Customer Considerations & Principles for Ring-fencing Guideline Updates

Prepared For: Energy Consumers Australia

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STRATEGEN

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Table of Contents

Executive Summary

Australia's electricity systems are experiencing perhaps the most profound period of transformational change since the dawn of electrification in the late 1800's. In this wider context, cost-effective energy storage has become one of the most promising and transformative technologies. Globally, energy storage is recognised as having enormous potential to deliver enhanced customer value and significant electricity system efficiencies.

By its nature, however, the capabilities and applications of energy storage are blurring the boundaries that have been imposed in traditional economic regulatory frameworks. This paper engages with the opportunities and challenges at the intersection of energy storage technologies and the related regulatory arrangements. It seeks to do so in a balanced manner that:

- applies a customer-centric and future-informed perspective, focused on better consumer outcomes in a future energy system that provides cheap, abundant and clean energy;
- is informed by a diverse range of Australian and international perspectives derived from a series of stakeholder interviews and an extensive literature review; and,
- is relevant to the Australian Energy Regulator's (AER) review of the Ring-fencing Guidelines for Stand-Alone Power Systems (SAPS) and Energy Storage Devices (ESD)[1] – 'the Guideline'.

Energy Consumers Australia (ECA) and Strategen welcome the AER's Updating the Ring-fencing Guidelines for Stand-Alone Power Systems and Energy Storage Devices Issues Paper (the 'Issues Paper'). We note that it is seeking stakeholder feedback on *"incorporating refinements in the Guideline to reflect the changing nature of services offered by distribution businesses, including via the use of new technology such as stand-alone power systems and storage devices; and clarifying and improving certain obligations to make the Guideline clearer and simpler."*

In considering this topic we emphasize that it is critical that any changes made in this area are consistent with the National Electricity Objective (NEO) and in the long-term interests of energy consumers. It is also noteworthy that a failure to make reforms commensurate with the nature of the opportunity provided by energy storage technologies and a range of new business models may also gravitate against the long-term interests of consumers. In other words, the challenge for Australia is to chart a flexible and balanced course that avoids extremes and facilitates optionality.

In the time available since the Issues Paper late November 2020 release, ECA and Strategen have not yet had the opportunity to fully explore the underlying issues presented by potentially emerging models for SAPS and ESD technologies. Therefore, we have not addressed the specific

[1] Updating the Ring-fencing Guidelines for Stand-Alone Power Systems and Energy Storage Devices Issues Paper (AER 2020. Pg 8.)

questions raised in the Issues Paper, with the exception of the matter of moving from waivers to exemptions. On this matter, we are supportive of the proposal to move from the existing system of waivers to exemptions. We further suggest that additional engagement be conducted by the AER in the subsequent stakeholder consultations to explore how an exemption framework could work, to benefit consumer outcomes, prior to the publishing of the Draft Guideline in March 2021.

It should be highlighted that the timing of the AER's Issues Paper has coincided with significant engagement by consumer organisations, including Energy Consumers Australia, in the Energy Security Board's Post 2025 Market Design (P2025) project. This has involved significant engagement with the P2025 Consultation Paper and the work leading into the P2025 Directions Paper to be released in early January 2021. While we recognise the AER's statutory requirements and timetables, this runs the risk that the potential for enhancing consumer outcomes may not be as fully explored or comprehensively articulated as it may otherwise have been. This is especially noteworthy given that the long-standing principles underlying the existing economic regulatory frameworks do need to be substantively considered and appropriately challenged given that:

- Australia's electricity systems are undergoing profound transformation and needing to confront many world-first challenges; and,
- The holistic integration of energy storage and distributed energy resources across all relevant technological, economic and regulatory systems is pivotal to the continued pursuit of the NEO and serving the long-term interests of consumers.

Given these constraints, our collective efforts have been focused on exploring a proposed principles-based approach to Ring-fencing that is both future-informed and customer-centric. This is important because SAPS and ESD services will emerge in a diverse range of applications over an extended period of time, during which the quality and completeness of knowledge will expand and mature.

Ultimately a principles-based, rather than a prescriptive, approach to Ring-fencing will provide a means for emerging technologies to be properly evaluated as they mature and experience is gained across diverse applications. This will provide a mechanism that does not unnecessarily preclude promising solutions or applications due to inflexible or administratively burdensome requirements. In so doing, it will support the more timely formation of competitive markets for SAPS and ESD technologies, expand the range of solutions and applications, support greater cost-efficiencies and deliver better outcomes for customers as a whole.

Regulation and Ring-fencing in a Transformational Context

The regulation of Australia's electricity distribution networks has evolved over several decades in the context of a supply-side oriented bulk delivery system where the application (and value) of energy storage was very limited. Both the system design and its associated economic regulatory models were premised on delivering a one-directional supply of electricity from centralised, dispatchable, fossil fuel generation in a context of;

- long lifespan, capital-intensive investments;
- slow, incremental technological change;
- limited participation by customers;
- limited business model innovation;
- negligible dispatchable demand-side energy resources;
- no meaningful competitive tension between the historically dominant supply-side system and demand-side alternatives; and,
- no credible risk of 'product substitution'.

This paper has been developed in the context of the Australian Energy Regulator's (AER) Issues Paper on Updating the Ring-fencing Guidelines for Stand-Alone Power Systems (SAPS) and Energy Storage Devices (ESDs). Its goal is to present an expanded set of customer considerations and related principles for informing the AER's Ring-fencing Guideline update.

Regulation & Ring-fencing – Key aims

At the outset, it is noteworthy that pursuit of the National Electricity Objective (NEO), in which the long-term interests of consumers are central, is a key aim of economic regulation and Ring-fencing. With this in focus, economic regulation has sought to maximise the benefits of competitive markets where appropriate, and function as a proxy for competitive dynamics in the case of natural monopoly services.

Specifically, Ring-fencing seeks to ensure that regulated monopoly businesses do not compete unfairly with unregulated entities where a functioning competitive market exists or could exist, and to provide effective economic regulation where competition is unattainable. As the AER notes "*Ensuring regulated monopolies do not have an unfair advantage over unregulated competitors is an important element of ensuring the development of competitive markets.*"[2]

[2] Updating the Ring-fencing Guidelines for Stand-Alone Power Systems and Energy Storage Devices Issues Paper. AER, 2020. Pg 8.

The future is very different from the past

While commonalities will remain, the future of Australia's electricity distribution networks is evolving to be significantly different from the past. It is widely recognised that electricity distribution networks are now transitioning to become the enabler of the multi-directional supply and exchange of electricity in a context whether there is an expanded focus on the demand-side of the system. This electricity distribution network role is being transformed in response to the following changes:

- electricity generation is provided from multiple sources including centralised and decentralised, fossil fuel and variable renewable, dispatchable and non-dispatchable sources;
- technology innovation is accelerating and, in many cases, will remain in a state of competitive flux where the ultimate 'winners' will not be clear for some time;
- growing diversity of consumer needs and aspirations;
- expanding levels of participation where the nature of that participation in shifting load, producing, storing and trading electricity will vary by particular customer segments;
- increasing consumer concerns about social equity, fairness and participation in aspects of the evolving future energy system;
- significant innovation of business models to challenge the dominance of a few large "gentailers" in shaping new energy service and innovation in pricing in retail markets; and,
- emerging competitive tension between traditional supply-side solutions and fast-emerging demand-side technologies and business models.

Energy storage potentially a 'game changer'

While a diverse range of new technologies are emerging, energy storage has unique potential to disrupt conventional revenue and economic regulatory models due to their diverse range of applications and potential for 'value stacking'. It is becoming increasingly apparent just in the past two years or so how the opportunities emerging for cost-effective energy storage could more radically blur the boundaries between regulated, unregulated and competitive services – both behind the meter and in front of the meter.

Distribution networks themselves have an expanding range of opportunities to apply SAPS and ESDs to improve services and outcomes for customers. These opportunities and the related technology / business model combinations will evolve in a wide range of ways that simply cannot be exhaustively anticipated.

Ring-fencing in this transformational context

Traditional more prescriptive regulatory processes by their nature are complex, administratively intense and change slowly. Where regulated entities operate in an environment that is relatively linear and predictable this is unlikely to present issues. In this case, technology and business model innovation is largely incremental and traditional regulatory processes are able to adapt commensurate with the rate of change occurring in the operating environment.

However, where a sector is experiencing transformational change in technologies, business models and customer aspirations, the wider competitive dynamics become increasingly difficult for regulatory processes to anticipate. In this case, more prescriptive regulatory processes may unintentionally slow or limit the emergence of new forms of actual competition.

In his groundbreaking examination of how disruptive forces impact industry sectors, Harvard's Clayton Christensen noted, "Disruptive technologies typically enable new markets to emerge" and "bring to a market a very different value proposition than had been available previously."[3] In the increasingly dynamic context of SAPS and ESD technologies, an overly prescriptive Ring-fencing model will inhibit competitive dynamics, slow new market formation and potentially result in missed opportunities to better serve customers.

[3] The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail (Harvard Business Review Press, 1997)

What Electricity Consumers Value

With the goal of contributing an expanded set of consumer considerations and related principles for informing the AER's Ring-fencing Guideline update it is important to revisit what the research tells us about what energy consumers want and value.

Research by Forethought for Energy Consumers Australia on a consumer vision for future energy services was conducted with the objective to *'explore consumers' lives and how energy fits into it now, what the future of energy should look like, and what consumers want from the sector. They key question was what does better look like in their eyes?*[4]

This research highlighted that there is an opportunity to make energy better for consumers as an outcome of this period of transformation. Common themes emerged from this research in terms of what consumers seek from energy services and a future energy system:

- **Affordable** - Consumers disliked rising energy prices and felt they were being overcharged by energy companies. Lower prices is a key desire and fundamental to a better energy future.
- **Simple** - Energy bills and plans consistently confused and overwhelmed consumers, who struggled to understand the breakdown of costs and found comparing providers near impossible. A better future meant simplified, more comprehensible information. This extended to the source of energy and what options exist.
- **Easy to manage** - Apps, real-time information and smart homes were examples of technology to assist energy management, which would improve the outcomes for households and small businesses into the future. This did not mean technology that took control of everything but gave consumers options and with appropriate social license in place to enable automated energy saving behavior.

Important community level aspirations also emerged from the research, summarised as:

- **Clean** - An overwhelming number of consumers believed that renewables were the future and wanted Australia to be a country that moved towards a smaller carbon footprint in the electricity sector and throughout the economy. The ideal future involved adoption of more sustainable energy sources and an eventual shift away from fossil fuels.
- **Inclusive** - Most consumers felt they didn't know much about how the energy sector was governed and felt powerless. Further, some consumers wanted to have a say regarding the future of energy but felt they didn't have an information base to do so.

[4] A Customer Energy Vision Consumer Expectations Research. Energy Consumers Australia & Forethought, 2019. https://energyconsumersaustralia.com.au/wp-content/uploads/Future-Energy-Vision-Forethought-Household-Full-Report.pdf

Empowering consumers through information and a platform to have a say if desired, was seen to contribute to a better future.

This highlights that there is an overarching agreement by consumers that the future energy system can and should be better than the past. Paying particular attention to all of these key customer priorities is critical in navigating any transition.

To summarise, consumers want cheaper, more abundant clean energy, where the decisions they make are simpler and enabled by smart technology. They also want to have a say in the energy transition, and what the future energy system looks like. Reliability is also important, particularly for customers in areas of poor reliability and there are particular opportunities to address these challenges and improve outcomes for customers with new technologies and SAPS and ESDs are no exception. Future focused customer principles are considered later in this document to provide guidance for regulatory reform in light of these important customer values. Customers expect the energy system and associated regulations to contribute to this change and enable a better future.

Navigating Large-scale Transformation

As noted above, the pace and scale of transformation impacting all parts of Australia's electricity system is unprecedented. This has introduced new knowledge gaps where traditional and emerging technologies and business models are in tension and in competition and where the ultimate 'winners' for serving particular applications will not be clear for some time. At the same time, there is a growing heterogeneity of energy consumer needs and aspirations coupled with increasing concerns about social equity, fairness and reciprocity (rights and obligations) and the universal ability to participate in the evolving energy system.

An unfolding and ongoing transformation

It is important to note that complex and sector-wide transformation of this nature necessarily takes significant time to play out. During this time, accurate and complete knowledge for regulatory decision making will not always be present as the process unfolds. Knowledge for effective decision making in any transformational period necessarily moves through a gradual maturation process that Roger Martin of the Rotman School of Management summarised as the journey from a Mystery to Heuristics to Algorithms.[5]

In the case of the evolving electricity system, it is anticipated that it will take much of the 2021 – 2030 decade for these dynamics to mature into anything akin to a more settled equilibrium.[6] Given the rolling nature of disruptive forces impacting all industry sectors, it is reasonable to expect that any future state will be characterised by a level of technological and economic volatility that was unprecedented when the governance arrangements and economic regulatory frameworks of the National Electricity Market (NEM) were originally conceived.

Configuring Regulation and Ring-fencing for ongoing volatility

Given the dynamic flux in which the regulated, unregulated and competitive markets increasingly operate, it is unlikely that the traditional processes for updating and implementing regulations can remain fit for purpose.

It is arguable that the NEM's original governance arrangements were designed to provide long-term confidence in the form of market and economic regulation, sufficient to encourage all parties to invest (in long-lived assets) with certainty for the ultimate benefit of the customers the system serves. However, at this point in the system's development, the pace and transformative nature of technology innovation and its adoption by consumers and participants bringing new business models is fundamentally challenging these original regulatory constructs. This is not a criticism of those arrangements or of their application; indeed, it is evident that all parties are endeavoring to work within these arrangements. Nonetheless, the need now, as it always is, is to move the 'system' forward in a manner which is consistent and reflective of consumer's best interests.

[5] The Design of Business: Why Design Thinking is the Next Competitive Advantage (Harvard Business School Press , 2009)
[6] Refer to Appendix C: Three Phases of Systemic Transition for additional information.

Applying Future-informed & Customer-centric Principles

At this point in the NEM's development it is necessary to reconsider the current Ring-fencing arrangements and their ability to provide the flexibility required in an increasingly uncertain future. This will be critical if the meaningful pursuit of the NEO on behalf of all energy consumers is to be enabled in the context of the transformational volatility outlined above.

As noted earlier, traditional economic regulatory processes are well aligned and able to incrementally adapt in a more stable and relatively predictable environment. However, it is no longer possible to accurately predict all dimensions of the emerging future state(s), nor even the range of iterative and non-linear pathways that technology innovations and applications will need to traverse over the next decade. As such, agreeing collective ambitions and principles must be the imperative for regulatory and Ring-fencing arrangements; enshrining the same in prescriptive regulatory arrangements is not. This presents a material challenge.

Expanding the capacity of economic regulatory systems to navigate the complex transition of the electricity system requires a deep future-informed orientation and a comprehensive set of customer-centric principles. It is suggested that such principles could contribute to expanding the adaptability of regulatory models and processes to ensure emerging technologies and business models are not precluded, competitive dynamics are enhanced, and effective options analysis and decision-making can occur while emerging knowledge is still maturing. Ultimately these two elements –future orientation and customer-centric principles – will be critical to regulatory arrangements capable of meaningfully pursuing the long-term interests of energy consumers in such a volatile, sector-wide transition where opportunities to serve customer interests are still emerging and evolving.

To that end, the content outlined below provides general commentary on both Stand-Alone Power Systems (SAPS) and Energy Storage Devices (ESDs) relevant to the Ring-fencing guideline update. Most critically, it outlines proposed examples of customer-centric principles informed by a view of the plausible desired future state(s) for consumers being served by each technology.

Stand Alone Power Systems (SAPS)

The AER and AEMC have both highlighted significant potential benefits of SAPS for energy consumers in regional and remote areas of distribution network and/or in areas with poor reliability or resilience. SAPS offer an opportunity to better serve customers while also reducing overall system costs. However, while there are likely to be immediate opportunities for distribution networks to transition customers from traditional network connections and to implement SAPS, the extent to which contestable retail and generation services and contestable markets in general are plausibly likely to be available in remote locations (for potentially small groups of sparse customers) remains unverified and a matter of speculation.

Ringfencing waivers or exemptions will allow distribution networks to provide aggregated solutions where competition is unlikely to emerge. However, these regulations also need to ensure that enough flexibility is allowed so that the waiver or exemption processes themselves do not add further administrative complexity and delays to allowing new solutions to be provided in a timely manner for customers. Such issues and processes are likely to take time to address. The right balance of flexibility is likely to accelerate innovation and improved customer outcomes.

Allowing distribution networks to explore and implement such solutions in the shorter-term could also be important to ensure that issues and challenges with implementing these complex systems do not impact customer services or outcomes. Furthermore, allowing distribution networks to implement SAPS in a timely fashion will also play a role in advancing markets through contestable procurement and through establishing growing adoption of such technological solutions. This will itself likely create improved market dynamics which will benefit a growing number of customers. With a degree of uncertainty in how quickly solutions can be implemented for customers and the degree to which contestable services will emerge to support this it is important to ensure that customer principles are upheld through this uncertain transformation.

Following are a set of proposed customer-centric principles informed by a view of the plausible desired future state(s) for SAPS relevant to regulatory and Ring-fencing arrangements.

- Equal or better TOTEX outcomes compared with traditional distribution network delivery and augmentation to support ongoing customer services, with cost savings shared with all customers (reduced cross-subsidisation);
- Equal or better cost / kWh outcomes for customers transitioned to SAPS;
- Equal or better service reliability for customers transitioned to SAPS;
- Equal or better outage management and restoration of power for customers transitioned to SAPS;
- Equal ability for SAPS customers to upgrade their connection arrangements; and,
- Equal customer protections, with a focus on outcomes.

Energy Storage Devices (ESD)

Similar to SAPS, demonstrations of network-integrated Energy Storage Devices (ESDs) are emerging in significant numbers and in an expanding range of applications. The AER and AEMC acknowledge these expanding opportunities across the electricity value chain but note the blurring of boundaries between regulated, unregulated markets and competitive service provision. The pace at which different technologies, market models, orchestration platforms and contestable services will become fully scalable across diverse applications and combinations is still emerging.

In addition, the way in which energy consumers will adopt storage themselves (behind-the-meter) in response to still transforming price signals is uncertain and evolving. This consumer response will have broader system benefits and impacts that need to be considered as this becomes clearer.

While energy storage can address a range of distribution network and market needs, it is unduly complicated to require every ESD application to be assessed against every potential use or benefit that device can technically provide. This adds to the complexity of assessing a still emerging technology and the set of market services. Instead, it is proposed that, initially as this technology emerges, energy storage should be assessed against its ability to deliver against an identified need with other benefits considered as second order benefits. For instance, if storage can be used to defer network augmentation more cost-effectively than other identified solutions then it should be deployed primarily on this basis. As the technology is deployed, and associated markets mature, then second order benefits and applications may then be investigated further. This principle should be reflected when considering the benefits that support distribution network efficiency and therefore customers as a whole through deployment of new technology. Such an approach also allows for markets to develop and for broader benefits of batteries to be demonstrated and scaled while minimising the risks of poor customer service outcomes through this period of integration and expansion.

Following are a set of proposed customer-centric principles informed by a view of the plausible desired future state(s) for Energy Storage Devices relevant to regulatory and Ring-fencing arrangements.

Grid-connected Energy Storage

- Equal or better TOTEX outcomes compared with traditional distribution network delivery and augmentation options to support ongoing customer services;
- Equal or better reliability compared with traditional distribution network service delivery;
- Equal or better outage management and restoration of power compared with traditional distribution network service delivery;
- Equal or better ability for customers wanting to upgrade their connection arrangements (e.g. install DERs, EV charging, etc.);
- Equal protections for customers, with a focus on outcomes, including those unable or unwilling to participate in local DER or related storage programs;
- At least initially, ESD applications should be assessed on their ability to deliver against a primary use case with other benefits considered as second order benefits;
- Distribution networks increasingly sourcing network services from a combination of network and third party owned ESDs and platforms;

- Distribution networks responsible to demonstrate that financial benefits accrued with the application of ESD are shared with all customers.[7]

Community Storage

In addition to the above, Community Storage approaches should ensure:

- Equal or better financial benefit and cost outcomes compared with equivalent customer-side energy storage alternatives;
- Equal or better cost ROI outcomes where a participation or utilisation fee is charged compared with equivalent customer-side energy storage alternatives;
- Equal or better outage management and restoration of power compared with equivalent customer-side energy storage alternatives;
- Equal or lower complexity than equivalent customer-side energy storage alternatives; and,
- Participating customers are not encumbered with additional participation costs that might apply to localised storage solutions or programs

General

- Where network solutions are applied, customers should be no worse off as a result of applicable assets (or appropriate portions of assets) being applied into the distribution network RAB;
- The conditions and capability of third-party behind-the-meter (BTM) and in-front-of-the-meter (FTM) solutions should be monitored and measured on an ongoing basis to establish whether any exemptions applied should be extended or reapplied; and,
- Distribution networks and other parties should report on program progress and outcomes to allow regulators and customers to monitor market developments and emerging opportunities.

In general, as ESD and SAPS technology / business model combinations are proven in diverse applications over time, market models will mature and the most competitive service options will become clear. Important lessons will also be gained that are relevant to ensuring high levels of service and operational reliability for customers. In addition, noting that the integration of multiple platforms and service models with distribution network operations will be complex, significant effort will be required to sustain both service quality and simplicity for customers.

[7] i.e. Benefits derived from energy storage utilisation and value stacking and without allocation of non-network service related costs to customers.

Suggested Approaches to Regulatory Reform and Ring-fencing

Regulatory Approaches to facilitating SAPS & ESD development

In the face of the unprecedented transformation impacting energy consumers and distribution network businesses, regulatory transformation will be critical in providing downward pressure on SAPS and ESD costs while increasing system efficiencies that benefit all consumers. More agile regulatory arrangements that recognise 'learning by doing' are critical in such a time of transition and will empower the organisational cultures and process configurations that are commensurate to current and emerging challenges.

Relevant to the consideration of SAPS and ESD regulatory arrangements, Strategen recommends a broad three stage approach to market development and regulatory considerations as follows:

- Stage 1: Starting. Initial regulatory considerations should clear the way to expand consideration of emerging energy storage technologies and their diversity of applications. An initial flexible approach helps to catalyse and unlock value propositions of energy storage within the regulatory framework. The objective is to drive deployment of SAPS and ESD to foster and accelerate operational experience, learning and successes.
- Stage 2: Scaling. Subsequent activities should focus on scaling of applications and markets for SAPS and ESD. This will be achieved through further refinement and definition of the economic regulatory frameworks based on lessons from initial deployment activities and market activities. An evidence-based approach to adapting incentive structures, Ring-fencing boundaries and supporting emerging markets will help reduce the barriers for subsequent deployments and market growth.
- Stage 3: Standardising. The final stage positions markets for further growth and maturity. This includes the consideration of SAPS and ESD technologies as an established and mature asset class. This goes beyond a specific project or technology focus to defining market services in granular and technology-agnostic terms.

Proposed Ring-fencing Considerations

Waivers & Exemptions

We support the notion that waivers and, ideally, within the new Guideline, broad well-defined initial exemptions to Ring-fencing requirements should be allowed when the benefits of doing so outweigh the costs of compliance on a case-by-case basis. The current waiver process is administratively complex, time consuming and uncertain for all involved, with the result of delaying and/or increasing the costs of services to customers. Encouraging SAPS and ESD

applications to emerge in a timely manner will help markets become established more quickly which will benefit customers through lower technology and implementation costs.

We also support PIAC's previous suggestion in relation to the application of waivers – but ideally now applied in a new Guideline to exemptions - that Ring-fencing obligations on distribution networks could be applied in a manner proportionate to the potential for consumer harm, particularly where this could result in a delay to SAPS provision.[8] Exemptions for small-scale SAPS could streamline processes and accelerate improved outcomes for small groups of customers while a potential proportionate exemption process for larger SAPS and market monitoring will facilitate improved information gathering as markets develop. Such a process would provide a degree of transparency and certainty for distribution network providers seeking to implement better outcomes for customers in identified areas or locations. Any exemptions, however, should not be granted in perpetuity allowing flexibility for market evolution and developments.

Where consistent with the future-informed and customer-centric principles outlined earlier, this flexibility will support faster market formation to drive down the costs and technical complexity associated with technology deployment and reduce complexity for customers and administrative burden. The measured application of exemptions would also provide a level of agility that better supports the expanded application, evaluation and integration of emerging DER and ESD aggregation platforms and virtual power plants that will be critical for Australia's increasingly decentralised electricity systems.

Appropriate Flexibility & Avoiding Lock-in

Ring-fencing boundaries that are prescriptive and inflexible in the short-term will create extra barriers to markets developing and the timely delivery of improved customer outcomes. Additionally, where too rigid, SAPS and ESD solutions may not be robust to fast evolving opportunities for the technologies to leverage their full capability to the advantage of consumers and the entire system. An appropriate level of initial flexibility with the ability to adjust or, where appropriate, tighten regulations over time will provide opportunities for both market formation and development while avoiding inadvertent lock-in.

Such an arrangement provides the context for evaluating the range of SAPS and ESD solutions across a range of applications and consistent with the future-informed and customer-centric principles outlined above. For example, real-world variables can be actively assessed including examples of stress-testing how models can adjust if customer density and/or requirements change, exploring how adaptive storage technologies are in terms of providing solutions to different applications, or identifying likely points of failure, etc. This flexibility will be essential to help validate that effective service provision can be cost-effectively provided across a diversity of SAPS and ESD applications.

[8] Updating the Regulatory Frameworks for Distributor-Led Stand-Alone Power Systems (AEMC, 2020)

This challenge is not unique to the NEM and observations are provided from several other jurisdictions that are grappling with similar challenges in considering how best to facilitate efficient and flexible regulatory processes in relation to storage (see Appendix D).

Procurement of SAPS and ESDs

It is important to acknowledge the significant market power of regulated entities as both monopoly providers and, in some cases, the sole buyers of services. As a customer-centric principle, it is anticipated that distribution networks will increasingly source network services from a combination of network and third party owned ESDs and platforms.

In exchange for the provision of additional flexibility in the Ring-fencing arrangements, expanded transparency and new tools supporting the evidence-based comparison of options by diverse parties will be required. This will help avoid information asymmetries and the perception of power imbalances and that may gravitate against competitive procurement and inhibit market formation and maturation.

Updated Ring-fencing arrangements should provide for a balanced procurement process that supports an appropriate degree of flexibility while being designed to transition over time as markets evolve and mature. As such, an additional customer-centric principle noted above is that distribution networks and other parties should progressively report on program findings and outcomes. This will help enhance transparency and enable market developments to be monitored as the basis for processes and practices to be adapted over time as technologies and the competitive market matures.

Appendix A: About the Authors

Mark Paterson, Chief Strategy Officer & Managing Director Australia Mark leads Strategen's global strategy and leads the Strategen Australia practice with a focus on whole-of-system transformation. Previously at CSIRO, Mark directed the Electricity Network Transformation Roadmap and chaired the Future Grid Forum. At Energex and Horizon Power, he led the development of Australian and world-first technology innovations. He is an architect of co-design methodologies that engage diverse energy system stakeholders to navigate wicked problems and co-develop transformation pathways. Mark is Co-Chair of the CEC Distributed Energy Leadership Forum, Fellow of the Pacific Energy Institute and an Associate of the GridWise Architecture Council (US Dept. of Energy).	
John Phillpotts, Senior Director John is an energy strategy expert with deep knowledge of strategic planning and regulatory reform in the context of the transformational environment facing electricity distribution networks. John has broad experience working with and within electricity networks in a range of strategy and future network functions considering challenges emerging through market transformation and technological disruption and exploring how these are creating new opportunities for electricity networks to better serve their customers.	
Neil Gibbs, Specialist Advisor Neil has 30 years consulting experience specialising in the utility and energy industries with a focus on business unit strategy, electricity market design and development, the management of major utility reform programs, organisational change management, and performance improvement. Neil's depth of Australian experience has been augmented by significant work throughout Asia, and in the USA, Europe and selected countries in the Middle East and Africa. Neil is Co-Chair of the CEC Distributed Energy Leadership Forum.	

Appendix B: About Strategen

Strategen is a globally-connected consulting firm focused on whole-of-system transition to a low carbon and human-centred energy future

With offices in the United States and Australia, Strategen has developed an integrated suite of seven core capabilities for co-designing and accelerating electricity system transformation.

1. Energy Sector Collaboration & Co-design – methodologies for designing multi-stakeholder engagement and collaboration to enable shared learning, foster trust and enable complex and contested 'wicked problems' to be progressively resolved.

2. Energy System Futures – applying Strategic Foresight methodologies to interrogate plausible policy, regulatory, market and technology futures in the electricity and hydrogen sectors to provide a globally-informed basis for policy, regulatory, market, and technology initiatives.

3. Future Power System Architecture – evaluating the alternative cyber-physical structures necessary to enable efficient high-VRE / high-DER electricity systems. The Future Power System Architecture methodology simultaneously focuses on the complex interactions between all layers of the electric system, including the physical/electrical, control/orchestration, communication and value/transaction layers.

4. Market & Regulatory Innovation – supporting design, development and stakeholder engagement relevant to new market, control and regulatory systems enabling an efficient high-DER future including V-DER[9] tariffs, DSO / DMO models and Transactive Energy[10] architectures.

5. System Planning & Economic Analysis – modelling the optimal future resource mix of key technologies in electricity grids to enable evidence-based investment decisions for utility-scale VRE aggregated DER, remote off-grid and/or grid-connected renewable hydrogen projects.

6. Systems Thinking & Behavioural Science – methodologies for navigating both systemic complexity in both technical and human systems, leveraging the insights of behavioural economics and decision science to enable optimal technical, economic and societal outcomes.

7. Transition Roadmapping – applying a structured approach to reverse-engineering the transition from the desired future state back to the current state and delivering an integrated set of action steps capable of accelerating whole-of-system transformation.

[9] Value of Distributed Energy Resources

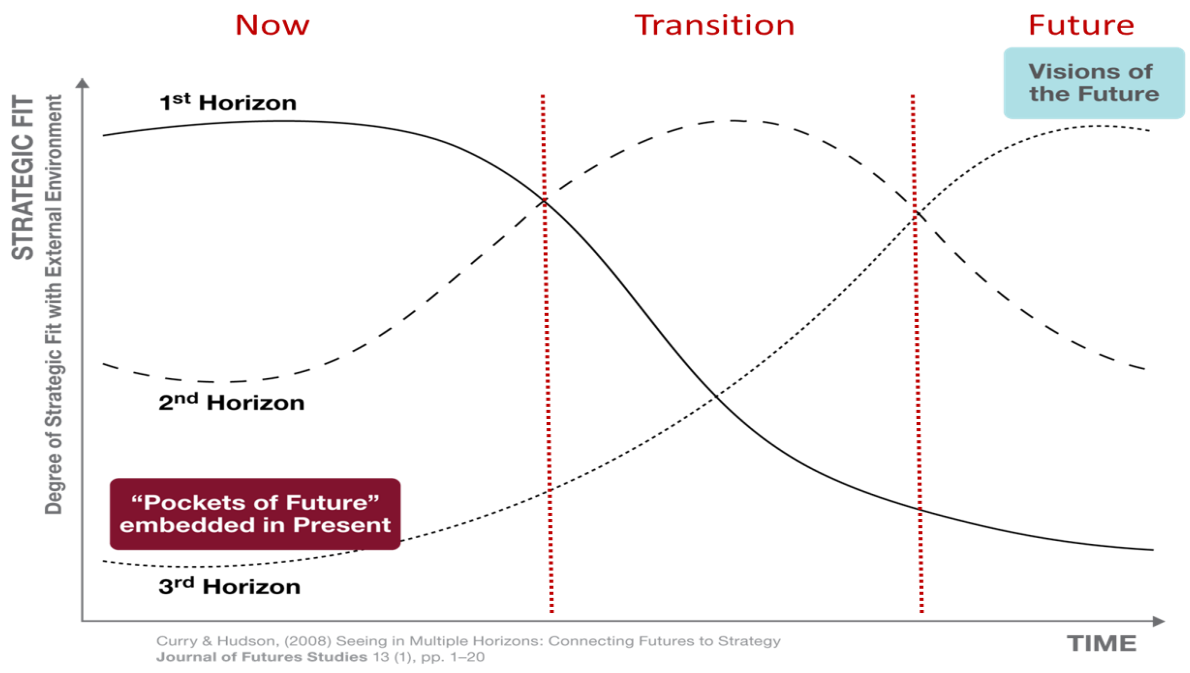
[10] Transactive Energy is an integrated system of economic and control mechanisms enabling the dynamic balance of electric supply and demand using value as a key operational parameter.

Appendix C: Three Phases of Systemic Transition

Periods of transformational change in large and complex systems require new capacities to navigate ambiguity and make effective decisions with incomplete knowledge. In the case of electricity systems, which are defined as Ultra-large Complex Systems, traditional means of forecasting, planning and regulating system change will be necessary but insufficient as they risk being outpaced by the scale and speed of the transformation.

Given the inherent complexity and inertia of electricity systems, the duration of this transformation should not be under-estimated. In this regard, Curry & Hudson's[11] internationally respected work on large-scale systemic transition provides a helpful mental model for framing the transition now impacting electricity distribution networks, including the approaches to Regulation and Ring-fencing.

As highlighted in the diagram below, three phases of systemic transitions are identified. These phases move from the historic or legacy condition ('Now'), through a volatile and extended period of change ('Transition') toward the future state where a relative level of systemic equilibrium is realised (Future). While each transition will involve its own unique features, this model is instructive in that it makes explicit the inherently non-linear and somewhat chaotic period of Transition between when the historic Now and the emerging Future.



[11] Seeing in Multiple Horizons: Connecting Futures to Strategy (Journal of Futures Studies, 2008)

In the case of Australia's electricity systems, it could be argued that the historic or legacy system began to face transformative forces from early in the 2000's. These forces have continued gaining momentum due to the confluence of several technological, economic, environmental and societal dynamics. As the legacy electricity system (represented by the 1st Horizon) has been receding, the 2nd Horizon of a more volatile Transition period has been ascending.

This period has been characterised by increasing competition between new technologies on both the supply-side and demand-side, regulated and unregulated entities and business models. This increase of innovation and competitive dynamics has also resulted in a significant decrease in certainty about the 'optimal' combinations of new and legacy solutions for different situational needs. This will necessarily take significant time and experience to mature and for new decision heuristics to be universally settled.

It may be reasonable to anticipate that the current Transition period may span much of the 2021 – 2030 decade due to the electricity system's inherent complexity and inertia. It is instructive, however, to realise that this phase ultimately represents a state of 'dynamic flux' en-route to the more settled Future state represented by the 3rd Horizon (i.e. not an end in itself). This is helpful as it highlights the need for governance and regulatory systems to develop both the mechanisms and cultural capacity for making effective decisions during an extended period of transformative change where ambiguity and incomplete knowledge are the 'new normal'.

It is important to note that it is not possible to accurately predict all dimensions of the Future state that will ultimately emerge in such a transition. Therefore, developing the necessary mechanisms and cultural capacity will require expanded capabilities to interrogate, compare and contrast the range of plausible future scenarios. Rather than implicitly considering matters such as the Ring-fencing primarily (or only) with a 'present-forward' framing, this enables the same topics to be reframed with a 'future-back' perspective that allows a wider range of options to be considered and decisions made with an awareness of all plausible futures but unconstrained by any single future.

Finally, given the now rolling nature of disruptive forces impacting all industry sectors, it is reasonable to expect that any Future state (3rd Horizon) of the electricity system will be characterised by a level of technological and economic volatility that was unprecedented when the governance arrangements of the NEM were originally conceived.

Appendix D: Examples from other Jurisdictions

Following are several emerging and evolving examples from Australian and international jurisdictions that have some relevance to the AER's consideration of the Guideline. They highlight that the challenges confronting regulatory reform in the NEM are not unique. Ultimately, they highlight that different jurisdictions are actively seeking ways to leverage energy storage in a context where technologies and markets are evolving.

Western Australia

Horizon Power[12] is providing vertical-integrated 'all in one' SAPS solutions as an alternative to replacing aging remote and high-risk network with the goals of:

- Enhanced quality of service as SAPS provide improved reliability for the majority of remote customers;
- Enhance economic efficiency through competitive SAPS procurement process and guaranteed view of long-term costs for life of SAPS; and,
- Bushfire risk reduction through the removal of high-risk powerlines through bushland.

Western Power is also undertaking a deployment of SAPS at scale for similar reasons.

In addition, Western Power recently released a Distribution Storage Opportunities Information Paper to publish opportunities for distribution-level storage to address emerging network needs.[13] Western Power is agnostic as to whether potential storage technology solutions are located in front or behind the meter (point of connection to the distribution network) provided they address required standards and distribution network safety requirements in an efficient manner. This appears to be an early example of a distribution network testing energy storage markets to provide required network services.

International

Following are a number of relevant examples of where other jurisdictions are grappling with similar issues:

- In California, CAISO is exploring how proposed regulations might allow regulated utilities to use energy storage as a network asset while also participating in unregulated markets. Any revenues earned through unregulated activities are returned to customers so that costs are balanced as unregulated revenues are earned with potentially regulated assets. However, the complexities involved (not entirely dissimilar to those in Australia though noting different market structures) have led to CAISO indefinitely postponing these considerations.[14]

[12] Horizon Power Submission to Priority 1 Review of the Regulatory Framework for Stand-Alone Power Systems. February 2019. https://www.aemc.gov.au/sites/default/files/2019-02/Horizon%20Power.PDF
[13] Distribution Storage Opportunities Information Paper (Western Power, 2020)
[14] Deploying Storage for Power Systems in Developing Countries: Policy and Regulatory Considerations. (The World Bank. 2020. p29).

- In New Hampshire, a pilot is underway allowing regulated (vertically aggregated) utilities to deploy utility-owned batteries behind customer meters and to share the benefits of these devices with customers[15]. These storage devices are being used as non-wires alternatives (NWAs) to address distribution network peak augmentation and network flexibility with positive customer benefits. The same utility is also building on this program to work with private third-parties to aggregate other third-party owned resources into NWAs. This provides an example of regulated utilities leading with storage deployment while simultaneously opening the door to third-party participation and subsequent market innovation.[16]
- In the European Union, consideration is being given to whether vertically disaggregated energy companies could deploy storage given its ability to function as both a generation and distribution asset. The proposed legislation notes that regulated entities cannot own storage unless it is considered an approved 'fully integrated network component'. However, regulated utilities are allowed to deploy, own and operate storage with a derogation if no market party is willing to provide the required service. The regulated entity must demonstrate the benefits of and need for the proposed storage deployment, but, if approved, the DSO (Distribution System Operator) must run a public consultation every five years to assess whether market parties may have emerged with the capability to invest in and operate storage facilities.[17]

[15] https://new-hampshire.libertyutilities.com/alstead/liberty-utilities-home-battery-storage-pilot-approved-.html
[16] https://www.utilitydive.com/news/new-hampshire-settlement-moves-cutting-edge-utility-btm-storage-pilot-for/542866/
[17] Deploying Storage for Power Systems in Developing Countries: Policy and Regulatory Considerations. (The World Bank, 2020. p30).