

1. Overview

AusNet Services is one of Australia's largest privately owned electricity and gas network businesses. We own and operate one of five Victorian electricity distribution networks, the majority of Victoria's electricity transmission network, and a commercial ring-fenced business that delivers a diverse range of unregulated services across the energy supply chain.

AusNet Services sees its purpose as empowering communities and their energy future, and is actively engaged in projects that will help deliver better customer outcomes in a future with higher penetration of distributed energy resources (DER).

The Australian Energy Market Commission's (AEMC's) focus on unlocking value streams for DER and identifying opportunities to maximise the value of distributed energy resources is one AusNet Services strongly supports. Making the most of these resources is critical to the future affordability of energy in the National Electricity Market (NEM).

However, this submission identifies a few key aspects of the AEMC's approach that could inhibit the development of distribution markets and lead to outcomes that are not consistent with the best interests of all customers. These include:

- the definition that is being applied to the emerging 'optimisation function';
- the application of the principle of 'independence' in relation to the optimisation function; and
- consideration of how the approach will apply in the real world where there are practical limitations to taking first-best approaches.

These issues require either clarification of a revised approach for the Final Report.

The definition of the 'optimising function' is a source of confusion in the Draft Report. As 'optimisation' is used to capture a wide range of activities, and to refer to different roles at different stages of the evolution of distribution markets, and because the Commission's analysis suggests some parties should be excluded from performing optimisation, the Final Report should clarify the behaviours that are intended to be covered in the definition.

The Draft Report's conclusion that distribution networks should not play the role of 'optimiser' is of concern given the wide range of activities that the 'optimisation' term is applied to. The Commission's rationale that the optimising function should not be performed by a party that has a financial interest in the services being provided would equally preclude retailers, aggregators, or any other third party who has a financial interest in the electricity supply chain. Particularly during the early stages of the development of trade in services from DER, exclusion of networks, retailers or other parties is likely to stifle innovation and slow the process of unlocking the value of DER for electricity customers.

Finally, the Final Report should reflect the current environment, and the barriers that exist to some of the theoretically optimal methods (such as cost reflective pricing) of maximising the benefits from growing investments in DER, and provide guidance on how the Commission's rule-making will address these practical limitations.

AusNet Services' response emphasizes that:

1. The Commission's approach to distribution market development must focus on consumer outcomes, guided by the National Electricity Objective (NEO);
2. Networks' control over network asset operation and management must be protected; and
3. The final approach should not make it harder for networks and other parties to access services from DER.

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2. Introduction

2.1. Understanding the value of distributed energy resources

Distributed energy resources (DER) are increasingly popular and important in the electricity system. Solar PV has allowed energy users to generate their own electricity. Batteries allow energy to be stored, and electric vehicles as a green source of transport will significantly change the way consumers use electricity. Smart appliances and energy management services can provide better control over *when* and *how* energy is consumed.

In the first instance, customers are choosing to invest in DER for the direct benefits they can access by managing when they use, store or export electricity. However, as the Draft Report highlights, there are three value streams that can benefit from DER, and future developments will likely enable households and businesses to trade, not just their surplus electricity but a multitude of energy services.

Table 2.1: Value streams for DER

Customer services	Wholesale services	Network services
<ul style="list-style-type: none"> Supply continuity (backup power) Energy arbitrage (increase PV self-consumption; retail tariff arbitrage) Reduced grid reliance 	<ul style="list-style-type: none"> Energy arbitrage Ancillary services (frequency control; system restart). 	<ul style="list-style-type: none"> Demand management (investment deferral for distribution and transmission network; congestion management) Power quality (particularly local impacts) Supply continuity (reliability)

The Energy Networks Australia-CSIRO Electricity Network Transformation Roadmap (the ENTR) forecasts that households and businesses will determine over \$200 billion of investment in energy system assets between now and 2050. And, up to 50% of all electricity consumed is expected to come from distributed sources, as opposed to large scale generators.

It is clear individual households and businesses will have far greater control in future decades, and therefore have more collective power over the outcomes for the entire system.

2.2. Objective

The Distribution Market Model Review (DMM Review) is about understanding distributed energy resources and considering how the current National Electricity Rules (the Rules) may need to be changed to continue to drive efficient outcomes for the National Electricity Market (NEM) in light of the customer driven changes that are occurring in the market. The report notes that:

[C]onsumer choices should continue to drive the development of the energy sector, but that market design and regulatory frameworks may need to be modified to better align individual decisions with the long-term interests of consumers more generally.¹

¹ Draft Report, p.25

AusNet Services strongly supports the AEMC's focus on unlocking value streams for DER and identifying opportunities to maximise the value of distributed energy resources. Making the most of these resources is critical to the future affordability of energy in the NEM.

2.3. Purpose and scope of review

According to the Draft Report, the purpose of the DMM Review is to set out the AEMC's theoretical framework and approach to distribution market development issues, to provide guidance for how it will approach future Rule changes and the future advice it provides to government.

The scope of the Draft Report is broad. Intentionally abstracted from specific business and market models in order to maintain optionality, and considering all phases of distribution market development, it can be difficult to see the implications of the report for rule making over coming years.

In developing the Final Report, the AEMC should focus on:

- clearly identifying **outcomes** (for electricity customers) from distribution market development that the AEMC will seek to promote in shaping future distribution market regulation. While the draft Assessment Framework identifies the National Electricity Objective (NEO) as the overarching guide to its policy and rule development, it should be possible to identify specific customer outcomes.
 - An example of an outcome measure would be *improving productivity* as indicated by increasing utilisation of electricity system assets (network and generation), or less peaky energy consumption;
 - the 'principles of good model design' that form the other half of the proposed Assessment Framework are identified as indicators of well-functioning markets. These are good principles, although consumer outcomes should take precedence.
- Clarifying the **approach to the initial phases of distribution market development**, including promoting enablers of distribution market development, and intervening in markets to remove barriers to the optimisation of DER.
 - Identifying principles consistent with 'good behaviour' or where parties are acting in the interests of all customers, to guide the Commission's approach to Rules development. i.e. What types of developments would suggest a need to change current regulatory settings?

2.4. AusNet Services' position

2.4.1. About AusNet Services

AusNet Services is one of Australia's largest privately owned electricity and gas network businesses.

AusNet Services owns and operates one of five Victorian electricity distribution networks, the majority of Victoria's electricity transmission network, and a commercial ring-fenced business that delivers a diverse range of unregulated services across the energy supply chain (including contestable infrastructure and new energy services). AusNet Services also owns a gas distribution network in Victoria.

AusNet Services sees its purpose as empowering communities and their energy future.

Both AusNet Services' regulated electricity distribution business and the unregulated commercial energy services business are actively engaged in projects that will help deliver better customer outcomes in a future with higher penetration of DER. Details of two significant projects are included below.

These projects do not presume a specific model for the development of distribution markets. But, they do seek to increase the efficiency with which we manage our networks, understand the evolving needs of an increasingly complex system, and deliver the energy services customers want.

Mooroolbark Community Mini Grid Trial (regulated network trial)

The Mooroolbark Community Mini Grid trial represents a snapshot of the future of the distribution network, with highly concentrated DER in the form of battery storage and solar power, and high levels of both data flows and control capabilities. The trial provides the foundations for testing multiple services and functions that could potentially evolve with a distribution level market in the coming years.

At its core, the trial is building out a fully integrated network optimisation platform geared toward supporting increased take up of DER, enabling the customers to gain more productivity out of their investments, providing increased customer supply quality and reliability, while leveraging the network infrastructure and enabling the network to be operated more efficiently.

AusNet Services has deployed the trial's DER assets at the homes of the 14 participating customers and is currently developing the platform control capabilities in a live environment. The trial is canvassing a wide range of use cases and operational scenarios including: local peak demand reduction, upstream network support, virtual power plant operation, community energy trading, mini-grid islanded operation and home islanded operation.

Not all of the functions being carried out by AusNet Services in the trial would be network functions as the distribution market develops. This is because, in addition to developing network management tools to facilitate and leverage increasing levels of DER, this trial is helping AusNet Services to understand and prepare for the many ways that customers are likely to respond to changes in technology, energy service offerings and new price signals, and the consequences of those customer choices for network operation.

Yackandandah Mini Grid Project (commercial project)

The Commercial Energy Services team at AusNet Services has been working in partnership with community renewable energy group, Totally Renewable Yackandandah (TRY), to explore ways to assist the Yackandandah community in achieving their goal of being 100 per cent renewable by 2022. Specifically, the project aims to deploy the first commercial mini-grid in Australia.

This project is not tethered to existing market roles and looks at the community mini-grid as a potential service model innovation. The project incorporates customer level DER investments (solar PV and batteries) and energy information tools, to deliver both home and community level insights and energy management. The project is also exploring the potential to establish a community retailer.

2.4.2. AusNet Services' position

This submission seeks to emphasize three points in response to the Draft Report:

1. The Commission's approach to distribution market development must focus on consumer outcomes, guided by the National Electricity Objective (NEO);
2. Networks' control over network asset operation and management must be protected; and
3. The final approach should not make it harder for networks and other parties to access services from DER.

AusNet Services supports customer driven take up of DER, and unlocking the maximum value from DER to support an efficient energy system using policy approaches that are "value stream neutral".

3. Optimisation function, incentives and independence

3.1. What is the optimisation function?

The definition of the optimising function is a source of confusion in the Draft Report.

The AEMC defines optimisation as "responding to signals", which can be done by "consumers themselves" (more accurately, *DER owners* themselves) or "consumers' energy service providers" (DER owners' energy service providers). Hence the definition covers both centralised and decentralised models of optimisation.²

While the focus on "responding to signals" would appear to distinguish 'optimising' from 'providing signals', the uses of the "optimisation" term throughout the report make it unclear. At times, it would seem that any interaction between third parties and DER owners is included in the AEMC's definition of the optimising function.

*Optimisation provides a way to send signals to whoever has control of the distributed energy resource to provide the service that will deliver the most value at that point in time. This optimisation process gives consumers the ability to maximise the benefits of an investment in distributed energy resources by enabling them to, if they choose, receive the maximum possible benefit of utilising and selling the full range of services that the asset is capable of providing, given transaction and information costs, and technical constraints. Consumers may choose to 'optimise' the operation of their distributed energy resources themselves, or give this function to an agent, for example their electricity retailer or energy service company, to optimise the asset's operation on their behalf. [emphasis added]*³

The AEMC's interpretation of the ENTR's concept of *network optimisation* (including the development of the Network Optimisation Market) as an example fitting the Draft Report's definition of an optimising function, illustrates how complex this idea is in practice. Network optimisation as envisaged in the ENTR is a necessary step toward broader market optimisation because it is the 'toolset' or approach that will allow networks to establish efficient signals that are a necessary input to optimising across all DER value streams.

Network optimisation as described in the ENTR is perhaps best understood as new-wave asset management. It is about developing new approaches to combining DER services, with maintenance, augmentation and connection policies in order to plan, develop and operate

² AEMC, 2017, *Distribution Market Model, Draft Report*, p. 5.

³ AEMC, 2017, *Distribution Market Model, Draft Report*, p. 18.

the network to suit all customers' needs. It is a tool or method for making network decisions about:

- Hosting capability;
- Willingness to pay (for DER services and additional network capacity);
- Capital investment; and
- Service procurement,

as efficiently as possible.

In this way, network optimisation allows businesses to determine (on an increasingly dynamic and locational basis) the value of DER services to the network. This is what can determine efficient signals to provide to DER owners.

The ENTR's concept of a network optimisation market is distinct from a distribution level energy market (where many-to-many or peer-to-peer trade in DER services is possible). Network optimisation is a necessary input to overall optimisation. Without network optimisation, networks may provide an inefficient constraint to the trade of DER services, or network prices may be higher than necessary due to sub-optimal network operation and asset management decisions.

The Final Report should clarify what behaviour by parties such as networks, retailers, and aggregators would be considered as 'optimising' and what would be considered 'providing signals'.

3.2. Restrictions on who can perform an optimisation function unwise

Given the AEMC's broad definition of what constitutes an 'optimising function', which includes not just sophisticated whole-of-distribution-market trading platforms that might emerge, but also incremental bilateral arrangements (such as between a network and an aggregator of DER, or between retailers and DER owners), the Draft Report's conclusions about who should and should not play the role of "optimiser" is of concern.

The AEMC concludes:

the optimising function is best carried out by a party that does not have a financial or regulatory interest that would result in them favouring the provision of one service over another, other than in response to efficient price signals.

and

the Commission does not consider it appropriate for the party who is responsible for providing common distribution services (i.e. a DNSP) to take on the function of optimising investment in and operation of distributed energy resources and the services that they provide.⁴

The AEMC's decision to immediately rule out distribution network service providers (DNSPs) from the central optimising function without a balanced examination of consequences of other market participants undertaking the optimisation role means that the analysis undertaken is partial and incomplete. The conclusion ignores the fact that the same criteria would exclude retailers, aggregators or any other third party who has a financial interest in the service the DER could provide.

In particular, in the NEM the three major retailers own substantial shares of the electricity generation market. It is easy to imagine a situation where such a generator has a strong

⁴ AEMC Draft Report, p.38

direct financial incentive to block a battery from bidding into that market at peak times. This would seem a far worse conflict of interests than a DNSP.

In considering the parties most able to perform the optimisation function in an impartial and transparent way, DNSPs offer significant advantages in terms of already being highly regulated from both an economic and regulatory viewpoint, having no financial conflicts regarding the end customer's electricity consumption or generation, and having intimate and transparent knowledge of the state of the network assets via which the distribution market must operate. Retailers, aggregators and independent third parties all fail to exhibit this complete suite of advantages.

However, a bigger issue is that, the idea of having an 'independent' optimiser does not make sense in the real world. In almost all imaginable circumstances DER will be operated by a party who has a principal interest in one of the three value streams (i.e. customer services; wholesale market participant; network owners). Everyone who is interested in batteries is interested in value streams and many will have a greater interest in one value stream than others.

Quite why the Draft Report only actively excludes one set of sector participants from the optimising process at this stage is a mystery.

3.2.1. Independence proposal will limit development of DER

The Draft Report's focus on applying limits or restrictions on DNSPs in relation to DER may stifle rather than maximise the value of DER services. It will make it harder to unlock network value from DER, while relying on other stakeholders, whose interests have greater conflict with all customers' interests than networks do, to act in a way that preserves a level playing field. Large retailers (generators) could easily come to dominate.

The AEMC should resist adding additional layers (such as an 'optimiser function') to Australia's already complex electricity system.

It should also be recognised that despite the significant focus being placed on 'smart' DER and its role in the future of the electricity system, the technology itself, the level of customer engagement and the relevant business models are all in their infancy. Each of these aspects of DER are rapidly evolving and changing before they have even fully reached the early adopter market. Therefore, market rules should be kept as flexible as possible to allow this rapid evolution and should not look to constrain market players or overly define market roles at such an early stage. To do so risks locking in inefficient DER practices and reducing innovation value to the end detriment of electricity consumers.

3.3. Conclusion

As difficult as it is to reach conclusions about the optimisation of DER on a theoretical basis that covers all possibilities for market development, there are two observations that the Final Report needs to better address:

- 1. Value streams for DER are not fully separable*

Networks are needed to enable DER. While DER may be able to respond dynamically in real time to customer demand, network constraints or wholesale market peaks, the physical properties of the network (such a network capacity at any

given location) cannot respond as quickly. In some instances it will be necessary for networks to have the ability to direct DER to preserve the security of the system.

As such, the design and capacity of the distribution networks will always have physical limits that in some cases will constrain a market-delivered optimisation of DER services. i.e. a market for DER services can only deliver an optimal outcome within that system.

A broader type of optimisation that incorporates the design of the system, means thinking about when do we want networks to be augmented? And, how should networks approach those decisions?

It is appropriate to consider whether the combination of obligations and incentive regimes that networks face, provide the right incentive to optimise how often such actions are necessary (i.e. what security or reliability should networks be accountable to deliver).

- 2. In the absence of fully established, centralised DER market, all parties with the potential to benefit from services provided by DER must have the ability to engage DER.*

All parties should be able to engage DER services. Restricting one, or multiple parties, from arrangements that deliver DER value to networks or wholesale markets is likely to limit rather than encourage efficient use of DER. This is particularly true while the DER services market is largely decentralised.

In relation to the evolutionary path, the initial priority should be on removing barriers to transacting (selling and buying) DER services, both for sellers and purchasers. As DER penetration increases over time network access and congestion management arrangements may need to be examined e.g. for access to bi-directional transport and for access to upstream DER markets.

While it may not be appropriate for DNSPs to perform all envisionable optimisation functions, like it may not be appropriate for retailers and other energy market participants to perform some optimisation functions, there are plenty of ways in which customers interests can be promoted by these parties' participation in the market.

Rules limiting participation in DER markets should be specific to both circumstances (the state of the market) and the behaviours to be limited (e.g. controlling DER to limit services to other value streams).

4. Market and technical enablers

AusNet Services supports an initial focus on removing barriers to DER market development, such as through achievement of more cost reflective pricing, and development of better methods for provision of data.

Nevertheless, it is important that second-best solutions can be used when first-best options are not available. Perfect should not be the enemy of the good, so the Commission's approach to distribution market development should *both* seek to reduce barriers to markets, and, recognise the real limitations that exist, and promote the best outcomes for customers in light of these constraints.

The Commission's initial focus should be on:

- Putting in place incentives for efficient investments; and
- reducing barriers to innovative arrangements.

Many of these issues are dealt with more fulsomely in the ENA submission and in the reports of the CSIRO/ENA Electricity Network Transformation Roadmap.

4.1. Barriers to cost-reflective pricing

Improving the cost reflectivity of electricity pricing will deliver benefits to all electricity users and will make for a more equitable development of energy markets. As customers gain greater control over their energy use through distributed energy resources, introducing new electricity price structures that reward customers for behaviours that reduce costs elsewhere in the system (including wholesale electricity generation and network costs) becomes more critical and urgent.

AusNet Services agrees with the Draft Report that a whole-of-sector approach (involving DNSP's retailers, governments and consumers) will be needed to make meaningful headway on changing electricity pricing in the NEM.

Notwithstanding current efforts to improve price signalling in electricity, there are limits to how reflective prices can be expected to be (both in the near term, and the longer term).

The limits to the AEMC's vision of fully cost reflective tariffs are numerous, including:

- *retail market barriers* – in the deregulated retail markets of the NEM, decisions on tariff offerings are left to individual retailers. To date, retail markets have not shown high levels of pricing innovation, or pass through of network tariff structures⁵;
- *political barriers* – governments have continued to show a strong interest in electricity tariffs, and have imposed restrictions on what changes to electricity pricing can be introduced. Political hurdles reflect the need to manage upfront winners and losers from changes to electricity pricing, and to reflect community attitudes, such as expectations that prices will not vary according to where customers live; and,
- *informational and technical barriers* – including:
 - difficulties with coordinating and communicating changes to customers in a system with multiple networks, and retailers;
 - limits to how accurately cost drivers can be reflected in prices, including the lumpy nature of investments in network assets; and
 - compatibility of systems (e.g. for market settlement and billing)

Not all of these barriers will be overcome by Rule making. Indeed, in some instances the limits on proposed pricing changes are due to the benefits from a specific change being outweighed by the costs.

Similarly, there will be limits on the degree to which pricing signals can be expected to drive 'optimised' behaviour and operation of DER. A lot of current investment is 'non-rational' in an economic sense. Behavioural responses of individuals with respect to DER reflect a broad set of environmental influences in addition to financial incentives – a desire for 'independence' and a distrust or dislike of energy companies; a desire to help the environment; an interest in leading edge technology; a response to marketing.

⁵ Network tariffs are only one component of the final retail cost structure.

The Commission has tended to underplay the materiality of the barriers to cost-reflective pricing, and overstate the degree of response that can be expected. Given many of these price and incentive signals do not exist or are imperfect at present –short term action should focus on removing the barriers to cost reflective pricing, and not prematurely removing DNSP’s ability to pricing alternatives. DNSPs must have access to other tools if they cannot use pricing to manage network constraints.

If barriers to fairer pricing persist, the AEMC may also need to address the negative externalities imposed on the electricity system where costs are imposed on other consumers.

4.2. Updated DER connection policy

The AEMC’s Draft Report notes differences in DER policies of DNSPs, however, some of the information quoted is inaccurate or outdated.

AusNet Services’ updated policy has a zero pre-approval threshold for embedded generation (i.e. all embedded generation must be pre-approved). It is understood that this is consistent with CitiPower/Powercor, while United Energy and Jemena have 10kW per phase threshold.

AusNet Services was one of the first distribution networks in Australia to formalise a connection policy that allowed for ‘limited export’ embedded generation forms of DER. This policy was developed in recognition of customers’ desires to install larger DER systems and technological development that allowed DER such as solar and battery systems to self-manage the level of exports at the customer connection point.

In practice, this means that most of our customers (non-SWER) are now able to export up to 5kW per phase, from an installed system capacity of up to 10kW per phase. For example, a customer may install 4kW solar power system, and a 6kW battery storage system on a single phase supply, as long as there is a local control system in place that can be demonstrated to ensure net exports do not exceed 5kW.

This approach allows a high level of flexibility in how customers use their DER, whilst helping ensure that network impacts such as voltage rise are contained to manageable levels. For example:

- During the day, if the solar is producing maximum power, the battery is full and the customer consumption is low, then most of the 4kW of solar production would be exported and attract a feed-in tariff.
- If the customer has also elected to a participate in the wholesale market via an aggregator, or as part of a network support virtual power plant, then a control signal could be sent to the customer’s DER system to request that it exports power at peak times. If this is during the late evening when the solar production has ceased, and the customer is using 1kW, then the battery may be called upon to generate 6kW, with a resultant export of 5kW.

4.3. Network access

The Draft Report identifies a range of network access issues potentially arising from greater penetration of DER, including:

- Inefficient levels of investment in network assets to resolve capacity constraints, power quality etc.;
- Unfair distribution of costs among network users;

- Inefficient procurement of DER services (i.e. networks procurement of DER intervenes with the optimisation of services with the contracted DER);
- Inefficient limits on the connection of new DER assets; and
- Inefficient levels of constraints, power quality etc.

However the Draft Report does not indicate how it would like to see networks resolve these issues (e.g. setting principles that should guide actions), or where the Commission might seek changes to the Rules to promote outcomes that are in the best interests of customers.

While the theoretical answer is that cost reflective pricing will address these issues, the Final Report should give greater guidance on what should be done in circumstances where pricing cannot be used, or where pricing is failing to deliver outcomes consistent with the NEO.