Cost-reflective network tariffs aren't very cost-reflective

Electricity distribution networks are transitioning customers to 'cost-reflective' network usage tariff structures when the customer receives a smart meter. These tariffs aim to signal that network costs are driven by increased energy consumption during peak periods. This practice has been encouraged by regulators and market bodies.[1]

Network tariffs differ to retail prices which are meant to be the prices meant to be 'seen' by the consumer. While retailers can decide which types of retail prices and structures they offer, some have been passing on these changing network tariff structures to customers without their consent.[2]

The Australian Energy Market Commission (AEMC) has recently proposed a rule change that seeks to prevent retailers from changing a customer's retail price structure without their consent.[3] The rule change essentially allows distribution networks to continue to assign 'cost reflective' network usage tariffs to customers but requires retailers to not pass it on for a three-year period.

An underlying assumption driving this potential rule change is that there is a strong and necessary case for transferring every household and small business to a 'cost-reflective' network usage tariff, even if the retailer doesn't pass it on. We believe this assumption warrants re-evaluation.

This paper demonstrates that 'cost-reflective' network tariffs do not necessarily reflect the true nature of a distribution network's costs. It is also unclear that transferring all customers to a 'cost-reflective' network tariff will lead to lower energy network costs for consumers, compared to opt-in arrangements.

Network costs are changing

Between 2007 and 2014, electricity network costs surged, contributing to significant increases in retail electricity bills.[4] A primary factor that contributed to these rising network costs was the substantial investments by distribution networks in augmentation capital expenditure (capex). Augmentation capex relates to expenditures that expand the size of the network.

The unprecedented levels of augmentation capex were attributed to a variety of factors, including:

- The need to expand the network to accommodate anticipated growth in peak demand and heightened reliability standards.[4]
- Accusations of "gold plating", which claimed deliberate overinvestment by the networks.[5]

In 2014, the AEMC made a rule change to require network tariffs to be based on the "long run marginal cost" of providing the service to customers.[6] The AEMC explained that the intention of the rule change was for networks to signal to customers the costs associated with expanding the network if demand rises in the future:[7]

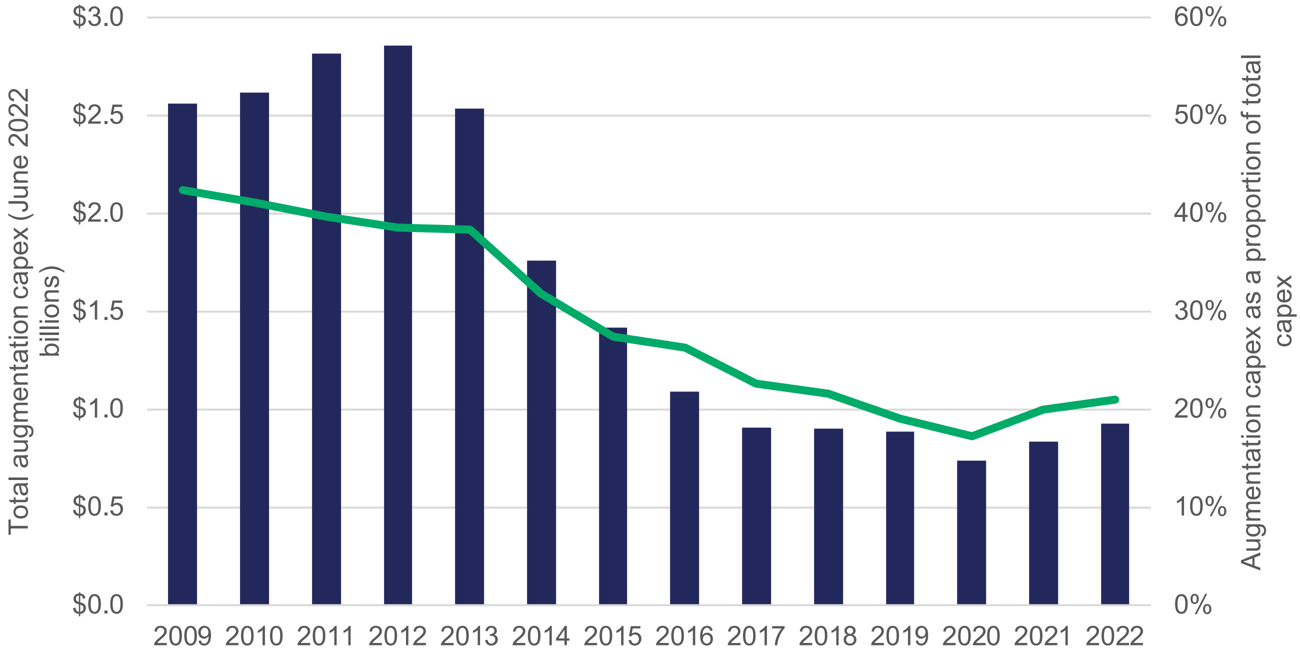
> *"[Long run marginal cost] is important for cost reflective network tariffs because it signals the future costs of investing in the network. As consumption increases, the capacity of the network requires augmentation to accommodate the additional demand. Therefore, in order for consumption decisions to take into account these increased costs, current network tariffs need to reflect the expected additional costs arising from additional consumption"*

However, the AER has stated it is unclear what the future drivers of long-run marginal costs are, because the nature of electricity demand is always evolving.[8] As such, as Ron Ben-David says, there is no objective or verifiable approach to calculating long-run marginal costs.[9] Distribution networks are given discretion as to how they determine long-run marginal costs when proposing tariffs to the Australian Energy Regulator (AER).

As shown below, network cost drivers in the National Electricity Market (NEM) have been changing. Network augmentation capex has decreased significantly in recent years. Asset replacement capex is now the largest component of distribution network capital expenditures, accounting for nearly 40% of capex in the past five years.

An emerging cost driver for distribution networks relates to costs for increasing the ability for exports from rooftop solar and batteries. A recent rule change allowed distribution networks to charge export pricing to reflect these costs.[10] This shows the evolving nature of the drivers of network expenditures.

Total NEM distribution network augmentation capex – 2009 to 2022[11]



Outside of Queensland, peak demand has remained stable over the past 12 years

In 2014, there were understandable concerns for persistent high augmentation capex due to rising demand. These likely motivated efforts to signal these potential costs to consumers in the hope that they could be avoided.

However, peak demand has stabilised in most areas of the NEM and as shown above, network augmentation costs have reduced significantly. The Australian Energy Market Operator (AEMO) has attributed the uptake of rooftop PV as reducing peak demand growth in regions.[12]

Highest electricity demand in each jurisdiction (MW)[13]

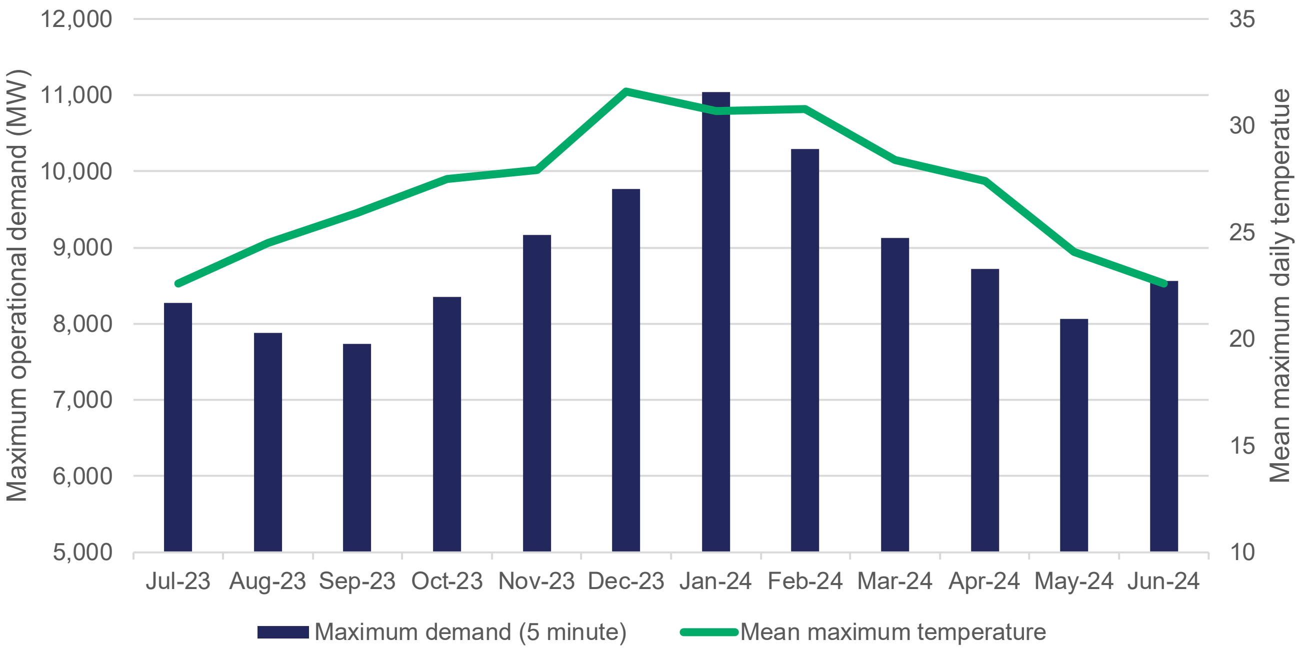
	QLD	NSW	VIC	SA	TAS
On record	**11,055**	**14,764**	**10,490**	**3,397**	**1,884**
Date	*22/01/2024*	*1/02/2011*	*29/01/2009*	*31/01/2011*	*21/07/2008*
Since summer 2019/20	**11,055**	**13,827**	**9,618**	**3,221**	**1,809**
Date	*22/01/2024*	*1/02/2020*	*31/01/2020*	*19/12/2019*	*14/06/2022*

Peak demand is a rare event, not an everyday event

The ‘cost-reflective’ tariffs that distribution networks are introducing are ‘time-of-use’ or ‘demand’ structures. Time-of-use tariffs typically have higher rates in the evening, and/or cheaper rates during the day. Demand tariffs charge based on the highest level of electricity consumed by a customer. Both structures signal to a customer that network costs will increase if peak demand increases.

However, peak demand varies significantly throughout the year. True peak demand events usually occur during extreme weather conditions, such as very hot or very cold days,[12,14] rather than every day or month. For example, Queensland peak demand was closely correlated with temperature increases during the 2024 financial year.

Maximum Queensland operational demand and average Brisbane temperature[15]



The above chart illustrates how rare peak demand events are. Queensland’s highest operational demand occurred in January 2024 at 11,055MW, following 5 consecutive days where temperatures reached over 31 degrees in Brisbane. However, outside of January, peak demand only exceeded

9,500MW in two other months of the financial year. Even within January 2024, peak demand exceeded 9,500MW on just 6 days.

This shows that peak demand for most days of the year has little to no impact on network costs. This is because the network must still be sized to accommodate rare peak demand events during extreme weather conditions. It is therefore unclear how current network tariff structures which send daily signals to consumers reflect the true nature of their costs.

Disincentivising energy consumption during peak demand days is likely to be ineffective and potentially unwise

In order for network augmentation costs to be deferred or avoided, true peak demand has to reduce. Price signals may have limited effectiveness in reducing household and small business energy consumption during extreme weather.

Electricity consumption rises during extreme weather events due to the increased use of air-conditioners for heating and cooling.[14] In very hot or very cold conditions, households and small businesses are likely to prioritise comfort over cost savings. Further, many of our homes were built before building energy standards were introduced and, as a result, are highly inefficient.[16]

Additionally, most peak demand events have occurred on weekdays when many people are likely not at home during the day.[13] This limits the ability of many households to shift heating and cooling loads on peak days.

More broadly, consumer engagement with the energy sector is much lower than is often assumed by some in the industry. Recent time-of-use tariff trials have found that the short-run price elasticity of demand is minimal.[17] Furthermore, 1 in 3 households say they don't know their retail electricity price structure.[18]

Implementing price signals during extreme weather events also raises some equity issues:

- Heating and cooling are essential for indoor comfort and health, particularly for vulnerable populations. Restrictions on their use could pose health risks, especially to the elderly, young children, and individuals with health conditions sensitive to temperature extremes.[19]
- Higher costs during extreme weather events could disproportionately affect those who cannot afford increased electricity bills or lack alternative means of cooling or heating. Recent research has found that people living in homes with low energy efficiency turn off their heaters more when on time-of-use retail rates, but those living in more efficient homes didn't reduce their usage.[20]

Many distribution networks have a lot of spare capacity to accommodate increases in peak demand

The need for augmentation capex will be triggered when forecast peak demand is at risk of exceeding the current size of the network. Therefore, network costs are determined by changes in peak demand, but also the current size of the network infrastructure.

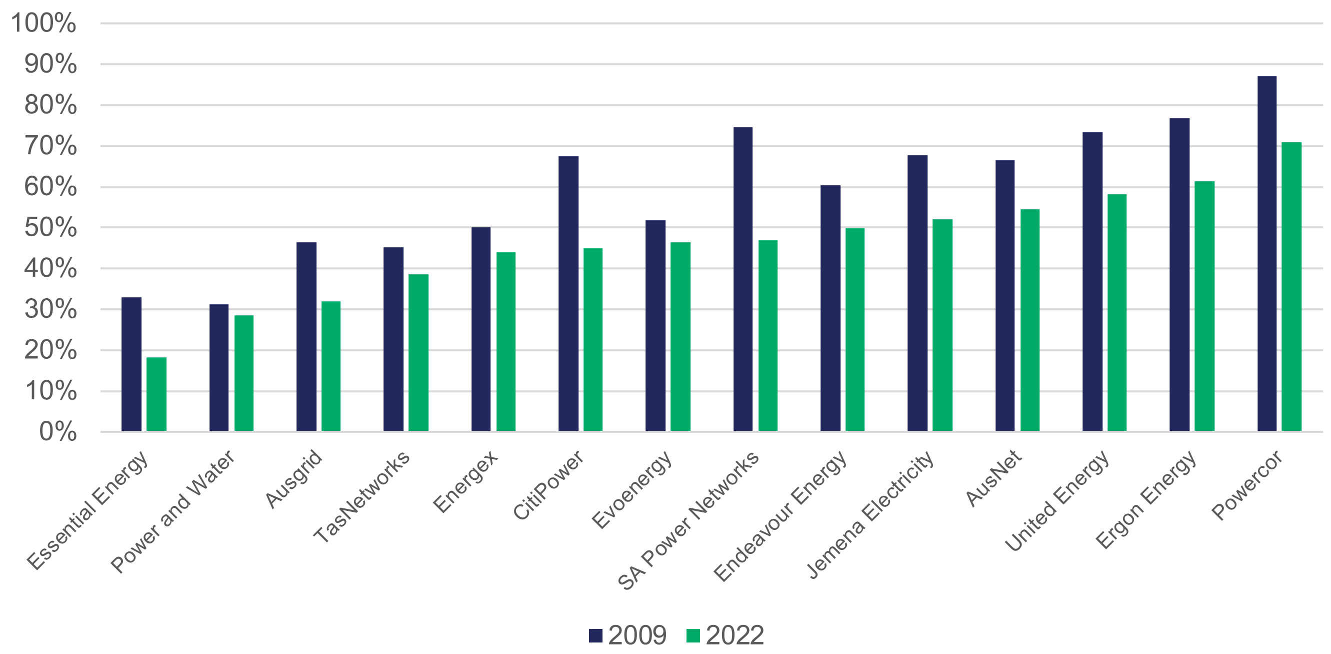
As previously discussed, distribution networks overinvested in network augmentation capex between 2009 and 2014, and peak demand has since stabilised. As a result, most networks have significant additional capacity to manage increases in peak demand.

The AER measures the amount of spare capacity in each network by calculating their utilisation rate. Utilisation rates compare the maximum capacity of zone substations with their electricity throughout during peak demand.[21]

The AER's analysis shows that many networks have a considerable amount of spare capacity. In fact, 9 of the 14 distribution networks in the NEM have a peak utilisation rate less than 50%. This indicates that the infrastructure could handle a near doubling of peak demand on the highest demand day of the year.

Further, the AER's analysis also shows that network utilisation in the NEM has been decreasing. Current utilisation rates are well below peak 2009 levels.

Peak utilisation rates for distribution networks in the NEM – 2009 and 2022[16]



Current capacity is likely to accommodate forecast peak demand growth in many locations for the foreseeable future. Under the Integrated System Plan (ISP) Step Change scenario, peak summer demand for each region is forecast to increase between 33% (New South Wales) to 57% (Queensland), relative to 2024 levels.[22]

Augmentation risks are limited to a specific number of distribution assets

Current distribution network tariff reform approaches uniformly apply the same price signals to customers regardless of their location within the network. However, a network is not a singular entity but rather a collection of numerous assets, with varying customer numbers, types, and load profiles. This means that peak utilisation rates are highly variable across the network.

The variability in utilisation rates is evident from analysis of zone substation-level utilization data from Endeavour Energy. As shown, 9% of Endeavour Energy zone substations operated at a peak utilisation rate above 60% in the past year. In contrast, nearly 62% of zone substations operated at a peak utilisation rate below 40%.

This shows there will be many locations with ample capacity to meet even quite high levels of peak demand growth. Therefore, reducing network costs through decreased peak demand can only be effective if it occurs in high-utilisation areas. Any efforts to lower demand in low-utilisation areas will not reduce network costs.

Peak utilisation rates for Endeavour Energy zone substations in the past 12 months[23]

Utilisation rate for top 1 hour of demand	Proportion of assets
Above 80%	1%
60 to 80%	8%
40 to 60%	29%
20 to 40%	54%
Below 20%	8%

Recovering most network costs via usage charges may not be cost-reflective

Currently, most network costs are recovered via usage charges. Around 60 to 75 per cent of a household's annual distribution network charge will be recovered via network usage charges (if they consume 4,000 kWh of grid electricity a year).[24] The remainder of costs are recovered via fixed network charges.

Relying predominantly on usage charges may not accurately reflect to consumers the true natures of network costs. This is because a significant proportion of network costs are fixed, relating to costs incurred from previous investments.

The largest component of distribution network costs is the return on, and return of, the regulatory asset base (RAB). These are the costs to compensate investors for their funds invested into the business for previous projects.[16] In 2024-25, 64% of the NSW/ACT distribution network costs were attributed to these costs alone.[25]

The costs of some distribution network projects are recovered up to 60 years. By 2029-30, the combined RABs of the NSW/ACT distribution networks are forecast to exceed $40 billion. Even without additional capital expenditure between 2030-31 and 2049-50, the remaining RAB value would still be $23 billion.[24] These costs are going to have to be recovered regardless of any changes in consumption patterns by consumers.

Further, many network costs are going to have to occur regardless of changes in consumer usage patterns. For example, there will always be needs for ongoing routine asset replacement (which is currently the largest driver of network capex costs). Networks are also likely to have to invest in augmentation as well if we assume ongoing population and economic growth plus the necessary electrification of transport and buildings.

Operational expenditures (opex) can account for around 25% of distribution network costs and are also to an extent independent of changes in consumption patterns by consumers. Opex can include costs relating to labour and ongoing maintenance of the network. Distribution networks are also proposing investments to protect the network from cyber risks and make the network more resilient to bushfires and other climate risks.

Implementing a truly cost-reflective network usage tariff has challenges

Risks for needing to invest in network augmentation due to increased consumption are confined to specific locations on the network and are driven by consumption during extreme weather events. Current network tariffs do not reflect these costs.

If there are endeavours to assign a truly 'cost-reflective' network usage tariff, it is likely to be structured as:

- low, potentially even zero, for customers living in locations with network assets with low utilisation
- for customers living in locations with higher utilisation rates, they would be low for most of the time, but would increase dramatically during extreme weather events.

Network usage tariffs that set such harsh penalties for consumption by some consumers during peak periods is likely to never be politically or socially acceptable.

Lowering usage charges for most consumers would likely mean that fixed network charges would have to increase. Some may view this as an unfair outcome under current rules, as all households (regardless of their consumption, or income) would have to pay the same unavoidable charges.

Overseas, more radical reform has been introduced to address these issues. Recently, the Californian Public Utilities Commission approved a new tariff structure that reduced usage charges and offered discounted fixed charges for low-income households.[26]

There are more effective non-pricing solutions available to reduce network costs

Mandatorily rolling out “cost-reflective” network tariffs appears to be an inefficient and ineffective approach to minimising network costs. Instead, a more holistic approach should be used to manage peak demand.

Firstly, we need better information on distribution network utilisation to pinpoint where each network’s cost pressures are concentrated. We anticipate valuable insights from the Institute for Sustainable Futures’ review of network utilisation measures, which aims to improve how we measure network usage.

Once these at-risk locations are identified, several non-pricing solutions could more effectively address peak demand and manage network costs. These include targeted initiatives like:

- Energy efficiency programs
- Installation of community batteries
- Opt-in load control programs
- Consumer education and engagement programs.

Evolving tariff structures can certainly complement these approaches. For example, cost-reflective network tariffs enhance the business case for battery solutions to optimise dispatch times based on realtime network conditions.[27] Such solutions should be explored by networks, along with clear guidance on the locations where batteries would be most beneficial.

Reducing network costs through pricing does not require all customers to be exposed to the signals. For instance, consumers interested in purchasing batteries and other smart technologies will likely seek out products that rely on dynamic pricing if presented with a clear value proposition.

The upcoming Australian Energy Market Commission (AEMC) review of retail prices and network tariffs presents an opportunity to ensure these right products are available for interested consumers, and lower network costs for everyone.

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