



ENA Position Paper DECEMBER 2014

TOWARDS A NATIONAL APPROACH TO
ELECTRICITY NETWORK TARIFF REFORM



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EXECUTIVE SUMMARY

Australia's current electricity distribution network tariff structures are increasingly outdated, inefficient and unfair. Customers have increasingly diverse load profiles, depending on their use of air-conditioning, energy efficiency, solar panels and other technology.

Despite these varying uses of the network, most Australian network tariffs rely on volumetric charges (cents per kilowatt hour) which do not vary by time. They bear little relation to drivers of network cost, resulting in unfair cross-subsidies between customers today and a failure to signal the costs of increased network investment which would be required in the future.

To protect Australia's residential and small-to-medium-business customers, the Energy Networks Association (ENA) supports a comprehensive reform program for electricity network tariffs and enabling metering.

The implementation of tariff reform in a timely way with customer support can make electricity bills fairer and avoid significantly higher electricity bills in the long term. Network tariff reforms would mean that customers would be charged network tariffs that are more cost-reflective rather than paying a flat or "average" rate based on their electricity usage.

The economic deployment of advanced metering will be necessary to achieve the full benefits of network tariff reform for customers. Advanced meters support smarter network tariffs which reward customers that help to reduce the key network cost driver – peak demand. The rate of deployment of advanced meters among small customers becomes a key determining factor on the path to modernising network tariffs.

Currently, approximately 70 per cent of Australian small customers have a simple accumulation meter that measures only total consumption since the last reading. While these meters remain in place, there are limited options to make tariffs more cost-reflective, such as increasing the recovery of costs through higher fixed charges (e.g. cents per day) or through declining block tariffs.

WHAT'S AT STAKE FOR CUSTOMERS?

Detailed analysis by Energeia has highlighted the potential benefits to the Australian community of achieving timely electricity distribution network tariff reform. Currently most customers pay a retail price based on the amount of energy they use, either a flat rate or an increasing amount as consumption increases, plus a small fixed supply charge.

The analysis compared outcomes from three alternative network tariff scenarios to the base case of an inclining block network tariff scenario, assuming that the network tariffs are fully passed through into the retail tariff. The analysis finds that:

- » up to \$655 per year (\$2014) in unfair cross subsidies in 2034 could be avoided for residential customers which cannot or do not invest in distributed energy resources;
- » network tariff reform could achieve average residential electricity bills up to \$250 (in \$2014) per year lower in 2034, when compared to the base case scenario;
- » network tariff reform could make the difference between network prices increasing by only 7% by 2034, compared to a cumulative increase under the base case scenario of over 30%; and
- » while network tariff reform could remove the current incentives for \$17.7 billion (\$2014) in over-investment in distributed energy resources by 2034, it remains technology neutral and results in rooftop solar photovoltaic (PV) and storage capacity increasing more than 1000% to 35 gigawatts (GW) by 2034.

CURRENT MEASURES ARE INSUFFICIENT

Fairer, more efficient distribution network tariffs are unlikely to be achieved without the ability for networks to assign customers. Rational customers will choose to maximise their financial benefits, even though this means they will remain on unfair network tariffs which will provide them with a cross-subsidy.

Up to an additional 7 million customers are likely to install solar panels by 2034. Given a choice many of these customers will remain on unfair inclining block tariffs resulting in over-investment and significant cross-subsidies paid for by other customers. This is despite solar installations including the metering required to permit a cost-reflective network tariff to be provided with no additional investment by the customer. While consumer engagement and a transitional approach will be necessary, it is clear that some use of mandating network tariff assignment will be needed for some customers, if Australia is to protect fair, efficient outcomes for all customers and the general community.

Network businesses will seek to implement cost-reflective network tariffs that can provide comparatively lower bill outcomes for electricity customers in future and reduce unfair cross subsidies in a technology neutral manner. This is in the best interests of the community and customers taken as a whole. However, to implement such changes will require the removal of regulatory barriers to tariff reform, including those which mandate inefficient tariff structures and rely on “opt-in” frameworks.

A NATIONAL APPROACH

The need for tariff reform is urgent, and concerted action is required by network businesses, retailers, governments and market participants working together in the interests of customers.

The recent changes to the National Electricity Rules (NER) as a result of the *Distribution Network Pricing Arrangements Rule change 2014* will make a positive contribution to the implementation of distribution network tariff reform, including: greater engagement between networks and stakeholders; greater transparency of network tariff structures and indicative pricing levels in a tariff structure statement (TSS); and earlier finalisation of network prices in the annual pricing proposal process.

However, these changes to the NER do not address the key constraints presented by the current metering asset base and existing and proposed jurisdictional policies and obligations. It is these constraints, and not a lack of firm obligations in the NER, that are the main reason that cost-reflective network tariffs have not been more widely introduced by networks or adopted by residential and small-to-medium business customers. ENA has previously recommended an integrated approach to electricity network tariff reform including:

- » a national approach to support electricity network tariff reform and enabling metering;
- » a balanced approach to the economic deployment of smart meters following the introduction of contestability;
- » better information and decision making tools for customers considering new tariff offers;
- » the review of customer hardship programs to support vulnerable customers; and
- » the deregulation of retail electricity prices in remaining jurisdictions to encourage innovation.

A national approach to electricity tariff reform is needed to establish a clear, enduring policy and regulatory environment, and to remove the risk of the “ad hoc” imposition of jurisdictional requirements and obligations. This would provide for greater stability and certainty for customers and investors over the longer term and enable the system-wide benefits of network tariff reform for customers to be realised.

The scope of this position paper is focused on distribution network tariff reform. However, in light of the recent changes in distribution network tariffs, transmission businesses are also looking at an industry approach to reform transmission charges – including ways to improve price signals, customer responsiveness and price stability.

ENA is seeking stakeholders' feedback on the views expressed in this position paper. We will undertake a series of engagements with stakeholders in 2015 to further develop the ENA proposals for a national approach.

ENA POSITIONS FOR CONSULTATION

The ENA has adopted the following positions informing the industry's approach to network tariff reform in consultation with customers and key stakeholders.

- » **Existing regulatory barriers to cost-reflective network tariff design should be removed.**
While a transitional approach and close consumer engagement will be necessary, all stakeholders should recognise that tariff assignment will be needed for some customers to protect fair outcomes for all customers.
- » **Further regulatory constraints on the ability of network businesses to provide a cost-reflective network tariff to retailers should not be progressed.**
- » ENA is seeking to engage with stakeholders on an **Industry Standard for Network Tariff Reform**, recognising the shared responsibilities of networks, retailers, governments and market participants. The Industry Standard for Network Tariff Reform could support tariff development, co-operative models for retailer pass-through, assistance to vulnerable customers and the development of information and decision making tools for customers. ENA will shortly release an options paper on supporting vulnerable electricity and gas customers.

ENA has proposed Foundation Policies for transitioning to Smart Tariffs including:

- » a new and replacement meter policy which provides for 'smart ready' meters to facilitate future tariff reforms outside Victoria;
- » the ability for network businesses to assign new or upgrading customers to cost-reflective network tariffs, without scope to opt-out to an unfair tariff; and
- » the ability for network businesses to assign existing customers to a cost-reflective network tariff above a consumption threshold of 40 MWh, or based on a capacity requirement.

While these policies provide an important context for fair, efficient tariffs, individual network businesses will consult with their customers on network tariff proposals which provide the best outcomes in their locations.

Network tariff reform is important to achieving lower, fairer bills for customers in the long-term.

Feedback

ENA is interested in your views on the issues discussed in this paper and welcomes your comments.

Please provide comment to
Lynne Gallagher lgallagher@ena.asn.au
by 31 January 2015.

GLOSSARY

Capacity	Network capacity is the highest level of peak demand at which the network supplies customers simultaneously.
Capacity network tariff	Charges a rate based either on installed capacity or a specified minimum capacity rather than maximum demand, expressed as a price per kilowatt.
Cost-reflective tariff	A network tariff where the structure of the tariff reflects the drivers of network costs (recovery of total efficient costs, replacement of ageing assets, future growth in peak demand) rather than being based on energy consumption.
Distributed energy resources	Distributed energy resources includes both distributed generation (such as rooftop solar photovoltaic systems) and energy storage technologies.
Energy-based network tariffs	Network tariffs that are based on energy consumption, expressed as a price per kilowatt hour. These tariffs include flat rate tariffs, inclining and declining block tariffs, and time-of-use tariffs.
Maximum demand network tariff	Charges a rate based on maximum demand (i.e. actual usage) expressed as a price per kilowatt.
Smart tariffs	Tariffs that signal customers the costs of peak demand on the network.
Time of use network tariff	Network tariff where consumption during peak periods is charged at a higher rate than other, non-peak periods.

1 BACKGROUND

INTRODUCTION

Changes in network costs

Australian electricity customers have seen significant increases in their electricity bills due to rising network prices in recent years. These network price increases have been due to a number of factors including the growth in forecast peak demand, higher financing costs as a result of the global financial crisis, changes in network use and the replacement of ageing infrastructure. While the effects of these factors are now moderating, looking forward more efficient network tariff structures will play a critical role in keeping downward pressure on electricity bills and ensuring fairness in our community.

Simultaneously, there is a growing diversity in the way customers use technology that impacts on their use of the electricity grid. Some “active” customers may be fundamentally changing their reliance on the electricity grid, adopting technologies for small scale electricity generation such as rooftop solar PV systems and, in the future, battery storage and electric vehicles. Other “passive” customers may use their connection to the electricity grid in a relatively constant way while still reasonably expecting a safe, reliable and affordable service, without paying large cross-subsidies as a result of the changing use of other customers.

Reforming network tariffs

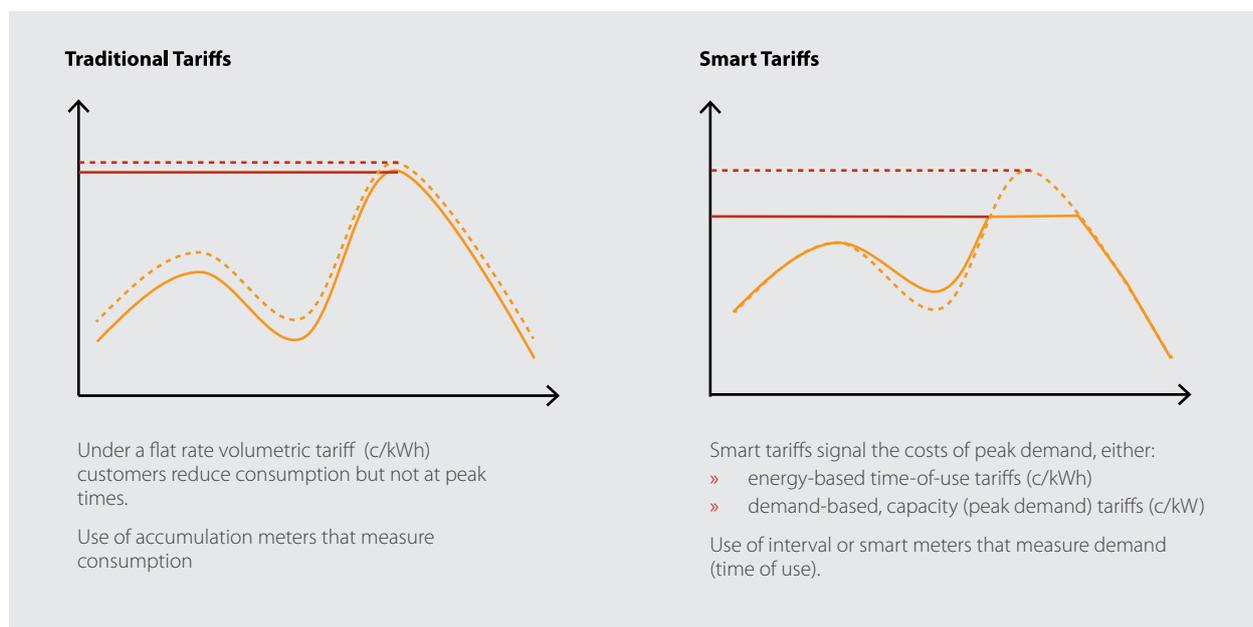
Residential and small-to-medium business customers do not pay electricity networks directly. Rather, the network charge or tariff is paid by the retailer, who charges customers a bundled tariff which charges a rate (or rates) based on the amount of energy they use.

The distribution network tariff is one of two components that make up the network use of system costs charged to retailers. In addition distribution networks are responsible for the pass through of feed in tariff and other schemes.

- » The transmission network charges customers for the transport of electricity over long distances, and is generally less than 10 per cent of the customer’s retail electricity bill.¹
- » The distribution network tariff charges customers for transporting electricity to their homes and businesses. The distribution network tariff ranges from 15 to 50 per cent of a retail customer’s electricity bill, depending on the network.

Australia’s current electricity distribution network tariff structures are increasingly outdated, inefficient and unfair.

Figure 1: Impact of tariffs on consumption



1 Australian Energy Market Commission, Residential Price Trends, 2013, p.12

Customers have increasingly diverse load profiles, depending on their use of air-conditioning, energy efficiency, solar panels and other technology.

Despite these varying uses of the network, most Australian electricity distribution network tariffs rely on volumetric charges (cents per kilowatt hour) which do not vary by time. They bear little relation to drivers of network cost, resulting in unfair cross-subsidies between customers today and a failure to signal the costs of increased network investment which would be required in the future.

To protect Australia's residential and small-to-medium-business customers, the Energy Networks Association (ENA) supports a comprehensive reform program for electricity distribution network tariffs and enabling metering.

The implementation of network tariff reform in a timely way with customer support can make electricity bills fairer and avoid significantly higher electricity bills in the long term. Electricity distribution network tariff reforms would mean that customers would be charged tariffs that are more cost-reflective rather than paying a flat or "average" rate based on their electricity usage.

This will allow customers to make more informed decisions about how they want to use electricity network services and about their investment in technology to help manage their use.

The economic deployment of advanced metering will be necessary to achieve the full benefits of network tariff reform for customers. Advanced meters support smarter network tariffs which reward customers that help to reduce the key network cost driver – peak demand (see Figure 1). The rate of deployment of advanced meters among small customers becomes a key determining factor on the path to modernising electricity distribution network tariffs.

Currently, approximately 70 per cent of Australian small customers have a simple accumulation meter that measures only total consumption since the last reading. While these meters remain in place, there are limited options to make network tariffs more cost-reflective, such as increasing the recovery of costs through fixed charges (e.g. cents per day) or in another form such as a declining block tariff.

Principles for network tariff reform

The regulatory framework should allow distribution networks to have the **flexibility to design appropriate, more cost-reflective network tariffs** in consultation with their customers, stakeholders and with the oversight of the regulator. The pathway for network tariff reform will vary from one network to another, depending on differing operational circumstances and taking into account the needs of customers. Engagement with customers on tariff design will be critical to making the transition to more cost-reflective network tariffs, and ensuring the benefits are realised.

Network tariff reforms should be **revenue neutral**, without seeking to increase or decrease the short-term revenue approved by the regulator for network businesses to operate the electricity grid. However, in the medium to long term, tariff reform will significantly reduce the future investment required in the electricity network and Australia's electricity supply chain. Network tariff reforms would result in network tariffs that signal to customers the efficient costs of their supply from the electricity grid.

Efficient network tariffs reward customers for network use which helps to lower system costs or their individual bill, without allowing some users to unfairly avoid some of their network costs, at the expense of other users. This way, efficient network prices are **neutral to the technology choices** of customers while fairly recovering the costs of the electricity grid. Importantly, this enhances the capacity of the electricity grid to integrate increased use of air-conditioning and space heating, distributed generation and future 'step changes' in technology such as a rapid uptake of battery storage or electric vehicles.

PURPOSE

The ENA is the national industry association representing the businesses operating Australia's electricity transmission and distribution and gas distribution networks. Member businesses provide energy to virtually every household and business in Australia.

Network tariff reform provides a demonstrable long-term benefit for customers. However, it is dependent on addressing a range of technical, regulatory, commercial and political challenges. The most critical of these is securing the confidence of electricity customers and their close engagement in the process.

It is ENA's view that a national approach on electricity network tariff reform is required that includes network tariff design and enabling metering policies. Implementation of a national approach will require concerted action by network businesses, electricity retailers, Commonwealth and State Governments, and energy market institutions working together in the interests of customers.

This position paper outlines a potential pathway for a series of key complementary steps to achieve the practical implementation of network tariff reform in a timely manner. The key sections of this ENA position paper address:

- » the need for electricity distribution network tariff reform;
- » the challenges in implementing network tariff reform;
- » the network tariff scenario analysis; and
- » a proposed national approach to electricity distribution network tariff reform.

SCOPE

This position paper considers the potential options for *distribution* network tariffs and policies that could be part of a broader integrated approach to network tariff reform including a national approach on electricity tariff reform.

While they are relevant, a number of related aspects of electricity tariff reform are not directly addressed in this paper including the following.

- » **Related initiatives in the reform of transmission network pricing.** Transmission businesses are looking at an industry approach in consultation with their customers to reform transmission charges, including opportunities to achieve stronger locational incentives for customers and transparent pass-through to larger business customers on the distribution network. Transmission network customers are currently charged for their use of electricity based on the costs of their use of network services which includes a locational component. Transmission pricing reform may see these charges more focused on the times of peak demand, as well as having greater regard to the level of utilisation of network elements and with a view to moderating pricing volatility.
- » **The role of controlled load tariffs and demand management.** This position paper does not include discussion of controlled load tariffs or demand management tariffs that could also be used to manage potential electricity demand at peak times. Controlled load tariffs offer low rates to customers for separately metered or time controlled loads, which allow appliances to be switched on and off and are common in most jurisdictions. There is the potential for customers to increasingly take up smart appliances that enable controlled loads in the future that could impact on network costs where hot water, heating or cooling loads are potentially significant for peak demand, if these are not managed. Similarly, there are expected to be market developments as a result of implementation of recommendations from the AEMC's Power of Choice Final Report that will result increasingly in demand management being offered by a range of market participants, including networks, that could reward customers for reducing their usage at peak times.

- » **Gas distribution network pricing**, which has been the subject of recent consultation initiatives by gas network providers, recognising that gas competes as a ‘fuel of choice’ in Australia’s energy sector. Other ENA publications have analysed the distortionary impacts on gas network pricing of policy settings which do not provide technology neutral, least cost forms of abatement.
- » The need for a substantial **review of customer hardship programs** addressing energy affordability for vulnerable customers, covering both electricity and gas, which will be addressed in detail in a forthcoming ENA options paper.

2 THE NEED FOR NETWORK TARIFF REFORM

Network businesses build and maintain the electricity grid to ensure reliable supply in extreme weather conditions. As a result network costs are driven by the demand for total capacity, unlike the costs of energy which are determined by demand and supply throughout the day. Network capacity may be used only a few days per year, and is not fully utilised outside of these peak times. It has been estimated that \$11 billion of electricity grid infrastructure is used for the equivalent of 4 or 5 days a year (approximately 1 per cent of the time).

Network tariff reform is essential to recover the total efficient costs of the network and to signal the future costs of expansion in network capacity. Efficient network tariffs will:

- » maintain downward pressure on network costs;
- » ensure that the electricity grid is resilient and can integrate future step changes in technology, while sustaining high levels of quality and reliability; and
- » ensure fairness between customers irrespective of their use of technology.

DOWNWARD PRESSURE ON NETWORK COSTS

As living standards have risen over time and the costs of electrical appliances have fallen, there has been a significant increase in the demand for electricity at peak times.

Amongst the largest drivers of demand on distribution networks has been residential customers' use of heating and cooling appliances, such as reverse cycle air-conditioning. Morning and evening peaks are largely as a result of residential customers preparing to leave for work in the morning or arriving home in the evening.

NETWORK CAPACITY UTILISATION IS LOW

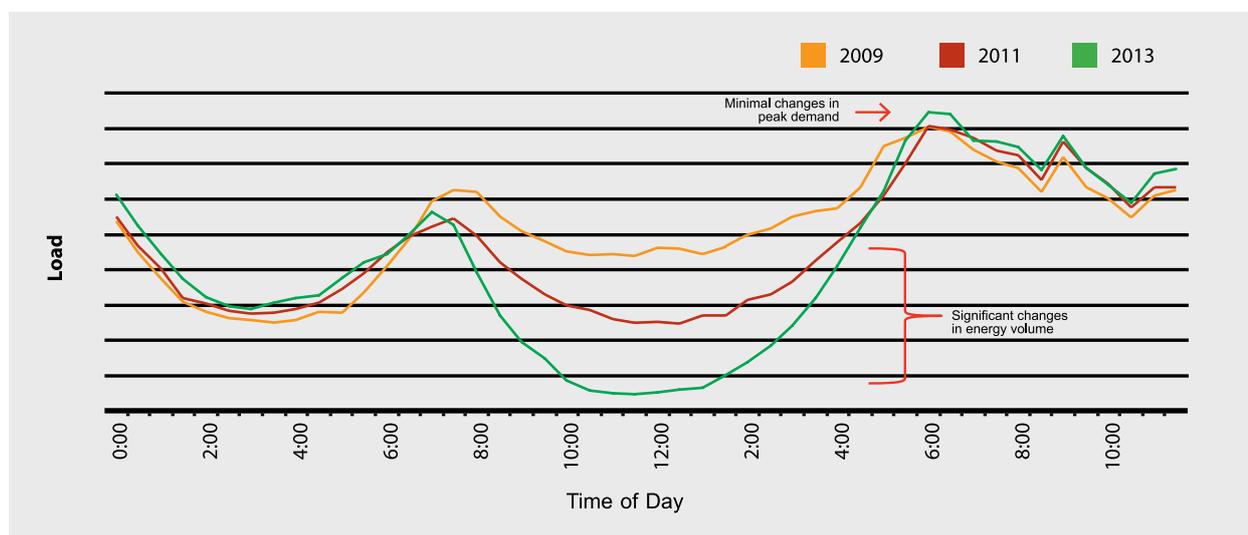
While growth in peak demand has slowed, or fallen in some cases, in recent years it remains high compared to overall electricity consumption. The relative 'peakiness' of the network load has increased where average energy demand has fallen faster than peak demand. Recent analysis found that from 2001 to 2012, peak demand increased by between 20% and 37% "...approximately double the underlying rate of energy demand growth"²

The result is that capacity utilisation on the electricity grid (the ratio of average demand for electricity to peak demand) is low. For example SA Power Networks reports that the average use of electricity in older homes is just 35 per cent of customers peak demand while the average use of electricity in homes in newer sub-divisions is just 21 per cent of their peak demand.

The capacity utilisation of the electricity grid is also directly impacted by increases in the penetration of distributed generation such as rooftop solar photovoltaic (PV) systems. As illustrated in Figure 2, the key cost driver (peak demand) for one Queensland network remained relatively constant over the period from 2009 to 2013, despite the key revenue driver (energy volume) declining markedly. While the need for a reliable, safe network service at times of peak capacity is unchanged, the unit cost of electricity (if measured on a cents per kilowatt hour basis), will clearly increase where there is a higher penetration of distributed generation.

2 Nelson et al (2014) "From Throughput to Access Fees" in Distributed Generation and its Implications for the Utility Industry, p. 274 Academic Press.

Figure 2: Impacts of solar PV on energy consumption and peak demand (Example feeder, Energex network)



Source: Energy Networks Association, *The Road to Fairer Prices*, April 2014, p 3.

Signaling the cost of peak demand

Network tariffs that better signal to customers the higher costs of their use of the network at peak times has the potential to reduce the need for future network investment in capacity and lower electricity bills in the medium to longer term.

Cost-reflective network tariffs provide customers with an incentive to reduce their use of the network at peak times. For residential customers this could mean modifying their use of air conditioners on the hottest days, without loss of amenity, or by improving the overall energy efficiency of their homes so that there are fewer spikes in their peak demand.

Analysing energy supply scenarios to 2050, the CSIRO's Future Grid Forum project recently found that peak demand management was essential to saving customers about 8 per cent of the retail bill by 2020.³

Customers respond to peak prices

Evidence suggests that customers feel capable of changing their demand. Survey results reported for Smart Grid Smart City were that 40 per cent of customers said they would reduce their heating or air-conditioning regardless of how extreme the temperature in order to save money. The remaining 60 per cent said that they would reduce their use on moderate temperature days but would not do so on days of extreme temperature.⁴

In Australia and internationally there is evidence that customers will significantly reduce their peak demand in response to well designed price signals that reward off-peak use and peak demand management. In work commissioned by the AEMC for the Power of Choice Review, Futura Consulting, reported peak demand reductions of up to 30 or 40 per cent in a range of domestic and international trials. More recently the Brattle Group has reported that 60 per cent of trials internationally have resulted in peak reductions of 10 per cent or more.⁵

The AEMC has also reported that trials by a number of networks found that the impacts of more cost-reflective tariffs are greater where more cost-reflective tariffs are supported through better communication channels.⁶

3 CSIRO Future Grid Forum (2014) *Change and Choice: The Future Grid Forum's analysis of Australia's potential electricity pathways to 2050*

4 *Smart Grid Smart City: Shaping Australia's Energy Future*, National Cost Benefit Assessment, July 2014, p. 403

5 AEMC Power of Choice Review, Final Report, p. 155; Ahmad Faruqui, "Architecting the future of dynamic pricing," August 2014

6 AEMC Power of Choice Review, Final Report, p. 155

Resilience of the electricity grid

The electricity grid is changing rapidly, with the recent growth in distributed generation. Since 2008 the installed capacity of rooftop solar PV systems in the National Electricity Market (NEM) has increased from 23 megawatts (MW) in 2008 to approximately 3.5 gigawatts (GW) in 2014.⁷

In the future both storage technologies and electric vehicles have the potential to impact on customers' reliance on the electricity grid. There is, however, considerable uncertainty as to the timing of when these technologies will become economic.

- » As lower-cost, longer-lived storage technologies become more economic, customers may combine solar PV with storage to meet most of their consumption needs, including at peak periods. This will reduce the need for expanding network capacity to meet peak demand. In addition to customer investment in storage, networks may use energy storage technologies to add stability, control and reliability to the electric grid.
- » Electric vehicles have the potential to provide storage and to increase peak demand. A recent CSIRO study found that high levels (33 per cent) of penetration of electric vehicles could increase peak demand by 5 -15 per cent under existing tariff structures or alternatively, provide a platform to reduce peak demand by up to 5 per cent with cost-reflective tariffs and enabling of 'vehicle to grid' supply.⁸

The extent to which distributed energy resources, both generation and storage, could contribute to reducing the future costs of the capacity of the electricity grid to meet peak demand depends on having in place more efficient, cost-reflective network tariffs. The more cost-reflective the network tariff, the more efficient is the investment in network capacity and in distributed energy resources which will maximising the benefits to the community and minimise the costs.

Fairer prices for customers

Recent analysis by NERA for the AEMC identified significant cross-subsidies between customers under current network tariffs. Customers that contribute most to peak demand, by using a higher proportion of their consumption at peak times, pay the same unit electricity price as other customers. This means that they are subsidised by customers whose use of the network is relatively more constant across peak and off-peak times.⁹

NERA used case studies to estimate the cross-subsidy to customers with air conditioners, and customers with solar PV. They found that:

- » for customers with a large air-conditioner, the cost of their network service exceeded the amount paid in network charges by these customers by \$683 per year;
- » for customers with north-facing solar PV, the reduction in network charges due to lower levels of consumption supplied by the network exceeded the reduction in network costs by \$117 per year;
- » for customers with west-facing solar PV, the reduction in network charges exceeded the reduction in network costs by \$29 per year.

Similar cross-subsidies under current tariffs have been identified in recent analysis by Oakley Greenwood for the ENA. Oakley Greenwood found that the customers without solar were providing an effective subsidy through their network charges of \$98 to \$163 per year to a customer with solar.¹⁰

It is worth noting that customers with solar PV systems could have either high capacity utilisation or low capacity utilisation in their use of the electricity grid depending on their demand for electricity from the grid at peak times.

7 Clean Energy Regulator, Small-scale installations by postcode, <http://ret.cleanenergyregulator.gov.au/REC-Registry/Data-reports>, accessed 3/10/14.

8 Platt, G., Pavere P, Higgins A., Grozev G., 2014, *Electric Vehicles: New headache or distributed energy asset?* in *Distributed Generation and its Implications for the Utility Industry* Academic Press.

9 NERA, Economic Concepts for Pricing Electricity Network Services, A Report for the Australian Energy Market Commission, 21 July 2014

10 Oakley Greenwood (2014) *Value of the Grid to Network Customers*

In this context almost one in four households in South Australia and Queensland has solar PV systems, which are considerably higher penetration rates than other jurisdictions in the NEM. However, the experience of the impact of solar PV on peak demand is different between these locations. Figure 2 (above) shows that for Queensland, the rapid growth in solar PV over the period 2009 to 2013 has not been associated with a measurable change in peak demand. However, in South Australia's heatwave event of January 2014, AEMO analysis showed that solar PV contributed to meeting up to 6 per cent of peak demand and deferred the normal peak time by 2 hours. By contrast in Victoria, where 10.5 per cent of households have solar PV, the contribution of solar PV to peak demand was less than 1.5 per cent during the heatwave event.¹¹

Solar PV's contribution to "shaving" peak demand is limited under outdated tariff structures which provide no incentive for customers to install panels facing west, to maximise their contribution at peak times. In a 2011 study of close to 27,000 solar PV systems, Ausgrid found that these systems only operated at 32 per cent of their capacity at the time of the demand peak.

Charging customers cost-reflective network tariffs will minimise the extent to which there are cross-subsidies between customers with different loads on the network.

11 ENA *Enabling Embedded Generation*, p. 2

3 CHALLENGES TO NETWORK TARIFF REFORM

THE AEMC RULE CHANGE

The Australian Energy Market Commission (AEMC) has recently finalised a rule change in response to rule change requests by the Council of Australian Governments (COAG) Energy Council and the Independent Pricing and Regulatory Tribunal (IPART) of New South Wales (NSW).

The Rule change process has been an important opportunity to advance the case for network tariff reform. ENA welcomes the AEMC support for network pricing reform that results in *“network prices that better reflect the costs of providing network services to individual consumers”* as this will allow *“consumers to make more informed decisions about how they want to use energy services and the technologies they invest in to help manage their use.”*¹²

ENA supports a number of aspects of the Final Rule Determination, *National Electricity Amendment (Distribution Network Pricing Arrangements) Rule 2014*.

It is ENA’s view that the regulatory framework should allow networks to have the flexibility to design appropriate, more cost-reflective network tariffs in consultation with their customers, stakeholders and with the oversight of the regulator. ENA welcomes the AEMC’s support for the objective that networks should have flexibility to design and set tariffs in consultation with their customers in the Final Rule Determination.

*“It is important that distribution businesses develop prices that best suit the particular circumstances of their network and their customers, after consultation with consumers and retailers and subject to the oversight of the AER.”*¹³

The recent changes to the National Electricity Rules (NER) as a result of the Distribution Network Pricing Arrangements Rule change 2014 will make a positive contribution to the implementation of network tariff reform, including:

- » greater engagement between networks and stakeholders in the development of network tariffs;
- » greater transparency of network tariff structures and indicative pricing levels to apply over a regulatory period in a tariff structure statement (TSS); and
- » earlier finalisation of network prices in the annual pricing proposal process.

These changes to the NER, however, do not address the constraints represented by current metering assets (i.e. approximately 70 per cent of meters remain simple accumulation meters), and jurisdictional policies and obligations. It is these constraints, and not a lack of firm obligations in the NER, that are the main reason that cost-reflective network tariffs have not been more widely introduced by networks or adopted by residential and small-to-medium business customers.

12 AEMC, Draft Rule Determination, Executive summary, i

13 AEMC, Draft Rule Determination, Executive summary vi

METERING SERVICES

The capacity of network businesses to offer residential and small-to-medium business customers options for cost-reflective network tariffs is limited by the customer's electricity meter.

More than 70 per cent of existing meters are simple meters that only measure electricity consumption. This limits recovery of network costs to network tariffs based on accumulated consumption, with the recovery of a greater proportion of costs being imposed as a fixed charge. Rebalancing the network tariff to recover a higher proportion of network costs through a fixed charge is appropriate, as the costs of building and maintaining the electricity grid are largely fixed and do not vary with consumption. As discussed in this report, this would deliver fairer outcomes reducing cross subsidies paid by customers without distributed energy resources in the future, however the impact of this change would need to be managed.

Offering customers a cost-reflective network tariff that signals the network costs of their electricity demand at peak times requires a meter that measures demand. Demand is the maximum rate at which electricity is used rather than the amount of electricity used.

Meters that measure demand, or advanced meters, includes smart meters and interval meters that do not have the two-way communication capability of smart meters.

- » There are over 1.5 million smart meters (less than 15 per cent of meter stock) installed in Australia, of which 96 per cent are in Victoria where the mandated roll-out of smart meters is largely complete.
- » There are more than 1.5 million interval meters in Australia that have been installed as and when a new or replacement meter is required.¹⁴

The future up-take of smart meters in jurisdictions (outside of Victoria) where the roll-out will be market-led will be influenced by the development of a contestable market in supplying metering services. This contestable market framework is currently being developed by the AEMC, and is expected to be implemented around 2017. In this context ENA supports a balanced framework for smart meters that will enable the fastest economic roll-out to benefit all customers.

ENA supports a competitive, open and fair market for demand side services and a market driven rollout of smart meters. To provide for the earliest economic deployment of it will be important that the new framework permits:

- » market-led business cases for smart meter investments to be built on diverse benefits to individual customers, retailers and all customers through network services; and
- » network businesses to deploy smart meters where it is economic to do so to provide benefits to network customers.

Smart metering can provide significant benefits to all customers when used in an integrated way in network operations. These include improvements to grid reliability and service from rapid and localised identification and rectification of faults and power outages; advanced warning of dangerous asset degradation (e.g. candlering which could cause fires); targeted load management options to limit need for costly grid expansion; safe and speedy responses to customer requests to connect or disconnect supply relating to move in/move out.

Delivery of these services will be dependent upon:

- » ensuring that the market-led rollout of smart meters enables meter functionality sufficient to support delivery of network benefits;
- » the smart meter service model (including a Shared Market Protocol) delivering appropriate service delivery timeframes and continuity of service despite changes to parties responsible for metering and service delivery;

14 *Smart Grid Smart City: Shaping Australia's Energy Future, National Cost Benefit Assessment, July 2014, p. 99*

- » provision of a mechanism to ensure economic outcomes in pricing and terms of smart metering services offered in the proposed market. Light handed access regulation could ensure access to smart metering services is available to all parties including networks at an efficient cost, to the benefit of all customers; and
- » ensuring Victorian customers are able to receive the benefit of their investment in smart meters by ensuring these assets are not prematurely replaced.

Given that the deployment of advanced meters is critical to achieving the general customer benefits of tariff reform, this paper addresses potential additional measures to increase the economic penetration of advanced meters in Section 5.

JURISDICTIONAL POLICIES

Jurisdictional policies and obligations are in place that restrict or limit the use of cost-reflective network tariffs. These policies vary from jurisdiction to jurisdiction.

Locational pricing

Some jurisdictions impose a policy of a uniform tariff or state-wide pricing that means that customers in more expensive areas for networks to service pay the same rate as customers in less expensive areas. Queensland has a uniform tariff policy while South Australia and Tasmania have state-wide pricing. While these policies are likely to remain in place for the foreseeable future, the question of the high cost to serve in particular locations, and the impact of averaging these costs across all other customers, is being addressed through consideration of alternatives to electricity grid supply in these locations and through demand management initiatives. Consistent with the recent changes to the distribution pricing principles, networks in NSW and Victoria, where there are no restrictions on locational pricing, may consider introducing locational pricing and reduce these cross-subsidies between customers in areas of the network that have lower network costs to serve and areas that have higher costs to serve.

Limits on fixed charges

Within the current regulatory period, some networks have sought to rebalance their tariffs to reduce the energy usage component and to recover a higher proportion of their costs through fixed charges.

In relation to fixed charges, South Australia is the only jurisdiction to have applied a cap on the growth in fixed network charges, which will lapse at the end of June 2015.

It is widely recognised that fixed charge tariff components are likely to play an important role in the near future in improving the economic efficiency of network tariffs given that most residential and small-to-medium businesses outside of Victoria have a simple accumulation meter.

For these customers, more cost-reflective network tariffs will necessarily involve an increase in the fixed charge component, reflecting the fact that network costs are largely fixed and do not vary with consumption.

A reliance on fixed charges will also be appropriate where a greater number of customers in the future could rely on on-site generation and storage to meet most of their supply needs, and are charged a back up supply charge for their connection to the electricity grid.

ENA supports consideration of the potential options for managing the impact on vulnerable customers of higher fixed charges. This includes the gradual phase-in or reduced fixed charges in special circumstances, as identified in the report prepared by the Brattle Group for the AEMC on the recovery of residual costs.¹⁵ Further, the application of the customer impact principle within the Rule change requires networks, in complying with the distribution pricing principles, to manage the transition to cost-reflective network tariffs and mitigate price shocks.

Given the customer impact provisions in the National Electricity Rules (NER), ENA would be concerned if any jurisdiction sought to introduce new obligations on network businesses to limit changes in fixed charges.

It is ENA's view that concerns with the impact of higher fixed charges adds further impetus to the policy consideration of access to smart meters, and the widespread adoption of smart tariffs.

15 The Brattle Group, *Structure of Electricity Distribution Network Tariffs: Recovery of Residual Costs*, 2014

Optional time-of-use pricing

Outside of Victoria, networks in NSW, the ACT and Queensland have made time-of-use pricing available for customers provided with an interval meter for some time. For example from 2010 onwards ActewAGL's network time-of-use tariff has been the default tariff for new customers.

Victoria commenced a mandated roll-out of smart meters in 2009. While one of the benefits of the mandated roll out was the sending of price signals to customers, subsequent concerns with the impacts of potential time-of-use network pricing structures resulted in the Victorian Government announcing a moratorium on 22 March 2010. The moratorium deferred the introduction of time-of-use pricing in Victoria until an assessment was made of the impact on vulnerable customers.

After a period of review and broad consultation, the moratorium was lifted with the introduction of time-of-use pricing (flexible pricing) in Victoria from September 2013. Under a regulatory framework imposed by the Victorian Government network businesses are required to have both a flat rate and a common time-of-use network tariff available for customers to choose from. The default retail tariff is the flat tariff, i.e. customers must opt-in to the time-of-use tariff. There are also transitional arrangements in place until April 2015 to allow customers to switch back to a flat tariff.

ENA has a number of concerns with the Victorian arrangements, and with the potential for the same or similar arrangements to be introduced across the NEM through the pending rule change on prescribed retail tariffs.¹⁶

Flat rate default tariff

The effect of the Victorian opt-in arrangements is that a significant number of customers that could be better off on a time-of-use tariff remain on the flat tariff. International and Australian studies have shown that:

- » most customers could benefit from time-of-use pricing, including vulnerable customers (see Box 1);
- » customers are four times more likely to be on a time-of-use tariff where that tariff is the default tariff (80 per cent) than if a customer has to opt-in (20 per cent).¹⁷

With most customers remaining on a flat rate there will be less reduction in peak demand and the inherent cross-subsidies to customers imposing the greatest costs in their use of the electricity grid will persist. Rather than the opt-in framework providing a safe haven, vulnerable customers are likely to become increasingly worse off over time by remaining on the default flat tariff.

Rather than opt-in arrangements, it is ENA's view that assistance should be provided to vulnerable customers to make it easier for them to understand and respond to price signals and to benefit from cost-reflective network tariffs. There are a number of reports that make clear that low income households, because of their circumstances such as rental housing etc., often have less awareness and knowledge about emerging technologies and initiatives than the general population and show different communication preferences and behaviours.¹⁸ ENA supports giving vulnerable customers the decision tools and information they need to benefit from time-of-use retail pricing and cost-reflective network tariff structures as well as the effective targeting of customer hardship programs to where they are needed the most.

16 COAG Energy Council Standing Council of Officials, Aligning Network and Retail Tariff Structures for Small Customers, Rule change request, 25 June 2014, <http://www.aemc.gov.au/Rule-Changes/Aligning-Network-and-Retail-Tariff-Structures-for>

17 Ahmad Faruqi, Ryan Hledik and Neil Lessem, Smart by Default, Public Utilities Fortnightly, August 2014, p.25

18 CSIRO, Change and Choice, The Future Grid Forum's analysis of Australia's potential electricity pathways to 2050 p. iv

Box 1 Customer impacts

Evidence provided to the AEMC is that the majority of customers could be better off under electricity pricing reforms. NERA estimated that:

- » up to 81 per cent of customers would face lower network charges in the medium term under a peak capacity price, depending on the method of residual cost recovery; and
- » between 62 - 69 per cent of customers would face lower network charges in the medium term under a critical peak price.

NERA's findings for the AEMC are consistent with the findings reported by the Brattle Group which identified that

- » 80 per cent of low income customers paid more under flat rates than under a critical peak price; and
- » 60 per cent of residential customers paid more under flat rates than under a critical peak price.

Sources: AEMC, Draft Rule Determination, p.22; The Brattle Group, Architecting the Future of Dynamic Pricing, August 8, 2014

A critical issue in securing the benefits of network tariff reform will be the extent to which network price signals are reflected or "passed – through" into the retail tariffs paid by customers. The outcomes sought by the AEMC's Final Rule Determination are dependent on such a pass-through.

While it is often assumed that energy retailers are strongly incentivised to pass-through input cost signals, there is some evidence that this may not occur in practice. There are a number of contributing factors which may mitigate the incentive for retailers to pass through a network tariff. These include retailers' perceptions of the customer response to the network tariff signal and differentiation strategies in competitive markets. Additionally, retailers' recovery of input costs on a volumetric basis, and the infrastructure of national billing systems and call centres, all may constrain the pass through of network tariff structures.

Evidence was provided of the problem with retailer pass-through in the course of the Productivity Commission Inquiry, *Electricity Networks Regulatory Frameworks*.

In its 2009 study KPMG (cited by the Productivity Commission) determined that retailers could be reluctant to pass through price variability in tariffs, because of concerns about the complexity of tariff structures. It reported that when Ausgrid introduced a time of use network charge in 2009

"...of customers with an external retailer, only an estimated half of these faced time of use tariffs from their retailer of choice."

More recently the Productivity Commission found that a time of use network charge with significant variation in peak and off-peak periods is usually translated into much smaller price relativities at the retail level.

"For example, in New South Wales, Origin Energy's peak retail energy prices for residential customers in the Ausgrid network area are only around four times those of the off-peak rates (Origin Energy 2012). Accordingly, a ten-fold price differential at the network side was more than halved when expressed in retail prices."

Given the different incentives faced by networks and retailers to pass-through network tariff structures, the ENA and member businesses will work closely with retailers to ensure increased alignment of network and retail tariff structures in the interests of customers. However, it is neither possible nor necessary to achieve a "one-size-fits-all" approach, in the form of a single common network tariff structure to apply in diverse jurisdictions with more than 9 million residential and small-to-medium business customers across the National Electricity Market (NEM).

In short, ENA supports proactive industry engagement, rather than a regulatory intervention, to promote the 'pass-through' of the network cost signal by the retailer.

However, there would be significant long-term risks to customers if additional regulation was introduced preventing network businesses from providing cost-reflective pricing to the retailer at all. The AEMC has received a pending rule change request, concerning the alignment of network and retail tariff structures, which could replicate features of current Victorian arrangements throughout the NEM to the detriment of customers. The rule change has been requested by the Senior Committee of Officials on behalf of the COAG Energy Council.

Under the Victorian arrangements, there is a prescribed time-of-use tariff structure and the retailer has the right to assign customers to a distribution network tariff. These arrangements in effect limit the customer's choice of network tariff to the default flat tariff or the prescribed time-of-use tariff. Networks may offer other tariffs than the prescribed tariff to better reflect peak demand costs and this could be in the form of either a different time-of-use structure to the prescribed tariff or a demand tariff. However, the Victorian regulation provides that the retailer has the discretion whether to offer these tariffs to the customer and that if the retailer does not prefer the cost-reflective tariff, the network business is obliged to supply under the less cost-reflective, prescribed tariff structure.

ENA considers that the pending rule change, should it proceed, will jeopardise the implementation of network tariff reform by limiting the customer's choice of cost-reflective network tariffs passed through into the retail tariff.

A PROPOSED NATIONAL APPROACH

Network tariff reforms are being currently developed by network businesses, in consultation with their customers, as part of the regulatory proposals being considered for the next regulatory control period.

While the need for more cost-reflective network tariffs is urgent, and the potential benefits significant, there are a number of challenges that must be addressed if substantial progress is to be made on network tariff reform within the next five years.

It is ENA's view that these challenges need to be addressed through a national approach, rather than being considered by each jurisdiction in isolation. While network businesses may differ in their network characteristics, including the penetration of advanced meters and incidence of distributed generation, they share a common goal of bringing about cost-reflective network tariffs in the long term interests of customers.

The responsibility for implementation of network tariff reform lies not only with networks, in consultation with their customers, but also with retailers, governments and energy institutions working together in the interests of customers.

ENA's integrated package of five measures, the Road Map for Tariff Reform (see Figure 3) includes a call for a national approach to support electricity network tariff reform and enabling meters. In a period in which network tariff reform would be associated with unprecedented change, the purpose of such an approach would be to support an ongoing commitment to the goals of network tariff reform, and recognition of the direction and pace of change.

To support the development of a national approach, the ENA commissioned analysis by Energeia of the benefits of network tariff reform. The analysis identifies the aggregate community benefits from more efficient investment in networks and distributed generation, compared with a base case, under a range of scenarios based on different options for cost-reflective network tariffs and assumptions about customer adoption of those tariffs. The results of that analysis are presented in Section 4, while based on that analysis ENA's proposed national approach to electricity tariff reform is put forward in Section 5.

Figure 3: ENA's Road Map for Tariff Reform



4 NETWORK TARIFF REFORM SCENARIO ANALYSIS

ENERGEIA SCENARIOS

Tariff scenarios

ENA commissioned Energeia to quantify the benefits of three cost-reflective network tariff options, compared with an inclining block tariff (the **Base Case**) which is not cost-reflective. The detailed results of the Energeia scenario analysis are provided in the Energeia Report, *Network Pricing and Enabling Metering Analysis*. An overview of Energeia's approach is provided in the Appendix, while full details of the Energeia results and technical information are publicly available in Energeia's final report (available on the ENA website).

The scenarios can be summarised as follows.

- » A **Base Case**:
 - An **Inclining Block Tariff** scenario (IBT), with a three tier inclining block network with a matching retail tariff.¹⁹
- » Three alternative cost-reflective network tariff scenarios:
 - A **Declining Block Tariff** scenario (DBT), with a three tier network tariff structure, matched by the retail tariff, and where as is typical of these tariffs the fixed and residual costs are recovered in the first two blocks, and the last block recovers avoidable marginal costs.
 - A **Seasonal Time-of-Use Tariff** scenario (STOU) where the network tariff structure is matched by the retail tariff. The network peak price was set slightly above long run marginal cost, with the multiple of peak to off-peak rates depending on the class of customers (residential or business) and the jurisdiction.

- A **Maximum Demand Tariff** scenario (MD+STOU) The majority of network costs are recovered through a monthly maximum demand tariff based on capacity (peak demand) expressed as a cents per kilo-volt-ampere (\$/KVA). A small proportion of the network costs are based on usage (c/kWh) to ensure total efficient cost recovery. In addition to the full pass through of the Maximum Demand Tariff, the retail tariff component is a time-of-use tariff expressed in cents per kilowatt hour (c/kWh).

The Energeia scenarios applied specific network tariff structures, under particular assumptions about long run marginal costs and the allocation of residuals. There is a range of energy-based or demand-based tariff structures and these are described in general terms in Box 2.

Under the **Base Case**, all customers are on an inclining block tariff. As most customers are currently on a non-cost-reflective network tariff, either a flat rate or an inclining block tariff, the results under this scenario are indicative of what could happen to investment in networks and in distributed generation and electricity bill outcomes in the absence of network tariff reform.

Within the model, under the three alternative network tariff scenarios customers have a choice to make about whether to invest in distributed energy resources (DER), in this case solar PV and battery storage distributed generation technologies. Under each scenario customers are assumed to compare the economic benefits of remaining on the inclining block tariff, with the alternative cost-reflective network on a stand alone basis, or with the benefits of the alternative cost-reflective tariff if they invest in DER.

¹⁹ The inclining block tariff was chosen in preference to a scenario with a flat rate tariff, as inclining block tariffs are increasingly prevalent for most customers on most networks. As the inclining block tariff for the purposes of the modelling was structured to be non-cost-reflective with a small fixed charge, the proportion of which is held constant, the results are unlikely to be significantly different to a scenario where a flat rate tariff was assumed.

In addition to modelling the three cost-reflective network tariff scenarios and the **Base Case**, ENA requested that Energeia model an additional scenario, the **Mandated Consumption Threshold** scenario. Under this scenario:

- » above the consumption threshold of 40 MWh per year, all customers are mandated a smart meter and assigned a maximum demand tariff; and
- » all customers below that threshold have the same choice to voluntarily choose the cost-reflective network tariff as under the three alternative cost-reflective network tariff scenarios.

The estimated benefits of the **Mandated Consumption Threshold** scenario are additional to the potential benefits of the **Maximum Demand Tariff** scenario. ENA included this scenario in the modelling, as a proposal for a mandated consumption threshold was put forward in the AEMC's Power of Choice Final Report, although the level was not specified.

The purpose of the Energeia modelling was to enable a comparison of the benefits of alternative network tariffs, given the specific structures, pricing levels and assumptions under each of the scenarios. The pricing levels used in the modelling are not forecasts, but allow comparison of potential relative outcomes under each scenario. Similarly, the potential adoption rates and investment in solar PV and storage in the period to 2034 are indicative for the purposes of comparative scenario analysis.

KEY FINDINGS

There are a number of key findings from the Energeia analysis which show the potential benefits of different cost-reflective network tariff reform options, and these are summarised in this section, below.

More efficient investment under demand tariffs

Energeia found that the **Maximum Demand Tariff** scenario resulted in the most efficient investment in both electricity grid capacity and DER capacity.

Community costs by 2034

This is shown by the demand tariff having the lowest community costs to meet expected peak demand and consumption over the period to 2034 (see Table 1). Community costs are measured as the cumulative sum of network revenue less avoided network costs, retail revenue (including generation) and the costs of the direct investment by customers in DER.

The cumulative gross savings (see Table 1) in the investment costs to meet peak demand (the sum of the avoided network capital expenditure and savings on investment in DER capacity) amounts to \$33 billion in net present value terms under the **Maximum Demand Tariff** scenario compared with the base case. This compares with gross savings under the **Declining Block Tariff** scenario of \$31 billion compared with the **Base Case**, and \$19 billion under the **Seasonal Time of Use Tariff** scenario.

Table 1: Savings in Community Cost by 2034

	Cumulative Community costs \$ Billion	Gross savings (over Base Case) \$ Billion	Net Savings (over Base Case) \$ Billion
IBT	\$345		
DBT	\$340	\$31	\$5.4
SToU	\$335	\$19	\$9.8
MD+STOU	\$327	\$33	\$17.7

Note: The difference in gross savings and net savings is the increase in customers' retail bill costs.

Table 1 also shows that compared with the **Base Case** scenario, there are significant savings in community costs for customers under the three alternative cost-reflective network tariff scenarios. These savings flow through to customers as savings on their electricity bills, after taking in account the costs of investing in DER. The greatest cumulative net savings over the period to 2034, compared with the **Base Case**, are \$17.7 billion in net present value terms under the **Maximum Demand Tariff** scenario.

Growth in DER capacity

Under the **Base Case**, investment in DER capacity could increase from 3.5 GW in 2014 to 44 GW in the residential sector by 2034, or a total of 63 GW (including businesses with solar) by 2034 (see Table 2). These model results reflect assumptions in relation to the tariff scenario; extrapolations of AEMO forecasts; cumulative increases in the unit price of electricity; and potential falls in the cost of DER. These results are therefore only illustrative for the purposes of comparing the three alternative cost-reflective network tariff options.

Efficiency in reducing peak demand

Energeia found that under the **Maximum Demand Tariff** scenario, the cumulative reduction in peak demand by 2034 was almost double that under the **Base Case** with almost half the level of investment in DER capacity. The maximum demand tariff is also more efficient than the **Seasonal-Time of-Use Tariff** as it provides customers with a stronger reward for reductions in their peak demand, achieving the same level of peak demand reduction with half the investment in DER (see Table 2).

Table 2: Reduction in peak demand compared with total DER capacity

	Peak demand reduction 2034 GW	DER capacity 2034 GW
IBT	2.5	63
DBT	2.2	49
SToU	4.2	58
MD+STOU	4.2	35

Box 2 Types of network tariffs**Existing tariffs**

Existing flat rate tariffs and inclining block tariffs, with a high usage component and a low fixed charge are not cost-reflective. Inclining block tariffs are reasonably common in Australia and are offered in South Australia, New South Wales and Victoria. These tariffs are not cost-reflective as most of the largely fixed network costs are recovered from customers based on the amount of electricity they use.

Declining block tariffs

A declining block tariff is a more cost-reflective tariff than existing tariffs, and does not require a change in the electricity meter. A declining block tariff recovers most of the fixed costs in the first or second consumption block, and like a fixed charge component achieves a better reflection of the cost structure of the service. Declining block tariffs are not in use in any jurisdiction for residential and small-to-medium business customers, but have been proposed as an option in the next regulatory period in NSW.

Time-of-use tariffs

Time-of-use network tariffs are currently available in Victoria, Queensland, Tasmania and the ACT. Time-of-use network tariffs are more-cost-reflective than other energy-based tariffs, as they signal the higher costs of electricity consumption at peak times.

Generally time-of-use network tariffs recover network costs by charging higher rates for electricity consumption at peak times during the day, and may charge higher rates according to the season (depending on whether the network has a summer peak or a winter peak). However, a time-of-use price signal may be too weak to achieve changes in customer behaviour during the few days a year on which electricity demand on the network reaches its extreme maximum. A critical peak price provides a stronger signal than a time-of-use tariff by charging high peak prices during critical peak periods and charging low rates at other times during the year. However, there may be a number of practical and implementation issues in applying critical peak pricing to residential and small-to-medium customers across broad areas, where operating conditions of the network may vary.

Demand tariffs

Currently demand tariffs are offered to significant numbers of large commercial and industrial customers across Australia, and will require advanced metering to become available residential and small-to-medium business customers. Demand tariffs are the most cost-reflective as they recover network costs by charging customers for the amount of network capacity used during a billing period. Customers may be charged for capacity based on monthly or annual maximum demand, contracted capacity or based on the extent to which the customer's demand coincides with system peak demand. Networks will need the flexibility to engage with their customers in determining a demand tariff that best meets their customers' needs.

Box 3 Residential customers investment in DER

Energeia found that residential customers face different incentives to invest in DER under the **Base Case** and under the three cost-reflective network tariff scenarios.

- » Under the **Base Case**, significant investment in DER is driven by its lower cost compared with the unit cost to the customer (in cents per kilowatt hour) of electricity supplied by the grid. This sets up a cycle where increased investment in DER reduces consumption supplied by the grid, and further increases unit electricity prices. Energeia found investment in DER was the highest under the **Base Case** with capacity reaching around 44 GW in 2034.
- » Under the **Declining Block Tariff** scenario, residential customers tend not to invest in DER until later in the period compared with the **Base Case**. This allows them to remain on the more attractive IBT tariff. Once the tipping point is reached at which DER becomes sufficiently cost competitive to encourage residential customers to switch tariffs they invest in DER to reduce their consumption. Where this tipping point occurs is sensitive to assumptions about the timing of falls in the costs of DER and the design of the declining block tariff.
- » Under the **Seasonal Time-of-Use Tariff** scenario, investment in solar PV is lower than under the **Base Case**, because off-peak prices provide less of an incentive. Once energy storage is cost-competitive with peak prices under the TOU tariff, residential customers begin to invest in storage to capture the excess solar generation and meet their supply needs at peak times. Energeia found that storage becomes economic for residential customers the earliest under this scenario, in 2018.
- » Under the **Maximum Demand Tariff**, customers have an incentive to invest in DER that reduces their maximum electricity demand, while there is little incentive to reduce consumption at other times. DER capacity reaches around 18 GW in 2034 compared with 3.5 GW of largely residential solar PV capacity in 2014.

Box 4 Business customers investment in DER

The results are for businesses with annual energy consumption greater than 15 MWh.

- » Under the **Base Case**, Energeia found that investment in DER capacity was the highest compared with the three cost-reflective tariff scenarios. DER capacity of around 19 GW is reached in 2034, under the **Base Case** scenario compared with 17 GW under the Maximum Demand Tariff scenario. Storage capacity is 2 GW and 1 GW in the **Base Case** and under the **Maximum Demand Tariff** scenario respectively.
- » Under the **Declining Block Tariff** scenario, there is limited investment in solar PV capacity given that small businesses are assumed not to invest and for these larger businesses (above 15 MWh per year) solar is not cost-competitive with the lowest price consumption block under this tariff.
- » Under the **Seasonal Time-of-Use Tariff** scenario, businesses invest in solar PV to offset the higher peak prices that apply for a longer period during the day for these customers. As solar can supply electricity to meet business peak demand, there is little incentive for business customers to invest in storage.
- » Under the **Maximum Demand Tariff** scenario, business customers have an incentive to invest in DER to reduce their maximum electricity demand, and little incentive to reduce consumption at other times. Solar PV is the most cost effective mechanism to achieve this as business peak demand tends to occur in daylight hours. The volume based Time-of-Use component provides an additional incentive to reduce consumption at peak times. Energeia also found that once storage becomes economic under this tariff scenario in 2018 businesses invest in storage to ensure that they have the capacity to meet occasional or intermittent peaks, which would otherwise increase their maximum demand on the electricity grid. DER capacity in the business sector reaches around 17 GW by 2034.

Growth in network prices lowest under demand tariffs

Energeia's analysis shows the potential for tariff design to have a significant cumulative impact on network prices over the next twenty years.

The cumulative increases in network prices over the period to 2034 are due to network costs that are not recovered from customers with DER in one year being recouped in the following year under each tariff scenario.

For residential customers, the best performing scenario is the **Maximum Demand Tariff** scenario, where network prices in 2034 are just 7% higher than network prices in 2014. This compares to the **Base Case** which results in cumulative price increases of around 33% for residential customers.

Under the **Maximum Demand Tariff** scenario customers that reduce their electricity demand (contribute to a reduction in network costs) are rewarded by a lower network charge (resulting in a reduction in network revenue). Energeia found that as the revenue changes are more proportionate with changes in costs, there is less upward pressure on network prices under the demand tariff scenario, particularly for residential customers.

The outcomes for residential customers under the **Declining Block Tariff and Seasonal Time-of-Use Tariff** scenarios are explained more fully in the Energeia report. In summary,

- » Cumulative increases in network prices for residential customers are the highest under the **Declining Block Tariff** scenario. This is due to the greater incentive to invest in DER to reduce consumption, compared with the **Base Case**, once investment in DER becomes cost-competitive; and

- » The cumulative increase in network prices under the **Seasonal Time-of-Use Tariff** scenario is similar to the **Base Case** by 2034 even though the seasonal time-of-use tariff structure is more cost-reflective. This is due to the higher value placed on peak demand in this tariff which results in storage becoming economic from 2018. Significantly more consumption is reduced during the period in which peak prices apply, but at a cost of much higher investment in DER capacity than under the **Maximum Demand Tariff** scenario.

Analysis of the outcomes for business customers shows that the lowest cumulative increase in network prices occurs under the **Declining Block Tariff** scenario. However, this is due to a limitation of the analysis that assumed smaller businesses cannot install DER and the lack of incentive for larger businesses with high volumes to switch to DER under a declining block tariff, where most consumption is charged at the lowest block rate (see Box 4).

The lowest cumulative increase in network prices for business customers, without the limitation of the assumptions under the **Declining Block Tariff** scenario, occurs under the **Maximum Demand Tariff** scenario. Under this scenario business customers have an incentive to invest in solar PV to reduce the volume based component of their bill, which is mostly the wholesale and retail costs component. This also has the effect of reducing the small usage based component of the network bill. This impacts on network revenue and drives a higher network price impact than was found for residential customers.

Figure 4: Cumulative network price increases, residential customers

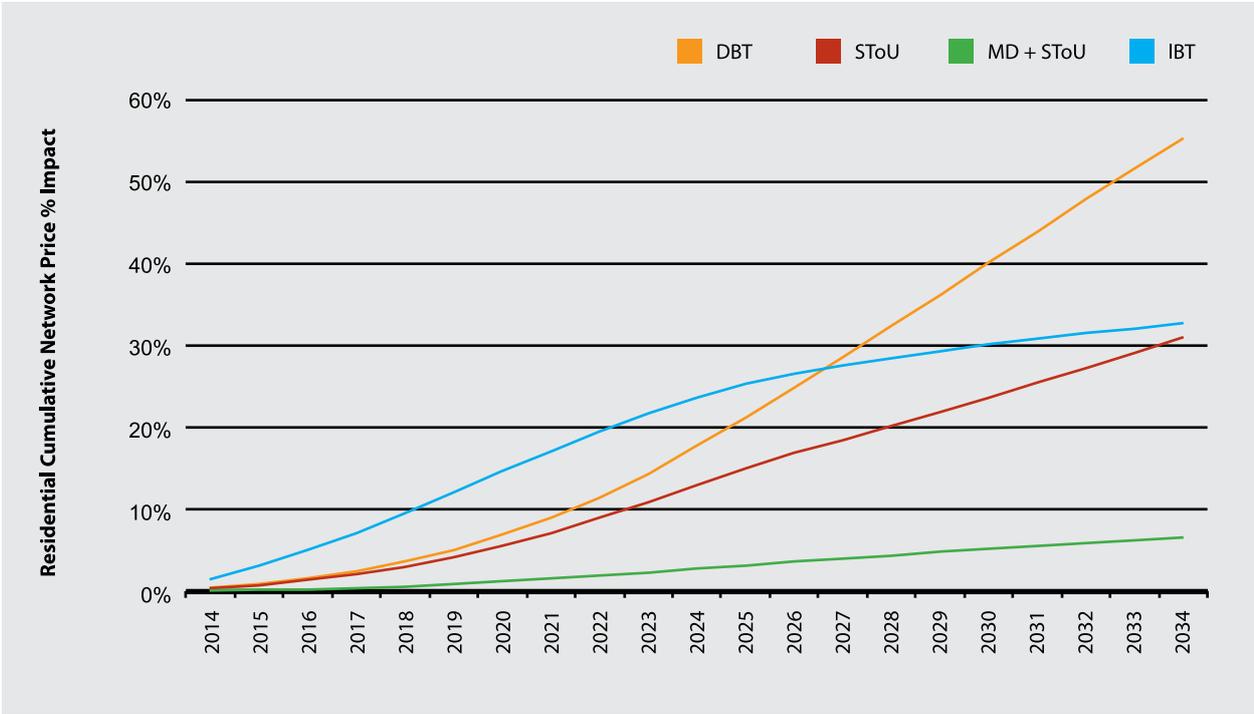
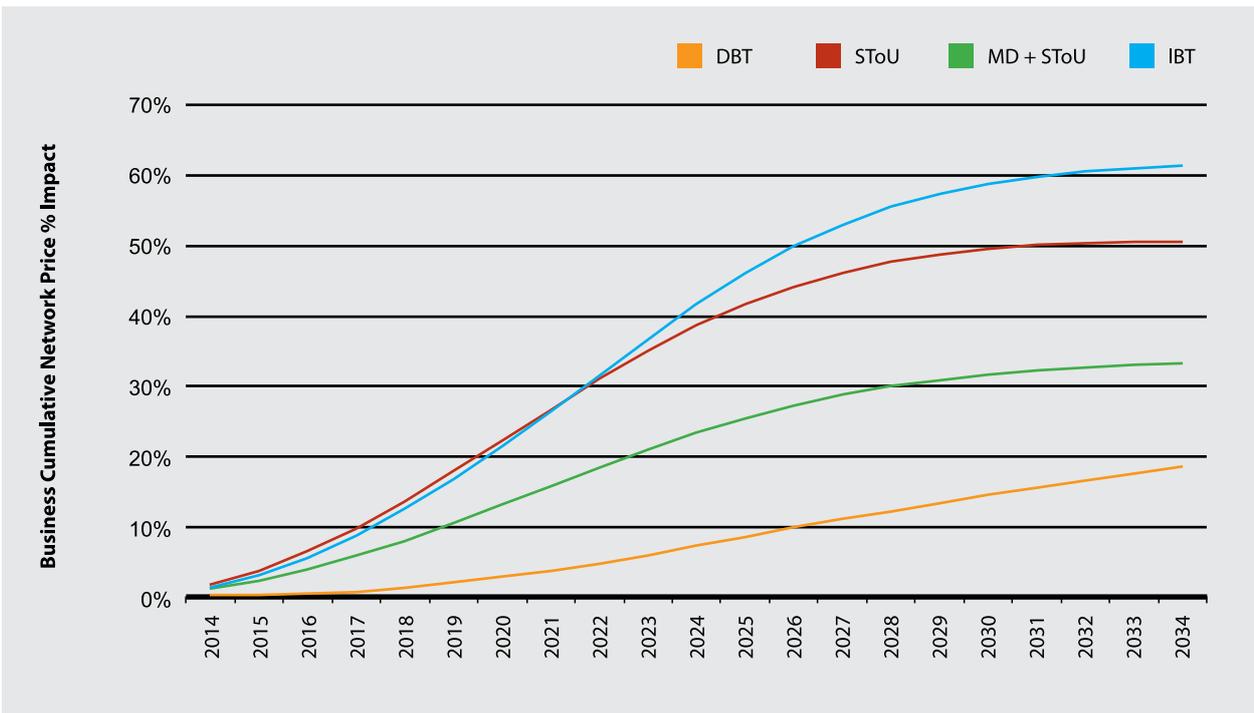


Figure 5: Cumulative network price increases, business customers



Passive customers better off under demand tariffs

Cross-subsidies in 2034 significant under the Base Case

One of the most important findings of the Energeia analysis is the size of the cross-subsidies to customers who invest in DER, through the higher electricity bills of passive customers. Passive customers, under each of the scenarios, are customers that do not for whatever reason (including customers renting premises, medium density housing etc).

Figure 6 and Figure 7 show the cross-subsidy in 2034 under the **Inclining Block Tariff** scenario, for residential and business customers respectively.

Currently the average residential customer's annual electricity bill is around \$1,820 depending on the jurisdiction and average consumption. By 2034, under the **Inclining Block Tariff scenario** the electricity bill for the average residential customer is expected to be \$3,000 (in \$2014) per year. This result disguises the significant disparity in the electricity bills between passive customers and customers with DER.

Under the **Base Case**, passive residential customers will have an electricity bill of \$3,050 (in \$2014) in 2034 (see Figure 6). This will be 1.7 times greater than the electricity bill of a customer with DER, whose electricity bill will be \$1,780.

Figure 6: Residential customer bill comparison (base case)



Figure 7: Business customer bill comparison (base case)



The cross-subsidy from a passive customer to customers with Distributed Energy Resources is estimated to be \$655 per year by 2034. This is significantly greater than those cross subsidies which currently occur today. For instance, current cross subsidies have been estimated at between \$29 and \$117 per year (estimated by NERA), and a range of \$98 to \$163 (estimated by Oakley Greenwood).

Similar results have been reported for business customers, as for residential customers. The annual electricity bill of the average business customer in 2014 is \$8,000. This is expected to increase to around \$14,900 (in \$2014) per year by 2034. As with residential customers there is a significant difference between the electricity bills of passive business customer's and business customers with DER.

The annual electricity bill of passive business customers is expected to be 1.8 times the electricity bill of a business customer with DER (see Figure 7). The cross-subsidy in the higher electricity bill of the passive customer is estimated to be around \$4,100 per year.

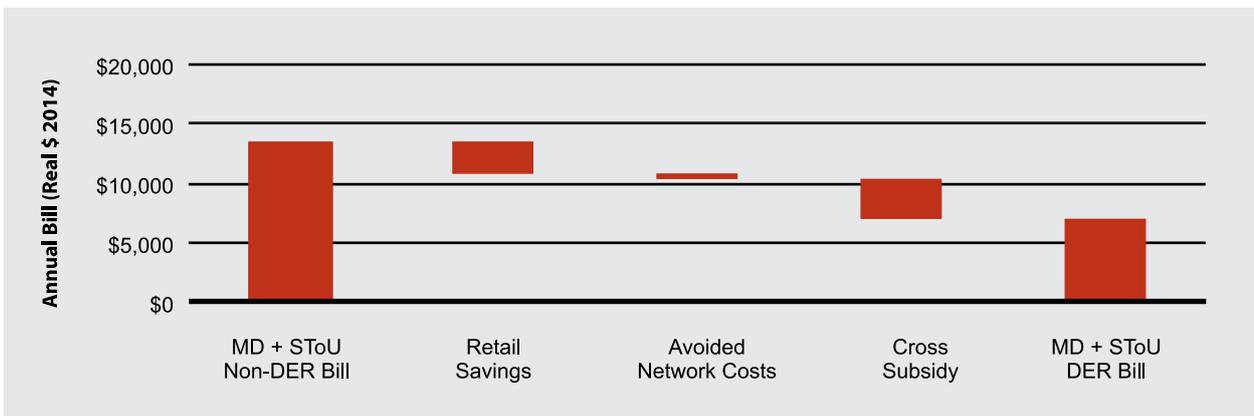
Under the **Maximum Demand Tariff** scenario cross-subsidies are nearly eliminated for residential customers. This is because most of the network costs are recovered through the maximum demand tariff and very little through the volume based component that recovers residual costs. This small residual cross-subsidy effect is evident for residential customers in Figure 8.

To the extent networks recover a greater proportion of costs through a usage charge, in addition to a demand tariff, as is the case with business customers under a **Maximum Demand Tariff** scenario (see Figure 9) there will still be a cross-subsidy effect.

Figure 8: Residential customers bill comparison 2034 (maximum demand tariff)



Figure 9: Business customers bill comparison 2034 (maximum demand tariff)



The cross-subsidy results in the Enegeia analysis are consistent with those reported by the Smart Grid Smart City in their results for a dynamic peak price that included a network capacity tariff. Under a demand tariff, cross-subsidies do not occur because the tariff is fully cost-reflective and network revenues fall in proportion with network costs.

It is clear from the Enegeia analysis is that under a **Maximum Demand Tariff** scenario, average electricity bills are lower than under the **Base Case**. Residential customers will have an average electricity bill that is \$250 per year lower than under the **Base Case**, and for business customers the difference in the average electricity bill is \$1,400 per year lower under the **Base Case**.

Benefits of a threshold

Enegeia estimated the net savings in community costs, under the **Maximum Demand Tariff** scenario compared with the **Base Case** of \$17.7 billion in net present value terms in 2034 (as shown in Table 1).

For the three alternative tariff scenarios and the **Base Case** the Enegeia modelling was based on all customers using under 160 MWh per year. Currently jurisdictions vary as to the level of the threshold that is used to differentiate between large commercial and industrial customers on one hand and small customers who are residential and other business customers. Some use 150 MWh or 160 MWh annually, while others use 100 MWh.

During the AEMC's Power of Choice Review there was discussion of the merits of consumption threshold and the level at which it could be applied. Under the **Mandatory Consumption Threshold** scenario a significant cohort of customers were required to have a smart meter and be assigned the maximum demand tariff. The threshold was set at 40 MWh, which is significantly above typical residential consumption. Typically these businesses are of a medium size, and together may account for a significant proportion of total consumption. At 40 MWh annually, their electricity bill would be around \$10,000 per year.

The Enegeia analysis show significant additional net savings in community costs of \$5.8 billion under the **Mandatory Consumption Threshold**. Of this \$2.2 billion is the gross savings in avoided network costs (and there is a small increase, \$0.1 billion, in additional DER investment to reduce peak demand).

CONCLUSIONS

The Enegeia analysis clearly demonstrates that allowing customers taking up solar PV and storage to remain on an inclining block tariff and benefit from cross-subsidies is unfair and expensive. Outdated tariff structures result in higher levels of investment in network capacity, and a spiraling increase in network prices that further incentivises more investment in solar PV and storage and only increases the long-term incentive for disconnection.

Outdated tariff structures are unfair and expensive

Currently there are more than 1.3 million solar PV systems installed nationally, or around 14 per cent of all dwellings.

Under the **Base Case**, Enegeia estimates that the number of customers with solar PV and storage installations will have increased by close to 7 million in 2034, to take advantage of the benefits of the usage based tariff. These customers will already have been required to have installed an advanced meter to support their solar PV installation – meaning the requisite metering infrastructure will be in place to permit cost-reflective network tariffs.

By 2034 under the **Base Case** one third of customers will be passive customers, i.e. customers whose circumstances or choices limit their take-up of solar PV. They will pay significantly higher electricity bills than their neighbours with solar PV and storage, with a cross-subsidy to residential customers with solar PV and storage of \$655 per year.

Under the **Base Case** cumulative community costs, i.e. the amount that will be spent on expanding network capacity to meet peak demand and in investment in solar and PV amounts to \$345 billion over the 20 year period to 2034, in net present value terms. This translates into an annual electricity bill for average residential customers of \$3,000.

Improved fixed cost recovery is more efficient

Rebalancing tariffs to recover a greater proportion of the network component of the electricity bill as a fixed charge (including through a declining block tariff), more effectively signals the relative costs of electricity grid supply and distributed generation than an inclining block tariff. They can however result in increased by-pass of the network, once the costs of solar PV and storage become cost-competitive with the spiraling unit costs of electricity grid supply.

A further limitation of fixed charges is that they do not lead to efficient investment in the medium to longer term, because they do not signal the future costs of network expansion to meet peak demand.

Increasingly, fixed charges, rather than usage or demand charges, may be appropriately utilised in the future where customers rely on onsite generation and storage to meet most of their supply needs and are charged a back up supply charge for their connection to the electricity grid.

Time-of-use tariffs provide individual benefits

Well designed time-of-use tariffs can signal the future costs of growth in peak demand. The main limitation of these tariffs, as with all energy-based tariffs, is that the price signal incentivises customers to reduce their consumption, rather than to reduce their network peak demand on the system. The incentives under time-of-use tariffs encourage customers to utilise solar PV in combination with battery storage to export excess generation to minimise their retail bills with little or no effect on network peak demand.

Demand tariffs achieve fairer, lower residential bills

Based on Energeia's analysis, demand tariffs are the most cost-reflective of all the network tariff options assessed and are technology neutral. Therefore demand tariffs, which signal the cost of capacity, are the most effective in minimising cross subsidies and maximising the efficiency of investment in network capacity and in solar PV and storage.

In 2034, the community costs are \$327 billion in net present value terms or \$17.7 billion lower than under the **Base Case**. This is as a result of avoiding uneconomic, over-investment in on-site generation and storage subsidised by other customers.

While the scenario does see a lower number of customers taking up solar PV and storage and smaller systems, it still results in significantly increased economic investment in solar PV, with the capacity increasing by 31GW to around 35 GW in 2034, an increase of more than 1000%. Importantly, the benefits of this investment in DER in reducing peak demand are significantly greater than under the **Base Case**.

The more efficient investment, in both network capacity and in solar PV and battery storage, is reflected in lower electricity bills. In 2034, the average annual electricity bill for residential customers is around \$250 per year lower than the **Base Case**, with almost no cross-subsidy between passive customers and customers with solar PV and storage. Demand tariffs are therefore both cost-reflective and neutral with respect to the technology choices of customers.

There are significant additional benefits in reduced community costs from adding a consumption threshold of 40 MWh per year.

When a threshold was added in addition to a demand tariff, the number of business customers on the maximum demand tariff in 2034 increased by almost 151,000 customers (10%). The result was a cumulative savings in community costs in 2034 of \$23.5 billion in net present value terms, compared with the **Base Case**.

5 A NATIONAL APPROACH

CUSTOMERS BENEFIT FROM TARIFF REFORM

Network tariff reform is essential to protect the interests of Australia's more than 9 million residential and small to medium business electricity customers. It is ENA's view that gaining the support of customers for network tariff reform and their engagement in the process of reform is the most pressing priority facing networks, electricity retailers, governments and market participants. This position paper is part of ENA's contribution to the ongoing development of this customer support and engagement.

Networks support tariff reform as necessary to ensuring that the benefits of investment in an integrated electricity grid, supported by distributed generation and storage, are maximised. As the evidence in this position paper shows, leaving customers on outdated network tariffs that are not cost-reflective will significantly increase the cumulative community costs, over the next twenty years, of investment in both the electricity grid and distributed generation and storage capacity, which will flow through into higher electricity bills. More significantly, unless customers are charged network tariffs that signal the costs of their use of network capacity (peak demand), there will continue to be cross-subsidies paid to customers with peakier loads by all other customers.

Network tariff reforms, that ultimately charges customers on the basis of capacity (peak demand) rather than energy, will encourage the most economic investment in distributed generation and storage while avoiding the exploitation of the inefficiencies and unfair cross subsidies inherent in energy-based tariffs.

A NATIONAL APPROACH

The need for tariff reform is urgent, and concerted action is required by network businesses, retailers, governments and market participants working together in the interests of customers.

Regulatory frameworks which rely on individual customers 'opting in' to cost-reflective tariffs will be ineffective in achieving network tariff reform on any scale.

Energeia's analysis indicates that allowing up to 7 million customers with solar panels to remain on inclining block tariffs will result in over-investment and significant cross-subsidies. This is despite each of those customers having metering technology permitting a cost-reflective network tariff to be provided to them with no additional investment by the customer. While a transitional approach and close consumer engagement will be necessary, all stakeholders should recognise that network tariff assignment will be needed for some customers to protect fair and efficient outcomes for all customers and the general community.

Network businesses will seek to implement cost-reflective network tariffs that can provide comparatively lower bill outcomes for electricity customers in future and reduce unfair cross subsidies in a technology neutral manner. This is in the best interests of the community and customers taken as a whole. However, the implementation of these changes will require the removal of regulatory barriers to tariff reform, including those which mandate inefficient tariff structures or rely on opt-in frameworks.

A national approach to electricity tariff reform is needed to establish a clear, enduring policy and regulatory environment and to remove the risk of the 'ad hoc' imposition of jurisdictional requirements and obligations. This would improve long-term stability and certainty for customers and investors and enable system wide benefits of network tariff reform for customers to be realised.

ENA Position

Existing regulatory barriers to cost-reflective network tariff design should be removed. While a transitional approach and close consumer engagement will be necessary, all stakeholders should recognise that tariff assignment will be needed for some customers to protect fair outcomes for all customers.

The AEMC's Final Rule Determination governing distribution network pricing arrangements has provided a foundation on which networks will consult with their customers on proposed network tariff changes from 2017 onwards.

In this context, it is ENA's view that the pending rule change on aligning retail and network tariffs is inconsistent with the objective for network tariff reform that is now included in the NER. Further by seeking to impose a requirement for the network tariff to match the retail tariff, alongside an opt-in framework, the rule change would act as a barrier to any significant retailer pass through or take-up of cost-reflective network tariffs.

ENA Position

Further regulatory constraints on the ability of network businesses to provide a cost-reflective network tariff to the retailer, including within the NER, should not be progressed.

Within the customer engagement and consultation framework, networks need the flexibility to set and design network tariffs to secure the best outcome given their particular network circumstances and feedback from customers and stakeholders.

In addition to networks' direct engagement with customers and stakeholders, the ENA is seeking to engage with stakeholders in 2015 on the potential for a national approach to electricity network tariff reform to secure the benefits for customers.

Industry Standard for Network Tariff Reform

A national approach could be progressed through the development of an *Industry Standard for Network Tariff Reform* and informed by ENA's proposed *Foundation Policies for Smart Tariffs*.

An *Industry Standard for Network Tariff Reform* could support:

- » tariff reform development and implementation;
- » co-operative models for retailer pass through of network tariffs;
- » assistance to vulnerable customers; and
- » the development of information and decision-making tools for customers.

Such a standard would require close collaboration and consultation with a wide range of stakeholders. ENA's proposed foundation policies are outlined in the following section.

ENA Position

ENA is seeking to engage with stakeholders on an *Industry Standard for Network Tariff Reform*, recognising the shared responsibilities of networks, retailers, governments and market participants. The *Industry Standard for Network Tariff Reform* could support tariff development, co-operative models for retailer pass-through, assistance to vulnerable customers and the development of information and decision making tools for customers.

Foundation Policies for transitioning to Smart Tariffs

The economic deployment of advanced meters is a critical prerequisite for widespread achievement of network tariff reforms, improving efficiency and fairness for customers. As highlighted earlier, the potential growth in the numbers of customers with advanced meters that will occur when millions of customers install solar PV and storage is an opportunity to transition customers to smart tariffs at the same time, which cannot afford to be missed.

If a robust, fair national approach is put in place now, the benefits of tariff reform can be achieved. However it is likely to require foundation policies including:

- » adopting a new and replacement meter policy which provides for 'smart ready' meters which facilitate future tariff reform outside of Victoria;
- » the ability of network businesses to assign new or upgrading customers to cost-reflective network tariffs without scope for customers to opt-out to an unfair tariff; and
- » the ability of network businesses to assign existing customers to a cost-reflective network tariff above a consumption threshold of 40 MWh or a capacity threshold such as customers with current transformer metering or three phase supply arrangements.

The ENA has proposed these three inter-related policies to support a faster transition to smart tariffs, than if left to customers to voluntarily participate alone. While most customers are likely to be better off under cost-reflective network tariffs, better information and decision tools will be required to enable customers to realise the potential financial benefits. At the same time, those customers who are significantly better off under the existing tariff structures, and are benefitting from cross-subsidies, are unlikely to shift to more cost-reflective tariffs.

These foundation policies could be implemented alongside the development of network businesses' Tariff Structure Statement which will be in place for the first time from 2017.

While these policies provide an important context for fair, efficient tariffs, individual network businesses will consult with their customers on network tariff proposals which provide the best outcomes in their locations.

A new and replacement meter policy

If customers are to have the opportunity to respond to price signals and manage their use of network capacity, accumulation meters will need to be replaced by interval or smart meters.

Rather than a jurisdiction by jurisdiction approach, the ENA supports a national approach where customers are provided with a meter of the same standard.

In ENA's view it would be appropriate for the meter standard to be smart ready, i.e. could be upgraded to have the communications capability of a smart meter or the communications capability could be installed but not activated. A 'smart ready' meter represents a comparatively low incremental cost above basic meters and would facilitate the activation of smart meter capability where there is a business case supported by a new service to the customer, retail or whole of network benefits. It is not clear that a New and Replacement Policy based on a smart meter (rather than a 'smart ready' meter) standard would provide sufficient net benefits given the additional costs in activating communications capability and systems supporting full smart meter services.

In Victoria, where smart meters are in place, a new and replacement policy based on the smart meter minimum functional specification remains critically important to achieve the societal benefits to customers of past investments.

ENA is seeking the views of stakeholders on whether an opt-out should be provided from *services or functions* provided by a smart ready meter. However, ENA does not support an opt-out that would allow for the installation of an accumulation meter. In our view allowing installation of an accumulation meter would be contrary to the intention of enabling a faster transition to smart tariffs.

Tariff assignment for new and upgrading customers

Networks are proposing that they have the ability to assign a mandatory network tariff to all new and upgrading customers. Existing customers, who have not changed address, connection or their supply arrangements could continue on their existing tariff (unless a threshold applies, see below).

This approach has the benefit of transitioning customers to a cost-reflective network tariff at a time when they are making new investments. It will preserve the benefit of existing customer investments while progressively moving all customers onto a smart tariff within a reasonable period of time.

Currently in Victoria, and under the pending rule change on alignment of retail and network tariffs, the framework requires customers to opt-in with a flat rate as the default tariff. The limitation of an opt-in framework is that with the low take-up rates of customers, and the strong

incentives for customers to benefit from cross-subsidies to remain on a flat tariff, the transition to smart tariffs could be drawn out over a long period. While the evidence is that opt-out frameworks have a higher success rate, they may still be a slower pathway than a mandatory tariff to transition all customers onto smart tariffs.

Tariff assignment for existing customers based on a consumption threshold or capacity requirements

Networks are proposing that they have an ability to impose a consumption threshold of 40 MWh for existing customers. Above this threshold customers would be required to have an interval or smart meter and would be assigned a smart tariff. Networks could propose a higher or a lower threshold within their regulatory proposal, where there are community benefits or benefits for customers from doing so.

Customers with high capacity (peak demand) requirements may also have low consumption, and these customers could fall below the 40 MWh threshold. Networks propose that they have the ability to assign existing customers with high capacity requirements, such as customers with current transformer metering and three phase connections, to be assigned a smart tariff.

ENA Position

The proposed *Foundation Policies for transitioning to Smart Tariffs* include a new and replacement meter policy to provide for smart ready meters which will facilitate future tariff reform outside Victoria; the ability for networks to assign new and upgrading customers to a cost-reflective network tariff; and the ability to assign existing customers to a cost reflective network tariff for customers above a consumption threshold of 40 MWh, or based on capacity requirements.

CONCLUSIONS AND NEXT STEPS

The need for tariff reform is urgent, and concerted action is required by network businesses, retailers, governments and market participants working together in the interests of customers.

Networks support network tariff reform as it will ensure the lowest community costs in network and distributed generation and storage capacity to meet peak demand in the longer term. Customers will benefit from lower electricity bills, but more importantly the cross-subsidies paid to customers with peakier demand from all other customers could be eliminated.

A supportive, stable framework through a national approach is needed to provide customers and investors with certainty and to secure the benefits. Importantly, there will need to be agreement on the foundation policies and industry standards that are needed to smooth the transition for all customers to smart tariffs and to achieve early success.

ENA is seeking stakeholders feedback on the views expressed in this position paper. We will undertake a series of engagements with stakeholders in 2015 to further develop the proposals for a national approach.

Feedback

ENA is interested in your views on the issues discussed in this paper and welcomes your comments.

Please provide comment to Lynne Gallagher lgallagher@ena.asn.au by 31 January 2015.

APPENDIX

OVERVIEW OF ENERGEIA SCENARIO ANALYSIS

The purpose of the Energeia analysis was to quantify the potential benefits of network tariff reform under a number of scenarios over a longer term than a five year regulatory period.

The model used to compare scenarios is by necessity a simplification. It consists of a single network supplying customers across the five regions in the NEM. These customers are divided into two groups of customers, residential and small-to medium businesses. These groups are further subdivided into small, medium or large customers depending on their load characteristics. Details of the assumptions, methodology and the results are provided in the accompanying Energeia report.

Energeia modeled five scenarios.

- » A **Base Case**:
 - An **Inclining Block Tariff** scenario, with a three tier inclining block network tariff with a matching retail tariff.

An inclining block tariff was used as the **Base Case** scenario, rather than a flat rate tariff. It is the least cost-reflective network tariff, relying on the fixed charge component which may be small. It is already on offer in some jurisdictions, is proposed in others and does not require an advanced meter. In the Energeia analysis the fixed charge component of the inclining block tariff is small and is held constant. Therefore the inclining block tariff is not cost-reflective of network costs.

- » Three alternative cost-reflective network tariff scenarios:
 - A **Declining Block Tariff** scenario, with a three tier network tariff structure, matched by the retail tariff.
 - A **Seasonal Time-of-Use Tariff** where the network tariff structure is matched by the retail tariff.
 - A **Maximum Demand (network) Tariff**, where the maximum demand tariff is a monthly charge based on capacity (peak demand) expressed as a cents per kilo-volt-ampere (\$/KVA). The Maximum Demand Tariff is combined with a retail time-of-use tariff that recovers the usage component (wholesale costs and retail costs) expressed as cents per kilowatt hour.

Energeia modelled an additional scenario, the **Mandated Consumption Threshold** scenario. Under this scenario:

- » above the consumption threshold of 40 MWh per year, all customers are mandated a smart meter and assigned a maximum demand tariff; and
- » all customers below that threshold have the same choice to voluntarily choose the cost-reflective network tariff as under the three alternative cost-reflective network tariff scenarios.

Within the model, under the three alternative network tariff scenarios and the **Mandated Consumption Threshold** scenario, customers have a choice to make about whether to invest in distributed energy resources (DER), in this case solar PV and battery storage distributed generation technologies. Under each scenario customers are assumed to compare the economic benefits of remaining on the inclining block tariff with the alternative cost-reflective network tariff on a stand alone basis, or with the benefits of the alternative cost-reflective tariff if they invest in DER.

The design of the alternative network tariffs was informed by network tariffs either on offer or currently under development by a number of network businesses in the course of their regulatory proposals being submitted for approval for the next determination.

The scenarios all assume that the network tariff is passed through into the retail tariff. If this were not to be the case, and the retailer in whole or in part “averaged” the network tariff across all customers, the benefits estimated in this Energeia analysis could not be realised.

Under each tariff scenario, for the period 2014 -2034 Energeia estimated (in \$2014):

- » the overall efficiency of investment
 - measured as the community costs of investment in the electricity grid and of investment in DER, less the benefit of the reduction in peak demand and the change in retail bills from reduced consumption.
- » investment in distributed energy resources (DER);
- » the impact of DER investment on peak demand;

- » the cumulative change in network prices due to:
 - the impact of the investment in DER in reducing network costs (avoided capital expenditure); and
 - reduction in the revenue recovered from customers with DER because of the change in their consumption (avoided revenue);
- » the difference between the electricity bills of passive customers, and customers with DER; and
- » the size of the cross-subsidies for residential and business customers.

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FURTHER INFORMATION

E: INFO@ENA.ASN.AU

P: (+61) (0) 2 6272 1555