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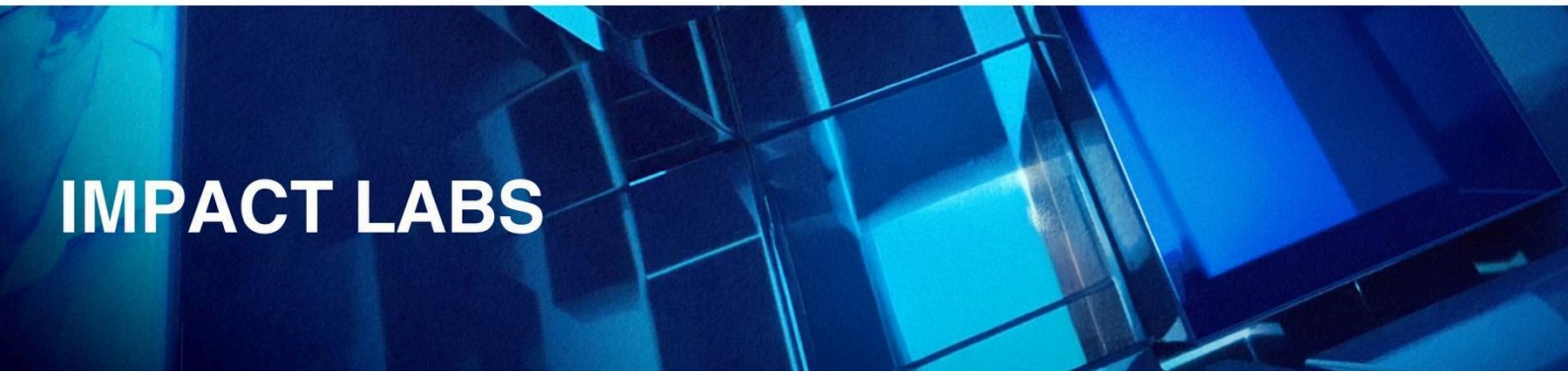

Submission to the AEMC Pricing Review

Energy Lab
Monash Business School
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FOREWORD

This submission is made by the Energy Lab of the Monash Business School and is made on behalf of Darryl Biggar, Shreejan Pandey, Guillaume Roger, Gordon Leslie and Andrew Rendall (the authors).

The Monash Energy Lab is one of six multidisciplinary labs under the Monash Business School. The energy lab undertakes relevant, significant, multidisciplinary research on energy markets in collaboration with industry and policymakers. The objectives of the lab are to engage in influential and impactful multidisciplinary research on energy markets in collaboration with industry and policymakers and to combine existing Monash Business School strengths in market structure, design and behaviour, forecasting, experimental analytics and Big Data, energy finance and regulation to address global climate challenges and shape economic policy and best practice.

This submission reflects the views of the authors above and does not represent the views of the Monash Business School or other entities with which the authors are affiliated.

SUMMARY

Monash Energy Lab is pleased to make this submission to the AEMC pricing review.

We commend the AEMC for tackling the issues associated with efficient integration of customer-side resources into the electricity sector and we applaud the focus on a customer-centred approach. We agree with many of the key observations of the Discussion Paper, namely:

- The importance of coordinating the operation of, and investment in, consumer energy resources with the operation of, and investment in, the network.[1]
- That existing network charges, which are set through an administrative process which includes recovery of the fixed costs of distribution networks, do not provide the necessary signals for efficient coordination (i.e., do not provide efficient signals for the use of, or investment in, consumer energy resources).[2]
- That the current tariff framework, which seeks to set network charges on the basis of long-run marginal cost is no longer fit-for-purpose and that, going forward, efficient network charges should be dynamic, location-varying and should reflect the short-run marginal cost of the use of the distribution network.[3]

End-customers likely vary in their preferences over retail contracts.[4] Some may prefer to be insulated from wholesale price variation; others may prefer to allow the retailer some control over their CER; still others may prefer to allow on-site devices (e.g., a Home Energy Management System) exposed to wholesale energy prices to control their local CER. We agree that end-customers should have access to a range of retail products and services that meet their needs.

It is our understanding that the Discussion Paper takes as a starting point the observation that retailers typically simply pass through the structure of network tariffs to retail contracts. As a consequence, the Discussion Paper focuses heavily on the retail-network interface and on the question of how network tariffs should be designed to meet the needs of retailers so as to, in turn, ensure that consumers receive the range of products and services they desire.

We suggest that this approach combines two ideas that are best kept separate:

- On the one hand, ensuring that retailers face accurate and efficient price signals, reflecting the short-run marginal cost of production and consumption decisions at the location of the end-customer; and
- On the other, ensuring that retailers have access to financial instruments which allow them to hedge the risks they face as they play their key role of interfacing between the wholesale market and the range of retail products and services that end-customers desire.

Good public policy practice should focus on identifying and addressing underlying market failures, while allowing competitive markets, operating within well-defined rules, to deliver the products and services that best meet the needs of consumers.

As the transition progresses, if we are to facilitate efficient usage of and investment in a range of consumer-side resources, it will be increasingly important to make sure that retailers (on behalf of

[1] For example, Discussion Paper (DP), page 34: "If CER was instead operated in a more coordinated manner, for example by responding with generation or consumption at times of system need, these technologies could unlock savings for both the owner of the CER and the system."
[2] For example, DP, page 75: "The issue that arises when the network tariff price signal does not reflect costs is that consumers will respond by either using the network too little or too much. Ideally, the price consumers receive to use the network matches the cost of providing that service. In theory, this allows consumers to decide whether using the network at that time is worth the cost."
[3] DP, page 57: "The current network tariff framework was designed when consumers, their agents, and CER technology were much less able to respond to dynamic short-run signals. … In practice, the current network tariff framework may not accurately reflect marginal costs given today's context." See also Appendix D.
[4] DP, page 28: "Meeting preferences for the range of future consumers, including those with and without CER, will require diverse offerings of products, services, and pricing structures." See also section 3.1.

end-customers) face *efficient price signals*. The National Electricity Market has well-established processes for determining price signals at the transmission network level. The key remaining gap - the primary remaining market failure in the electricity supply chain - is the lack of dynamic network price signals at the distribution network level. Although there has been some, slow movement towards 'cost-reflective pricing' over the last decade, distribution network charges remain set through administrative processes which do not reflect the changing conditions on the distribution network at different points in time. In our view, the establishment of efficient dynamic distribution network price signals should be a primary focus of policymakers going forward, and a primary focus of the AEMC's Pricing Review.[5]

At the same time, we recognise that without effective instruments for hedging dynamic pricing risks, retailers will likely pass through network tariffs into retail contracts. This occurs in the market today. If we are to facilitate competitive retail markets in delivering the range of products and services that customers desire, we must ensure that retailers have the financial instruments they need to hedge the dynamic pricing risks, including the risks associated with dynamic pricing of the distribution network. We consider that this should be a second key focus of the AEMC's Pricing Review.

We encourage the AEMC to adopt good regulatory practice, to focus on identifying the underlying market failures, and to identify the tools that the market needs to deliver the outcomes that the AEMC desires.

Our recommendations for the next stage of the review process are as follows. In our view, the AEMC should:

- Re-focus the objectives of the review around good regulatory practice including identifying underlying market failures and promoting the National Electricity Objective. That is, focus on promoting the efficient usage of, and investment in, CER and networks, while relying on competitive retail markets to deliver the range of products and services that consumers desire.
- Focus attention on improving the quality of wholesale price signals – particularly, the arrangements for dynamic pricing of distribution networks, ensuring that network charges reflect the time-and-location-varying short-run marginal cost of the use of the distribution network - so as to ensure efficient usage of, and investment in, the full range of consumer-side resources and efficient coordination of these decisions with the usage of, and investment in the network.
- Facilitate the availability of the financial tools that retailers need in order to interface between dynamic wholesale prices (including dynamic distribution network charges) and the retail contracts that customers desire, including the ability to provide insurance against time-and-location-varying wholesale prices where that is what customers desire.

[5] The DP does talk about the importance of "price signals", but it focuses primarily on price signals to end-customers. Here we are talking primarily about price signals to retailers (who may or may not pass those prices on to end-customers).

INTRODUCTION

The energy sector is transforming in ways that were not conceivable even ten years ago. In particular, there are now more opportunities for distribution-connected customers to actively produce, store, and consume energy than ever before. Every day millions of Australians are making decisions about whether to purchase, and how best to use, a range of assets such as electric vehicles, home batteries, rooftop solar, home energy management systems, and so on. These effects are compounded by the need to decommission gas networks, shifting substantial energy load to the electricity sector.

A key challenge for policymakers is ensuring that those millions of decisions regarding investment in, and usage of, customer-side resources, are effectively coordinated with decisions about the investment in, and usage of, the local distribution network. In the absence of effective coordination there is an increasing risk of involuntary load shedding, inefficient curtailment of low-emission generation, and the potential for inefficient over-building of the distribution network. This will increase costs for customers, potentially undermining public trust in the regulatory process and delaying the transition of the energy sector.

In our view, electricity price signals will play a key role in achieving that coordination. Effective price signals can ensure that day-to-day usage decisions (such as when to charge an EV, or when to store energy in a home battery) and on-going investment decisions (such as when to install solar PV, or a home battery) are carried out in a manner which balances the interests of the individual with the system as a whole. Effective price signals improve reliability, reduce overall system costs, and facilitate the transition to a secure, low-emission electricity sector for the benefit of all Australians.[6]

The importance of price signals is already well recognised in the Australian electric power system (the National Electricity Market). The wholesale electricity market determines prices for large producers and consumers every five minutes of the day at several different locations around the eastern part of Australia. These prices already (to an extent) reflect the additional cost associated with the delivery of an additional unit of energy to given locations in the transmission network. These prices include both the marginal as-bid cost of producing electricity and the marginal cost of delivering that electricity (accounting for losses) to the main transmission pricing nodes.[7]

In addition, in the existing market, electricity retailers play a vital role in partially or fully insulating electricity consumers from the short-term variation in these wholesale prices. Many retail customers are on an electricity contract that allows them to use as much electricity as they want at a fixed (constant) price, with the retailer fully insulating the customer from the moment-by-moment variation in the wholesale price. Electricity retailers can also provide key related services, such as offering to take control of the timing of EV charging, or to control a thermostat, in exchange for receiving a lower electricity price – thereby relieving the customer of the need to check the electricity price before plugging in the car to charge. Some retailers offer to control domestic batteries, choosing when to use those batteries to provide frequency control services, or to offset temporary price spikes.[8] In these ways retailers ensure that customers, directly or indirectly respond to the existing wholesale price signals - ensuring lower costs and better overall outcomes for the system as a whole.

But there is a missing piece in this puzzle, or a missing link in this chain: *the absence of effective price signals for the use of the distribution network* – the single biggest cost in the electricity sector supply chain. We turn to this issue now.

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[6] The importance of price signals is recognised in the DP. For example, Appendix D talks about the ability of consumers to engage in "behavioural change" and/or "longer-term investments" which correspond to the categories of "operation of" and "investment in" CER.
[7] We recognise that the existing wholesale price signals are not perfect. Specifically, the existing wholesale prices do not reflect the variation in transmission costs within each region. This gives rise to inefficient dispatch outcomes, known as 'disorderly bidding', that have plagued the NEM since its establishment.
[8] As the DP observes (page 4): "some customers' plans allow them to reduce bills by adjusting their energy use, whether through behavioural changes, utilising CER or through automation."

The importance of efficient pricing of distribution networks

Over the past decade there has been a slow movement towards making distribution network charges more cost reflective. Over time, distribution networks have introduced some degree of time-variation in their network charges, through the introduction of time-of-use (TOU) or demand charges.[9] However these network tariffs continue to be set through an administrative process which do not reflect the changing conditions on the network at each moment in time.

It is widely accepted in economic theory that the basis of efficient pricing is pricing at short-run marginal cost. The existing network charges bear no relationship to the underlying short-run marginal cost of using the distribution network in different places at different times. As a result, these network charges induce a range of inefficient outcomes that are discussed further below.

The importance of short-run marginal cost pricing (SRMC) of distribution networks is recognised in the Discussion Paper. The AEMC writes that the benefits of tariffs in leading to efficient usage and investment decisions:

> "... **can only occur where the volumetric network tariff accurately reflects the marginal costs of using the network**. If the tariff does not accurately reflect costs, it can encourage inefficient consumption and export decisions that may contribute to higher network costs over time … [and] customers rationing their energy use when there is no corresponding benefit in … lowering network costs."[10]

The fundamental role of marginal cost pricing is further set out in Appendix E of the Discussion Paper, under the heading "Pricing must be based on marginal cost":

> "A marginal cost is the incremental cost of an additional unit of supply, in electricity networks the costs of transporting an additional kilowatt-hour to (or from) a customer. … Marginal cost pricing facilitates communication between networks and customers. Good network tariffs share, through the retailer, the cost of transporting more electricity. This helps inform customers when and where the costs of transporting more electricity are high and low. Customer and retailer responses help inform the network when and where customers want more or less network. Economic theory states that marginal cost pricing is the best way to create an efficient allocation, and size, of network."[11]

However this is not how distribution charges are currently set. As the AEMC observes, distribution network tariffs are currently set on a time-and-location-averaged basis, referred to as "long-run marginal cost" (LRMC). Despite the superficial similarity in the terminology, LRMC is very different to SRMC.

As the Discussion Paper sets out in Appendix D, given the changing nature of the electricity sector it is no longer appropriate to set distribution tariffs on the basis of LRMC. As the AEMC observes, the key problem of LRMC charging is that it does not reflect either time or locational variation in the short-run marginal cost of use of the network:

> "We consider that there is reason to explore whether network tariffs should continue to be based on long-run marginal costs. [The existing] approach:
>
> - provides the same signal of long-run marginal cost to the whole network, even when those costs are different in different parts of the network
> - by design, does not reflect that congestion to the network happens in real-time
> - is difficult to estimate accurately, leading to signals that may be inaccurate and that therefore fail to encourage appropriate responses from retailers and customers."[12]

[9] DNSPs do not, to our knowledge, vary their charges by location.
[10] DP, page 56-57, emphasis added.
[11] DP, page 81.
[12] DP, page 74-75.

In addition, current distribution tariffs often include a contribution towards the recovery of the fixed costs of the network (referred to as "residual costs" in the discussion paper) which drives a further wedge between the network charges and the underlying short-run marginal cost.

The marginal cost of carrying an additional unit of electricity over a distribution network is typically very low (and limited to losses) at most hours of the day. It follows that the network charges should be low (and limited to losses) during most hours of the day across most of the network.

On the rare occasions when the network is reaching its physical limits, and power flows must be limited (in either the export or import direction), the marginal cost of carrying an additional unit of electricity can be much higher. At such times, the marginal cost of the use of the distribution network reflects the marginal value of rationing the scarce network capacity. I.e., the marginal value of electricity to the customers who are prepared to curtail their production or consumption at those times - which could depend on factors such as temperature or time of day. At these times the network charges should be higher, and sufficient to ration demand to the available network capacity.

Unfortunately, under the current network pricing arrangements, network charges are fixed and administratively-determined. These charges are well above marginal cost at most hours of the day, when the network has spare capacity, and well below marginal cost at those (rare) times and locations where the network is experiencing congestion.

As is widely recognised, the current charging arrangements lead to a range of economic distortions:

- Distribution charges are almost always "too high" (that is, above marginal cost) at most hours of the day, inefficiently inducing customers to curtail their electricity consumption and increasing the cost of charging their EV, even when there is no social benefit (from reduced network investment) from doing so. This point is emphasised in the Discussion Paper, which observes that current network tariffs "reduce valuable uses of electricity by retail customers with little or no network benefit by incorrectly signaling current and future network scarcity"[13]. Similarly, on page 57 the AEMC observes:

  > "Some South Australian consumers assigned and exposed to time-of-use network tariffs will be strongly encouraged to reduce their electricity consumption across the entire peak period, much of which occurs well after the period in which demand might drive network costs. This can lead to someone forgoing the use of electricity when doing so offers no network cost reductions, for example:
  >
  > - households in networks that experience peak demand in summer not heating their homes in winter
  > - households in networks whose peak demand is driven by hot summer days not using their clothes drier on cold damp days
  > - businesses in recently upgraded parts of the network making opening hour decisions around peak pricing."

- Distribution charges can send price signals which work against wholesale market signals. Although it may be efficient, on occasion, for distribution charges to be high even at times when the transmission-level prices are low, the current pricing arrangements can lead to situations where distribution charges are well above marginal cost at times when the transmission-level prices are low or even negative. In other words, the distribution-level charges could induce customers to inefficiently curtail their consumption even though the transmission-level prices are negative, suggesting that end-customers should substantially increase their demand. This point is noted in the Discussion Paper.[14]

[13] DP, page 55.
[14] DP, page 9.

- Customers are over-incentivised to install on-site generation (such as solar PV) to reduce on-site demand for grid-supplied electricity. Although investment in solar generation may contribute to reducing total sector emissions, this incentive can lead to an inefficient mix of solar generation in the system – inefficient over-reliance on rooftop rather than utility-scale solar. This effect further leads to a cross-subsidy from customers who are unable or unwilling to install solar PV (such as apartment dwellers) to customers who install solar. This point is noted in the Discussion Paper which observes that current network tariffs allow customers with CER (such as solar) to:

  > "Pay less for network services without necessarily contributing to reducing future network costs. This shifts costs onto other consumers, including the most vulnerable"[15]

- At the same time, distribution charges are "too low" (that is well below marginal cost) at times of distribution network congestion - which leads to over-consumption at these times. Distribution networks are forced to respond by curtailing demand for the network through involuntary load-shedding. The resulting black-outs cause considerable harm. The desire to avoid episodes of involuntary load-shedding in turn leads regulators to approve and networks to build substantial extra capacity on the network. This, in turn, increases charges for all customers.
- Distribution charges may also be "too low" in the export direction. For example, this may occur on sunny days when there are large amounts of solar PV injection. At such times networks are forced to curtail the solar exports - leading to lost revenue for solar PV owners. The need to minimise such episodes results in networks investing in the export capacity of the network, increasing charges for all customers.
- Distribution charges are also typically not *symmetric* (that is, the same for export and import). A customer who is paying 30 c/kWh to import electricity at a given time and location will typically not receive a payment of 30 c/kWh to inject electricity to the grid at that time and location (and will often be paid nothing). This gives rise to an inefficiently large incentive to install local energy storage for customers who also have solar PV (as it allows arbitrage from a low price at times of export to a high price at times of import). It also acts as a barrier to welfare-enhancing local trade in electricity (e.g., where a customer with solar PV would like to sell that electricity to his/her neighbour).
- At the same time, the fact that distribution charges are not symmetric acts as a barrier to the installation of battery storage on the grid, including at locations where investment in battery storage is cheaper than a network augmentation. Battery storage systems act as a form of arbitrage between times when the local price is high (e.g., when the local network is congested) and times when the local price is low. The fact that distribution charges are not symmetric drives a wedge between the buy and sell price, undermining socially-desirable investment in batteries. It has also led to a form of vertical-integration, threatening the structural separation principles on which the reform of the sector is based: In recent years the AER has allowed networks to install and own "community batteries" subject to ringfencing guidelines. This integration would not be necessary if the distribution charges were set efficiently.
- In addition, the use of an administrative process to set network tariffs in a predictable manner may exacerbate network congestion problems. For example, where customers are on Time of Use tariffs they have an incentive to set their EVs to charge at the same time (when the TOU tariffs change from peak to off-peak) which may aggravate network congestion. This is the subject of recent research, showing that electric vehicle owners who face such tariffs and respond to them by setting their EVs to charge at the onset of predictable on-peak to off-peak time thresholds can induce "shadow peaks [that] lead to

[15] DP, page 55.

> greater exceedance of local capacity constraints and advance the need for distribution network upgrades."[16]

We consider that the single most important remaining regulatory reform in the electricity sector is the development of distribution charges which reflect the time-and-location varying marginal costs of transporting electricity over the distribution network.

There remain many questions which will need to be answered to achieve this outcome. These questions are the subject of on-going research and should be explored further in the next stage of this review.

Should network tariffs be chosen to reflect desired retail outcomes?

From our reading, part of the logic of the Discussion Paper is that:

- Retailers mostly simply pass through the network tariff structures to retail customers. The structure of network tariffs affects the range of retail contracts available to retail customers.
- As policymakers, we seek to ensure that customers should have the full range of products and services that they desire.
- Therefore, it follows that policymakers should design network tariffs in the understanding that they will be passed through to retail contracts, and that they should be designed so as to ensure that retail customers have the range of products and services that they desire.

This logic can be seen throughout the discussion paper. For example, on page 41 the AEMC observes that "Retailers have often passed through network tariff structures rather than innovating beyond them". This has limited the range of retail offerings available to end-customers: "Some customers are unable to access a plan that aligns with their preferences for a basic offering". Similarly:

> "Retailers' abilities to manage network costs, however, appears to be mixed. We see most retail offers resembling network tariff structures, with customers thereby assuming network cost risk."[17]

The AEMC asserts in several places that a key objective of this review is ensuring that end-customers have access to a range of retail contracts. The heading of chapter 3 of the paper states: "We want the energy market to provide a range of offerings that meet diverse consumer needs". Paragraph 10 states that one of the two fundamental objectives of the review is "ensuring that the pricing framework supports the availability of the products and services that consumers want in the future".

From the Discussion Paper it seems that the AEMC envisages that there is a role for policymakers in designing network tariffs to achieve the retail outcomes that we desire. On page 8, a heading asks: "How can better outcomes for consumers be enabled through network tariff-setting processes?". The AEMC talks about designing network tariffs to "enable" certain retail outcomes.

> "We want to enable a future where all consumers can choose the offerings that best meet their needs. We cannot know what the future will be, and therefore our ambition is to facilitate a market and regulatory framework that enables a variety of offerings and outcomes."[18]

The suggestion is that network tariffs should be designed to "enable" the "bookends" of plan types to enable a full range of products and services between the bookends. On page 31 the Discussion Paper states:

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[16] Bailey, M. R., Brown, D., Myers, E., Shaffer, B., & Wolak, F. A. (2025). Electric Vehicles and the Energy Transition: Unintended Consequences of Time-of-Use Pricing. *American Economic Review: Insights*.
[17] DP, page 8.
[18] DP, para 19.

> "We consider that enabling both bookend energy product types to be present in the NEM's retail market should also enable the range of products and services that exist between the bookends. That is, it should meet the first of the two objectives of the review – delivering offerings compatible with consumer preferences."[19]

We commend the AEMC for the focus on consumer outcomes and consumer preferences. However, we question whether network charges should be designed so as to achieve desired retail outcomes. We suggest that it is the role of retailers to interface between the volatile wholesale prices and the retail contracts that consumers desire. If the retail market is not providing this service effectively we encourage the AEMC to explore the sources of the underlying market failure.

We acknowledge that retailers have historically mostly simply passed through the structure of network tariffs to retail contracts. We suggest that policymakers should explore why this is the case. After all, retailers are not *obliged* to mimic the structure of network tariffs in retail contracts. Why don't retailers offer retail contracts which mute or eliminate the network tariff structures?

As the Discussion Paper notes, we don't observe the same effect at the transmission network level. Retailers (typically) do not pass through the existing time-or-location varying *transmission* network charges through to retail contracts. The Discussion Paper notes that:

> "Retailers have demonstrated through vertical integration and/or financial hedging, strong abilities to interact with and manage wholesale and associated ancillary services markets for consumers".[20]

Why then do retailers feel it necessary to pass the structure of *distribution* network charges through to retail contracts?

We suggest that a key part of the reason is that retailers lack the financial instruments they need to manage risks of variation in network tariffs.

When it comes to transmission-level charges, retailers currently have access to financial hedging instruments which partially offset the risks they face. The available instruments include swaps and caps, which are actively traded on financial markets. In addition, retailers and generators have access to instruments known as inter-regional settlement residues (IRSRs) which are at least intended to offset the risks market participants face when trading across pricing regions. In many other liberalised wholesale markets overseas, market participants have access to "Financial Transmission Rights" which enable them to offset some of the risks of trading across pricing locations. We observe that these instruments (like the IRSRs in the NEM) did not arise "spontaneously" in the market, but needed to be created by the market designers.

But no such instruments exist for hedging distribution network tariff risks. The Discussion Paper points out that:

> "Retailers note they lack the tools necessary to manage a mismatch between the network tariff structure assigned to a connection point and the shape of the retail offer".[21]

In the absence of access to suitable hedging instruments, most retailers are not prepared to take on the risk from variation in distribution network tariffs.[22] As a result they simply pass through the distribution network charges to the retail contracts.

We suggest that a key reason why retailers feel a strong need to pass through network tariff structures to retail contracts is due to a lack of financial instruments for hedging distribution network costs. In other words, we suggest that a key market failure is the absence of effective instruments for hedging distribution network charges.

[19] DP, page 31.
[20] DP, page 8.
[21] DP, page 41.
[22] Even if the retailers themselves are indifferent to risk it is common for arrangements with banks to require that retailers avoid taking on risk.

But why is there an absence of effective instruments for hedging distribution network charges? Why don't banks and other financial intermediaries offer these instruments to retailers? This is a question which requires further research. However, we suggest that there are two plausible reasons:

1. First, distribution network charges have historically not been set through market-based processes but through *administrative arrangements*. A financial intermediary which offers a retailer a product which hedges against distribution charges is, in effect, placing a bet on the operation of these administrative arrangements in future. It is risky - and likely infeasible - to take a financial position based on the outcome of regulatory processes.

   For example, let's suppose that the distribution network proposes a time of use network charge, with a charge of 10 c/kWh at off-peak, and 30 c/kWh at peak times. A retailer wishes to offer its customers a flat-rate retail contract (with no time variation) and approaches a bank to offer an insurance product. It is known that 40 per cent of consumption occurs at off-peak times and 60 per cent at peak times. The retailer seeks a contract in which the network charge is a constant 22 c/kWh (40% of 10 c/kWh plus 60% of 30 c/kWh is 22 c/kWh)[23].

   This could be achieved through a contract under which the network pays the bank 12 c/kWh (22-10) at off-peak times, and the bank pays the network 8 c/kWh (30-22) at peak times. The bank breaks even overall.

   But the bank, in offering this contract, is taking the risk of future changes in the administrative prices. If the off-peak charge is increased to, say, 15 c/kWh, the bank will be making a loss on this contract.[24]

   There may also be opportunities for strategic behaviour. The distribution network could (perhaps indirectly, through a retailer) seek to enter into such a contract with a bank and then unilaterally change the network tariffs in order to profit from the hedge contract with the bank. Fearing such outcomes a bank is unlikely to enter into such a contract.[25]

2. Second, the cash-flow stream from distribution network charges accrues to distribution networks. This makes distribution networks the natural counterparty for the offering of hedge contracts (in the sense that they can offer these contracts without increasing their risk). Third parties, such as banks and financial intermediaries which don't have access to the cash-flow stream will take on risk when they seek to offer insurance against network charges.

   For example, let's consider an example involving a demand tariff. Let's suppose that a distribution network has a demand tariff in which the peak demand tariff is, say, $2 per peak-kW measured over a month. A retail customer has a peak demand which varies randomly between, say, 50 and 100 kW. The demand tariff component charged to the end-customer therefore varies randomly between $100 and $200 per month, with an average of $150/month. Let's assume that the total consumption over a month is always exactly equal to 750 kWh per month. A retailer would like to offer a flat-rate retail contract with a flat rate of 20 c/kWh (we are ignoring all other wholesale energy costs). The retailer could go to a bank, who could offer a contract which pays the difference between the demand charge and the monthly average of $150. But, in doing so the bank would face a risk. Alternatively, if the network offered the same contract, the network would have a payout obligation which matched its revenue stream and would not bear any risk.

[23] This is achieved through a contract which charges the retailer 12 c/kWh at off-peak times and which pays the retailer 8 c/kWh at peak times.
[24] The payments of the bank are now (30-22=) 8 c/kWh at peak times and (15-22=) -7 c/kWh at off-peak times, for an average payout of 2 c/kWh.
[25] There is another potential effect. In most common retail contracts the volume of consumption is not limited. Having entered into a contract with a bank of this kind, the retailer may be able to shift the consumption into the peak periods, making the contract unprofitable for the bank. The fear of this kind of action is a further reason for a financial intermediary to not enter into such contracts.

In summary, rather than assuming that retailers will pass the structure of network charges through to retail customers, we encourage the AEMC to consider what might be driving this outcome, and whether it is indicative of a market or regulatory failure. In our view, a market failure may be the basis for the lack of financial instruments available to retailers for hedging distribution network charges. In the absence of these instruments we consider that retailers are inclined to pass on the structure of network tariffs to retail customers.

In our view, there is likely to be a role for policymakers in facilitating the design of effective instruments for hedging distribution tariff risks. These instruments should allow retailers to manage the risks they face in purchasing electricity at the transmission connection point and delivering that electricity to the location of the customer – including the time-and-location varying charges we discussed earlier. The precise form of these instruments is a question for on-going research that can be discussed further in the next phase of this review.

Efficient arrangements for pricing and hedging

To summarise, in our view, the AEMC should focus this pricing review on two separate issues:

- The design of mechanisms for efficient short-run marginal cost pricing of the distribution network. These charges would vary by time and location and would reflect the changing conditions on the distribution network – in a similar manner to the mechanisms which operate at the transmission network level today.
- The design of financial instruments to allow retailers to hedge the risks they face in purchasing electricity at the wholesale level and transporting it to the location of the end-customers.

As we have noted above, conventional economic theory suggests that the starting point for setting electricity distribution tariffs (like all regulated tariffs in all regulated industries) is short-run marginal cost. It follows that the fundamental question the AEMC should be exploring in this review is how to achieve dynamic short-run marginal cost pricing of distribution networks.

It is only when customers face the short-run marginal cost of their decisions that they will make efficient decisions – such as decisions as to when to charge an EV, or when to discharge a home battery. In addition, it is only when customers face the SRMC of their decisions that they will make efficient investment decisions, deciding, for example, when to install solar panels or whether to purchase an EV.

In our view, the National Electricity Objective - which focuses on ensuring efficient usage of, and investment in, the electricity sector - provides strong guidance to policymakers that they should focus on ensuring that all users of electricity face a price which reflects - at the margin - the marginal cost of producing an additional unit of electricity and delivering that electricity to the location of the customer.

Such prices already exist in the wholesale electricity market, at the transmission network level. It is a primary and significant achievement of the National Electricity Market that it provides (more or less) efficient price signals - reflecting the short-run marginal cost of producing and delivering electricity - at each of the main transmission pricing nodes in the NEM. This is achieved through a process which involves a centralised market known as the dispatch engine. The dispatch engine finds the combination of production and consumption which maximises the value of trade taking into account the physical constraints of the transmission network. The output of this process is known as Locational Marginal Pricing. These locational marginal prices reflect the time-and-location varying marginal as-bid cost of producing electricity and delivering it to the pricing node. The marginal as-bid cost of the use of the transmission network is reflected in differences in the price of electricity across different locations.[26]

[26] We make the distinction of “as-bid” costs, because participants enter bids and offers to inject and withdraw energy into the wholesale market. The extent that these bids and offers reflect actual costs follows primarily from the market design and the competitiveness of the market.

A similar process will be required at the distribution network level. The precise design of that process is a topic for on-going research.

In our view, it will not be possible to achieve efficient usage of, and investment in, the vast range of consumer-side energy resources without some form of dynamic time-and-location-varying pricing of the distribution network. In our view, the establishment of such prices should be the primary reform effort of policymakers in Australia - and a key focus of this AEMC review.

To be clear, we note that DNSPs do not currently have an incentive to establish dynamic pricing arrangements in the absence of regulatory intervention. DNSPs operate under a revenue cap arrangement which ensures they receive adequate compensation for the tasks they are currently performing. Any move to more cost-reflective pricing will require regulatory action.

We note that efficient distribution network tariffs will be *symmetric* between import and export. This means that if, at a certain location and point in time a customer is charged 10 c/kWh for importing electricity from the grid, a customer at the same location and point in time should be paid 10 c/kWh for injecting electricity into the grid. This is the current arrangement at the transmission network level. This principle should be applied at the distribution network level.

At the same time, we recognise that introducing new dynamic prices will expose retailers to risks. If retailers are not simply to pass these risks along to their customers, they will require financial instruments to allow them to hedge these risks. The precise form of these financial instruments is the subject of on-going research. Here we merely emphasise the importance of progressing reform on two fronts simultaneously - both ensuring efficient short-run marginal cost pricing of distribution networks, on the one hand, and ensuring the availability of instruments for hedging the resulting risks, on the other.

By way of illustration, we envisage that when it comes to hedging distribution network charges there would be a range of contracts available to retailers. These contracts would vary over four dimensions: (1) the pricing location within the distribution network relative to the price at the nearest transmission connection point; (2) the time period over which the contract applies (e.g., peak versus off-peak hours); (3) the load shape over which the contract applies, and (4) the degree of price responsiveness of the customer. There is a worked example illustrating how these contracts would enable retailers to hedge their distribution charge risk in the appendix.

We note that not all retailers will choose to hedge the variation in the dynamic network charges in their retail offerings. Some retailers will probably choose to make retail offerings in which those charges are passed directly through to end-customers – as already exists in the market (as offered by Amber, for example). Other retailers will choose to provide some level of hedging of distribution charges in their retail offerings. The precise form of the wholesale hedge contracts required will depend on the retail contracts that customers desire. We will leave this question for further research.

Responses to Questions

The Discussion Paper asks the following questions of stakeholders. Our responses are set out below.

> **Question 1: If we focus on enabling bookend products (from basic to sophisticated), is this sufficient to enable the range of products and services that will meet consumer preferences and lower system costs?**
>
> We consider that public policy intervention should focus on identifiable cases of market failure. There are clear and fundamental market failures in the design of distribution network tariffs. In addition, we recognise that, at present, retailers lack the instruments they need to insulate themselves against variation in distribution network charges.
>
> We are concerned about the implication that network tariffs should be designed in such a way as to “enable” bookend products at the retail level. This suggests that success should be measured by the range of retail products and services available to consumers. We

suggest it is preferable to focus on answering the question as to why retailers find it necessary to pass network charges through to retail customers. The interventions which we recommend are focused on the design of network tariffs and the design of instruments to allow retailers to hedge the risks they face, as explained above.

Question 2: Can we rely on competition in the retail market to deliver the mix of products and services that customers value? How should this review address issues in the retail market to ensure the products and services needed will be available, recognising work already underway?

Although the retail market is not perfect, it is workably competitive. Provided retailers have access to the financial instruments they require, we can rely on competition to ensure that retailers interface efficiently between the wholesale market and the retail contracts that customers desire. Given efficient wholesale price signals and access to financial hedging instruments, retailers operating in a competitive market will do their best to provide a mix of products and services that customers value and which promote the National Electricity Objective.

Conversely, if policymakers do not address the lack of financial hedging instruments then, no matter how effective is the competition in the retail market, retailers will likely feel the need to pass on the structure of network charges in retail contracts.

The problems that exist in the electricity sector (and they are fundamental) are related to the wholesale pricing of electricity (including the pricing of electricity delivered through distribution networks) and the availability of products for hedging network pricing risks. Although it is desirable to continue to explore measures to improve the effectiveness of competition in the retail market (including assisting consumers who are unwilling or unable to shop around) we see no particular need for intervention to “address issues in the retail market to ensure the products and services needed will be available.”

Question 3: How can better outcomes for consumers be enabled through network tariff-setting processes?

Better outcomes for consumers can be enabled by ensuring that customers (or, more likely, retailers on their behalf) are exposed to the efficient delivered price for electricity – that is, the short-run marginal cost of producing electricity and delivering it to the location of the customer. This price ensures that the customer (or the retailer on their behalf) makes efficient decisions regarding the usage of, and investment in, all of the customer-side resources and that those investments are coordinated with the usage of, and investment in, the network. No other prices have this property. At the same time, retailers should have access to the tools they need to insulate customers from risks where that is what the customer desires.

The current administrative process for setting network charges cannot deliver the dynamic time-and-location varying prices that are required. The current network tariff-setting processes cannot be evolved to achieve the needed outcomes. Instead they must be replaced entirely, with a new market-based mechanism (along the lines of the existing dispatch engine that operates at the transmission network level).

- **What can be improved at the retail and network interface that would contribute to better outcomes for consumers?**

  There is no particular need to change the existing retailer-network interface. While policies to improve retail competition would be valuable, retailers already adequately perform their role of interfacing between the wholesale prices and the retail products and services that customers desire.

  The most important step that can be taken to contribute to better outcomes for consumers is to ensure that network charges reflect the short-run marginal cost of the distribution network – in the same way that current wholesale prices at the

transmission network level reflect the short-run marginal cost of the transmission network. This will ensure that incentives are aligned with economic reality, resulting in consumers operating their resources efficiently and ensuring that the network is efficiently designed and sized overall. This cannot be achieved through the existing administrative tariff-setting process. This process should be replaced through a dynamic market-based mechanism. At the same time, steps should be taken to ensure that retailers have access to the tools they need to insulate customers from risks where that is what the customer desires.

- **How can arrangements governing retailers and networks be improved to support better product and service offerings?**

  We see no particular reason to change the relationship between retailers and networks. Retailers acting in a competitive market already have a strong incentive to provide the product and service offerings that customers require. As we have emphasised, the most important policy reform is to introduce dynamic location-based pricing of the distribution network, accompanied with effective risk-management instruments to allow retailers to hedge the resulting risks. It is likely that retailers will need to be involved (to some extent) in the design of the resulting risk-management instruments.

- **Should network tariffs be designed for retailers or consumers? If retailers, how much weight should networks put on the recommendations and views of retailers?**

  Network tariffs should not be designed for either retailers or consumers. Network tariffs should send effective price signals – that is should reflect the short-run marginal cost of the use of the distribution network. The views of retailers are not relevant (although retailers should have access to financial instruments necessary to hedge the resulting risk).

  We note that networks do not currently have an incentive to set dynamic network charges. Networks are mostly regulated under a revenue-cap arrangement which leaves DNSPs largely indifferent to the nature or volume of services they provide. We consider that the development of dynamic pricing of the distribution network will require regulatory action.

- **Should any or all of the following be key design features of network tariffs: support competition in the retail market, avoid imposing unnecessary additional costs, and deliver lower overall costs over time?**

  The most important feature of distribution network tariffs is that they provide the correct price signals to ensure that customers make efficient decisions regarding usage of, and investment in, customer-side resources. Such tariffs will ensure efficient development of the sector and will deliver overall costs over time.

  As long as all retailers pay the same tariff (in serving the same end-customer, as will almost certainly be the case), the level or structure of network tariffs will not affect the level of competition in the retail market.[27]

Question 4: What role can network tariffs play in meeting customer preferences while also efficiently and effectively contributing to lower overall costs?

As we have emphasized, it will not be possible to achieve efficient usage of, and investment in, the vast range of consumer-side energy resources without some form of dynamic time-and-location-varying pricing of the distribution network. As long as there is an objective to promote overall economic welfare (which is here expressed as “lower overall costs”)

[27] It is possible that a change to dynamic pricing of the distribution network will increase the workload of retailers, which may change the structure of retail costs, potentially leading to fewer players in the retail market. But this is speculative.

policymakers should focus on ensuring that distribution network tariffs reflect the changing short-run marginal cost of the use of the network. In our view, the establishment of such prices should be the primary reform effort of policymakers in Australia - and a key focus of this AEMC review.

At the same time, as we have emphasised, retailers should have access to the tools they need to offer retail contracts that insulate customers from risks where that is what the customer desires. The design of those tariffs will be an important and somewhat complex question. We are happy to discuss this issue further.

Conclusion

We support the AEMC's focus on a customer-centred approach and the recognition that the current distribution pricing arrangements in the wholesale market do not provide the correct price signals.

In our view the single most important market failure in the entire wholesale electricity market – and therefore the single most important reform on which the AEMC should focus – is that lack of efficient price signals at the distribution network level. The current Rules require that distribution network charges be set on the basis of long-run marginal cost. This is no longer (if it ever was) fit for purpose. Distribution network charges should reflect the short-run marginal cost of the use of the distribution network – as already exists at the transmission network level. We urge the AEMC to focus its attention on the design of mechanisms to efficiently price distribution networks.

At the same time, if retailers are to play their key role of interfacing between the wholesale market and the products and services that consumers require, retailers will require instruments to allow them to hedge the risks that arise from time-and-location-varying price signals. The design of those instruments is a topic for on-going research.

We thank the AEMC for the opportunity to put in this submission. We would be very happy to make a presentation to the AEMC to further explain this submission if desired.

9 July 2025

APPENDIX

The purpose of this appendix is to illustrate how having access to a range of hedging instruments would enable retailers to hedge the risks from time-varying distribution network charges.

Let's suppose that a given retail customer has a load of 5 kW at off-peak hours, 10 kW at peak hours, which drops to 6 kW (due to demand response) when the local price faced by the retailer (that is, the transmission price plus the distribution network charge) increases above $3/kWh. The retailer would like to offer this customer a flat (non-time-varying) retail contract. This can be achieved if the retailer has access to a range of distribution hedging contracts such as the following (here we are focusing on the variable part of these hedge contracts; in practice each would also have a fixed part which is not relevant here):

An off-peak "swap-like" contract with a volume of 5KW which pays out the distribution charge at off-peak hours.

A peak "swap-like" contract with a volume of 10 kW which pays out the distribution charge at peak hours.

A "cap-like" contract with a volume of 4 kW which pays out the distribution charge whenever the local price exceeds $3/kWh.

The following table illustrates seven possible scenarios, with varying prices at the transmission node and the price at the local distribution node. The first two scenarios are at off-peak times, the others at peak times. The distribution charge is equal to the difference between the local price and the price at the transmission pricing node. The final column is the amount the retailer must pay to the distribution network to serve this customer.

Price at Tx Node c/kWh	Price at Dx Node c/kWh	Distn charge c/kWh	Load kW	Dx charge $/h
15	18	3	5	0.15
15	25	10	5	0.50
25	30	5	10	0.50
25	50	25	10	2.50
25	5	-20	10	-2.00
30	350	320	6	19.20
30	500	470	6	28.20

The following table illustrates how this time-varying distribution charge can be hedged using the combination of three hedges as noted above. Here we are only showing the time-varying component of each payout. The payout on the swap contracts are equal to the distribution charge times the load. The payout on the cap contract is equal to the distribution charge times the load, but only when the local price is above $3/kWh.

Off-peak Swap payout c/h	Peak Swap payout c/h	Cap payout c/h	Total payout $/h
15			0.15
50			0.50
	50	0	0.50
	250	0	2.50
	-200	0	-2.00
	3200	-1280	19.20
	4700	-1880	28.20

As can be seen, the final column in each of these tables is the same, showing that a retailer having access to these hedge contracts could perfectly hedge its risks when offering a flat retail contract to this customer.

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