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Fair pricing for Western Australia's electricity

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Overview

Reforming electricity network tariffs to deliver fairer and cheaper prices is an energy policy priority for Australian governments. But progress has been limited and there are signs the process is stalling.

Grattan's 2014 report, *Fair pricing for power*, explains why we pay too much for the network infrastructure that transports electricity. The amount consumers pay for network infrastructure is calculated according to total electricity usage over a given period. But network costs have been driven by electricity demand at peak times, mostly in summer. The current pricing structure gives consumers no reason to use less power at peak times. As a result, the amount of total electricity used at peak times continues to grow, and so do the costs of providing it.

The pricing structure also means that consumers whose electricity use does not peak at the same time as the peak in the network are effectively subsidising other consumers, such as air-conditioner users, who use a lot of power at peak times. This is unfair. Demand-based tariffs that better reflect the load placed on the network at peak times – the main driver of network costs – would reduce these cross-subsidies and lead to lower future costs and prices.

Tariff reform led by the Australian Energy Market Commission is under way. Yet, because tariff changes can be difficult to explain and will create winners and losers, state governments are baulking at the prospect of introducing reform.

Western Australia provides a striking example of where network tariff reform will provide significant benefits. Our analysis of customer-level data shows that reducing existing cross-subsidies by

introducing demand tariffs could reduce annual bills for more than half of the south-west's consumers by an average of \$120. Some consumers will see a reduction of more than \$500.

Yet Western Australia faces particular challenges as it moves to fairer and more efficient tariffs. Subsidies provided to electricity consumers in both Perth and remote regions ensure that power bills do not reflect true costs. Across-the-board subsidies muffle price signals and reduce their effectiveness.

It would be better to target subsidies so that the intended social benefit is delivered with minimal unintended consequences. Our analysis of customer-level data from Horizon Power, which covers many of Western Australia's remote regions, shows that better targeted subsidies combined with demand tariffs could reduce annual electricity bills for more than 75 per cent of vulnerable consumers in remote areas by an average of \$275.

Cost-reflective network tariffs will also provide price signals to encourage the efficient adoption of new technologies, such as solar panels with batteries, further reducing costs. With Western Australia's abundant sunshine and formidable distances, these technologies can play an important role in creating a cleaner and more efficient electricity system.

Policymakers seeking to reform tariffs must clearly explain the benefits. Trying to avoid creating losers or pretending there will be none will be counter-productive. It would be better to provide consumers with the tools to help manage any bill shocks and, where necessary, provide financial support to the most vulnerable. Reform might be hard, but the end result will be fairer power prices in the short run, and in the long run, cheaper power prices for all.

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1 Introduction: The case for network tariff reform

The 2014 Grattan Institute report, *Fair pricing for power*, demonstrated how the reform of network tariffs would deliver cheaper and fairer power prices for consumers. It argued that the existing structure of network tariffs should be replaced with tariffs that more closely reflect the costs incurred by the networks in reliably meeting consumer demand.

In November 2014, the Australian Energy Market Commission (AEMC) released its final decision on network pricing arrangements for distribution businesses in the National Electricity Market (NEM). The decision set new rules that would require network businesses to “develop prices that better reflect the costs of providing services to individual consumers so that they can make more informed decisions about how they use electricity”.¹

The AEMC ruling means that new network tariffs will be introduced from the beginning of 2017.² Some network businesses have already proposed more cost-reflective tariffs. If these are properly designed, and governments help with implementation, then network tariff reform will result in long-term benefits for consumers. But implementing this reform is facing major obstacles. Some analysts have questioned whether the structure of cost-reflective tariffs as proposed by networks will deliver the desired long-term benefits.³ State governments are mindful that some consumers may be unhappy with tariff reform, and some governments may seek to minimise its impact by watering down the reform.

¹ AEMC (2014), p. i

² New network prices will be introduced in Victoria on 1 January 2017 and from 1 July 2017 in the other eastern states connected to the NEM.

³ See, for instance, Passey (2015).

The remainder of this chapter outlines the case for network tariff reform, together with challenges different states will face, and recommendations. Chapter 2 explores the issues in the design of cost-reflective tariffs, and recommends a preferred structure. Chapters 3 to 5 present case studies of the Western Australian electricity market to examine how changes to electricity tariffs are likely to impact households. They explore some of the specific factors that will bear on tariff reform in Western Australia. Chapter 6 provides a list of recommendations for governments to progress network tariff reform across the country.

1.1 Why network tariff reform is needed

Electricity networks in Australia have been built larger than required. There are a number of factors that have contributed to this, including: a regulatory framework that created incentives for more capital investment than necessary; forecasts that incorrectly concluded electricity consumption and peak demand would continue to rise; and stringent reliability standards imposed on networks in some states.⁴ Consumers have borne the cost. Governments and network businesses are beginning to address some of the problems that led to wastefully high investment in network infrastructure.

Networks are larger than they need to be for another reason: the way Australian households and small businesses pay for electricity does not reflect the cost of supplying that electricity. Current network tariffs do not encourage households to consume less electricity at times of peak demand. As a result, there is investment that is unnecessarily high and prices that are higher to pay for that

⁴ See Wood, Hunter et al. (2012) and Wood, Carter and Harrison (2013) for details.

investment. These tariffs are also unfair – some consumers pay less than their fair share, while others pay more.

As natural monopolies, network businesses have their revenue fixed regardless of the amount of electricity sold. But electricity consumption has been falling in most states since 2010, meaning that network businesses have been increasing tariffs to recover their revenue.⁵ This gives consumers an even stronger incentive to reduce their electricity usage. Those who are able to reduce their consumption across the year pay less towards the network, even if they don't reduce their consumption at times of peak demand. Those who don't reduce their consumption across the year pay higher bills. Current network tariffs based around consumption do not give consumers a sufficient incentive to reduce their demand at peak times, but over-compensate consumers who reduce their consumption at non-peak times.

1.2 Cost-reflective network tariffs will be fairer

The network is built to transport electricity when demand is at its highest (peak demand). Electricity demand is at or close to its peak for only a few hours every year. As Figure 1.1 shows, networks in all states bar Tasmania operated at more than 90 per cent of their annual peak less than one per cent of the time from 2011 to 2014, and operated at more than 95 per cent less than a quarter of a per cent of the time – fewer than 24 hours a year.⁶ But the amount of electricity consumed during these peak periods has determined the size and cost of the network.

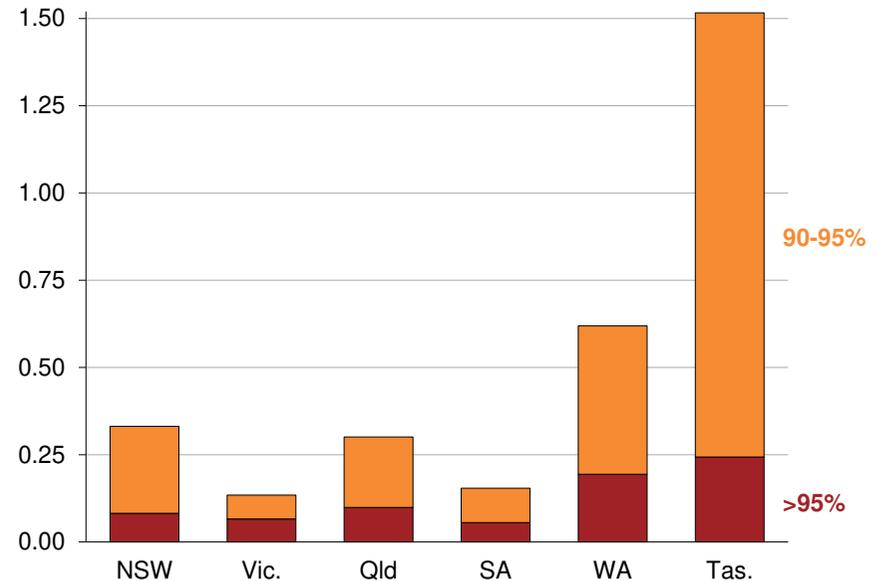
Current tariff structures do not recognise the contribution that individual consumers make to peak demand. Most people's power

⁵ AEMO (2015a)

⁶ Unlike the other states, Tasmania usually has a winter peak: electricity demand tends to be less volatile in winter and consequently the network operates at a higher capacity for more hours.

Figure 1.1: Electricity networks operate at more than 90 per cent of peak demand for a fraction of the year

Percentage of time networks operated at more than 90 per cent of annual peak demand, 2011 to 2014



Notes: Weighted average across all networks in each state.

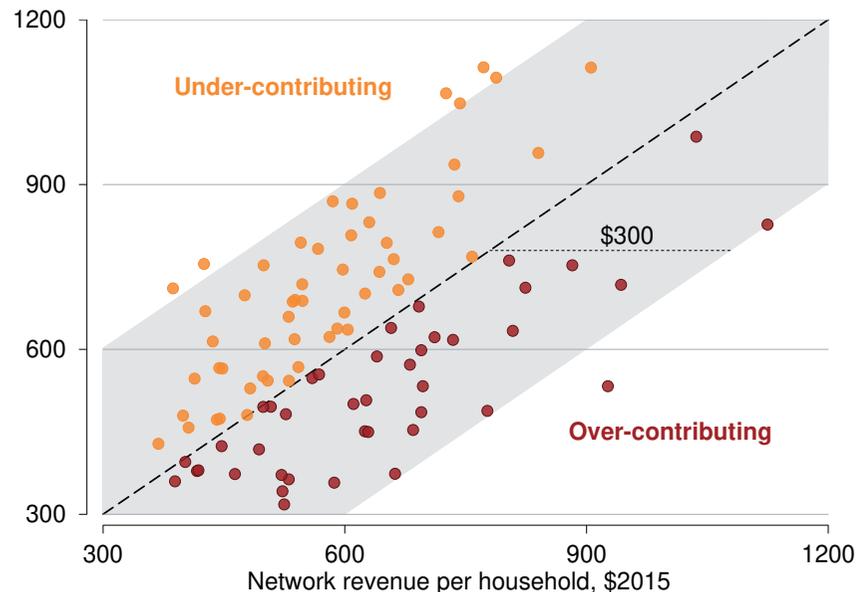
Source: Grattan analysis of AEMO (2015a), AEMO (2015b), and IMO (2015).

bills comprise of both a fixed tariff or standing charge, and a usage tariff that applies to overall consumption. This kind of pricing is known as a volumetric tariff. The more electricity a customer consumes, the more they pay for the network.

A customer's overall consumption doesn't correlate well with the load they place on the network at peak times. Households that have little impact on peak demand, but consume a lot of electricity overall, pay much more than the costs they impose on the system. These households over-contribute to their share of network costs and pay a cross-subsidy. Conversely, households who consume a

Figure 1.2: Network revenue collected from households has a weak relationship to costs

Network costs per household, Western Power, \$2015



Notes: Plot shows a random sample of 100 households connected to Western Power's network.

Source: Grattan analysis of Western Power (2015c), Western Power (2015d), and IMO (2015).

lot of electricity at peak times relative to their overall usage under-contribute and receive a cross-subsidy.

For this report we have analysed customer-level records for Western Power, the network operating in Perth and the south-west of Western Australia. As shown in Figure 1.2, some households provide Western Power with as much as \$300 in revenue above the costs these households impose on the network. Other households pay up to \$300 less than the costs they impose.

Pricing is unfair for new as well as existing infrastructure. The costs of new network infrastructure is spread across all consumers according to how much electricity they use across the entire year. Consumers who do not contribute to the need for new investment – that is, they use relatively little power during periods of peak demand – still contribute to the costs of the additional capacity.

Moving towards tariffs that take account of a consumer's contribution to peak demand would make pricing for electricity fairer. Those who use more electricity at peak times will pay for it, and at rates that reflect the pressure their high use places on infrastructure costs. Those who lower their use at peak times will benefit from the lower network tariffs that will apply at non-peak times.

1.3 Cost-reflective tariffs will reduce the cost of network infrastructure

Pricing for peak demand is not just fairer, it also provides an incentive for households to use less electricity from the grid during peak periods. Economists call this type of incentive a *price signal*: consumers generally respond more to pricing signals than to other influences, such as information campaigns.⁷

Because consumers currently pay the same price for electricity whenever they use it, there is no price signal to reduce usage at peak times. As a result network businesses build more infrastructure to meet the peak demand. Consumers pay for extra investment in network infrastructure through higher electricity bills.

Under a tariff that reflects costs, consumers would pay higher prices during peak periods – providing a signal to use less electricity at peak periods. Higher prices in peak times would be offset by lower prices at other times. Some consumers will respond to higher prices and choose to lower their consumption at peak

⁷ See, for instance, Ito, Ida and Tanaka (2015).

Box 1.1: Cost-reflective tariffs can take several different forms

Most current network tariffs for households and small businesses are volumetric tariffs. Network businesses recover the majority of their costs through the usage component, which in many cases is a flat tariff; consumers pay the same price for every unit of electricity that they consume.

But flat-rate charges do not accurately reflect the cost that households impose on the electricity system. There are a number of options (or combinations of options) for a more cost-reflective structure of network tariffs, each with strengths and weaknesses.

Fixed network tariff – this would recover the cost of existing network infrastructure via a fixed fee for each home or business. The rationale is that network infrastructure (and its maintenance) must be paid for regardless of how much electricity it transports. It provides an essential service to households and, therefore, all households should pay for it. But such an approach provides no price signal when using electricity may lead to the need to build more infrastructure. It is also unfair – everyone pays the same even though some have done more to increase the cost of the network in the past.

Time-of-use tariff – this would charge based on usage, but the price of electricity varies at different times of the day, throughout the week, or in different seasons. Prices are higher in the afternoon and evening in summer, providing a stronger price signal for consumers to reduce their usage at peak times. But this price signal is relatively weak, and relative to flat usage tariffs, time-of-use

tariffs are only marginally better at reflecting the costs of household energy use at peak times.^a This means time-of-use tariffs do little to reduce cross-subsidies between consumers or reduce overall costs.

Demand tariff – a portion of the network bill is based on an individual consumer's maximum demand, measured in kilowatts.^b In other words, households pay based on the point in time when they use the most power. Relative to usage tariffs, demand tariffs are a far better estimate of a household's contribution to peak demand. Consequently they reflect more accurately the current and future costs that consumers place on the network.^c Demand tariffs are likely to be effective at encouraging households to smooth their consumption across the day. But they do not provide a strong price signal for households to reduce consumption during the few hours a year when the network is most under strain.

Critical peak tariff – this is a more extreme version of a time-of-use tariff. There are relatively few periods during the year when the local network nears capacity: these are known as critical peak periods. At these times, customers will pay a much higher price to use the network. In exchange, they pay lower prices at other times. Customers are informed in advance of a period when a critical peak tariff will apply. While it provides the strongest price signal to reduce consumption at peak times, recovering all network costs via this tariff is fraught with difficulties. A cost-reflective critical peak tariff must be set much higher than the tariff at other times. Because consumers respond to such high prices by lowering their consumption, critical peak tariffs would have to rise further to recover network costs.

^a Wood, Carter and Harrison (2014), p. 14

^b *Fair pricing for power* referred to this type of tariff as a *capacity tariff*. The term *demand tariff* has since become the terminology normally used by network businesses.

^c Wood, Carter and Harrison (2014), p. 14

times, while others will not. But those who use a lot of electricity at peak times will pay for it instead of shifting the costs onto other consumers. Over time, cost-reflective tariffs will reduce the need for network businesses to invest in infrastructure, reducing future costs and making power bills cheaper.

But it is challenging to design a single tariff that is both fair and efficient. Each of the cost-reflective tariff designs outlined in Box 1.1 tends to achieve one of the objectives, but performs less well on the other. This is discussed further in Chapter 2.

1.4 Cost-reflective tariffs encourage the efficient use of new technologies

The uptake of air-conditioners and the emergence of technologies such as solar panels have changed how consumers use electricity, particularly the amount of electricity they use from the network during peak times in comparison to their overall use. In future, new technologies such as home battery storage and electric vehicles will also change how electricity is consumed. Cost-reflective tariffs help to integrate new energy technologies efficiently into the electricity system.

Air-conditioners

The rapid uptake of air-conditioners in recent years has increased network costs. Around one in three households had an air-conditioner in 1999; by 2014 it was more than three in four.⁸ Air-conditioners are used proportionately more during system-wide peak times, and this uptake has contributed to rising bills.⁹

⁸ ABS (2008), and ABS (2014)

⁹ There were other drivers, but household bills in Sydney and Brisbane, for instance, doubled in real terms between 1999 and 2014, see ABS (2015).

When a network is at or nearing capacity, a new four-kilowatt air-conditioner used at peak times may require an additional \$1000 of spending on network infrastructure.¹⁰ But most of the additional infrastructure costs are spread across all consumers, even those without air-conditioners. Under cost-reflective tariffs, households would consider more efficient air-conditioners, or use their air-conditioners less during peak times.

Rooftop solar PV

Over 1.4 million Australian households have installed rooftop solar photovoltaic (PV) systems since 2008.¹¹ This has been driven by generous government incentives, rapidly rising power bills, and a desire to reduce greenhouse gas emissions. Installing solar PV leads to a reduction in electricity consumption from the grid – a typical household installing a north-facing three-kilowatt solar PV system can reduce their consumption by up to 35 per cent.¹² But the reduction in consumption is typically more than the reduction in the household's demand at peak times, since peaks typically occur in the late afternoon when output from solar PV is low.

Usage-based network tariffs mean that households with solar PV are typically over-compensated for any network benefit they provide – a typical household with solar PV will reduce the network's costs by about \$80 a year, but will save \$200 a year in network charges.¹³ The difference is made up through the network charges paid by other consumers. With more cost-reflective pricing in place, households may orient solar panels differently – west-facing panels,

¹⁰ Based on Productivity Commission (2013) figures. In parts of the network that are mostly residential, peak demand typically occurs on a very hot afternoon or evening in summer – air-conditioners are a major driver of this.

¹¹ CER (2015)

¹² Grattan analysis of Victorian Government (2014), AEMO (2015a), BOM (2015), and ABS (2012).

¹³ Smith (2014), p. 3

for instance, tend to produce more power when network usage peaks.

Battery storage and electric vehicles

Over the next few years many people are likely to install batteries that can store electricity. This presents network businesses with both an opportunity and a new challenge. Cost-reflective pricing will encourage households to use their batteries to reduce their impact on peak demand, potentially reducing network costs for all consumers.¹⁴ In some areas, it may even be cost-effective for households to leave the grid, relying on solar PV and battery storage alone.

Electric vehicles are also likely to become more common over the next decade, as their costs reduce and governments introduce stricter emissions standards on vehicles. This will increase electricity consumption, since car batteries will need to be charged regularly. Efficient pricing can encourage households to recharge electric vehicles efficiently when overall demand is low.

The objective of tariff reform is not to discourage households from adopting new technologies. But it can ensure that tariffs give consumers price signals to use these technologies efficiently.

1.5 Challenges for network tariff reform in the National Electricity Market

Under the AEMC's new rules, all distribution businesses across the NEM must introduce cost-reflective prices by the middle of 2017. The businesses have already begun to implement new tariffs, with the majority looking to introduce demand-based tariffs (described in Chapter 2). All five of Victoria's network businesses have submitted

Tariff Structure Statements to the Australian Energy Regulator (AER) following public consultations.¹⁵

But the first steps towards more cost-reflective tariffs have highlighted challenges for both distribution businesses and politicians. Because tariff reform creates winners and losers, it can be hard for politicians to implement.

In 2010, one of Victoria's distribution businesses attempted to introduce a more cost-reflective tariff that charged customers more during peak times on weekday afternoons in both summer and winter. Under this tariff, the average household within the distribution business's area would be better off by around \$40 a year – over 10 per cent of the network component of the electricity bill.¹⁶

But media coverage at the time focused on the price at peak times, up to 38.2 cents per kilowatt-hour. This was far greater than the 7.6 cents per kilowatt-hour flat rate previously paid by a lower-use customer. In response to the outcry, the Victorian Government placed a moratorium on time-of-use pricing that remained in place until September 2013. When new time-of-use tariffs were introduced they were on an opt-in basis, and relatively few customers have adopted them.¹⁷

Queensland distribution company Energex intends to introduce a new demand-based tariff from July 2016 on a voluntary basis. It is estimated that about 58 per cent of customers would be better off under the new tariff.¹⁸ But it has also been estimated that some lower-income customers would face higher network charges. The

¹⁵ Tariff Structure Statements set out a distribution business's proposed pricing structure for the forthcoming regulatory period.

¹⁶ Wood, Carter and Harrison (2014), p. 31

¹⁷ According to Dowling (2015), the figure could be as low as 0.5 per cent of residential customers.

¹⁸ Energex (2015a), p. 13

¹⁴ Wood, Blowers and Chisholm (2015)

resulting media commentary surrounding the release of this information focused on the losers from tariff reform, and particularly its impact on some vulnerable customers.¹⁹

As network businesses have released their plans for tariff reform, they have met considerable opposition. Proponents of solar power have argued strongly against these new tariffs, saying that they “penalise rooftop solar and are designed to slow installation rates.”²⁰ The overall impression created is that network businesses are conducting a “war” on solar PV, to protect their existing business by imposing new tariffs.²¹ This perception has not been helped by the approach of some of the network businesses, which have singled out households with solar PV as discussed in Box 1.2.

In the face of vocal opposition, and in an effort to avoid immediate losers, politicians may back down on tariff reform or make the take-up of cost-reflective tariffs voluntary. But a voluntary approach would mute the impact of tariff reform, perhaps very significantly. If the limited take-up of flexible pricing in Victoria is any indication, making cost-reflective tariffs voluntary will have little effect on fairness or network costs. There might be fewer losers from the reform in the short term, but there would also be fewer winners in the long term.

1.6 What governments and network businesses should do

While network businesses are required to implement network tariff reform, state governments have a crucial supporting role.

Now is the right time to pursue network tariff reform. Network businesses are currently undergoing their five-year revenue determinations. The AER's decisions mean that overall network

¹⁹ See, for instance, Passmore (2015).

²⁰ Lim (2015)

²¹ Parkinson (2015a), and Parkinson (2015b).

Box 1.2: Higher prices for solar customers

In early 2015, South Australian distribution business, SA Power Networks, attempted to introduce a new network tariff that would apply to all customers with rooftop solar. In its proposal it argued that, under current tariff structures, solar PV customers were not paying sufficient network costs.^a A new, higher fixed tariff would better reflect the costs they impose on networks at peak times. But this tariff was noticeably higher than that faced by customers without solar PV.

The new tariff was dismissed by the AER on the grounds that there was no evidence solar customers' impact on peak demand was significantly different to other customers', and that therefore they should not face different tariffs.^b The fact that new tariff structures were proposed for only two customer cohorts – solar PV and vulnerable households – left the impression that customers with solar PV were being unfairly targeted.^c

Households with solar PV are more likely to be disadvantaged by the move to more cost-reflective tariffs and this will reduce the financial incentive to adopt rooftop solar.^d This creates a further challenge for both governments and network businesses. Making sure that all consumers are treated in the same manner will be essential. Any perception that network tariff reform is penalising solar *per se* will provoke a backlash, making tariff reform harder to sell.

^a SA Power Networks (2015)

^b AER (2015). SA Power Networks have subsequently appealed the AER's decision to the Federal Court.

^c Edis (2015)

^d Wood, Blowers and Chisholm (2015), pp. 19–25

prices are likely to fall (at least in real terms) in all jurisdictions over the next five-year period. These reductions will help to offset the increases in network charges for some consumers as a result of network tariff reform.

Set a timetable for network tariff reform

While introducing new tariffs would immediately reduce the cross-subsidies inherent in the current tariffs, a customer backlash to sudden bill increases could set back the reform. The best approach would be to introduce cost-reflective tariffs gradually over four years from 2017 to 2020, allowing consumers time to adjust to the changes, and potentially change the way they use electricity. But it is essential that cost-reflective tariffs are ultimately made mandatory for consumers – if the take-up is made voluntary, some households will continue to pay less than their fair share.

Develop an effective communication strategy

Communications will be vital to achieve public support for a reform as complex as this. While governments are best placed to coordinate this activity, other industry participants will need to be aligned in promoting new tariffs, particularly distribution businesses and electricity retailers.

Governments also need to work closely with consumer groups. They can talk to parts of the community beyond the reach of public campaigns, or where government and industry representatives aren't trusted.²²

²² The Consumer Utilities Advocacy Centre in Victoria suggests having an 18-month period in which the need for tariff reform and the structure of new tariffs is clearly explained to the general public, before the take-up is made mandatory, see CUAC (2015), p. 27.

Provide support for adversely affected low-income households

Some of those who end up paying more for their electricity after tariff reform are likely to be customers experiencing hardship; for some, higher power bills will be hard to manage. Governments need to understand the impact on vulnerable groups and act appropriately.

One option would be to assist these households through the welfare system. An alternative that requires less coordination between state governments and the Commonwealth would be to adjust the concessions frameworks already in place to deal with vulnerable customers' energy bills.²³ Government support can also extend beyond financial assistance, and could include helping vulnerable households to manage their energy use, particularly at peak times.

1.7 Western Australia and network tariff reform

Although Western Australia is not part of the NEM, there is, arguably, an even stronger case for tariff reform than in the eastern states. The sheer size of Western Australia, combined with its sparse population, increases the costs of providing electricity to all of the state's homes and businesses. Reforming network tariffs will help to keep these costs down.

Cost-reflective tariffs will also be fairer. The volumetric tariffs that currently apply in Western Australia are as unfair as elsewhere. They also fail to encourage the efficient use of distributed generation technology in an environment where solar and storage are more likely to be efficient solutions. Getting the detail right will be critical to designing network tariffs that reduce long-term costs.

²³ This can distort the price signals that consumers receive from cost-reflective tariffs, so it is important that governments find an appropriate balance between supporting such consumers, and ensuring they still have incentives to consume electricity efficiently.

2 Designing a cost-reflective network tariff

New network tariffs should reduce unfair cross-subsidies immediately and reduce costs in the long run. But the most cost-reflective tariffs tend to be the most complex. A critical peak tariff, for instance, could result in highly variable bills, which many households would find difficult to manage.

Network tariff reform involves a trade-off between a tariff that best reflects the costs imposed on the network, and a tariff that is simple enough to be widely accepted.²⁴ There are different options, but demand-based network tariffs – those based on a consumer's maximum demand – are a feasible approach and closely reflect the contribution that consumers make to peak demand.

2.1 Supplying electricity involves different types of costs

There are many types of costs in providing network services to a consumer. These costs can be divided into two categories: fixed costs, which are unrelated to when or how much electricity is consumed; and variable costs, which change according to how much electricity is consumed, or the way it is consumed.

- Fixed costs include:
 - fixed operating costs, such as most network maintenance and business running costs (such as personnel); and
 - 'sunk' costs, such as investments made in the past, on things like existing network infrastructure, that are yet to be recovered from consumers.

- Variable costs include:
 - volumetric costs, which depend on the total volume of electricity consumed. Few network costs are closely related to total electricity usage; and
 - peak usage costs, which depend on the demand for electricity at peak times, and in turn drive the construction of new network infrastructure.²⁵

Some network costs can fall into both categories.²⁶ Nonetheless, the categories provide a useful framework for designing a cost-reflective tariff.

At present, all costs are recovered from households exclusively through fixed tariffs and usage tariffs. But neither tariff is an appropriate way to recover peak usage costs. There is an argument for recovering sunk costs via a fixed tariff, since these costs are fixed. But electricity networks have been built to meet peak demand in the past; therefore, those who use more of the network at peak times should pay more for it than others. It is fairer to recover sunk costs similarly to peak usage costs rather than other fixed costs.

²⁴ A useful discussion of the trade-offs that exist is given in Deloitte Access Economics (2014), pp. 15–18.

²⁵ New infrastructure will be required whenever there is an increase in system-wide peak demand. But electricity networks depend on substations and feeders, so new infrastructure is also required when there is an increase in local-level peak demand (which is likely to occur at a different time to the system-wide peak). Some network maintenance costs are also closely related to peak demand.

²⁶ For example, some network maintenance costs are fixed and some are related to peak usage. Also, some costs may be fixed in the short term, but variable in the long term.

2.2 A demand tariff better reflects household usage at peak times

A demand tariff is a charge based on a household's maximum electricity use at any one time. This may be a different time to the peak demand for the network. However, a household's maximum demand is strongly related to its contribution to peak demand across the network, as shown in Figure 2.1. More detail about how a demand tariff might be applied is in Box 2.1.

At present, a household's contribution to peak demand costs – its use of electricity at peak times – is recovered primarily via a usage tariff, based around its yearly consumption. On average, households that consume more electricity across the year also use more electricity at peak times, so a consumption-based charge is generally fairer than a fixed charge for all households. But this relationship between overall energy consumption and peak consumption is weak. Some households with high levels of consumption contribute little to peak demand, while other households with low levels of consumption contribute a lot.

A usage-based network tariff tends to benefit certain types of consumers. Working households do not consume much electricity during the day, but can contribute significantly to peak demand in the early evening. In contrast, households where people are often at home during the day – such as pensioners – tend to consume more electricity overall relative to their demand at peak times, and are therefore disadvantaged by a usage-based tariff.

The left chart of Figure 2.1 shows the relationship between a household's overall consumption and its demand during system-wide peak periods for solar and non-solar households. In general, households with solar PV benefit more than others from a usage-based tariff relative to other households. Taking two households that use the same amount of electricity at peak times,

Box 2.1: How a demand tariff could be applied

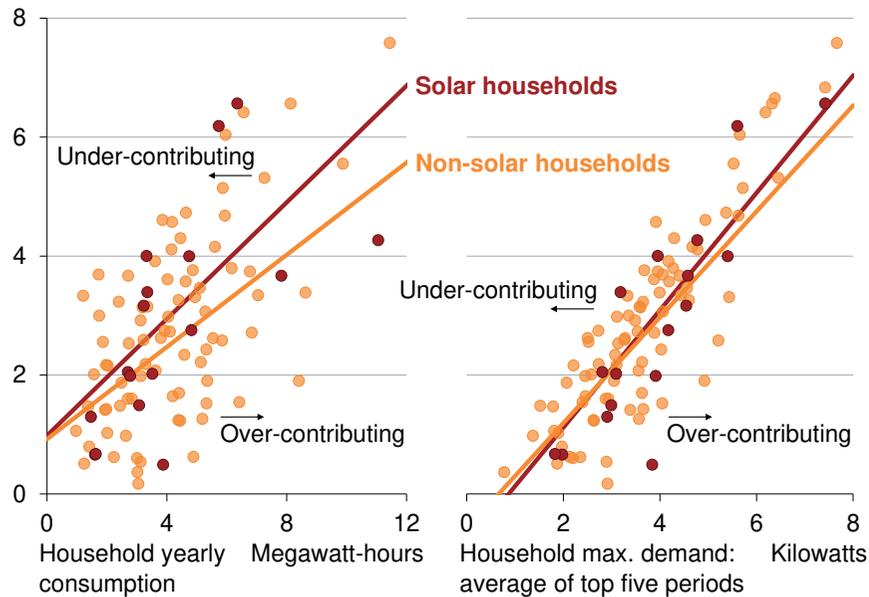
A demand tariff could be structured in different ways. Typically, a demand tariff would only apply during a peak window (for example, between 12pm and 9pm on workdays during the summer months); within that window, the half-hour period (or longer period) with the highest level of consumption would be the point of maximum demand. Different approaches include:

- **top five demand** – a charge based on the average of a household's top five periods of maximum demand within the pre-defined peak window over the previous year, as suggested by Wood, Carter and Harrison (2014). Using five periods creates less variability than using a single period of maximum demand, and has a stronger correlation to a household's contribution to peak demand.^a
- **monthly demand** – a charge based on a household's maximum monthly demand during the pre-defined peak window, as proposed by Victorian distribution business United Energy (2014). This is less cost reflective than the top five maximum demand tariff, but would be easier for households to understand.
- **'telco' demand** – households would choose an electricity plan in much the same way as they choose a mobile phone plan. More expensive plans would allow households a higher maximum level of electricity demand, and households would be penalised if they exceed their plan's cap. This follows a structure that is already familiar to many people, through their mobile phone and internet plans.^b

^a Grattan analysis of Western Power (2015c), and IMO (2015).

^b A telco demand tariff is also called a *capacity* tariff.

Figure 2.1: A household's individual maximum demand periods have a strong relationship with its demand at system peak times
Household maximum demand during system-wide peak periods, SWIS, kilowatts



Notes: Plot shows a random sample of 100 households from larger sample of Western Power households. Line of best fit shown for solar and non-solar households. Five system-wide peak periods are included, each lasting 4.5 hours. A household's top five maximum demand periods are the highest half-hour periods of consumption recorded during a peak window: 12pm to 9pm, November to April. SWIS: South West Interconnected System.

Source: Grattan analysis of Western Power (2015c), and IMO (2015).

a solar household will on average use 20 to 25 per cent less electricity overall.²⁷ Of course, this is not true for all solar households. Some households with solar PV contribute little to peak demand relative to their overall consumption.

The right chart of Figure 2.1 shows the relationship between a household's top five individual peaks and their demand during the top five system-wide peaks. This relationship is far stronger than the one shown in the left chart, and there is no significant difference between solar and non-solar households. This suggests that a demand tariff is a much fairer way of pricing a customer's share of peak demand network costs.²⁸

2.3 A demand tariff can be combined with other approaches to reduce peak demand

There are scenarios where a demand tariff does not do enough on its own to reduce peak demand. For instance, if a household has already recorded a high maximum demand, then it may not have much incentive to reduce its demand during system-wide peak periods. Thus, it can be useful to combine a demand tariff with a critical peak tariff, particularly in areas where the network is operating at or close to its capacity.²⁹ Households would typically be notified of an impending critical peak period so they can adjust their consumption accordingly.

²⁷ A household's maximum demand during system-wide peak periods can be thought of as a proxy for their share of network infrastructure costs.

²⁸ Other forms of demand-based pricing, such as the monthly maximum demand and telco demand tariffs, are slightly less cost-reflective than the top five demand tariff, but significantly more cost-reflective than a usage-based network tariff.

²⁹ Critical peak pricing is not necessary in areas where the network is not operating close to capacity.

Set at the right level, the critical peak tariff would encourage some households to reduce their consumption so that there is no need to augment the network. Any additional revenue raised would be redistributed back to consumers on future bills.

Critical peak pricing is only one way of reducing peak demand in areas where the network is close to capacity. A close alternative is to offer households a critical peak rebate. Instead of paying higher prices during a critical peak period, households would receive a credit on their bill if they reduce their electricity consumption during this period.

A further option is 'smart' grid management. An example of this is the PeakSmart program run by Energex in Queensland, which provides a cash reward to customers who purchase a PeakSmart-enabled air-conditioner.³⁰ During periods where system-wide demand is high, particularly on hot summer afternoons, the energy consumption of these air-conditioners is capped for short periods. Capping different air-conditioners at different times reduces peak demand without creating any noticeable difference in the cooling effect for consumers.

2.4 An effective cost-reflective tariff structure will contain multiple components

Critical peak pricing on its own does little to reduce cross-subsidies. A demand tariff on its own may not be enough to keep peak demand from rising. A well-designed cost-reflective network tariff structure would contain:

- a fixed tariff to recover fixed operating costs; and
- a demand tariff to recover the sunk costs of existing network infrastructure and any new infrastructure required.

In areas where the network is operating close to capacity, a higher critical peak tariff (or an alternative) can be used to lower peak demand and reduce infrastructure costs.

The following three chapters provide a case study of tariff reform in the Western Australian electricity market. Chapter 3 outlines a number of factors specific to Western Australia that affect the design of an appropriate cost-reflective tariff. Chapters 4 and 5 explore the impact that a demand-based tariff would have on households in Western Australia.

³⁰ Energex (2015b)

3 The Western Australian Electricity Market

A Western Australian Government review of the electricity market, undertaken in 2014-15, examined the electricity supply chain, from generation to retail, for inefficiencies, potential cost savings, and general improvements. An Options Paper, published in December 2014, outlined a range of findings, including the importance of more cost-reflective network tariffs.³¹ Network businesses and the state government are now investigating new tariffs.

Unlike most of the eastern states, nearly all of the electricity supply chain in Western Australia is owned by the state government.³² Perth and the south-west corner of Western Australia are part of an electricity system known as the South West Interconnected System (SWIS).

Figure 3.1 shows the supply chain in the SWIS. The transmission and distribution networks are operated by a government entity, Western Power. Another government entity, Synergy, is the sole retailer to households and small business electricity users. Synergy also produces more than half of the electricity consumed in the south west, and controls another quarter through long-term contracts.³³ Only one fifth of electricity is produced by generators independent of Synergy.³⁴

Figure 3.1: Government entities control all parts of the supply chain in the SWIS

The electricity supply chain in the SWIS



Source: Western Power (2015a).

In regional and rural Western Australia, a number of smaller networks are owned and operated by another government entity, Horizon Power. Horizon Power manages all parts of the supply chain in these areas: generation, distribution, and retail.³⁵

Even though the two Western Australian network businesses are not required to implement cost-reflective tariffs under the AEMC's ruling, tariff reform has the same advantages as it does for networks operating within the NEM. Western Australia faces many of the same challenges, including unfair tariffs, and rising network costs. But it faces other challenges as a result of specific features of its electricity market. These are as outlined in this chapter.

³¹ Government of Western Australia (2014), pp. 89–90

³² Most eastern states have privately-owned generation and retail, while Victoria and South Australia also have privately-owned transmission and distribution networks. Tasmania is the most similar to Western Australia in that much of the generation and retail is publicly owned.

³³ Government of Western Australia (2014), p. 20

³⁴ Ibid., p. 20

³⁵ Horizon Power purchases most electricity generation from independent power producers.

3.1 Government-regulated retail tariffs

Any reform of network tariffs must be reflected in the retail tariffs that households pay. Otherwise, consumers will not have price signals to use electricity efficiently. The way that retail tariffs are currently set in Western Australia is a potential barrier to this reform.

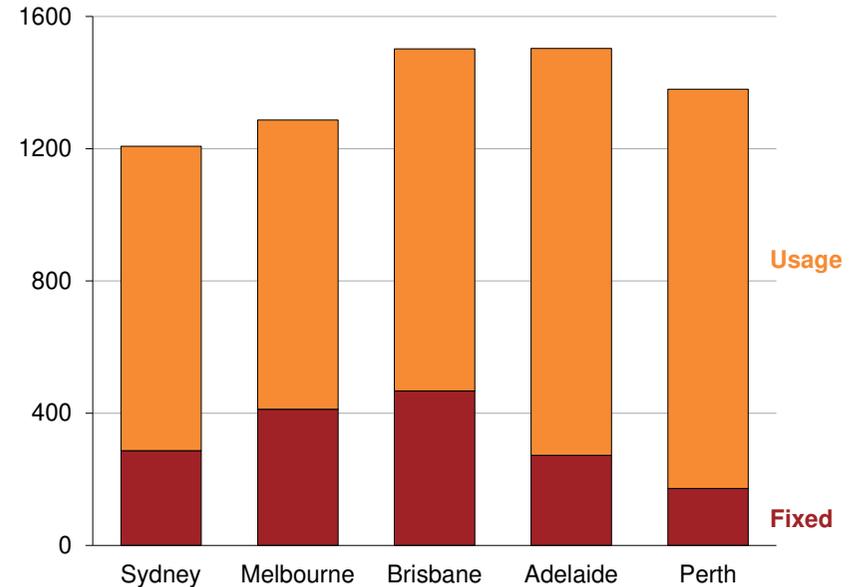
In the SWIS, both Synergy and Western Power are regulated because they do not face competition. Western Power is regulated by an independent body, the Economic Regulation Authority (ERA). But Synergy’s retail tariff is regulated by the state government. An independent body, such as the ERA, would ensure that retail tariffs reflect network tariffs.

Under the current structure of retail tariffs, the usage tariff makes up nearly 90 per cent of the average household bill in Perth. Figure 3.2 shows that this proportion is higher than in all other major cities. Much of the fixed costs involved in supplying electricity are paid for through the usage tariff, which is not cost reflective.

If network tariffs are changed to reflect costs, there is no guarantee that retail tariffs will reflect network tariffs while the government sets these prices. For tariff reform to be effective, Western Australia should reform both network tariffs and the way that retail tariffs are set.

Figure 3.2: Perth households pay a lower fixed tariff, but a higher usage tariff than most other cities

Yearly electricity bill of an average household, \$2015



Notes: Average household bill based on consumption of 4700 kilowatt-hours, using the average market offer of tier 1 retailers, with applicable discounts and subsidies applied. Includes GST.

Source: Origin Energy (2015), AGL (2015), Energy Australia (2015), and Synergy (2015).

3.2 Government subsidies

The state government sets the retail tariffs below the full costs of providing electricity. The government then subsidises the shortfall. Without this subsidy, Western Australian households – even those in urban areas – would pay more for electricity than other Australians.³⁶

Residential prices were fixed in nominal terms between 1997/98 and 2008, even though costs increased.³⁷ Since 2008, the government has increased prices by 85 per cent – well above inflation – in a effort to reduce the subsidy.³⁸ But this has had little impact on the subsidy, as costs have also risen significantly faster than inflation. Between 2006/07 and 2014, the cost of providing electricity to households rose by more than 60 per cent.³⁹

In 2014/15, the total subsidy paid to Synergy amounted to more than \$500 million.⁴⁰ The government has announced plans to phase out across-the-board subsidies to Synergy.⁴¹

In rural Western Australia, the costs of providing electricity are higher, and most households are subsidised much more than those in Perth. While the government and Horizon Power are looking at ways to reduce these subsidies, it is unlikely they will be phased out completely.

³⁶ Government of Western Australia (2014), p. 18. High costs in the SWIS are driven primarily by the wholesale generation market, which faces higher costs than in the NEM. In contrast, some eastern states face high costs driven primarily by network infrastructure. The per-unit *network* costs of Ausgrid in NSW and Energex in Qld, for example, are more than 50 per cent higher than those of Western Power, see *ibid.*, p. 18.

³⁷ Government of Western Australia (2015b)

³⁸ Government of Western Australia (2015c)

³⁹ Government of Western Australia (2014), p. 33

⁴⁰ Government of Western Australia (2015a), p. 579

⁴¹ Mercer (2014)

Cost-reflective tariffs and government subsidies may appear to be incompatible – by definition, a subsidy means the price of something is not cost reflective. But it is possible to apply a subsidy that meets its social objectives without compromising the fairness and efficiency objectives of a cost-reflective tariff.

3.3 The Uniform Tariff Policy

Rural areas have higher costs of living, and there are more low-income and vulnerable households than in urban areas. For that reason, the Western Australian Government supports subsidies for rural areas, whether they are paid directly by the government or as cross-subsidies from urban areas.

Even if there is a legitimate case for subsidising electricity in high-cost areas, both tariffs and subsidies must be applied so that consumers face appropriate price signals, as mentioned in Section 3.2. If not, the cost of providing electricity to these areas will continue to rise.

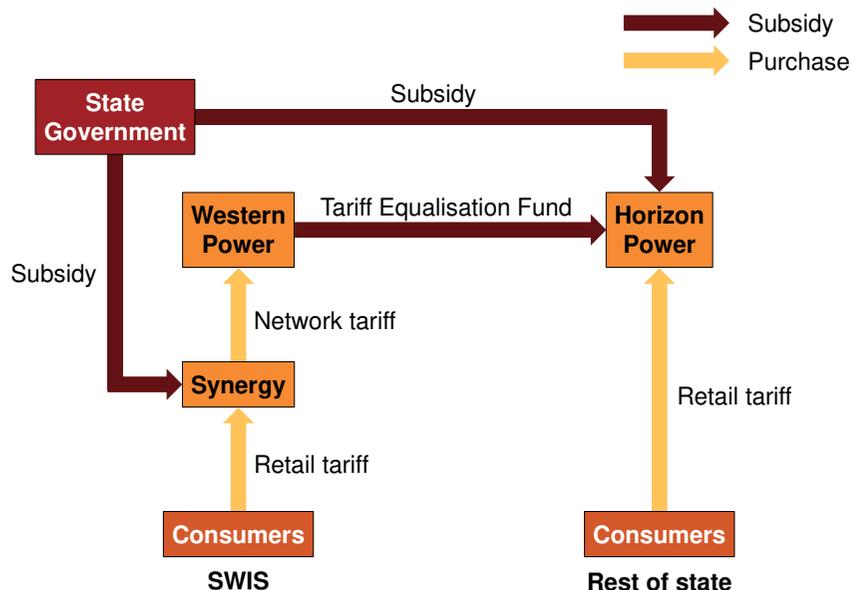
In order to remain solvent while charging the regulated tariff, Horizon Power relies on the Tariff Equalisation Fund (TEF). In the 2014/15 financial year, Western Power paid \$136 million into this fund.⁴² Western Power recovers this cost by levying higher network charges on its customers. As a result, Western Power's customers cross-subsidise rural and remote electricity users.⁴³ But consumers in the SWIS are themselves being subsidised, because the government also pays a direct subsidy to Synergy, much larger

⁴² Western Power (2015b), p. 68. Horizon Power also receives a direct government subsidy, but this is a much smaller component of their revenue than the TEF.

⁴³ Western Power (2015d). The Tariff Equalisation Contribution accounts for about 15 per cent of the household network tariff.

Figure 3.3: The Western Australian market involves various subsidies, both direct from the state and between parties

Financial flows between various parties in WA electricity market



Notes: Does not include all financial flows.

than the TEF. Households in the SWIS still receive a net subsidy of about 20 per cent of their total electricity costs.⁴⁴

A uniform tariff may appear to be an equitable way of pricing power. But when viewed in the context of subsidies it is highly inequitable. Under usage-based tariffs, households who consume more electricity typically benefit from a larger subsidy, and this is especially so in rural and remote areas.

⁴⁴ Grattan analysis of Government of Western Australia (2014), and Synergy (2015).

Figure 3.3 outlines how subsidies and payments flow between various parties in the Western Australian electricity market. Subsidies and the TEF are complex and are an additional barrier to tariff reform. It is not sensible for the government to pay a direct subsidy to Synergy so that Western Power's customers can then pay an indirect subsidy to Horizon Power's customers. It would be more appropriate for the state government to subsidise Horizon Power directly rather than through the TEF. This is one of the recommendations of the Electricity Market Review, which is described in more detail in Box 3.1.

3.4 Not all households have smart meters

One of the challenges for tariff reform is that smart meters are required to implement demand tariffs and critical peak tariffs.⁴⁵ Horizon Power is currently introducing smart meters for all its customers under the Meter Exchange Project funded by the state government. The project primarily aims to reduce the cost of manually reading meters, but it will also enable network tariff reform.

The SWIS is further behind. There are only about 15,000 smart meters installed in the SWIS.⁴⁶ Effective tariff reform would require all households to have smart meters. This will be costly in the short term, but it will lead to a more cost-effective electricity network in the long term.

⁴⁵ Interval meters can record the electricity usage of consumers at a point in time, or over short time periods, such as half-hourly intervals. Smart meters record such data and can also be read remotely.

⁴⁶ Western Power have trialled smart meters for some households. More meters in the SWIS are smart-capable, but require upgrading to be fully functional.

Box 3.1: Western Australia Electricity Market Review

The Electricity Market Review in Western Australia was announced by the Minister for Energy in March 2014. It is a wide-ranging review of the electricity industry in the SWIS. The Review has three specific objectives. These are:

- reducing the costs of production and supply of electricity and electricity-related services, without compromising safe and reliable supply;
- reducing government exposure to energy market risks, with a particular focus on having future generation built by the private sector without government investment, underwriting or other financial support; and
- attracting to the electricity market private-sector participants that are of a scale and capitalisation sufficient to facilitate long-term stability and investment.^a

An Options Paper was published in December 2014 at the end of Phase 1 of the Review. The Review found that “the current industry structure and the current market mechanisms cannot continue” if the objectives of the Review were to be met.^b

The Review's recommendations focused on increasing competition in the wholesale generation market, reform of the wholesale market and full retail contestability.

^a Government of Western Australia (2014), p. 1

^b Government of Western Australia (2014), p. 13

The Review suggested Western Australia should:

- Introduce full retail contestability as soon as practicable – increasing competition for residential and small business customers should help to reduce costs across the electricity sector, resulting in lower prices for consumers.
- Remove the government subsidy paid to Synergy.
- Replace the TEF: the cross-subsidy paid by consumers in the SWIS to Horizon Power should be replaced by a direct subsidy from the Western Australian Government.
- Remove the regulatory barriers that prevent the network from providing stand-alone electricity systems as an alternative to grid connection.
- Roll out smart meters across the SWIS.

The Review identified that the capacity market for generation in Western Australia is increasing electricity costs. The SWIS has 2000 megawatts more generation capacity than it needs, but which must be paid for. The Review recommended changes so that the wholesale market operates more like the NEM.

A second phase of the Review was announced in March 2015 to design the detail of the reforms prior to final Government decisions. This phase of the Review is underway.

4 Case study: South West Interconnected System

The SWIS is the electricity system that services households and businesses in Perth and the south-west of Western Australia. While the vast majority of consumers on the SWIS are located in Perth, the network extends as far north as Kalbarri, as far south as Albany, and as far east as Kalgoorlie, covering 261,000 square kilometres.⁴⁷

Electricity consumption in the SWIS increased by an average of three per cent a year between 2007 and 2011, but only 0.5 per cent a year since then.⁴⁸ With a greater uptake of solar PV and battery storage, consumption may decline in the near future. Tariff reform will help efficiently integrate these technologies into the grid while reducing existing cross-subsidies between consumers.

Our analysis of customer data shows that one in every 15 households in the SWIS currently receives a cross-subsidy from other households of \$500 or more a year on their electricity bills. These households typically consume a lot of electricity when overall demand for electricity is high, but consume relatively little over the whole year. Under a cost-reflective demand tariff, households who use more electricity during peak times would pay for it. Those currently paying a cross-subsidy will pay about \$120 a year less, while those currently receiving cross-subsidies of more than \$500 will see these reduced by more than half.⁴⁹

4.1 A demand-based tariff more accurately reflects costs

About 30 per cent of all residential costs in the SWIS depend on the total power used by households over the year.⁵⁰ But the current usage tariff is nearly 90 per cent of the average household bill.⁵¹ Households can reduce their bills significantly if they reduce their consumption overall, even if they use the same amount at system-wide peak times. Under the current residential tariff, about half of all households are paying a cross-subsidy to the other half, an average of about \$260 a year.

A demand-based tariff structure can match the cost structure of electricity more accurately, as shown in Figure 4.1. Usage costs would be recovered by a usage tariff, while a demand tariff would recover peak usage costs, including the costs associated with capacity payments as explained in Box 4.1. Peak usage costs account for 43 per cent of total costs. The remaining fixed costs, which include retail and network operating costs, would be recovered via a fixed tariff.⁵² If the existing subsidy paid to Synergy is maintained, it should be used to reduce the fixed tariff; this means all households receive the same subsidy, and still pay tariffs that reflect the full costs of their overall usage and their peak usage.

With a demand tariff, households can only reduce a substantial part of their bill by reducing their demand at times of system-wide peak. Customers can still save on their bills, but their savings are much better aligned with cost savings for the electricity system.

⁵⁰ Government of Western Australia (2014), p. 18

⁵¹ Grattan analysis of Western Power (2015b), and Synergy (2015). Based on an average household usage of 4700 kWh per year.

⁵² A critical peak tariff could be included in areas where the network is under strain, but it would not be to recover costs.

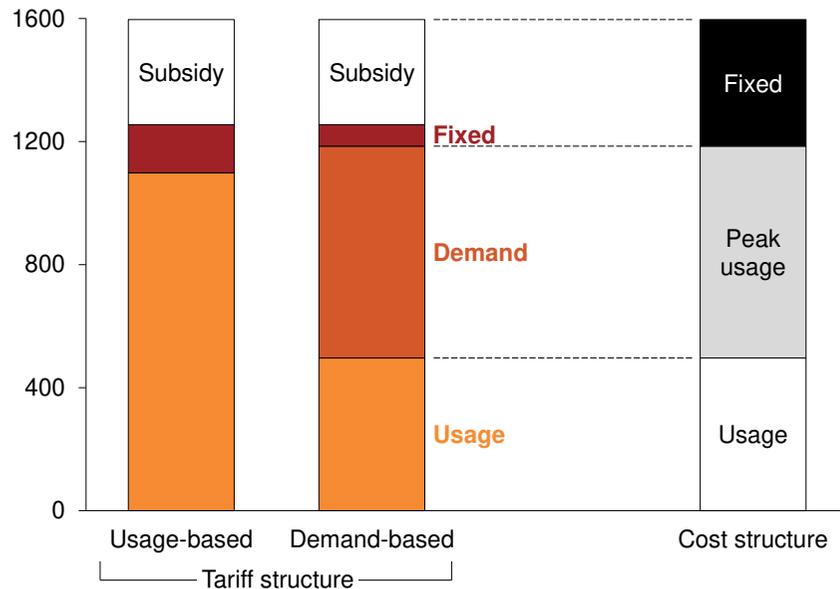
⁴⁷ Western Power (2015a)

⁴⁸ IMO (2015)

⁴⁹ Figures based on top 5 demand tariff, as outlined in Box 2.1 on page 16.

Figure 4.1: A demand-based tariff is a better match to the cost structure than a usage-based tariff

Recovery of average yearly household costs under different tariff structures, SWIS, \$2015



Notes: Does not include GST. Average household yearly consumption is 4700 kilowatt-hours. While the average bill remains the same under different structures, individual household bills will vary. The Tariff Equalisation Contribution is not included as a cost.

Source: Western Power (2015c), Government of Western Australia (2014), Synergy (2015), and Grattan analysis.

Box 4.1: Capacity market for electricity generation

The market for electricity generation in the SWIS has two components: a generation market and a capacity market. In the capacity market, generators are paid to provide a reserve capacity requirement, determined two years in advance by the Independent Market Operator. This is designed to ensure sufficient capacity is available during periods of peak demand. Generators are compensated even if their capacity is not used.

Capacity payments are costs not driven by overall consumption, but by peak demand. Even though capacity payments do not affect network tariffs, these costs should be paid for through a cost-reflective retail tariff – through a demand tariff rather than a usage tariff.

4.2 Only demand tariffs reduce cross-subsidies

While it is difficult, if not impossible, to completely eliminate cross-subsidies, a demand-based tariff can deliver electricity bills that more closely reflect each consumer's contribution to costs.

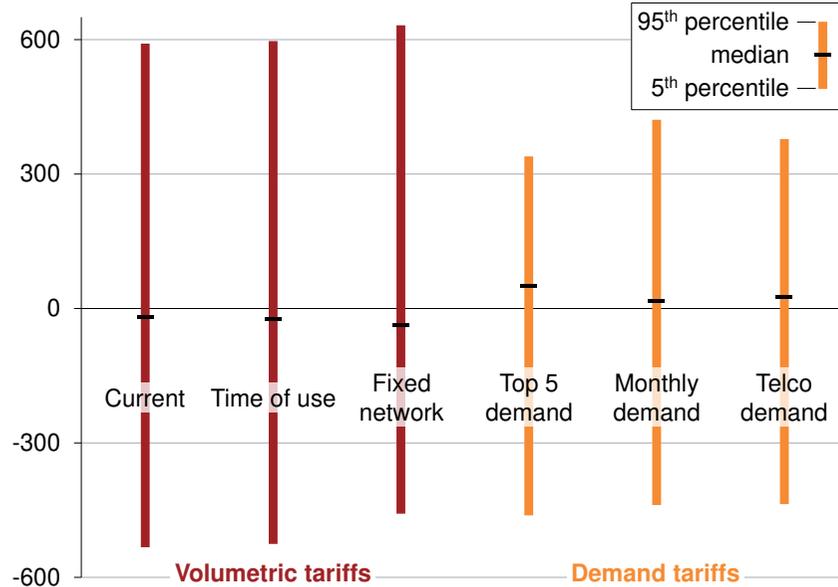
All three demand-based tariffs outlined in Box 2.1 on page 16 reduce cross-subsidies between households, as shown in Figure 4.2.⁵³ Households currently paying a cross-subsidy are better off by an average of \$120 a year, while households currently receiving a cross-subsidy will receive an average of \$130 less.

Of the different demand tariffs, the 'top 5' demand tariff reduces the cross-subsidy by more than the monthly demand and 'telco' demand tariffs, but the difference is relatively small. Alternatives to demand-based tariffs, such as time-of-use and fixed network tariffs, do not reduce cross-subsidies.

⁵³ Box 4.2 provides more detail about how cross-subsidies are calculated.

Figure 4.2: Cross-subsidies would be much smaller under demand-based tariffs

Yearly cross-subsidy across 90 per cent of households, SWIS, \$2015



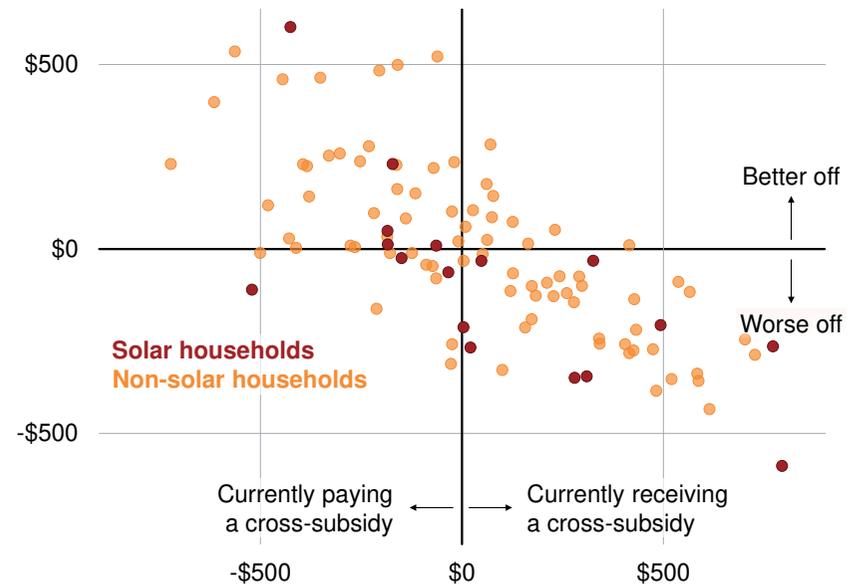
Notes: Positive values correspond to cross-subsidies received, negative values correspond to cross-subsidies paid. Cross-subsidies assume no changes in consumption under different tariff structures.

Source: Grattan analysis of Western Power (2015c), Synergy (2015), and IMO (2015).

While more households are better off under a demand tariff, beneficiaries of the current tariff structure will generally pay more than they do currently, as shown in Figure 4.3. Such households have high maximum demand relative to total consumption. While they will pay more if they keep using electricity in the same way, these households will also be in the best position to change when they use electricity and so reduce their bill. In contrast, households already consuming electricity in a way that is efficient from a system point of view may not be able to lower their bill by much more.

Figure 4.3: Households currently paying a cross-subsidy are likely to be better off under a demand tariff

Change in household bill under demand tariff against current cross-subsidy, SWIS, \$2015



Notes: Plot shows a random sample of 100 households from larger sample of Western Power households. Top five demand tariff used.

Source: Grattan analysis of Western Power (2015c), Synergy (2015), and IMO (2015).

Households with solar PV are often predicted to be worse off under a demand tariff for the reasons outlined in Section 2.2 on page 16. Yet more than 40 per cent are actually better off under a demand tariff in the SWIS.⁵⁴ What's more, solar households will be well-placed to benefit from the use of home batteries, which become more economical under demand-based tariffs. Instead of

⁵⁴ This is consistent with findings from Victorian distribution business United Energy, who note that solar PV customers are not significantly worse off or better off under their demand-based tariff, see United Energy (2015), p. 40.

Box 4.2: Calculating cross-subsidies

This analysis calculates the cross-subsidies that flow between different households because tariffs do not reflect costs. A cross-subsidy is defined as the difference between a household's bill and a household's contribution to the overall cost of the electricity system. But the electricity market is complex. An individual household's cost to the energy system depends on: its overall consumption; its demand at local network critical peak times; and its demand at system-wide critical peak times.

Data provided by Western Power include residential consumption recorded half-hourly across the 2013 calendar year for nearly 2000 households.^a The analysis conducted for this report uses the data to approximate a household's contribution to energy-system costs and so the amount it would have paid under a highly cost-reflective tariff, assuming no changes to consumption. This tariff bases peak usage costs upon a household's maximum demand during the top five periods of system-wide peak demand.^b

This tariff structure is used as a proxy for a household's average contribution to electricity system costs. Households that pay a higher bill than their contribution to costs are said to be paying a cross-subsidy, while those that pay a lower bill are said to be receiving a cross-subsidy.^c

^a Western Power (2015c)

^b The system-wide peak periods are defined according to the highest half-hour periods of system-wide demand on five different days across 2013, extending for two hours either side of the maximum half-hour period. While this tariff is highly cost-reflective, it is unlikely that this tariff could be implemented in practice. This tariff should not be confused with the 'top 5 demand tariff', which is based on the individual household's top five demand periods, not the top five system-wide peak periods.

^c Cross-subsidies reported do not include direct government subsidies.

exporting all their excess power to the grid, households could use their solar output to charge a battery. This battery can be switched on whenever a household's demand for electricity is high, helping to reduce their maximum demand.

While most of those who would pay more under a demand-based tariff are those currently receiving a cross-subsidy, some vulnerable or disadvantaged consumers will also face higher power bills. The government may seek to minimise any negative impact on such households. A sensible approach is to implement demand-based tariffs slowly. At first, the demand tariff would only cover a proportion of peak usage costs, then would gradually increase (and the usage tariff would decrease) over a few years to become properly cost reflective. In this way, households that are adversely impacted by the tariff change will have time to respond before seeing a large bill increase. The government may also consider providing targeted assistance to low-income households who see increases in their bills in the short term.

4.3 What the state government should do to implement tariff reform in the SWIS

Clearly communicate the benefits of tariff reform

Because reform will mean that some households will pay more, there will be opposition. The challenge for governments is to sell the case for change. In the case of tariff reform, the government should emphasise the long-term benefits: reducing unfairness; a reduction in the total costs of supplying electricity; and an electricity network better placed to integrate new technologies.⁵⁵

⁵⁵ Reduced electricity costs will ultimately reduce electricity bills, but in the short term, cost reductions might be used to reduce subsidies ultimately paid by taxpayers, or to free up government funds for other purposes.

Develop a cost-effective approach to installing smart meters

As noted in the previous chapter, effective tariff reform will require households and small businesses to have smart meters. While some households with solar PV currently have smart meters installed, this is not the case for most households without solar.⁵⁶ Any decision to mandate demand tariffs only for households with smart meters could be perceived as punishing those with solar, particularly as many of these households are likely to pay more under a demand tariff.

Smart meters have a number of other advantages. They can be read remotely, which saves on meter reading costs. They can provide households with a greater understanding of their electricity use, which assists them in working out ways they can save on their bills. And they can be used to assist with demand-management schemes, which helps to reduce network infrastructure growth.

The Electricity Market Review has already recommended that smart meters should be rolled out in the SWIS. The Western Australian Government should continue its work towards a cost-effective and timely implementation plan.

Hand over the setting of Synergy's retail tariffs to an independent body

If retail tariff regulation is to continue in Western Australia, the government should relinquish control for setting retail household and small business tariffs to the ERA. This change should ensure cost-reflective network tariffs and capacity market costs are passed through, and the retail tariff would not be influenced by immediate political considerations.

⁵⁶ In the SWIS, most households with solar PV have smart-capable meters. That is, they can be upgraded to become 'smart' at low cost.

Restructure existing subsidies

The current structure of subsidies in the SWIS is overly complex and is a barrier to tariff reform. Ultimately, tariff reform will be most effective if subsidies paid to Synergy are phased out, since a retail tariff without a subsidy is more cost reflective. When subsidies are removed, it will be easier for other retailers to enter the market and compete with Synergy. Competition would help to ensure that cost-reflective network tariffs are reflected at the retail level.⁵⁷

The Electricity Market Review has recommended that the subsidy paid to Western Power customers through Synergy should be phased out as quickly as possible.⁵⁸ While the subsidy remains, it should be paid as a fixed subsidy per customer. When tariffs are reformed, a fixed subsidy allows price signals to continue flowing through to the customer. This approach will also help to phase out subsidies over a few years: the fixed subsidy per customer can be reduced by a given amount each year.

The government should also remove the Tariff Equalisation Contribution from Western Power's network tariff, as recommended by the Electricity Market Review. Any subsidy paid to Horizon Power should be funded directly by the government.

⁵⁷ In a competitive retail market, some retailers may choose to offer simpler tariffs rather than pass through network demand tariffs. Instead, they may offer consumers incentives to reduce their maximum demand, such as a discount for allowing direct load control of their air-conditioner.

⁵⁸ Government of Western Australia (2014), p. 12

5 Case study: Horizon Power

Horizon Power is a government-owned utility which manages the generation, distribution, and retail electricity services for Western Australian consumers outside the SWIS. In many areas it services, the cost of supplying electricity is extremely high. Because Horizon Power's residential customers pay the same tariff as those in Perth, some are receiving very high subsidies, as much as \$10,000 a year.⁵⁹

Reforming tariffs in Horizon Power's areas will also involve changing the way that subsidies are applied. Together, cost-reflective tariffs and better-targeted subsidies will achieve three key benefits:

- Reduce unfair cross-subsidies from consumers who use electricity efficiently to those who place high costs on the network.
- Reduce the electricity bill of 77 per cent of vulnerable households and 45 per cent of non-vulnerable households.
- Lower electricity costs by reducing the need for additional network infrastructure and a more cost-effective adoption of solar PV in remote areas. This benefits not only Horizon Power customers, but also those providing subsidies (consumers in the SWIS and the state government).

5.1 High costs and high subsidies

Horizon Power covers a vast area and manages a range of electricity systems. It manages one major interconnected network: the North West Interconnected System (NWIS), which services the Pilbara region. It also manages a number of smaller non-interconnected systems (NIS), each usually servicing a regional town or remote community, some with fewer than 100 people.⁶⁰ Across these systems Horizon Power has about 40,000 residential and 10,000 business customers.⁶¹

Horizon Power's costs are higher than those in the SWIS, so its customers receive a larger subsidy under the Uniform Tariff Policy. But these costs vary greatly across Horizon Power's systems, as explained in Box 5.1. Network costs are far higher in low-density areas, and systems in some remote areas run on expensive diesel fuel. In some extreme cases, households only pay ten per cent of the costs of supplying them with electricity.⁶²

Subsidies do not need to be eliminated for network tariff reform to be implemented, as long as they are allocated more efficiently. This will still provide customers with price signals to change their behaviour in ways that would reduce the total costs of the system. These subsidies can also be better targeted to low-income and vulnerable households.

⁵⁹ Grattan analysis of Horizon Power (2015b).

⁶⁰ Horizon Power (2015a), p. 100

⁶¹ Horizon Power (2015b)

⁶² Horizon Power (2015b)

Box 5.1: Horizon Power's electricity systems face varying costs

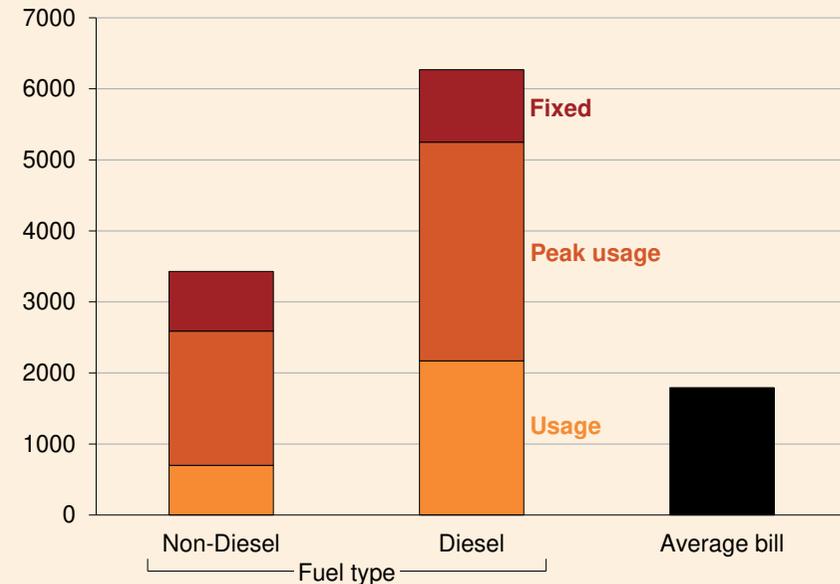
Horizon Power manages 38 electricity systems, which range in structure and cost depending on the size of the system, the remoteness and housing density of the area covered, and the main source of fuel. The non-interconnected systems (NIS) typically follow one of two basic structures: those serviced primarily by diesel fuel, and those serviced by non-diesel fuel (usually natural gas). The North West Interconnected System (NWIS) has a similar cost structure to the NIS non-diesel areas.^a These cost structures are summarised below and in Figure 5.1:

The NWIS – Horizon Power's largest system, servicing nearly 40 per cent of its customers, and accounting for more than half of total electricity consumption across all systems.^b Costs relating to peak usage account for more than half the total cost to supply. Households receive an average subsidy of about 45 per cent of the total cost to supply.

NIS non-diesel – Just over half of Horizon Power's customers are connected to one of the many smaller systems outside the NWIS that are connected to Western Australia's gas pipeline network, or have liquefied natural gas delivered. Peak usage costs, including network infrastructure and generation capacity, account for 55 per cent of total costs. An average household pays about half of the supply costs, with the remainder subsidised.

Figure 5.1: The cost of supplying electricity varies greatly across Horizon Power's networks

Cost structure to supply electricity to average household and yearly electricity bill, Horizon Power non-interconnected systems, \$2015



Notes: Does not include GST. Average consumption is 7000 kilowatt-hours. Source: Horizon Power (2015b) and Grattan analysis.

NIS diesel – Just under 10 per cent of Horizon's customers are serviced by generators running on diesel, a relatively high-cost fuel.^c Typically these customers are located in remote areas, meaning that other costs, including the cost of network infrastructure, are much higher as well. On average, these households receive a subsidy of more than 70 per cent of the total supply costs.

^a Horizon Power considers the cost structure of the NWIS to be commercially sensitive, so this is not published.

^b Horizon Power (2015b)

^c Diesel has the advantage of being relatively cheap to transport over long distances.

5.2 A cost-reflective tariff for rural areas

As in the SWIS, Horizon Power's costs include those that are fixed across consumers, those that are related to overall usage, and those related to peak usage. For most of Horizon Power's customers, fixed and peak usage costs are much higher than overall usage costs. A more cost-reflective tariff structure would recover peak usage costs via a demand tariff.

The analysis undertaken in this section looks at the potential impact of a demand-based tariff applied to the NWIS and to NIS non-diesel areas. In the NIS non-diesel areas, a particular focus is given to the impact on vulnerable households. A cost-reflective tariff structure for the NIS diesel systems is considered separately in Section 5.4.

Horizon Power has canvassed a range of alternative tariff structures, and is investigating a particular type of demand tariff – the 'telco' demand tariff, introduced in Box 2.1 on page 16 and described in more detail in Box 5.2.

A telco demand tariff follows a structure most households are already familiar with. A home internet contract, for instance, usually involves a monthly charge that depends on bandwidth – households pay more for a faster connection. The internet contract may also include a maximum monthly data allowance; households who exceed this will pay a penalty usage charge for every megabyte they use over the 'cap'. A telco demand tariff for electricity is similar. Households that require a high maximum demand will be on a higher contract (similar to paying for more bandwidth), and all households will pay a small usage tariff for the electricity they need (similar to paying for data). In NIS non-diesel areas, this usage tariff would be about half of the current usage tariff.

As shown in the analysis of households in the SWIS (Chapter 4), the 'top 5' maximum demand tariff was more effective at reducing

Box 5.2: Designing a 'telco' demand tariff

Residential data provided by Horizon Power across its various systems include yearly household consumption, and an estimate of each household's maximum demand within a summer peak window (November to April, 12pm to 9pm). The data also indicate whether a household should be considered 'vulnerable', using a broad definition.^a These data are sufficient to assess the impact on different customer groups when changing from the current tariff to a telco demand tariff, but cannot be used to obtain a reliable estimate of cross-subsidies between consumers.

A telco demand tariff would contain two components: a contract tariff that depends on a household's maximum demand, and a usage tariff. Households would be required to choose a contract based on what they expect their maximum demand to be. This analysis considers six contract options for households, each with a different maximum demand level: 1.5 kilowatts, 3 kW, 4.5 kW, 6 kW, 7.5 kW, and 10 kW – the higher the maximum demand, the higher the contract tariff would be. Those who consistently exceed the maximum demand in their contract would be put onto a higher contract.^b

The contract tariff is designed to recover both fixed and peak usage costs, while the usage tariff recovers usage costs. Any subsidy would be applied to the contract tariff.

^a This includes households on a low income relative to household size, those with a concession card, and those with a disability. Nearly 30 per cent of Horizon Power's residential customers fit this definition of vulnerable.

^b There are mechanisms that households can use to keep their demand below the cap. For instance, a household could be sent a warning via SMS when their demand is close to the cap.

the spread of cross-subsidies than the telco tariff. But a telco demand tariff is potentially easier for people to understand, given that most Australians are already familiar with the structure, and it has only two components: the contract tariff, and the usage tariff. Its effectiveness will be dependent on how it is implemented. Mechanisms must exist to make sure that the contract customers are on reflects their maximum demand, and moving to a lower contract is as easy as moving to a higher contract. If this is not the case, then customers may end up paying more for their electricity than they need to.

5.2.1 How do rural subsidies fit with a cost-reflective tariff?

Under the Uniform Tariff Policy, households serviced by Horizon Power pay the same tariffs as those in the SWIS, even though costs are higher. In the high-cost NIS diesel areas, the average subsidy is around \$4000 a year, and is above \$10,000 a year for some households. These subsidies are mostly funded by the TEF, collected from Western Power's customers.

It is worth considering the purpose of rural subsidies before determining how they are applied to a cost-reflective tariff. One possible purpose is to ensure that every household has affordable access to an essential service regardless of location. If so, should subsidies be provided for usage above an 'essential' level? Another possible purpose is to protect vulnerable households from high electricity costs. If so, should subsidies be targeted more tightly to this particular group? Finally, the purpose of subsidies might be to compensate households for the high costs of living in rural and remote areas. If so, should this compensation be provided through the tax and welfare system?

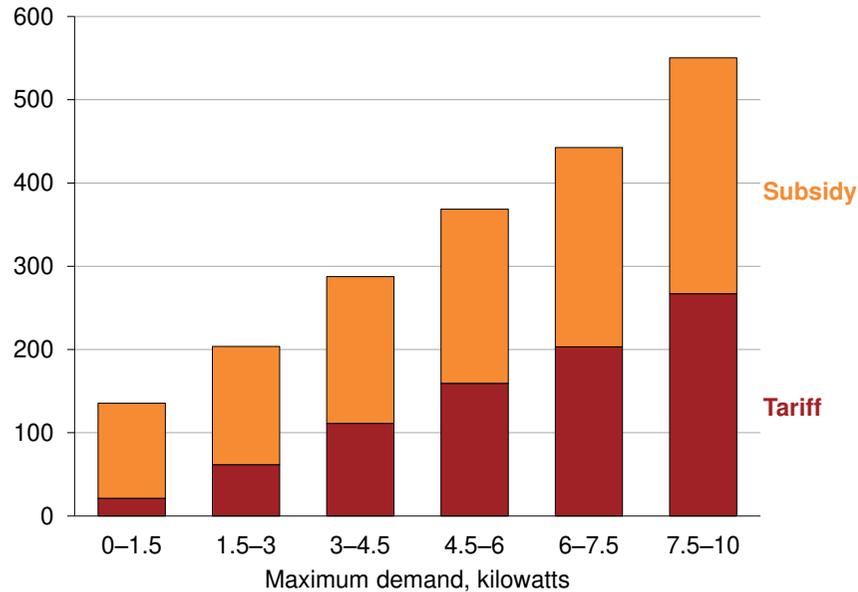
The Uniform Tariff Policy means that people who use more electricity typically receive a higher subsidy. But the most vulnerable households tend to use less electricity: in the NWIS, for instance, households that are not classified as vulnerable consume 50 per cent more electricity than those that are. As a result, the existing subsidies are poorly targeted towards those who need them most.

As discussed in Chapter 4, the most efficient way to apply a subsidy to a cost-reflective tariff structure is to give all households the same subsidy – that is, apply the subsidy to reduce the fixed tariff. But if the current subsidy for Horizon Power customers in the NWIS and NIS non-diesel areas is applied equally across households within each system, the subsidy would be more than the total cost of supplying electricity to some consumers. In other words, some households would end up with negative electricity bills.

With a telco demand tariff in place, the subsidy given to households could increase with each contract level. Households on a higher contract would receive more subsidy in *dollar* terms, but households on a lower contract would receive a higher subsidy in *percentage* terms. Figure 5.2 shows what a telco demand tariff would look like in the NWIS for different contract levels. In this example, households with a maximum demand of less than 1.5 kilowatts receive a subsidy of 85 per cent of their telco demand tariff, while those with a maximum demand of between 7.5 and 10 kilowatts receive a subsidy of only 50 per cent.

Figure 5.2: Both the contract tariff and the subsidy would increase with a customer's maximum demand under a telco demand tariff

Possible structure of monthly contract tariff and subsidy by contract option, NWIS, \$2015



Notes: Contract tariff does not cover any usage costs – these would be covered by a separate usage tariff.

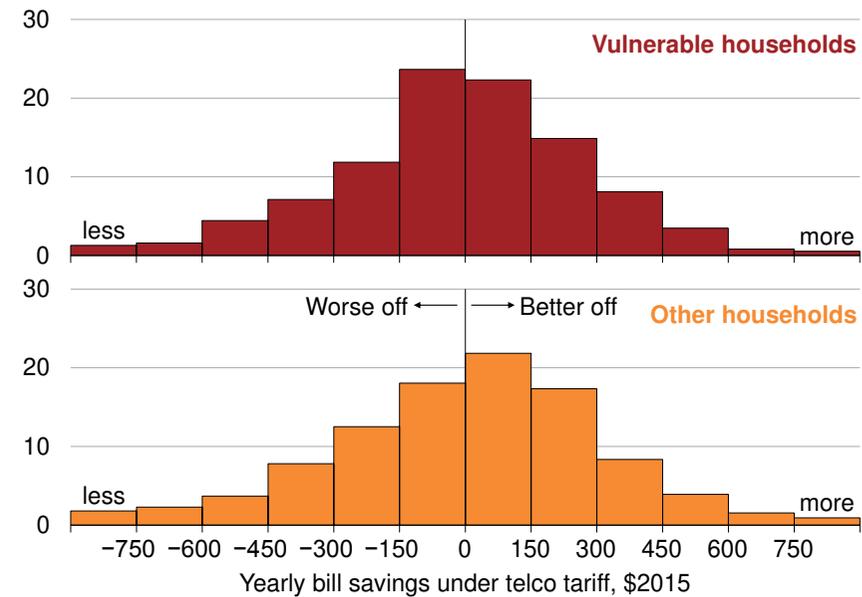
Source: Grattan analysis of Horizon Power (2015b), and Horizon Power (2015c).

5.3 More households are better off under a demand tariff

Switching to a demand tariff will yield two primary benefits: the spread of cross-subsidies between households will reduce, and households will use the electricity system more efficiently, keeping long-term costs lower. While this benefits Horizon Power's customers, it will also reduce total subsidies over time, which will benefit Western Power's customers and the taxpayers who currently fund the subsidies.

Figure 5.3: More households are better off under a demand tariff

Percentage of households, NIS non-diesel areas, \$2015



Notes: These bill savings assume households continue using electricity in the same way. Those who are adversely affected by the change to a demand-based tariff will have the strongest incentive to reduce their maximum demand.

Source: Grattan analysis of Horizon Power (2015b), and Horizon Power (2015c).

When the spread of cross-subsidies is reduced in the short run, some households will benefit, and others will face higher bills. In both the NWIS and NIS non-diesel areas, 53 per cent of households would be better off from the change of tariff, as shown in Figure 5.3. In the NWIS, 55 per cent of vulnerable households would be better off. But in the NIS non-diesel areas, 50 per cent of vulnerable households would be better off, and 50 per cent would face higher bills.

5.3.1 The government can protect vulnerable households at low cost

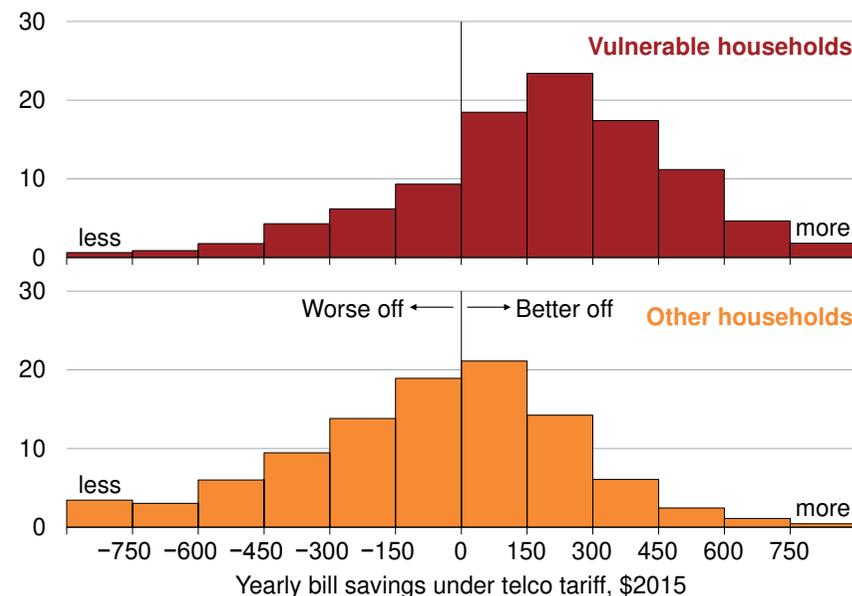
More than half of Horizon Power's customers are located in NIS non-diesel areas, and more than a third of these are classified as vulnerable. Switching to a demand-based tariff would adversely affect about half of these vulnerable households, and the government may want to shield them from any large negative impact. Providing assistance to these households may be an important part of selling the reform, but it should be done in a way that doesn't reduce the incentives to change their behaviour.

One option is to increase the subsidy for those on a higher contract, since households with a higher level of maximum demand are more likely to face higher bills under a demand tariff. This would reduce the number of households facing a large bill increase. But it would also weaken the price signal to households to reduce their maximum demand. And households on a higher contract are normally in the best position to reduce their maximum demand in response to tariff changes, potentially benefiting both themselves and the electricity system.

A better way of supporting vulnerable households would be to use a small proportion of the existing subsidies to provide a targeted rebate. A rebate of \$250 a year given to the one in three households considered vulnerable in the NIS non-diesel areas would cost about five per cent of the total subsidy currently given to these areas. Because the rebate would be given to *all* vulnerable households, this would not weaken the price signals to consume electricity efficiently.

Figure 5.4: A targeted rebate would ensure nearly all vulnerable households are better off under a demand tariff

Percentage of households, NIS non-diesel areas, \$2015



Notes: Yearly bill savings include a \$250 rebate received by vulnerable households funded by a reduced subsidy.

Source: Grattan analysis of Horizon Power (2015b), and Horizon Power (2015c).

Figure 5.4 shows that a demand-based tariff combined with a targeted rebate of \$250 would leave 77 per cent of vulnerable households better off in NIS non-diesel areas. Even though households that are not vulnerable would fund this rebate through a reduced subsidy, 45 per cent of them would still be better off.⁶³

⁶³ The figures are similar for a \$250 rebate given to vulnerable households in the NWIS.

5.4 An effective cost-reflective tariff in diesel areas is more complicated

Less than 10 per cent of Horizon Power's residential customers are serviced primarily by diesel fuel, but the cost of providing each unit of electricity to these customers is significantly higher than in other areas. Because of the large subsidies in place, the fuel cost of diesel is not fully reflected in the usage tariff. This encourages households to consume more electricity than they otherwise would. Western Power's customers bear much of the additional cost through the TEF.

Generation costs could potentially be reduced by more widespread use of solar PV. At present, though, only six per cent of rooftops in diesel areas have solar PV.⁶⁴ This probably reflects two factors: first, few households in these areas are able to afford the upfront costs of solar PV; and second, the current tariff structure means that solar PV provides fewer benefits to the household than it does to the system as a whole. If, for example, households faced a cost-reflective usage tariff of 34 cents a kilowatt-hour (including GST), instead of the current 26 cents a kilowatt-hour, solar PV would become a worthwhile investment for more households.

One option for a more cost-reflective tariff structure would be a single usage tariff: all fixed and peak usage costs would be subsidised, and the usage tariff would be set equal to the average usage cost. This would reduce existing subsidies, and the average bill would rise by 20 per cent. Vulnerable households would find bill increases difficult to deal with, so it would be important to provide them some assistance to help manage the transition.⁶⁵

But if a household could not afford solar PV under the current tariff structure, it would not be able to afford it under a new tariff structure either. For that reason, Horizon Power or the government should consider using some of the existing subsidy to help households make more efficient decisions with their electricity use. For some households, this could mean installing more efficient appliances, and for others it could be installing solar PV or even battery storage. Horizon Power could offer to install solar PV on rooftops through a power purchasing agreement – Horizon Power would own the solar panels, but households with solar on their roofs would pay a lower usage tariff.

Horizon Power could also assess the cost-effectiveness of small solar PV farms and grid-scale energy storage in these areas, given these costs have come down significantly in recent years and are predicted to come down further. Solar PV farms may be more cost-effective than rooftop solar PV, and would mean all households benefit from lower usage tariffs. The existing diesel generators would provide an important backup source at night and when the sun isn't shining. Grid-scale storage combined with demand management approaches (see Section 2.3 on page 17) could also be used to lower peak demand, reducing costs in the long run.

Ideally, customers in Horizon Power's diesel areas would face a cost-reflective usage tariff so that they make efficient decisions regarding their electricity consumption. But the important thing is that electricity is provided to these areas at lowest cost, whether this is achieved via consumers responding to cost-reflective tariffs, or via a direct approach by Horizon Power.

⁶⁴ Horizon Power (2015b)

⁶⁵ Ideally, any change in the usage tariff would be introduced incrementally, to avoid sudden bill shocks.

5.5 What the state government should do to implement tariff reform in Horizon Power areas

Progress network tariff reform in the NWIS and NIS non-diesel areas

Network tariff reform in the Horizon Power area has a head start over reform in the SWIS for one key reason: the Western Australian Government is already funding the Meter Exchange Project for the roll-out of advanced meters in the Horizon Power distribution area. The roll-out removes one of the core practical challenges to tariff reform.

The government, together with Horizon Power, should develop a plan and timetable to introduce new tariff structures to the NWIS and NIS non-diesel areas. The particular structure that a demand-based tariff takes, whether a telco demand tariff or otherwise, is an issue for Horizon Power to work out with the government. But a demand-based tariff is essential to reduce the cross-subsidies that currently exist, and to minimise the costs of new network infrastructure in the long run.

Any plan will need to be combined with an effective communications and engagement plan. The government and Horizon Power should adopt a communications strategy that emphasises the benefits of reform, and highlights – or even provides – the tools households can use to benefit from new network tariffs.

Consolidate subsidies flowing to Horizon Power into one single subsidy

The Western Australian Government should unravel the complex tangle of subsidies that flow to and from Synergy, Western Power and Horizon Power. It makes little sense that households in the SWIS are provided a direct subsidy from the government so that they, in turn, can then subsidise Horizon Power customers.

If the government wishes to continue subsidising Horizon Power customers, the Uniform Tariff Policy should be abolished, and part of the direct government subsidy currently paid to Synergy transferred to Horizon Power customers. Network prices for customers in the Western Power distribution network would then more accurately reflect the cost of providing electricity.

Provide more efficient and better targeted subsidies to Horizon Power's customers

At present, subsidies are poorly targeted in the NWIS and NIS non-diesel areas. Customers who use a lot of electricity, and who are less likely to be vulnerable, receive a proportionally higher subsidy than households with low use. Under a demand-based tariff structure, the usage tariff should not be subsidised. Any subsidy should apply to the demand component. This means that households are not over- or under-compensated for reducing their electricity usage, but will still have an appropriate price signal to keep their maximum demand below a certain level.

Horizon Power should also use part of the subsidy it receives to provide a direct rebate to vulnerable consumers. Although non-vulnerable households would then receive a lower subsidy, this step could protect disadvantaged consumers from any large negative impacts of tariff reform.

6 Progressing network tariff reform

Network tariff reform will provide consumers with fairer electricity prices in the short run and cheaper prices in the long run. But governments in the NEM states and in Western Australia will need to act if these benefits are to be realised. This chapter summarises recommendations that will ensure new network tariffs can be adopted effectively.

6.1 What all governments should do

Fair pricing for power identified three structural barriers to network tariff reform: limits on existing retail price competition; the absence of smart meters for many customers; and consumer inertia.⁶⁶ While progress has been made in these areas, the imminent introduction of new network tariffs in NEM states from 2017 requires governments and network businesses to take coordinated and practical steps to ensure their implementation.

Set a timetable for network tariff reform

Governments and distribution businesses need to commit to network tariff reform. A staged approach to introducing new demand tariffs from 2017 should be adopted, with tariff reform fully implemented by 2020.

Develop an effective communication strategy

Governments, together with distribution businesses and electricity retailers, need to develop and implement a communications strategy to gain public support for tariff reform. Other stakeholders,

including consumer groups, should be engaged in this process to ensure no members of the community are left out.

Provide support for vulnerable customers

Among those who will face higher bills from network tariff reform are some low-income households. Governments need to provide appropriate assistance to these consumers. This assistance can be both financial, through either the welfare system or concessions frameworks, and practical, through tools and information that will help them manage their energy use.

6.2 What the Western Australian Government should do

The Western Australian Government should seek to progress network tariff reform in both the SWIS and the Horizon Power distribution area. Five coordinated actions could form the basis for success.

Roll out smart meters across the SWIS

The vast majority of households in the SWIS do not have a smart meter, which is needed for more cost-reflective tariffs. The government should develop and implement a cost-effective process for rolling out smart meters to all households.

The ERA should regulate retail tariffs in the SWIS

Cost-reflective network tariffs need to be passed through effectively in the retail tariff to make sure consumers receive the right price signals. While retail price regulation remains in place, the government should pass control for setting retail household and

⁶⁶ Wood, Carter and Harrison (2014), p. 39

small business tariffs to the ERA to avoid undue political considerations in setting electricity prices.

Restructure existing subsidies

The subsidy paid to customers in the SWIS should be phased out according to a firm, clear timetable. Where subsidies continue to exist across all areas of Western Australia, they should be applied to customers in the most efficient manner possible. Any subsidy applied should have a minimal impact on the price signals provided by cost-reflective tariffs.

Remove the Tariff Equalisation Contribution

The subsidy currently paid from customers in the SWIS to customers in the Horizon Power distribution area should be abolished and replaced with a direct subsidy from the government to Horizon Power. This will allow customers in the SWIS to pay prices that are more cost reflective.

Target subsidies more effectively to Horizon Power's customers

Part of the direct subsidy Horizon Power receives from the government should be used to provide a direct rebate to vulnerable customers. This will make sure vulnerable households are protected from significant bill shock as a result of new network tariffs without compromising on the effectiveness of price signals.

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