators, networks, retailers, aggregators, technology providers and consumers. Yet, the NEM's legal framework is often treated as the technical machinery sitting behind energy policy. That approach understates the significance of law. Legal frameworks do not merely implement the energy transition. They shape it.

The NEM commenced operation on 13 December 1998 as a wholesale electricity market for eastern and southern Australia.[44] It was created during the period of national competition policy reform following the Hilmer Review. Its central assumptions were orthodox in the 1990s: that electricity generation could be exposed to competition; that natural monopoly network functions should be regulated; that vertically integrated state-owned electricity monopolies should be unbundled; and that the long-term interests of consumers would be advanced through efficient investment in, and operation and use of, electricity services.[45] Those assumptions were not irrational. In their historical context, they provided a coherent response to a state-based electricity system that was seen as fragmented, capital intensive and inefficient. However, the contemporary electricity system no longer resembles the system for which the NEM's foundational legal framework was built. In 1999, electricity traded in the NEM was overwhelmingly generated by large coal and gas-fired generators, with hydro also playing a role.[46]

Transmission network infrastructure connected these large-scale generators to the big population centres and industry. The system was premised on one way flow of electricity from generators to end-users. Today, the most important regulatory challenges arise from the opposite features. Consumers can generate, store and export electricity. Rooftop solar, batteries, electric vehicles, smart inverters and controllable loads increasingly sit behind the meter. Aggregators and virtual power plant operators can coordinate thousands of small assets. Distribution networks increasingly host power flows, constraints and operational decisions that materially affect the wholesale market and power system security. The legal distinction between generation, network services, retail supply and consumer participation is becoming more difficult to sustain. At the same time, the NEM now operates within a statutory climate framework. The national energy objectives were amended in 2023 to require consideration of participating jurisdiction targets for reducing Australia's greenhouse gas emissions or targets likely to contribute to reducing those emissions.[47]

This paper proceeds in four parts. Part 2 explains the current legal framework of the NEM. Part 3 identifies the main debates about its fitness for purpose. Part 4 considers credible international and domestic reform directions, with particular attention to CER, distribution system operation, data, interoperability and cyber risk. Part 5 sets out the key legal characteristics of a future framework for the next 10 to 20 years.

[44] David Clarke and Paul Graham, Australian Electricity Transitions 1900 to 2050: What Will It Take for Australia to Transition to a Net-Zero Electricity System by 2050? (Report, CSIRO, December 2022) 8; Crossley (n 1) 9.

[45] Frederick G Hilmer, Mark Rayner and Geoffrey Taperell, National Competition Policy Review (Report, Australian Government, 25 August 1993) 249; National Electricity Law (n 1) s 7.

[46] Crossley (n 1) 18–19, citing OpenNEM data for 1999.

[47] National Electricity Law (n 1) s 7(c); National Energy Retail Law (South Australia) Act 2011 (SA) sch s 13; National Gas (South Australia) Act 2008 (SA) sch s 23; Statutes Amendment (National Energy Laws) (Emissions Reduction Objectives) Act 2023 (SA).

4.2 Overview of the existing legal arrangements in the NEM

4.2.1 Constitutional foundations and cooperative federalism

The Australian Constitution does not give the Commonwealth a general power to legislate on electricity. The Commonwealth can legislate on matters that are expressly listed in the constitution – so called 'heads of power', including interstate and overseas trade and commerce, corporations, external affairs, territories, taxation, grants to the states and matters referred by the states.[48] Any matter not expressly listed in the Constitution is considered a residual legislative competence and remains substantially with the States. This includes the power to legislate for electricity, and energy infrastructure. This constitutional settlement explains why Australian energy law has developed through cooperative federalism arrangements, rather than a single national electricity statute enacted directly by the Commonwealth.[49] It also explains why the NEM's legal governance structure is neither a Commonwealth scheme nor a set of fully autonomous State schemes. It is a cooperative legislative scheme whose continued operation depends on the willingness of the participating jurisdictions to maintain mirror legislation. South Australia acts as the host jurisdiction for the *NEL*, which is enacted as a schedule to the *National Electricity (South Australia) Act 1996* (SA). Other participating jurisdictions apply that law through application legislation.[50] The same cooperative structure is used for national retail energy regulation through the *NERL*.[51] The Australian Energy Market Agreement provides the intergovernmental framework for this shared approach and allocates institutional responsibility for energy market governance.[52] This structure is often criticised for complexity, but its political logic should not be overlooked. Energy remains central to State economies, relying on public assets, land-use planning, regional development, consumer protection and climate policy. The cooperative model allows national coordination while preserving a degree of State control. It also reduces the constitutional risk that might arise from attempting to centralise the field through Commonwealth legislation alone. The price paid for that legitimacy is institutional complexity and a tendency to prefer negotiated compromise over decisive redesign.

4.2.2 Institutional roles and responsibilities

The NEM is governed through a division of responsibility between Ministers, statutory market bodies and jurisdictional institutions. The ECMC provides a forum for national energy policy coordination.[53] The Australian Energy Market Commission (AEMC) makes and maintains the national electricity, gas and retail rules and undertakes reviews and advice functions.[54] The Australian Energy Regulator (AER) regulates networks, monitors and enforces compliance with national energy laws and rules, and performs retail market functions in participating jurisdictions.[55] The Australian Energy Market Operator (AEMO) operates the electricity and gas systems and markets, undertakes operational planning and publishes the Integrated System Plan (ISP), which now functions as the principal whole-system transmission and (large-scale) generation roadmap for the NEM.[56]

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[48] Australian Constitution ss 51(i), 51(ii), 51(xx), 51(xxix), 51(xxxvii), 96, 122.
[49] Kallies (n 3); Crossley (n1)
[50] National Electricity (South Australia) Act 1996 (SA) s 5, sch 1 s 6; National Electricity (New South Wales) Act 1997 (NSW); National Electricity (Victoria) Act 2005 (Vic); Electricity—National Scheme (Queensland) Act 1997 (Qld); Electricity (National Scheme) Act 1997 (ACT); National Electricity (Tasmania) Act 1999 (Tas).
[51] Department of Climate Change, Energy, the Environment and Water (Cth) 'Energy Market Legislation' (Web Page, accessed 15 May 2026) <https://www.dcceew.gov.au/energy/markets/energy-market-legislation>.
[52] National Energy Retail Law (South Australia) Act 2011 (SA) sch; Council of Australian Governments, Australian Energy Market Agreement (30 June 2004).
[53] Department of Climate Change, Energy, the Environment and Water (Cth), 'Energy and Climate Change Ministerial Council' (Web Page, accessed 15 May 2026) <https://www.energy.gov.au/energy-and-climate-change-ministerial-council>.
[54] Australian Energy Market Commission Establishment Act 2004 (SA) ss 5–6; Australian Energy Market Commission, 'About Us' (Web Page, accessed 15 May 2026) <https://www.aemc.gov.au/about-us>.
[55] Competition and Consumer Act 2010 (Cth) pt IIIAA ('Australian Consumer Law'); Australian Energy Regulator, 'Our Role' (Web Page, accessed 15 May 2026) <https://www.aer.gov.au/about/our-role>.
[56] Australian Energy Market Operator, 2024 Integrated System Plan (Report, 26 June 2024); Australian Energy Market Operator, 'Integrated System Plan' (Web Page, accessed 15 May 2026) <https://www.aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp>.

This institutional separation reflects the original competitive market design. Policy is set by the Ministers. Rules are made by an expert rule-maker, the AEMC. Compliance and economic regulation is undertaken by an independent regulator, the AER. System and market operation is undertaken by an independent operator, AEMO. In theory, this separation protects market neutrality, allocates expertise to the right institutions, and reduces the risk that short-term politics will distort market operation. In practice, the energy transition has blurred the boundaries between these functions, and the design does not acknowledge that political decisions (for example State of Commonwealth schemes for targeted renewable energy support), have always interacted with the market. AEMO's operational and planning decisions affect investment, jurisdictional infrastructure planning, system security, reliability and consumer costs.[57] The AER's decisions on distribution network revenue and tariffs influence CER orchestration and consumer participation.[58] The AEMC's rule changes require policy choices about climate, technology integration, data governance and consumer risk.[59]

4.2.3 The National Electricity Objective and the limits of objective-based reform

The National Electricity Objective (NEO) is the legal centre of gravity for the NEM. It provides that the objective of the *NEL* is to promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity with respect to price, quality, safety, reliability and security of supply, the reliability, safety and security of the national electricity system, and the achievement of participating jurisdiction emissions-related targets.[60] The NEO is applied by the market institutions (AEMC, AER, AEMO) and guides their decision making. The addition of the consideration of emissions to the NEO in 2023 was a major legal development. For much of the NEM's history, climate change sat outside the operative objective of the national energy laws. Climate policy was pursued through separate Commonwealth and State instruments, including renewable energy schemes, emissions targets, project underwriting, network planning and state-based infrastructure legislation. The 2023 amendment reduced, but did not eliminate, that structural separation. It enables emissions to be considered within the national energy objective. However, it does not, by itself, create a comprehensive statutory framework for decarbonisation, system transformation, CER integration, distribution-level coordination, circularity, just transition or climate resilience.

The legal significance of the NEO is therefore twofold. First, it now recognises that emissions reduction can be in the long-term interests of consumers. Secondly, it exposes the limits of relying on a single objective provision to carry the full burden of system transformation. A modernised objective is necessary, but not sufficient. The operative provisions of the *NEL*, *NER*, *NERL* and *NERR* must also allocate functions, powers and duties consistently with the future system they are intended to govern. This point is central to the legal design problem. A statutory objective can frame discretion, but it cannot by itself determine which institution has responsibility for distribution-level visibility, whether an aggregator owes a duty to consumers when curtailing devices, how interoperability standards will be enforced, or whether the public interest in cyber resilience overrides private contractual arrangements. Those issues require a clear legal basis, not simply policy aspirations.

[57] Allens, A year of regulatory reform in the NEM and what it means for you in 2026 (Insight, 2026) <https://www.allens.com.au/insights-news/insights/2026/02/a-year-of-regulatory-reform-in-the-nem-and-what-it-means-for-you-in-2026/>.

[58] Australian Energy Regulator, 'Network tariff reform' (Web Page, accessed 15 May 2026) <https://www.aer.gov.au/about/strategic-initiatives/network-tariff-reform>.

[59] Anne Kallies, 'A Barrier for Australia's Climate Commitments? Law, The Electricity Market and Transitioning the Stationary Electricity Sector' (2016) 39(4) University of New South Wales Law Journal 1547, 1578; Australian Energy Market Commission, 'Rule change projects' (Web Page, accessed 15 May 2026) <https://www.aemc.gov.au/our-work/changing-energy-rules/rule-changes>.

[60] National Electricity Law (n 1) s 7.

4.3 Perspectives on the fitness of the existing arrangements in the NEM

4.3.1 What the existing legal framework does well

A fair assessment must recognise that the NEM has delivered important benefits. It created a large, interconnected wholesale market. It facilitated competition in generation and retail, introduced transparent spot market arrangements, supported inter-jurisdictional trading and provided a national framework for network economic regulation.[61] It also created specialist market bodies with deep technical capacity. These features should not be discarded lightly. A nationally coordinated market remains valuable in a geographically large federation with unevenly distributed resources, variable renewable generation, and material interconnection needs. The NEM also provides a shared platform for investment, operational coordination, and reliability management across participating jurisdictions. Its legal framework has shown some capacity to adapt, including through reforms for storage,[62] system security,[63] transmission planning,[64] emissions[65] and CER workstreams.[66] The strongest argument for incremental reform is that electricity systems are complex and safety critical. Wholesale legal replacement carries implementation risk. A staged approach can preserve continuity, minimise market disruption and allow governments to test reform pathways. This is a serious argument. It explains why many reforms have proceeded through rule changes, guidelines, derogations and jurisdiction-specific mechanisms rather than wholesale legislative redesign.

4.3.2 The costs of incrementalism

The weakness of incremental reform is that the cumulatively expanded legal structure can become incoherent. This is now the central problem. The *NEL* and *NER* were built around a model of electricity services that assumed clear functional categories: generation, transmission, distribution, retail and consumption. New technologies increasingly perform multiple functions. Batteries can consume, store, generate, provide frequency services, defer network investment and support system security.[67] Electric vehicles may be transport assets, household batteries, flexible loads and grid resources.[68] CER can operate as individual consumer assets, aggregated market resources or coordinated system security tools.[69] When legal categories do not match system functions, regulators must either stretch existing concepts or create additional special rules.

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[61] Alan Rai and Tim Nelson, 'Australia's National Electricity Market after twenty years' (2020) 53(2) Australian Economic Review 165, 170.

[62] Australian Energy Market Commission, 'Integrating energy storage systems into the NEM' (Rule determination, 2 December 2021) https://www.aemc.gov.au/sites/default/files/2021-12/1._final_determination_-_integrating_energy_storage_systems_into_the_nem.pdf ;Australian Energy Market Operator, 'Integrating Energy Storage Systems project' (Web Page, accessed 15 May 2026) <https://www.aemo.com.au/initiatives/major-programs/nem-reform-program/nem-reform-program-initiatives/integrating-energy-storage-systems-project#:~:text=Forming%20a%20part%20of%20the,until%20Fri%2028%20June%202024>.

[63] Australian Energy Market Operator, Improving security frameworks for the energy transition: High Level Implementation Assessment Final – how the rule change will be implemented by the AEMO (Report, April 2025) <https://www.aemo.com.au/-/media/files/initiatives/improving-security-frameworks-for-the-energy-transition/final-improving-security-frameworks---high-level-implementation-assessment-final.pdf?rev=dedac02fb6a34e88949079ccce40690f&sc_lang=en>.

[64] National Electricity Amendment (Integrated System Planning) Rule 2020.

[65] Department of Climate Change, Energy, the Environment and Water (Cth), 'Incorporating an emissions reduction objective into the national energy objectives' (Web Page, accessed 15 May 2026) <https://www.energy.gov.au/energy-and-climate-change-ministerial-council/working-groups/energy-transformation-working-group/incorporating-emissions-reduction-objective-national-energy-objectives>; Statutes Amendment (National Energy Laws) (Emissions Reduction Objectives) Act 2023 (SA).

[66] Australian Energy Market Operator, CER Data Exchange Industry Co-Design: Co-Design Summary (Paper, April 2025) <https://www.aemo.com.au/-/media/files/initiatives/der/2025/cer-data-exchange-industry-co-design-all-final-documents.pdf?rev=23e8d09ef631441f81dd65e34b87c851&sc_lang=en>.

[67] Zsuzsanna Csereklyei, Scott Dwyer, Anne Kallies and Dean Economou, 'The role of community-scale batteries in the energy transition: Case studies from Australia's National Electricity Market' 93 (2024) 112277:1–14, 2.

[68] Australian Government, 'Vehicle-to-everything opportunities' (Web Page, accessed 15 May 2026) <https://www.energy.gov.au/electric-vehicles/owning-electric-vehicle/vehicle-everything-opportunities>.

[69] Australian Energy Market Commission, 'Unlocking the Full Potential of Consumer Energy Resources' (Media Release, 3 August 2023) https://www.aemc.gov.au/news-centre/media-releases/unlocking-full-potential-consumer-energy-resources; Australian Energy Council,

Over time, this produces complexity, duplication and gaps. The result is not genuine technology neutrality. It is technology accommodation through legal improvisation. Storage provides the clearest example. Battery storage did not originally fit neatly within existing registration categories and required subsequent reform to accommodate its multi-functional characteristics.[70]

The problem is compounded by the volume and complexity of the instruments themselves. The *NER* is no longer simply a set of market rules. It is a detailed and highly technical code governing dispatch, system security, connections, network regulation, metering, retail interactions and a substantial body of jurisdiction-specific provisions. Each incremental amendment may be defensible on its own terms, but the marginal cost of further amendment rises as cross-references multiply, concepts are repurposed and consistency becomes harder to verify. The relative ease of proposing a rule change leads to a proliferation of rule change proposals, which obfuscates the need for a more systemic review of the rules. This also causes difficulties for consumer energy advocates who are under resourced to deal with the sheer volume of proposals and the types of evidence required to make a successful submission. The legal concern is not merely aesthetic. Complexity affects accountability. If a consumer cannot identify which protections apply,[71] if an innovative service provider cannot scale because materially different regimes apply across jurisdictions, or if a regulator must rely on bespoke guidelines to make sense of outdated statutory categories, the rule of law has been weakened. The NEM's legal framework increasingly asks market participants to navigate a system whose conceptual foundations do not match the physical system it regulates.

4.3.3 Fragmentation, derogations and divergent state pathways

Jurisdictional flexibility is necessary in a federation, but derogations and modifications can undermine legal coherence when they are not mapped, justified, reviewed and sunsetted. The AEMC's guide to the application of the National Energy Customer Framework recognises that jurisdictional application laws and modifications mean different versions of the framework apply in different jurisdictions.[72] For consumers and new energy service providers, this is not merely inconvenient. It can determine which protections apply, which regulator has jurisdiction, which dispute resolution pathway is available and whether a business model can scale nationally. Victoria's limited adoption of the National Energy Customer Framework and reliance on its own Energy Retail Code of Practice remains the most prominent example of divergence within the NEM's retail footprint.[73]

More broadly, the NEM lacks a sufficiently clear statutory mechanism for strategic direction and a strategic policy deficit has long been recognised.[74] The ECMC can issue statements of policy principles to the AEMC which have to be taken into account when making rules or conducting reviews.[75] This mechanism is not often employed. In absence of strong direction and accountability mechanisms, market bodies can undertake work programs, but the legal framework still relies heavily on specific rule change processes and technical amendments. This creates a mismatch between the scale of transformation and the tools available to manage it. The most obvious evidence is the proliferation of state-based mechanisms. New South Wales has established *Renewable Energy Zones under the Electricity Infrastructure Investment Act 2020* (NSW), including the Central-West Orana, New England, South West, Illawarra and Hunter-Central Coast zones.[76]

'Unlocking the value of CER: The Role of Retailers in Coordination' (Web Page, accessed 15 May 2026) < https://www.energycouncil.com.au/analysis/unlocking-the-value-of-cer-the-role-of-retailers-in-coordination/>.

[70] Crossley (n 1) 21; Australian Energy Market Commission, Integrating Energy Storage Systems into the NEM (Rule Determination, 2 December 2021) 2–4.

[71] Australian Energy Regulator, Review of consumer protections for future energy services (Final advice report, November 2023) 2.

[72] Australian Energy Market Commission, Guide to Application of the National Energy Customer Framework (n 3).

[73] Electricity Industry Act 2000 (Vic); Essential Services Commission of Victoria, Energy Retail Code of Practice (Version 4, 1 May 2024).

[74] Michael Vertigan, George Yarrow and Euan Morton, 'Review of the Governance Arrangements for Australian Energy Markets' (Final Report, Council of Australian Governments Energy Council, October 2015) 7.

[75] NEL s 8.

[76] Electricity Infrastructure Investment Act 2020 (NSW) ss 19, 24; Renewable Energy Zone (Central-West Orana) Declaration Order 2021 (NSW); Renewable Energy Zone (New England) Declaration Order 2021 (NSW); Renewable Energy Zone (South West) Declaration Order 2022 (NSW).

Victoria has legislated renewable energy and storage targets and established its own transmission planning arrangements.[77] Queensland has legislated a public ownership model for its renewable transformation.[78] Tasmania has legislated a renewable energy target.[79] These initiatives may be entirely rational responses to local conditions and national delay. State governments are often closer to land-use conflicts, communities, public assets and local reliability risks. The issue is not that state leadership is illegitimate. It is that the national legal framework does not always provide a clear method for reconciling state initiatives with NEM-wide planning, dispatch, cost allocation and consumer protection. A future framework should make space for state innovation, but it should do so through transparent legal framework rather than unmanaged divergence.

4.3.4 Consumer participation without matching accountability

The NEM is increasingly described as consumer-led.[80] That description is accurate in a limited technical sense: millions of consumers now own or control assets that materially affect the electricity system. Energy Ministers agreed to publish the National CER Roadmap in July 2024, identifying priority reforms across consumers, technology, markets and power system operations.[81] AEMO's ISP process also treats consumer resources as material to the future system.[82] However, calling the transition consumer-led can obscure a legal difficulty. Consumers did not design the distribution network. They do not control the wholesale market. They cannot reasonably be expected to understand the system impacts of millions of individually rational device decisions. If consumers are to become active participants, the law must allocate responsibility to the parties with the capacity to coordinate, inform, protect and be accountable. That requires more than consumer choice. It requires duties relating to device standards, interoperability, data access, cyber security, aggregator conduct, network visibility, consumer consent and dispute resolution. The emerging Commonwealth and ECMC work on CER data sharing, interoperability and roles and responsibilities is therefore highly significant. The December 2025 Data Sharing Final Report identified the need for effective data access and sharing arrangements across the power system, market participants and consumers, including capabilities for data availability, access, sharing and standards.[83] The December 2025 roles report similarly emphasised that clearly defining and allocating roles and responsibilities is crucial for orderly CER integration.[84] These reforms point in the right direction. The next step is to translate them into durable legal duties and institutional accountability. Without that translation, consumer participation risks being treated as a technical resource while consumer protection remains fragmented across retail law, general consumer law, device standards, network obligations and private contracts.

[77] Department of Energy, Environment and Climate Action (Vic) 'Victorian renewable energy and storage targets' (Web Page, accessed 15 May 2026) https://www.energy.vic.gov.au/renewable-energy/victorian-renewable-energy-and-storage-targets; Renewable Energy (Jobs and Investment) Act 2017 (Vic) ss 7, 7A; VicGrid, 2025 Victorian Transmission Plan (Report, August 2025).

[78] Energy (Renewable Transformation and Jobs) Act 2024 (Qld) pt 3.

[79] Energy Co-ordination Amendment (Tasmanian Renewable Energy Target) Act 2020 (Tas).

[80] See eg, Naomi Stringer et al, 'Consumer-Led Transition: Australia's World-Leading Distributed Energy Resource Integration Efforts' (2020) 18 (6) IEEE Power and Energy Magazine 20.

[81] Department of Climate Change, Energy, the Environment and Water (Cth), 'Energy Ministers Agree to the National Consumer Energy Resources (CER) Roadmap' (Web Page, 19 July 2024) <https://www.energy.gov.au/energy-and-climate-change-ministerial-council/working-groups/electricity-working-group/consumer-energy-resources-sub-working-group/national-cer-roadmap>.

[82] Australian Energy Market Operator, 2024 Integrated System Plan (n 16).

[83] Department of Climate Change, Energy, the Environment and Water (Cth), Data Sharing Arrangements to Inform Planning and Enable Future Markets (M2) Final Report (Final Report, 16 December 2025) <https://www.energy.gov.au/energy-and-climate-change-ministerial-council/working-groups/electricity-working-group/consumer-energy-resources-sub-working-group/data-sharing-arrangements>.

[84] Department of Climate Change, Energy, the Environment and Water (Cth), Redefining Roles for Market and Power System Operations (M3/P5) Final Report (Final Report, 16 December 2025) <https://www.energy.gov.au/energy-and-climate-change-ministerial-council/working-groups/electricity-working-group/consumer-energy-resources-sub-working-group/redefining-roles-for-market-and-power-systems-operations>.

4.4 International developments that may inform the transformation of the NEM

4.4.1 Strategic Leadership and linking energy policy and regulatory decision-making

The NEM governance framework responds to challenges reactively, rather than addressing them proactively. One way of addressing this strategic deficit could be by strengthening the role of the ECMC through a clearer mechanism to translate energy policy into regulatory decision-making. The UK model provides an example of how strategic oversight and proactive development can be facilitated. Initially, a guidance mechanism, similar to the statement of policy principles mechanism in section 8 of the *NEL* existed in the UK. However, this was considered to be 'unlikely to support a predictable regulatory environment that is coherent with government strategy, as the energy sector goes through a period of substantial change over the coming decades.'[85] As a result, it was replaced with a much more directive Strategy and Policy Statement.[86] The Statement sets out strategic priorities, outcomes to be achieved, and roles and responsibilities of persons who implement it.[87] In addition, regulators and Ministers must not only have regard to the strategic priorities when carrying out their regulatory functions, but also carry them out in a way that is 'best calculated to further delivery of the policy outcomes.'[88] The regulatory authority is also expressly tasked with setting out a forward work program to deliver the policy outcomes defined by Government,[89] thereby ensuring the interlinkage of energy policy and regulatory decision-making. A direct translation of this model into the Australian context will not be possible, as the intergovernmental nature of the regulatory framework provides additional hurdles to a more directive ECMC, with participating jurisdictions having to agree on direction before it can be given to the market bodies. Nonetheless, this example highlights how a tightly framed direction can lead to timely and targeted change.

4.4.2 Distribution system operation

Internationally, one of the clearest responses to decentralisation has been the strengthening of distribution system operation. The European Union's internal electricity market framework recognises distribution system operators as entities responsible for operating, maintaining and developing distribution systems and for ensuring the long-term ability of the system to meet reasonable distribution demands.[90] It also requires distribution network development planning and establishes rules for active customers, aggregation and citizen energy communities.[91] Great Britain has embedded distribution system operation within the RIIO-ED2 price control framework, including a DSO incentive for electricity distribution network operators.[92]

The NEM has historically treated distribution networks primarily as regulated network service providers, rather than as active local system operators coordinating flexibility, visibility and distribution-level constraints. While a number of innovation schemes have been introduced,[93] their benefit and utility has been questioned.[94] The incentive schemes have not changed the basic nature of the role of distribution network service providers in Australia, rather they operate as an add on. That approach becomes increasingly difficult in a high-CER system.

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[85] Department of Energy and Climate Change, Ofgem Review: Final Report (July 2011) 88.

[86] Enabled in part 5 of the Energy Act 2013 (UK).

[87] Energy Act 2013 (UK) s 131(2).

[88] Energy Act 2013 (UK) s 132.

[89] Utilities Act 2000 (UK) s 4A (3).

[90] Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on Common Rules for the Internal Market for Electricity and Amending Directive 2012/27/EU [2019] OJ L 158/125, arts 2(29), 31.

[91] Ibid arts 15–17, 31–32.

[92] Office of Gas and Electricity Markets, RIIO-ED2 DSO Incentive: Decision on Outturn Performance Metrics (Decision, 26 April 2024) <https://www.ofgem.gov.uk/decision/riio-ed2-dso-incentive-decision-outturn-performance-metrics>.

[93] Such as the Demand Management Incentive Scheme (DMIS), Demand Management Innovation Allowance (DMIA) mechanism, Capital Expenditure Sharing Scheme (CESS), Service Target Performance Incentive Scheme (STPIS), the Customer Services Incentive Scheme (CSIS).

[94] Ron Ben-David, 'Rethinking markets, regulation and governance for the energy transition' (Prepared for the ACC/AER Regulatory Conference, Brisbane, August 2023) <https://www.accc.gov.au/system/files/Ben%20David%20R.%20Rethinking%20markets%2C%20regulation%20and%20governance%20for%20the%20energy%20transition.pdf>.

Distribution networks are now the physical location of a substantial share of the energy transition. Rooftop solar exports, batteries, electric vehicles, flexible load, smart inverters and dynamic operating envelopes all raise distribution-level operational questions that cannot be solved solely at the transmission or wholesale market level.[95] A NEM DSO framework should not simply import overseas models. Australia's unusually high rooftop solar penetration, cooperative federal structure and existing institutional arrangements require local design. However, the legal questions are common: who is responsible for distribution-level visibility?; who may procure local flexibility?; how are conflicts managed if a network business operates a flexibility platform?; how are consumer assets enrolled, dispatched, curtailed or rewarded?; how are distribution constraints communicated to AEMO and market participants?; and how are cyber security and data obligations imposed? Considerable work has been undertaken to explore different potential DSO models in the Australian context.[96] How these can and should be translated into practice is a question that should be answered in law, not left to ad hoc operational practice.

4.4.3 Aggregation, market access and the valuation of multiple services

The United States provides a useful comparator through *Federal Energy Regulatory Commission Order No 2222*. That order requires regional transmission organisations and independent system operators to remove barriers to the participation of DER aggregations in organised wholesale markets, subject to tariff revisions addressing matters such as locational requirements, metering, telemetry, data and coordination among system operators, DER aggregators, distribution utilities and retail regulators.[97] The lesson for Australia is not that FERC's jurisdictional model should be copied. The United States has its own federal-state division and organised market structures. The relevant point is that DER participation was treated as a matter requiring formal market access rules, coordination duties and jurisdictional boundary management. In Australia, the analogous challenge is to ensure that CER and aggregations can provide value without compromising system security, distribution network integrity or consumer protection. This requires a legal framework capable of recognising multiple value streams. The creation of an Integrated Resource Provider rule allows hybrid systems at the grid-scale level, such as large-scale batteries or co-located generation and storage, to register in a single category.[98] CER may provide wholesale energy, frequency control, network support, emergency response and household resilience. A framework that values only one of these services will distort investment and operation. Equally, a framework that allows multiple payments without coordination may double-count value or create perverse incentives. The legal design task is to define eligibility, measurement, verification, dispatchability, consumer consent, settlement and accountability.

4.4.4 Data, interoperability and cyber security

A high-CER system is a data-dependent system. Visibility of device location, capability, status and operating constraints will increasingly be necessary for planning, connection, dispatch, emergency management and consumer services.[99] Data access cannot be treated as a purely commercial matter. It is becoming a system governance issue. The ECMC's 2025 Data Sharing Final Report identifies effective data access and sharing arrangements as critical to system security, emergency management, network visibility and the coordination of CER.[100]

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[95] Australian Energy Market Commission, Enhancing Distribution Network Planning and Reporting (Draft rule determination, 23 April 2026) 1.

[96] Energy Catalyst, 'Distribution System Operator (DSO) Models' (Report 4 prepared for CSIRO Australian Research in Power Systems Transition, August 2025).

[97] Participation of Distributed Energy Resource Aggregations in Markets Operated by Regional Transmission Organizations and Independent System Operators, 172 FERC ¶ 61,247 (17 September 2020) ('Order No 2222'); Federal Energy Regulatory Commission, FERC Order No 2222: A New Day for Distributed Energy Resources (Fact Sheet, 28 September 2020) <https://www.ferc.gov/media/ferc-order-no-2222-fact-sheet>.

[98] Australian Energy Market Commission, 'Integrating energy storage systems into the NEM' (Rule determination, 2 December 2021) https://www.aemc.gov.au/sites/default/files/2021-12/1._final_determination_-_integrating_energy_storage_systems_into_the_nem.pdf

[99] Australian Market Energy Operator, Visbility of Distributed Energy Resources: Future Power System Security Program (Report, January 2017) 4.

[100] Department of Climate Change, Energy, the Environment and Water (Cth), Data Sharing Arrangements (n 34).

In March 2026, the Commonwealth published industry information on 18 initial minimum CER device requirements endorsed by ECMC in December 2025 to support interoperability for new CER devices, including solar inverters, home batteries and electric vehicle chargers.[101] These developments are important because they shift the regulatory conversation from whether CER should be coordinated to how coordination can be made legally, technically and commercially possible. The legal framework will need to specify data classes, access rights, permitted uses, consent, privacy safeguards, cyber security obligations, liability for incorrect data and enforcement pathways. Cyber security must be integrated from the outset. A decentralised electricity system has a much larger attack surface than a traditional centralised system. Devices, aggregators, communications platforms and cloud services can create new vulnerabilities. The *Security of Critical Infrastructure Act 2018* (Cth) already provides a broader national framework for critical infrastructure risk management, but electricity-specific obligations will need to be operationally aligned with CER interoperability, data and market participation rules.[102]

Comparator regimes show how the law and the NEM need to develop. The European Union's NIS2 Directive imposes cyber security risk-management obligations across essential and important entities, while the United States' NERC Critical Infrastructure Protection standards provide mandatory reliability standards for bulk electric system cyber security.[103] Australia does not need to replicate either model. It does need a more explicit answer to the question of how cyber resilience obligations will apply across the long tail of CER devices, aggregators and digital platforms that will increasingly affect system operation. A future NEM legal framework should treat cyber resilience as a core design requirement, not an external compliance add-on.

4.4.5 Whole-of-system planning and strategic spatial governance

The integration of variable renewable generation and CER also requires a more explicit legal relationship between whole-of-system planning, transmission development, distribution planning, jurisdictional renewable energy zones and consumer-side flexibility. AEMO's ISP is increasingly central to system planning, but its legal status remains constrained by the structure of the *NEL* and *NER*. There is no formal mechanism that requires the AER to link, for example, the determinations of the AER to ISP forecasts. State REZ regimes can accelerate infrastructure and investment, but they also create bespoke access, planning and underwriting arrangements that interact unevenly with national connection and market rules. They also create a confusing patchwork of rules for potential investors into generation, who have to navigate different legal frameworks in every state. Great Britain's National Energy System Operator (NESO) is a useful comparator, not because its institutional form can be transplanted into Australia, but because it illustrates a more explicit statutory approach to whole-of-system planning. NESO became responsible for electricity and gas system planning in Great Britain on 1 October 2024 and was established under the *Energy Act 2023* (UK).[104] Its emerging planning functions, including strategic spatial planning and regional energy strategic planning, show how legal frameworks can connect national strategy, regional planning and network investment. The NEM does not need a British institution. It does need a clearer legal method for translating national strategic direction into binding, transparent and reviewable consequences for transmission, distribution and CER planning.

[101] Department of Climate Change, Energy, the Environment and Water (Cth), 'Industry Information on Initial Consumer Energy Resource (CER) Device Requirements' (Web Page, 30 March 2026) <https://www.energy.gov.au/energy-and-climate-change-ministerial-council/working-groups/electricity-working-group/consumer-energy-resources-sub-working-group/Industry-information-initial-cer-device-requirements>.
[102] Security of Critical Infrastructure Act 2018 (Cth) pts 2B, 2C, 2D; Security of Critical Infrastructure (Critical Infrastructure Risk Management Program) Rules (LIN 23/006) 2023 (Cth).
[103] Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on Measures for a High Common Level of Cybersecurity across the Union [2022] OJ L 333/80; North American Electric Reliability Corporation, Critical Infrastructure Protection Reliability Standards (CIP-002 to CIP-014, as approved by the Federal Energy Regulatory Commission).
[104] Energy Act 2023 (UK) c 52 pt 4; Office of Gas and Electricity Markets, NESO Electricity System Operator Licence (1 October 2024).

4.5 A future legal framework for the next 10 to 20 years

4.5.1 Strategic leadership with legal discipline

The next phase of reform requires strategic leadership that is given legal form. Strategic leadership does not mean the centralised political control of dispatch or investment. It means a clear legal mechanism through which governments can set the normative direction of the market, require market bodies to implement that direction, and publicly account for trade-offs between efficiency, reliability, security, emissions, consumer protection, resilience and equity. The way in which change is managed in a NEM framework is premised on a stable technological system, not a system in rapid transition. As electricity is an essential service, some political (re)direction will be required.

The current NEO is necessary but underpowered for this task. It should be supplemented by clearer statutory principles or decision-making duties that require transparent consideration of decarbonisation, resilience, consumer participation, affordability, vulnerable consumers, distribution-level coordination, long-term system adaptability and the integrity of a shared network. The aim should not be to turn every rule change into a broad social policy inquiry. It should be to ensure that major market design decisions are assessed against the actual characteristics of the future system. This may require an explicit statutory mechanism by which ECMC decisions of strategic significance are translated into legal duties for the market bodies. At present, Ministers can set policy direction, but the legal force of that direction depends on the instrument used. A future framework should distinguish between political statements, policy priorities, directions to market bodies, statutory reviews, rule-change pathways and binding legislative standards. That distinction matters because strategic leadership without legal discipline becomes rhetoric, while legal prescription without strategic leadership becomes technical accretion.

A review of the current strategic leadership framework across several levels should be undertaken. All participating jurisdictions should consider whether the objectives of the AEMA underlying the NEM frameworks still reflects shared expectations. The creation of the NEM in the 1990s was based on the recognition that a coordinated operation of an interconnected electricity system would be preferrable to the previous individual state-based governance. The AEMA confirmed this commitment and set out the structures of the NEM in 2004. In light of the fundamental changes to the way Australia produces and uses energy since the last amendment of the AEMA in 2013, it is worth assessing whether the AEMA still reflects the expectations of participating States of the shared governance framework and, if so, whether this purpose is currently being achieved through the institutional frameworks in place. A review and update of the AEMA was one of the recommendations of the 2017 Finkel Review. Now, nine years later, it is more than overdue.[105]

4.5.2 A disciplined approach to derogations

Derogations should be retained but disciplined. They are an important federalism safety valve, especially where jurisdictions face different resource profiles, asset ownership structures, climate risks, planning constraints and consumer needs. However, derogations should be publicly mapped and reviewed. A National Derogations Register should identify the legal instrument, jurisdiction, subject matter, rationale, duration, interaction with other regimes, affected market participants and consumer impacts. Significant derogations should have review dates and, where appropriate, sunset clauses. The register should also identify whether a derogation responds to a genuinely jurisdiction-specific condition or to a defect in the national framework. The latter category should trigger consideration of common reform. This would not eliminate divergence. It would make divergence governable. It would also allow Ministers and market bodies to identify when repeated state derogations reveal a national legal problem that should be addressed through common reform rather than recurring local exceptions.

[105] Alan Finkel et al, Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future, Commonwealth of Australia 2017'.

4.5.3 Formal distribution system operation and transmission-distribution coordination

A future *NEL* should define distribution system operation functions separately from the current DNSP roles. These should include distribution-level visibility, hosting capacity assessment, dynamic operating envelopes, local flexibility procurement, operational coordination with AEMO, emergency coordination, data exchange and consumer-facing obligations where network actions affect CER exports or access. Transmission-distribution coordination should also be made explicit. The distinction between transmission and distribution remains physically and legally significant, but operational interdependence is increasing. AEMO cannot operate a secure power system without better distribution-level visibility. Distribution networks cannot efficiently manage local constraints without understanding wholesale and transmission-level signals. Consumers cannot be expected to respond rationally if these signals are inconsistent. The legal framework should therefore define coordination duties between AEMO, transmission network service providers, distribution network service providers and relevant market participants. The rigorous assignment of roles and responsibilities will be central. The emerging Commonwealth workstreams recognise this need, but the next phase must embed an objective methodology in the law itself. Functions should be mapped to actors by reference to capability, information access, incentive compatibility, accountability, independence and consumer impact. In a high-CER system, role allocation cannot be resolved by institutional habit. It must be justified by the functions the future system actually requires.

4.5.4 A consumer-centred CER framework

CER regulation should be built around consumer benefit, informed consent and system accountability. Consumers should be able to obtain value from their assets, but they should not bear opaque risks created by complex aggregation, device control or tariff structures. However, the law also clearly needs to recognise the responsibilities held by consumers within the shared system. Considering how risks and benefits will be redistributed in a consumer-centred future and who has the capability to recognize and minimize risks, will be a central role for the legal framework. A future framework should include minimum device standards, interoperability requirements, data rights, consent rules, switching rights, complaint pathways and protections for vulnerable consumers. These obligations should apply to the right actors, including retailers, aggregators, technology providers, installers and network businesses where their conduct affects consumer outcomes. The consumer protection framework also needs consolidation. The interaction between the National Energy Customer Framework and the *Australian Consumer Law* is increasingly strained as consumers purchase bundled products involving electricity supply, devices, software, finance, installation, monitoring and control.[106] This means that a consumer may experience one transaction, but the law may divide it between multiple regimes, regulators and remedies. That fragmentation is no longer acceptable in a consumer-led transition. A consumer-centred framework should not assume that market participation is synonymous with empowerment. It should ask whether consumers understand the rights they are giving, whether benefits and risks are fairly distributed, whether vulnerable consumers can participate safely, and whether there is a clear pathway when something goes wrong. The future framework should also recognise that some consumers will participate actively, some passively, and some not at all. A fair CER framework should not create a two-tier electricity system in which households with capital, roof space, digital literacy and stable housing capture the benefits while renters, apartment dwellers and low-income households absorb residual network and system costs. Consumer-centred design therefore requires distributional analysis, not only aggregate efficiency.

[106] Australian Consumer Law (n 13) sch 2; National Energy Retail Law (n 12); Australian Energy Market Commission, Guide to Application of the National Energy Customer Framework (n 3); Australian Energy Regulator, Review of Consumer Protections for Future Energy Services (Final Report, November 2023).

4.5.5 Re-drafting the NEL and NER

The most ambitious option is a re-draft of the *NEL* and *NER*. This should not be dismissed as unrealistic. The existing legal framework has been amended repeatedly to accommodate new technologies and policy objectives. At some point, accumulated amendment becomes less efficient than re-codification. A re-draft would allow governments to separate enduring statutory principles from technical rules, remove redundant provisions, consolidate definitions, clarify institutional responsibilities and design the framework around the future electricity system rather than the historic one. A re-draft should account for changes to the AEMA and the agreed future utility of the intergovernmental framework of the NEM.

A sensible approach would be staged. First, governments should commission a Legal Governance Review of the *NEL*, *NER*, *NERL* and *NERR* focused on coherence, duplication, derogations, institutional responsibilities and future system functions. Second, they should identify reforms that can proceed immediately through rule changes or targeted legislative amendments. Third, they should develop a medium-term re-drafting program for the core instruments. The purpose would not be cosmetic simplification. It would be to produce a legal framework that is legible, durable and capable of governing a decentralised, decarbonised and digital power system. A redraft should retain the cooperative legislative scheme unless and until governments decide on a more fundamental constitutional settlement. It should also retain the core strengths of the NEM: national coordination, specialist market bodies, independent regulation and transparent market operation. The task is not to abandon the NEM. It is to rebuild the legal framework so that the NEM can govern the system that is emerging, rather than continually retrofitting a framework designed for the system that is disappearing. The redrafted *NEL* should include a refreshed objective expressly oriented to a consumer-led, decarbonising, two-way system; clearer statutory delineation of the functions of the AEMC, AER, AEMO, any national technical regulator and any DSO entities; explicit treatment of strategic spatial planning and the legal status of jurisdictional REZ regimes within the national framework; a statutory data access and interoperability regime; and a disciplined treatment of derogations, including review and sunset obligations. The *NER* should then be reordered around the functional structure of the new system rather than the legacy structure preserved in the present chapter structure.

4.6 Conclusion

The NEM is not merely experiencing a transition in generation technology. It is experiencing a transition in legal purpose, institutional function and consumer participation. The original legal framework for the NEM was designed for a power system dominated by large generators, passive consumers and one-directional networks. That system is being replaced by one in which millions of small assets, data flows, distribution-level constraints, climate obligations and consumer choices materially affect system operation. The current framework has adapted, but largely through incremental amendment. Incrementalism has avoided abrupt disruption, but it has also produced complexity, fragmentation and blurred accountability. The cumulative weight of derogations, the divergence of jurisdictional pathways on climate and infrastructure, the duplication of state and national regimes, and the rapid move toward formal CER governance combine to make further incremental amendment an increasingly costly response.

The next phase requires legal design equal to the scale of transformation. The Commonwealth Energy Minister, working through ECMC, should lead a structured legal reset that preserves the national market but modernises its foundations. The goal should be a NEM legal framework that is coherent enough for governments, workable for regulators, bankable for investors, intelligible for consumers and robust enough for the electricity system Australia is now building. The legal conditions for such a reset are now ripe. The political conditions will need to be created. That is precisely why the matter should be framed now, not as a narrow question of further rule amendments, but as a question of national legal governance structure. The NEM's cooperative federalist foundations remain valuable. They should now be used to build the next framework deliberately, rather than continue adding complexity to the last one.

4.7 Recommended priorities for consideration in the transformation of the NEM

1. Revisit the AEMA to reaffirm the commitment to the NEM as an intergovernmental system and clearly set out the respective roles of Commonwealth, State and multi-jurisdictional institutions such as the market bodies.
2. Commission a Legal Governance Review of the NEL, NER, NERL and NERR, focused on coherence, duplication, institutional roles, derogations and future system functions.
3. Create a public National Derogations Register with rationales, review dates, sunset clauses where appropriate, and an assessment of consumer and market impacts.
4. Develop a statutory mechanism for translating ECMC strategic decisions into legally consequential duties, reviews or rule-change pathways.
5. Define distribution system operation and transmission-distribution coordination functions in the NEL, including visibility, flexibility procurement, dynamic operating envelopes and data exchange.
6. Translate CER data sharing and interoperability reforms into enforceable legal duties, including consent, privacy, cyber security and accountability arrangements.
7. Reframe consumer protections for bundled energy, device, software, finance and control services so consumers experience one coherent protection framework rather than multiple fragmented regimes.
8. Prepare a staged re-drafting program for the NEL and NER, retaining cooperative federalism but rebuilding the instruments around the functions of a decarbonised, decentralised and digital electricity system.

5 NEM Governance Mechanisms

Author: Rob Murray-Leach, Emel Consulting

Executive Summary

Energy governance can be simplified as *who* makes public policy decisions, *how* they are made and *whose interests* are considered. Energy governance profoundly affects Australia's ability to successfully navigate the energy transition.

This discussion paper sets out:

- Australia's current energy governance system
- What we need to navigate the energy transition, and potential limitations of our current energy governance system; and
- Options to address these limitations and effectively navigate the energy transition.

This briefing paper draws from the recent *Power Dynamics* White Paper that was commissioned by the Energy Efficiency Council and supported by RACE for 2030.[107] This report is based on hundreds of hours of interviews with senior figures across governments, market bodies, industry, research institutions and energy stakeholder groups. The White Paper is strongly recommended as additional reading.

5.1 Introduction - What is governance?

'Public governance' can be summarised as who makes policy decisions, how they are made and whose interests are considered. Governance includes formal institutional structures, rules and procedures, but also informal elements such as shared ideas, cultural norms and relationships between individuals.[108] These informal elements act as 'hidden' mechanisms that can enable or impede efficient decision-making and coordination.

Governance extends beyond governments and regulators. It includes citizens, consumers, businesses, industry bodies, researchers and civil society organisations that provide information, influence decisions and help build social licence.

Households and businesses are part of energy governance as stakeholders that influence public policy decisions. They are also increasingly investors and decisionmakers whose choices about technologies and energy use are directly reshaping energy systems. While private investment choices are not a formal part of governance systems, they both influence and are influenced by governance.

Sound governance matters for two reasons. First, it improves the *effectiveness* of decision-making and therefore real-world outcomes. Second, it supports *legitimacy* by ensuring that decisions are lawful and widely perceived as competent, fair and made in the public interest.

[107] Murray-Leach, R. 2026 *Power Dynamics – Energy Governance in Australia*, Energy Efficiency Council. https://eec.org.au/wp-content/uploads/2026/04/202604_EEC_PowerDynamics_DIGITAL.pdf

[108] Organisation for Economic Co-operation and Development (OECD) 2020 *Policy Framework on Sound Public Governance: baseline features of governments that work well*, OECD Publishing, Paris.

5.2 Overview of the existing governance arrangements in the NEM

Energy policy spans more than just electricity generation and networks. It includes multiple fuels, distributed generation and end-uses such as appliances, buildings, vehicles and industrial equipment. As a result, energy policy intersects with areas such as land-use planning, housing, transport, industry and contributes to critical societal goals including wellbeing and economic development.

This breadth means responsibility for energy-related decision-making is distributed across multiple departments and institutions, even in countries with a single national government.

In Australia, responsibility for energy policy is divided both across portfolios and between levels of government. The Australian Constitution does not explicitly mention energy and climate change, but section 51 sets out that the Federal Government can legislate on matters that include corporations, interstate trade, external affairs (such as international climate treaties) and issues referred by the states.[109, 110]

States and territories retain primary responsibility for many aspects of energy policy. While the Federal Government cannot directly legislate in many areas of state and territory responsibility, it can influence decisions through its fiscal capacity to support coordination, policy analysis and investments that are critical to the energy transition.

To manage this fragmentation, governments have progressively established both intra- and interjurisdictional governance arrangements. These arrangements were designed during a period when energy technologies and markets were relatively stable, and energy policy did not need to evolve rapidly. There was limited focus on integrating electricity market governance with end-use sectors such as buildings and transport, as relationships between supply and demand were seen as stable and well understood, and demand was treated as largely passive and not easily influenced.

From the late 1980s, East Coast governments began expanding interstate transmission connections to improve energy affordability and reliability. Physical interconnection increased the pressure for harmonisation of electricity markets and regulatory frameworks across jurisdictions. This harmonisation was feasible because governments broadly shared objectives of efficient electricity dispatch and incremental investment.

In the NEM, some decision-making functions are delegated to the market bodies – the Australian Energy Market Commission (AEMC), the Australian Energy Regulator (AER) and the Australian Energy Market Operator (AEMO). This reduced the need for governments to negotiate minor reforms and streamlined multijurisdictional decision-making.

However, cabinets and ministers remain the ultimate decision-makers, and some reforms formally or practically require intergovernmental consensus. Even where market bodies have delegated powers, they operate within both explicit rules and a broader authorising environment shaped by governments and intergovernmental dynamics. For example, states and territories retain the ability to depart from national arrangements through jurisdictional variations (known as derogations), creating pressure for decisions and public positions that are acceptable across jurisdictions.

[109] Crossley, P. 2024 *Energy regulation in transition – Parliamentary Research Service Research Paper 2024-09*, Parliament of New South Wales, Sydney.

[110] Kallies, A. 2021 'The Australian Energy Transition as a Federalism Challenge: (Un)cooperative Energy Federalism?' *Transnational Environmental Law,* 10:2 (2021), pp. 211–235

The context in which this framework was designed has changed. Rapid technological change, shifting markets and the imperative to reduce emissions have both increased the pressure for rapid policy change and redefined the objectives of energy policy. Consensus-based governance can make rapid reform more challenging and may favour incremental change, particularly where governments differ in priorities or policy approaches.

The pressure for reform, combined with the difficulty in securing NEM-wide agreement, has led states and territories to increasingly act unilaterally. To date, states and territories have collectively implemented more than 400 jurisdictional derogations from NEM rules and regulations.[111]

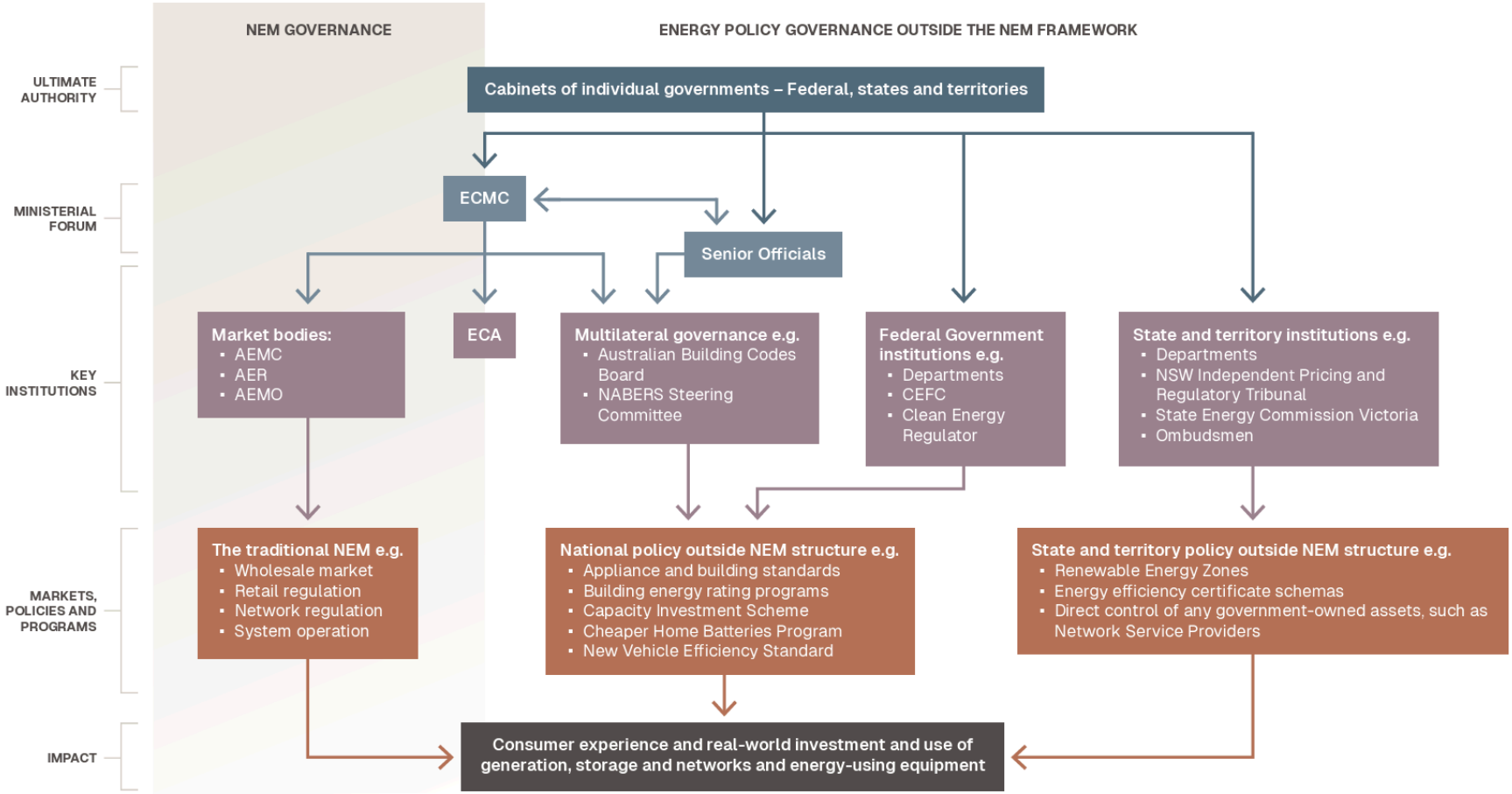
At the same time, many issues that are now central to electricity policy — such as CER and the electrification of transport — were not envisaged within the original NEM framework. Policy in these areas has therefore developed through a mix of unilateral and multilateral processes outside the NEM framework, further increasing fragmentation (see Figure 7).

As a result, energy policy in the East Coast is now governed through a complex mix of:

- unilateral Federal Government actions;
- national multilateral agreements;
- NEM-wide decisions made by governments or market bodies;
- jurisdictional derogations from NEM rules and regulations; and,
- unilateral state and territory policies that sit outside the formal NEM framework.

Western Australia and the Northern Territory have retained greater control over energy policy within their borders, although they remain affected by Federal Government policies and national agreements. While governance arrangements in these two jurisdictions are generally more straightforward, they face different challenges from smaller markets and fewer policy staff.

[111] Crossley, P. 2024 *Energy regulation in transition – Parliamentary Research Service Research Paper 2024-09,* Parliament of New South Wales, Sydney.



Notes: This figure is illustrative, and to aid clarity it omits many important institutions and programs. Acronyms in this diagram include AEMC (Australian Energy Market Commission), AER (Australian Energy Regulator), AEMO (Australian Energy Market Operator), CEFC (Clean Energy Finance Corporation), ECA (Energy Consumers Australia), ECMC (Energy and Climate Ministerial Council), NABERS (National Australian Built Environment Rating Scheme) and NEM (National Electricity Market).

Figure 7: NEM governance is part of a broader energy governance system

5.3 Perspectives on the fitness of the existing arrangements in the NEM

The energy transition involves rapid change in supply and demand patterns and technologies. This includes changes to generation, electrification of space heating and transport, and new loads like data centres and hydrogen electrolysers.

In the face of rapid change and uncertainty, we need to use a range of 'anticipatory' tools to identify and adapt to potential challenges, such as strategic foresighting and modelling divergent future scenarios. We also need to think about the electricity sector (and the broader energy sector) from a whole-of-system perspective to enable integrated decision-making.

Successfully navigating the energy transition will require us to rapidly:

- research a broad range of topics
- develop and test divergent policy options across a range of possible futures
- create shared visions and build social licence for change
- make and implement policy decisions.

5.3.1 Current strengths

Australia's current energy governance arrangements have numerous strengths. These include:

- the NEM effectively requires consensus among governments for major reform, which can increase stability and investor confidence.
- individual governments can take alternative approaches to energy issues outside the NEM, which allows for diversity and experimentation.
- the NEM market bodies are specialised, rules-based and structured to implement the current design of the NEM.
- Australia has a large pool of capable energy experts inside and outside of government.

5.3.2 Emerging challenges

However, current governance arrangements face challenges during a period of rapid change when widespread reforms may be required. These include:

- The requirement for multiple governments to effectively reach consensus to make major changes to the NEM can make it *hard to rapidly secure* reform.
- Energy governance is *highly fragmented*, with responsibility for different issues being split between multiple levels of government, departments and multilateral institutions. Governments have established structures to enhance coordination, such as the Energy and Climate Ministerial Council, but significant challenges remain that include:
    - analysis can be siloed and lack a whole-of-system perspective
    - decisions made by one institution may not consider interactions with policies made by other institutions.
- Many decision-making processes contain *explicit or implicit assumptions* that are based on past experience. Some of these assumptions may no longer hold.

- There is a significant gap in *exploratory research.* The authorising environment that departments and market bodies operate under can make it challenging for them to undertake and share some types of analysis. Research institutions, industry, consumer groups and think tanks are less politically constrained in the analysis that they undertake but require funding and tools to conduct effective research.
- *Under-representation* of the views and interests of consumers, researchers and emerging industries in some processes.
- *Social licence* needs to be generated for important reforms. As physical energy systems change, markets and regulations also need to adjust. Even broadly beneficial reforms can generate more opposition than maintaining existing arrangements. Opposition to reform can be significantly greater when it redistributes costs, benefits or risks between different groups. Energy policy is particularly vulnerable to politicisation because it is complex and highly visible.

5.4 Recommended priorities for consideration in the transformation of the NEM

This section sets out three major elements to strengthening governance.

5.4.1 Match reforms to levels of government

Historically, energy governance has placed a strong emphasis on multilateral reforms, particularly within the NEM. When governments were broadly aligned and technological change was modest, market bodies were able to refine market settings within a broad design framework.

Rapid technological change and diverging policy priorities have made consensus-based reform increasingly difficult. Multilateral reforms generally require not only consensus among relevant energy ministers, but also explicit or tacit approval from cabinets. As a consequence, attempting to secure all reforms through multilateral processes can result in delays and increased fragmentation.

This requires a shift in approach to a more decentralised approach, which is already underway:

- Multilateral reforms remain appropriate where national or NEM-wide outcomes are strongly desirable, the Federal Government lacks direct policy levers, and there is a politically viable path to agreement.
- The Federal Government should take unilateral – but consultative – action where national outcomes are desirable, and the Federal Government has suitable policy levers.
- Unilateral state and territory action can be appropriate where the Federal Government lacks policy levers, multilateral agreement is unlikely in the near term, and speed, experimentation or local tailoring are important.

The level of government that is suitable to progress an issue will depend on the issue. For example, technical interoperability standards – which were previously left to states and territories – are now better addressed at the national level due to the pace of change and importance of consistency. The regulation of regionally specific distribution networks, on the other hand, may benefit from more control at the state and territory level.

There is also a potential role for communities to participate more directly in decision-making on local energy infrastructure. Governments could work with highly engaged communities to pilot and evaluate different approaches – both to understand where local decision-making delivers the greatest value, and to build evidence on the design of enabling frameworks

However, decentralisation should not imply isolation. National and NEM-wide collaboration can play an important enabling role in unilateral decisions through:

- **Shared analysis.** Jurisdictions can pool their insights, and the Federal Government and market bodies can provide analysis to support states and territories individually or collectively to make better decisions. This is particularly important for smaller jurisdictions with fewer policy resources.
- **Policy coordination** across jurisdictions and sectors, such as the coordination of the Federal Government-funded Nationwide House Energy Rating Scheme (NatHERS) and state and territory construction codes.
- **Voluntary harmonisation** of key policy features to reduce costs and complexity.

Consumer Grid Summit participants are encouraged to consider what matters are best addressed at different levels of government.

5.4.2 Build demand-side capability and whole-of-system thinking

The purpose of energy systems is to meet households' and businesses' need for energy services, such as hot showers and smelting steel. Demand for these services is met through investment in, and operation of, a mixture of:

- supply-side infrastructure – which includes large-scale generation, storage and distribution and transmission networks
- demand-side infrastructure – which includes rooftop solar, distributed batteries and technologies that influence energy demand, including appliances, vehicles and insulation.

Energy markets do not emerge spontaneously - they are constructed by governments and institutions.[112] Decisions about market rules and policies can, often inadvertently, shape choices by households and businesses and strongly impact the balance of investment in supply- and demand-side measures. Many experts interviewed for the *Power Dynamics* report argued that Australia's energy governance arrangements structurally result in insufficient focus on both consumers and the demand side. These include:

- demand-side and supply-side policy are poorly integrated
- many energy institutions, including government energy departments and market bodies, are structured and staffed around supply-side priorities
- capability on demand-side issues remains relatively limited across parts of the governance system
- education, training and professional development pathways have historically reinforced supply-side perspectives, limiting the development of interdisciplinary and demand-side expertise.

The Power Dynamics report recommends a range of actions to increase the focus on the demand side and foster whole-of-system thinking, which include:

- prioritising the demand-side through ministerial directions
- expanding demand-side policy capability across the workforce, particularly within government departments, which are well placed to adopt a whole-of-system perspective and influence a broad range of policy levers

Consumer Grid Summit participants are encouraged to consider how to build demand-side policy capability and whole-of-system thinking across Australian institutions.

[112] Ben-David, R 2023, *Rethinking markets, regulation and governance for the energy transition*, Monash Energy Institute, Melbourne

5.4.3 Building distributed analytical and engagement capability

Effectively navigating the energy transition will require extensive research and debate to build the knowledge and alignment among stakeholders required for reform. As noted earlier, in a period of change this includes a wide range of 'anticipatory' techniques like strategic foresight and analysis of divergent scenarios and policy options.

Government departments and market bodies already undertake analysis that is critical to the transition, but they cannot fulfil this function on their own because:

- no single institution has all the perspective and analytical capacity required in-house
- diverse perspectives and debate strengthen policy outcomes.[113]
- exploratory analysis can be politically sensitive, as stakeholders and the public can misinterpret analysis of divergent scenarios and policies as endorsements of those positions.

Research undertaken by arms-length institutions, including research bodies, think tanks, consumer advocates and industry bodies, can help inform policy development without tying decision-makers to politically sensitive analysis. However, to perform this function effectively they need to:

- have access to appropriate funding, data and tools
- engage with experts within government and market bodies, who often have critical knowledge and perspectives
- coordinate their research activities with other organisations so that collective priorities are targeted.

The *Power Dynamics* report recommends several actions that would support expanding decentralised analytical capability, including:

- increased funding and coordination for arms-length research
- increased funding for consumer representation
- deliberative forums to work through complex issues
- increasing joint projects and secondments between institutions to share knowledge
- establishing a data services division within AEMO to improve data collection and conversion
- complementing the Integrated System Plan (ISP) with simpler open-source modelling tools that can be used by governments, industry and researchers to examine divergent futures.

Figure 8 provides an illustrative diagram of how distributed analytical and research capability can support rapid and effective policy reform.

The author encourages Consumer Grid Summit attendees to consider how we can build distributed analytical and engagement capability.

[113] Australian Department of Finance, 2025 Commonwealth Investment Framework – Resource Management Guide 308. Australian Government, Canberra. Accessed online 13 January 2026 from https://www.finance.gov.au/government/commonwealth-investment-framework/commonwealth-investments-toolkit/governance

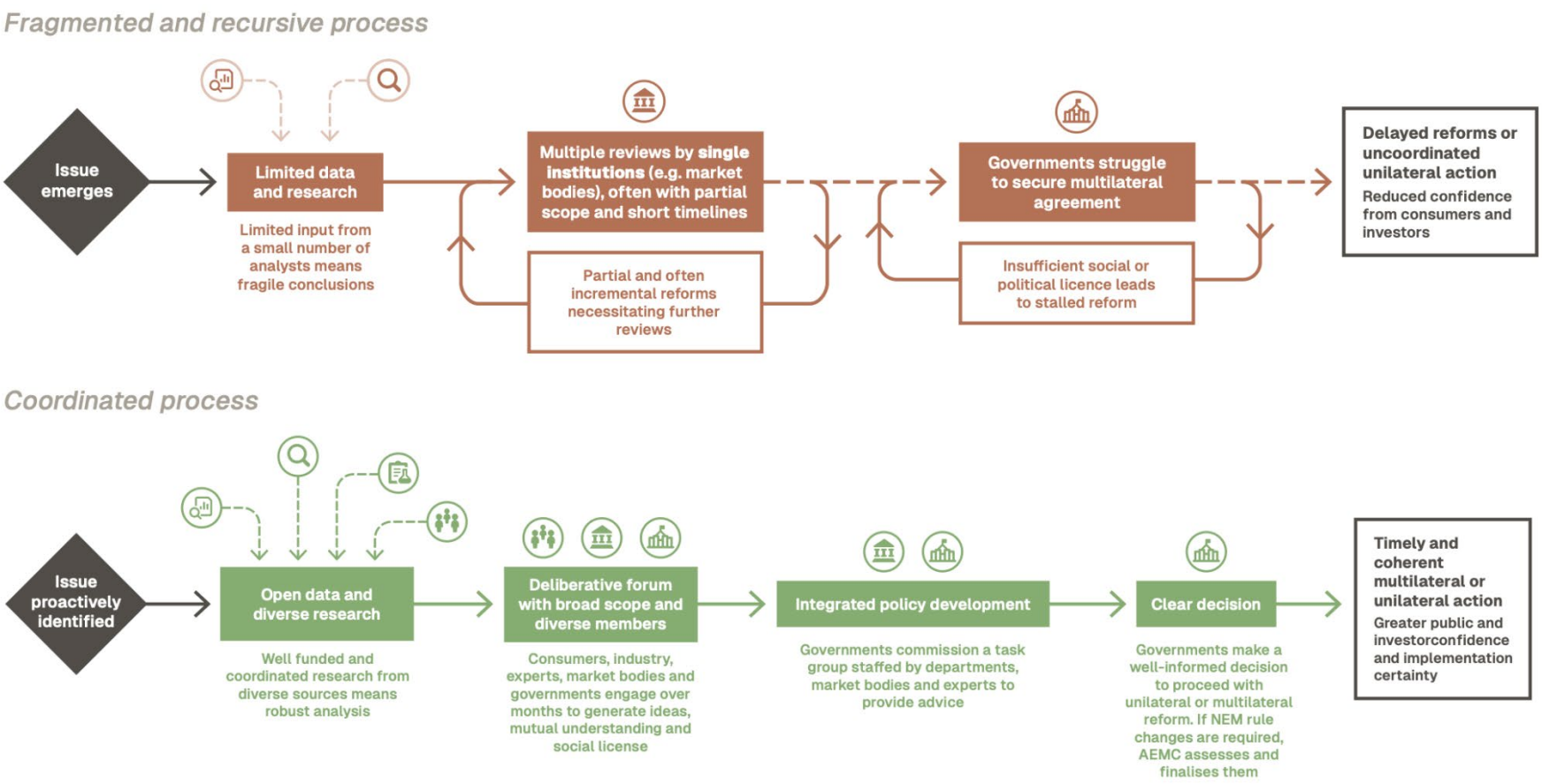


Figure 8: Fragmented and recursive reform vs. coordinated reform

6 NEM CER/DER Value Ecosystems

Author: Ian de Cruz, Greenicorns Advisory

Executive Summary

The transformation of the NEM is being outpaced by the speed and scale of consumer and distributed energy (CER/DER) adoption. Rooftop solar, household batteries, EVs, flexible loads and community-scale assets are no longer peripheral; they are becoming core system resources. Yet the NEM remains structurally anchored in centralised generation, one-way power flows, regulated asset-base investment, and passive consumers. The result is a widening gap between the physical electricity system now emerging and the market, governance, digital and investment architecture needed to optimise it.

The central proposition is of this paper is that Australia does not have a technology problem; it has an architecture and integration problem. Millions of CER/DER assets already exist behind the meter, but the system cannot reliably see, measure, coordinate or reward them as system assets. This leaves major value stranded, including potential reductions in cost-of-living pressures, wholesale volatility, network investment, emissions, and resilience risk. South Australia shows what happens when high-renewables penetration reaches the limits of physical integration, while Western Australia, community battery projects, microgrids and stand-alone power systems demonstrate what becomes possible when storage, local assets and orchestration are treated as infrastructure-grade solutions.

Current NEM arrangements are only partially fit-for-purpose. DNSPs are still largely rewarded for capital expenditure rather than flexibility and local resilience. Retailers often monetise arbitrage rather than orchestration. Consumers face weak or distorted price signals, while renters, social housing tenants, SMEs, and regional communities remain structurally excluded from many CER/DER opportunities. The document recognises that reform is underway, particularly through the AEMC's Electricity Network Regulation Review and Electricity Pricing Review but argues that incremental adjustment will not be enough. The NEM needs redesigned architecture for a decentralised, flexible, consumer-centred system.

Leading international experience points in a consistent direction: the future grid is becoming an exchange platform, no longer only a one-way infrastructure. Denmark, California, the EU, New York, the Netherlands, and the UK are moving toward flexibility-first regulation, distribution-level markets, active distribution system operation, open data, mandatory interoperability, and value-stacking. Australia has the assets, consumer appetite, and market transparency to lead globally, but risks falling behind unless it builds a national platform architecture capable of coordinating distributed resources at scale.

The proposed future grid rests on five pillars. First, a national market-based CER/DER platform layer providing interoperability, real-time optimisation, consumer data portability, geospatial coordination, value-stacking, and portfolio aggregation. Second, distributed optimisation as the default, with neighbourhood energy sharing, local flexibility markets, microgrids and public assets acting as anchor portfolios. Third, electrification as the demand-side engine, with EVs, fleets, buildings, data centres, and HVAC and treated as flexible system resources. Fourth, portfolio-level business and investment models that include renters, social housing, SMEs, councils, schools, and depots to make them financeable. Fifth, a reformed economic model that rewards flexibility, resilience, local optimisation, non-network solutions, and consumer value, rather than treating regulated network build as the organising principle.

The strategic opportunity proposed is significant: a fully orchestrated CER/DER system could lower system costs, defer network investment, improve equity, accelerate electrification, create new investable asset classes, strengthen resilience, and improve national competitiveness. The risk of inaction is equally clear: stranded assets, higher bills, weaker trust, slower decarbonisation, and growing inequity. The next phase in Australia's energy transition including for NEM reform is to move from managing CER/DER as a problem to designing the market around it as Australia's largest emerging energy asset that can unlock the full value of distributed resources and provide a foundation for Australia's national competitiveness that delivers Australia's climate goals faster and in a more participatory manner than any centralised pathway.

6.1 Overview of the current situation in the NEM

Australia now operates the most decentralised electricity system in the world. One in three households has rooftop solar. One in every 25 homes has a battery today. Electric vehicle (EV) adoption is rising rapidly, with projections showing more than 1.5 million EVs on the road by 2030. Electrification is reshaping homes, businesses, fleets. Consumers alone are investing more than $5 billion per year of their own capital into solar, batteries, energy efficiency and EVs. Yet the system they are connecting into is based on design principles and assumptions from a different century (CER 2023; EVC 2023).

The architecture of the National Electricity Market (NEM) still assumes and has a bias towards centralised generation, one-way flows, predictable dispatch, passive consumers, a small number of large assets and a slow-moving investment cycle. None of these assumptions hold anymore. The physical transition has outpaced the digital, economic and governance layers. Millions of Consumer Energy Resources (CER) and Distributed Energy Resources (DER) now sit behind the meter, undervalued by markets and constrained by incentives that reward the wrong behaviours (NEAC 2024).

South Australia (SA) is the canary in the proverbial coal mine. It has reached the limits of physical integration, with periods of 100% renewable generation, and now requires a transformation of the digital layer: interoperability, data, orchestration and incentives. The missed opportunity is profound. A fully utilised CER/DER system could reduce cost of living pressures, improve equity, lift national productivity, accelerate electrification, reduce wholesale price volatility, avoid billions in network investment, strengthen resilience, create new markets and help Australia meet its 2030 renewable and 2035 emissions targets.

Australia currently misses the opportunity to harness an estimated 24 GWh/day of potential CER/DER value due to lack of interoperable standards, poor visibility and misaligned incentives (Kuiper 2024). This is not a question of technology. It is a missed opportunity for integration in the system.

The pace of change in the NEM is now outstripping the system's design assumptions. New data shows that in the first quarter of 2026 batteries became the grid's primary price-setting mechanism, dictating terms in 32% of all trading intervals. Gas-powered generation collapsed to its lowest quarterly average since 1999 (Razzouk 2026). This is a profound milestone: technologies once dismissed as marginal or limited to ancillary services are now outperforming the very assets designed to provide firming and peak support.

Battery storage now commands a globally leading 18% of all installed dispatchable capacity in Australia, more than twice of the next best country in China at 7%. Australia's battery capacity increased by 7.6 GW in a single year, a nine-fold increase with utility-scale systems at 4.2 GW and behind-the-meter household storage hit 3.4 GW (Razzouk 2026). These assets particularly household batteries remain insufficiently coordinated or valued for system level optimisation. The largest untapped flexible resource in the country sits behind the meter and is not yet integrated as a system asset in formal planning and market design.

Western Australia (WA) provides a glimpse of the future. WA is now a global leader in grid scale batteries, treating them as core infrastructure deployed to stabilise the system, firm renewables, reduce reliance on gas and defer network investment. WA's approach demonstrates what is possible when planning frameworks embrace distributed and storage led solutions.

These developments reinforce a central truth: the future grid is emerging despite the system, not because of it. The challenge is not technological readiness; it is the absence of an enabling national architecture capable of unlocking and coordinating these assets at scale.

WA's Jupiter Project shows how distributed solar, community batteries, EV charging and local energy management systems can be orchestrated to deliver reliability and defer network investment. Ausgrid's Edith Project in New South Wales demonstrates distribution level flexibility markets and community scale optimisation. SA Power Networks' microgrids and Western Power's stand-alone power systems show that localised resilience is not a fringe concept and is already being deployed where policy, community leadership and technical capability align.

A key problem with the NEM and Australia's energy system is that it curtails CER/DER value because the system cannot see, measure or orchestrate it as a system asset. It raises a fundamental question for CER/DER participants about why would the stay connected to the grid?

As household solar, batteries and EVs proliferate, the risk of stranded network assets grows. The value of the grid must be reframed not as a legacy infrastructure platform, but as an enabler of community level resilience, local trading and portfolio level optimisation. Unless the system evolves, consumers will increasingly seek autonomy, accelerate grid defection and undermine long term affordability for all.

The focus should not be on only prioritising existing network regulated asset bases but place equal emphasis on incentivising the new flexibility services that deliver the greatest consumer, community and business value. With the NEM becoming one of the world's most distributed GW scale power systems, it requires a platform layer that enables multi-party exchanges and investable business models capable of unlocking beneficial CER/DER participation at massive scale.

6.2 Perspectives on the fitness of the existing arrangements in the NEM

The central debate is no longer whether CER/DER will reshape the future grid as that shift is already underway. The real question is whether the NEM's current arrangements can scale CER/DER from millions of individual assets into a coordinated national resource, or whether the system will drift toward stranded assets, rising costs and declining trust.

Supporters of the current system emphasise stability, consumer protections and incremental reform. Critics including engineers, researchers, innovators, investors and community leaders argue that the architecture remains fundamentally misaligned with a decentralised future. The truth lies somewhere between these positions.

Distributed Network Service Providers (DNSPs) continue to be rewarded primarily for capital expenditure, not for enabling flexibility or local resilience. Retailers monetise arbitrage rather than orchestration. Consumers face weak or distorted price signals that do not reflect the value of flexibility or the cost of peak demand.

The economic framework for the energy system still rewards the wrong behaviours but this is acknowledged by stewards of the system and reforms are underway. The Australian Energy Market Commission (AEMC)'s Electricity Network Regulation Review (ENRR) will be examining the risk–reward package faced by networks, service classification, ring-fencing, and the future role of networks in enabling local generation and CER. This review has the potential to directly addresses many of the structural issues identified in this paper.

Similarly, the AEMC's Pricing Review: Electricity Pricing for a Consumer-Driven Future is exploring how retailers and networks can work together to offer consumer-accessible tariffs for "energy services" that reward flexibility and support CER participation. This work is essential to shifting incentives away from infrastructure-centric models toward service-centric ones.

The digital layer required for orchestration remains incomplete. Millions of devices operate behind the meter and to become a national system asset will require standardised data pathways, shared digital layer and consistent performance expectations. While work is underway, there is an urgent need to create a national interoperability standard with real-time visibility and device-level coordination with consumer data portability.

While the national CER Roadmap and market-body collaboration are progressing elements of this digital layer, the system still lacks a coherent, end-to-end architecture capable of coordinating CER/DER at scale. Governance is fragmented but coordination mechanisms do exist.

The NEM's governance framework includes defined roles, formal coordination mechanisms and active collaboration across the Australian Energy Market Operator (AEMO), AEMC, Australian Energy Regulator (AER) and the States and Territories with the National Government. The challenge is not the absence of governance but that the governance model was not designed for a world where millions of distributed assets behave as system resources.

Consumers and small medium businesses (SMEs) want automation, not engagement. Consumers and SMEs increasingly expect a "Netflix-level energy experience": seamless, automated, personalised and invisible. They want to know that if they provide flexibility, it will be trusted, measured, verified and fairly rewarded. They want transparency about value-stacks, clear settlement processes and confidence that participation will not expose them to risk.

Today's system cannot deliver this because it is built around the regulated asset base, not around the problems consumers and businesses are trying to solve. From an equity perspective this is even worse for renters, people on social housing, people living in regional and remote communities without access to the grid, and many SMEs who remain largely excluded from electrification and CER/DER participation because:

- they cannot participate without ownership of the house or building or access to the grid
- they cannot access capital
- they cannot access trusted intermediaries
- they cannot access value-stacking opportunities
- they cannot access information and choices that is transparent, auditable, measurable, verifiable and easily accessible
- they cannot access tariffs that reflect their needs for flexibility
- they cannot access platforms that aggregate them into investable portfolios

This is not a marginal issue. It is a structural equity challenge that undermines the legitimacy of the entire energy transition for Australia.

The risks of not acting are significant. Rising system costs, stranded assets, declining trust, slower electrification and a widening equity gap. The opportunity cost of inaction is measured not only in dollars, but in lost productivity, resilience and national competitiveness at a whole-of-economy level.

Energy demand including through electrification across households, commercial buildings, transport fleets and data centres is accelerating, but remains inaccessible to renters, social housing, SMEs and digital-infrastructure providers. Transport electrification is a distinct system asset class that also needs to be integrated into the system while adding another layer of complexity noting it is mobile, Original Equipment Manufacturer (OEM)-controlled, telematics-dependent and governed by different standards.

A key question is whether investment signals reward the right mix of flexibility, storage, local generation and network capacity. Today, they do not.

Missing investment signal	Consequence
Standardised measurement and verification	Flexibility cannot be reliably recognised, measured, contracted or valued
Clear counterparty models	It is unclear whether revenue comes from networks, retailers, AEMO markets, governments, communities or consumers and who should benefit and on what terms
Value-stacking rules	CER and DER cannot easily earn across energy, capacity, network support, resilience, emissions and local benefits
Portfolio aggregation pathways	Renters, social housing, SMEs and residential buildings remain too fragmented for mainstream capital unlike commercial buildings
Bankable long-term flexibility revenues	Aggregators and financiers struggle to scale beyond pilots with both certainty in timeframes and scales that attract institutional investment

The system cannot yet coordinate the assets that already exist. The NEM over the last year has almost as many GWh of residential batteries as utility-scale batteries. These assets have already had profound influences on wholesale markets, but they are not being coordinated for system-level optimisation, nor integrated systematically into planning, pricing or investment frameworks.

Emerging business models show what is possible but cannot scale to system level aggregation under current settings. New models are emerging to start to aggregate these DER/CER assets including the following examples:

- National Renewable Network (NRN) is aggregating distributed solar and storage portfolios into financeable national assets.
- Enel X is monetising C&I flexibility as dispatchable capacity.
- AlphaESS is deploying hybrid household and C&I storage ecosystems at scale.
- Amber is demonstrating real-time price-responsive households and early vehicle-to-grid integration.
- Pilco is showing how community-trusted VPPs can deliver resilience and reliability.

These models are the early signals of a new market, but the current system is not designed to scale them. The deeper issue is that the NEM privileges infrastructure over people. The regulated asset base remains the organising logic of the system. But the future grid will be built around:

- consumers
- communities
- businesses
- portfolios
- digital infrastructure
- flexible demand
- electrification

Incrementalism is exhausted. The system cannot be "tuned" into a decentralised future. It must be redesigned around the resources that are rapidly emerging and likely to dominate the grid.

Existing arrangements, shaped by political economy constraints, are slowing the transition. The Consumer Grid Summit provides a rare opportunity to articulate an alternative paradigm that is both ambitious and institutionally realistic, one that complements and leverages current work including the AEMC's ENRR.

6.3 International developments that may inform the transformation of the NEM

Globally, leading jurisdictions are converging on a common insight: the future grid is a platform, not a one-way infrastructure system. The shift mirrors the transformation in the telecommunications sector over the last 20 years from a system based on fixed telephone lines and physical infrastructure with singular benefits and uses to open, interoperable, multi-service digital platforms.

Countries and states such as Denmark, California, the European Union, New York, the Netherlands and the UK are building architectures that treat distributed resources as essential system assets. These jurisdictions are not waiting for perfect alignment. They are designing platform-based, standards-first systems that enable competition, innovation and consumer choice.

Meanwhile, China is rapidly building the digital and operational capability to orchestrate distributed resources at scale. Australia risks falling behind not because of technology, but because of institutional inertia. The energy system is no longer an engineering system based on physical infrastructure but is transforming into a platform for national competitiveness.

Several themes are emerging internationally:

- Flexibility-first regulation: Distributed solutions must be tested before centralised build (Denmark Energy Agency 2023).
- Distribution System Operator (DSO) evolution: Distribution networks are shifting from passive hosting to active coordination (Ofgem 2023).
- Mandatory interoperability and open data: Device-level standards such as IEEE 2030.5, SunSpec, and CSIP-AUS are becoming foundational (IEEE 2030.5; SunSpec 2023; CPUC 2022).
- Distribution-level markets: Local markets for flexibility, resilience and congestion management are emerging (Netherlands Enterprise Agency 2023).
- Electrification as flexible demand: Buildings, EVs, fleets and data centres are being integrated into flexibility markets (EU V2G Study 2023).
- Community and place-based aggregation: Local assets are being aggregated to deliver resilience, equity and system value (Local Government NSW 2024).
- Value-stacking: Assets earn across energy, network, capacity, resilience and emissions services (Kuiper 2024 DER² Fact Sheet).
- Consumer trust and transparency: Products must be simple, automated, reversible and aligned with consumer value

Australia is uniquely positioned to lead. It has a transparent market-based energy system, the highest CER/DER penetration in the world, the strongest consumer appetite for electrification, the fastest rooftop solar adoption, the highest uptakes of batteries, and some of the most advanced community Virtual Power Plants (VPPs) retailer-integrated orchestration models globally, and reform is already underway through the AEMC's Pricing Review and Electricity Network Regulation Review (ENRR).

But leadership requires an open, interoperable and market-based platform that takes a standards-first approach that:

- builds on the AEMC's Pricing Review's work on energy services and consumer-accessible tariffs
- builds into the AEMC's ENRR's work on risk–reward, service classification and the role of networks
- clarifies who holds and operates the national CER/DER platform layer
- provides trusted, transparent, auditable measurement and verification
- enables value-stacking across markets
- integrates data centres, fleets and buildings as flexible demand
- ensures renters, SMEs and social housing are not left behind

Australia can leapfrog incremental reforms and move directly to a platform-based model but only if the system architecture, incentives and governance evolve together, leveraging global best practice around the following areas:

Theme	Relevance to Australia
Flexibility-first regulation	Distributed solutions must be tested before network or centralised build. This aligns with the ENRR's examination of the risk–reward package for networks and the future role of DNSPs in enabling local generation and CER.
DSO/platform evolution	Distribution system operators (DSO) need active coordination, not passive hosting. Australia's ENRR is already exploring service classification, ring-fencing and the role of networks in enabling CER, a critical foundation for any DSO evolution.
Mandatory interoperability and open data	DER cannot scale without shared technical and data standards. Australia's CER Roadmap and AEMC/AEMO/AER collaboration are progressing elements of this, but a national, end-to-end architecture is still missing.
Distribution level markets	Local markets for flexibility, resilience and congestion management are emerging internationally. The AEMC Pricing Review's focus on "energy services" and consumer-accessible tariffs is a step toward enabling these markets.
Community and place-based aggregation	Local assets can provide resilience, equity and system value. This aligns with the ENRR's exploration of the role of networks in enabling local generation and CER.
Electrification as flexible demand	Buildings, EVs, fleets, HVAC and data centres become active core grid integrated resources. Australia's rapidly growing data centre sector (now the second-largest destination for global investment) represents a major opportunity if designed as flexible, renewable-backed loads.

Theme	Relevance to Australia
Value-stacking	Investment depends on combining energy, network, capacity, resilience and emissions value not subsidising existing and future centralised infrastructure plans. Consumers want transparent, trusted, auditable value stacks, not opaque or retailer-controlled arrangements.
Consumer consent and portability	Trust requires transparent data use, opt-in/opt-out rights and service portability. Products must be simple, automated, reversible and aligned with consumer value. This is central to both the Pricing Review and the CER Roadmap.

6.4 Recommended priorities for consideration in the transformation of the NEM

By 2035, Australia can operate a grid in which CER/DER is the dominant source of flexible capacity, resilience and decarbonisation. CER/DER should be treated as a national economic asset class capable of delivering at least $19 billion in benefits by 2040 (Kuiper 2024). Electrification and CER/DER are the fastest, cheapest pathway to decarbonisation and the most powerful lever for improving affordability, productivity and resilience.

The future grid is not a speculative vision. It is emerging today in business models, consumer behaviour, technology capability and the rapid uptake of batteries, EVs and electrified homes and buildings. The question is whether the system will evolve fast enough to harness this potential.

6.4.1 Five pillars of a high-CER/DER future grid

The future grid rests on five pillars, each of which builds on and complements the AEMC's current reform agenda, including the Pricing Review and the Electricity Network Regulation Review (ENRR).

Pillar 1 — A National Market-Based CER/DER Platform Layer

The platform is the digital backbone of the future grid. It enables:

- device-level interoperability
- real-time optimisation
- consumer data portability
- multi-party value-stacking
- geospatial orchestration
- automated participation with do-no-harm backstops
- portfolio-level aggregation

This is not a centralised control system. It is a market-based platform that enables competition, innovation and consumer choice while ensuring interoperability and trust.

Pillar 2 — Distributed Optimisation as the Default

The future grid is orchestrated from the bottom up:

- neighbourhood-level energy sharing
- local markets for flexibility and resilience
- geospatial optimisation

- community-scale aggregation
- microgrids and stand-alone systems
- government energy assets as anchors for this distributed optimised network

This is the opposite of today's transmission-centric planning. It is a system built around people and places, not infrastructure. Consumers and communities including households, SMEs, renters, social housing tenants, and businesses are not peripheral actors. They are the system. They want:

- trusted, transparent, auditable value-stacks
- clear settlement processes
- simple, automated participation
- confidence that flexibility will be rewarded
- alternatives to network augmentation
- platforms that aggregate them into investable portfolios

A Future Grid must be built around these needs, not around legacy infrastructure. It must deliver asset utilisation and optimisation not just network constraint management. Consumers and businesses want to know that if they provide flexibility, it will be:

- trusted
- measured
- verified
- fairly rewarded
- transparent and auditable

This requires a platform that provides trusted measurement and verification, transparent value-stacks and clear settlement processes. Without this, consumers and businesses will not participate at scale. Governments both at State and National level can also aggregate their energy assets and energy use as system assets that accelerate and anchor a distributed optimisation model too in a manner that builds greater trust, transparency and legitimacy.

Pillar 3 — Electrification as the Demand-Side Engine

Electrification becomes the organising logic of the energy system:

- EVs as the largest flexible resource
- electrified buildings as thermal batteries
- fleets as dispatchable assets
- data centres as flexible loads

Australia is now the second-largest destination for global data centre investment. If designed as flexible, schedulable, renewable-backed loads, data centres could become anchor loads that strengthen reliability, reduce costs and accelerate the Future Grid. This aligns with the Pricing Review's focus on energy services and the ENRR's exploration of the role of networks in enabling CER.

Pillar 4 — Portfolio-Level Business and Investment Models

The future grid is not built household by household or SME by SME. It is built portfolio by portfolio, underpinned by business models that are investable for:

- renters
- social housing
- SMEs
- commercial buildings
- councils and schools
- fleets and depots

Brighte demonstrates the critical role of finance partners in enabling electrification at scale by removing upfront cost barriers and simplifying customer journeys. NRN, Enel X, AlphaESS, Amber and Pilco amongst others show how portfolios can be aggregated into financeable assets, but these models cannot scale without:

- clear counterparty models
- trusted measurement and verification
- transparent value-stacks
- interoperable devices
- consumer-accessible tariffs

This is where the Pricing Review and ENRR can play a catalytic role.

Pillar 5 — A Reformed Economic Model

The future grid rewards:

- flexibility
- resilience
- local optimisation
- non-network solutions
- consumer and community value

The regulated asset base becomes one tool among many, not the organising principle of the system. A reformed economic model requires:

- long-term contracted flexibility
- standardised measurement and verification
- portfolio aggregation pathways
- value-stacking across energy, network, capacity, resilience and emissions
- public anchor portfolios to de-risk private capital
- trusted, explainable, reversible participation
- local delivery markets that support SMEs and communities

This aligns with the AEMC ENRR's examination of the risk–reward package for networks and the Pricing Review's focus on consumer-accessible tariffs and energy services.

6.4.2 What the Future Grid Enables

A fully orchestrated CER/DER system enables outcomes that are not possible today; lower system costs, reduced peak demand, deferred network investment, improved equity, greater resilience, faster electrification, new markets and services, new investable asset classes and stronger national competitiveness.

The future grid is not a technical challenge. It is a commercial, sociological and system design challenge. The opportunity is to build a national market-based platform that unlocks the full value of distributed resources and accelerates Australia's transformation for not only the energy system but its national competitiveness across the whole of the economy.

The future grid requires transformation to a modern systems architecture with a neutral independent CER/DER platform layer for open data, interoperability and real-time optimisation; scalable investable business models; integrated planning linking distribution, transmission and community needs; and value-stacking pathways that reward services beyond energy. Elements and key principles of the business models and market design for a future grid are summarised in the table below.

Business model requirement	2035 design implication
Long-term contracted flexibility	Networks, governments and/or system operators procure services from portfolios
Standardised measurement & verification	Investors can verify performance and revenue
Portfolio aggregation	Residential housing, social housing, SMEs, councils, schools, depots become financeable in the way that is emerging with commercial property portfolios
Value-stacking	Assets earn across energy, network, capacity, resilience and emissions value
Public anchor portfolios	Government assets create early scale and de-risk private capital
Consumer protection	Participation is trusted, explainable and reversible with do no harm backstops
Local delivery markets	SMEs and community providers capture installation, operations and maintenance value

6.5 Considerations for Summit Participants

6.5.1 Key Questions for Participants

1. What value is currently being lost because the system cannot operationally coordinate millions of distributed assets (to meet individual, local and whole-system needs)?
2. What is the minimum viable architecture for a secure, affordable, consumer-centred two-way system and who is responsible for delivering it?
3. How should roles and responsibilities evolve to enable distributed optimisation without compromising system security?
4. What investment signals are required to reward flexibility, local resilience and non-network solutions and to avoid stranded assets?
5. What governance model best supports interoperability, data portability and consumer trust at national scale?
6. What immediate steps can AEMC, AER, AEMO and States take now within existing powers to accelerate the transition?
7. How can Australia harness the rapidly growing fleet of utility and residential batteries, which now rival gas peakers in energy contribution?
8. How can data centres, government energy assets, fleets, buildings and neighbourhoods become flexible demand assets that strengthen the grid?

6.5.2 A Coalition of Doers — The Moment to Act

Australia is standing at a catalytic moment. The physical transition is happening. The commercial frontier is emerging. Communities and businesses are already leading. The question is whether the energy system including the NEM will unlock this potential or continue to constrain it.

The Consumer Grid Summit is an opportunity to bring together the people, institutions and ideas capable of shaping a coherent national pathway. Many of the issues identified here are being examined at some level including through the AEMC's Pricing Review and ENRR.

The Summit has potential to help build a credible coalition behind a coherent vision for the Future Grid. Race for 2030, the Energy Charter, consumer groups, networks, retailers, technology providers, financiers and governments all have a role to play. The Summit can catalyse this coalition by:

- aligning stakeholders around a shared narrative
- identifying immediate steps within existing powers
- clarifying the platform architecture
- building trust across institutions
- creating momentum for coordinated reform
- ensuring consumers and communities are at the centre

6.5.3 What the Summit could surface

The Summit could illuminate two sets of pathways:

1. The paths that accelerate the transition including the Future Grid

These include:

- interoperability and open standards that enable device-level coordination
- portfolio-level business models that aggregate renters, SMEs, social housing and fleets
- local markets for flexibility and resilience
- transparent, trusted, auditable measurement and verification that builds consumer confidence
- value-stacking frameworks that reward flexibility, resilience and emissions reduction
- consumer-accessible tariffs and energy-service models aligned with the Pricing Review
- network roles and incentives aligned with the ENRR's examination of risk–reward and service classification

These pathways build on the work already underway and create the conditions for a national CER/DER platform layer.

2. The paths that will block the transition including the Future Grid

These include:

- rigid asset-based regulation
- fragmented governance
- weak price signals
- opaque value-stacks
- lack of trusted measurement and verification
- barriers for renters, SMEs and social housing
- absence of a national architecture for CER/DER coordination

These barriers are not theoretical. They are already slowing electrification, increasing system costs and undermining trust.

The most important unresolved question is who holds and operates the national CER/DER platform layer, and on what commercial basis. This is the central architectural decision that will shape the next decade of reform. The platform could be:

- regulated infrastructure
- a competitive market
- a data-exchange layer
- a hybrid

Each option has implications for cost, risk, governance, consumer protections and innovation. The Summit is the right place to explore these options openly and constructively.

6.5.4 What comes after the Summit

Participants should consider what happens next:

- a coordinated process to refine the vision
- testing the platform architecture
- identifying immediate steps within existing AEMC/AER/AEMO powers
- exploring options for a national CER/DER platform layer
- building a coalition capable of sustaining momentum
- ensuring the Pricing Review and ENRR are leveraged as foundational pillars

The opportunity is to build a national market-based platform that:

- unlocks the full value of distributed resources
- accelerates electrification
- reduces system costs
- strengthens resilience
- empowers communities
- improves equity
- provides a foundation for national competitiveness
- and delivers Australia's climate goals faster and more affordably than any centralised pathway

The coalition to build this future starts with the participants in the Consumer Grid Summit 2026.

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