BANKWEST CURTIN ECONOMICS CENTRE

POWER PLANS FOR ELECTRICITY

The impact of tariff structure changes on energy vulnerable households

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The Bankwest Curtin Economics Centre is the first research organisation of its kind in Western Australia, and draws great strength and credibility from its partnership with Bankwest, Curtin University and the Western Australian government.

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The Centre is able to capitalise on Curtin University's reputation for excellence in economic modelling, forecasting, public policy research, trade and industrial economics and spatial sciences. Centre researchers have specific expertise in economic forecasting, quantitative modelling, micro-data analysis and economic and social policy evaluation. The Centre also derives great value from its close association with experts from the corporate, business, public and not-for-profit sectors.

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Executive summary

In this report we discuss a mixed methods research project aimed at gaining a better understanding of the experience of energy vulnerable households in response to changes to electricity tariff structures.

By vulnerable, we intend those households that are either in energy poverty or are in danger of falling into energy poverty; for practical purposes we apply Horizon Power's definition of vulnerable which is all customers in receipt of concessions, and those reporting lower incomes or with larger families.

The research is a collaboration between Bankwest Curtin Economics Centre, WACOSS and Horizon Power and draws on a rich dataset resulting from a pilot project in regional WA that was conducted by Horizon Power over the 2016/2017 summer.

With this pilot, Horizon Power was able to test key features of a 'Power Plans' pricing concept based on a model similar to the mobile phone plans, familiar to many. Access to smart meters at every household in the location allowed both the study participants and control group to be monitored.

The study examined the effect on consumption behaviour and customer experiences through demand data, a post pilot survey and by gathering data on first-hand experiences through semi-structured interviews. These analyses sought to understand whether respondents believed that Power Plans had: a) changed how they consume energy; b) affected their general well-being; c) increased their feelings of control; and d) lessened their feelings of vulnerability with respect to their electricity bills.

The resulting data and associated analysis are unique in Australia given the regional location of the study and nature of tariff being tested.

Key findings

Costs of energy high in north of the State

For some vulnerable customers, the absolute magnitude of their bills is too high in relation to their ability to pay, with some individuals interviewed having bills greater than $7,000 annually. This appeared mostly to relate to inefficient air-conditioning systems, uninsulated houses or lack of information about efficient usage or appliances.

Power Plans recognised as helping to smooth bills

Over 80% of vulnerable customers feel very or somewhat anxious about high summer bills. A similar proportion feel frustrated by the current lack of visibility on the impact of changes to their electricity usage. They recognised that Power Plans are a way to provide greater visibility of behaviour change and helped to smooth annual costs.

Participants generally successful at remaining within peak allowance targets

The post-pilot survey showed that participants were able to change their usage successfully. Around 63% of vulnerable customers kept all incentives until end of pilot and a further 18% lost only one. A study of actual usage suggests that 25% of participants would be able to drop their peak demand by around 15%.

Controlling peak usage usually achieved through turning air conditioning off or down

Turning off air-conditioning units was the first priority change action among all participants to decrease consumption during peak period or after receiving an alert. Two thirds of respondents reported turning air-conditioning units off to stay within the allowance, and half of them changed the temperature settings.

Doubts were expressed by some about maintaining the regime

A third of vulnerable customers suggested they would struggle to maintain changes to consumption they made during the pilot – this compares to 15% for the whole group of pilot participants.

Some anxiety reported relating to staying within the allowance

A number of those households interviewed reported feeling anxiety, especially when they received alerts about a possible breach, either related to a sense of wanting to abide by the conditions of the peak allowance or concern at the potential loss of the incentives.

Remaining within their allowances, vulnerable customers were forced to make difficult choices

Customers needed to choose, for example, between using the oven to prepare a cooked meal or to run the air conditioning. There was evidence from the interviews that consumers were curtailing cooling despite experiencing discomfort.

Key implications

Some vulnerable customers could be worse off under Power Plans

While usage data suggests that two thirds of vulnerable customers could expect to be better off under Power Plans, the remaining third of this customer group could be worse off. Given that the customers already find power prices to be high and the location in the tropics necessitates significant usage of air-conditioners during the summer months the potential for bills to rise further is clearly of significant concern.

Explore means to reduce impact on vulnerable customers

Devising effective responses will initially require a better understanding of the reasons why some vulnerable customers are worse off. Solutions could include exempting specific vulnerable cohorts likely to be at risk, providing subsidies or rebates to compensate the most vulnerable, providing improved energy efficiency in rental properties, offering financial support for solar installation or allowing optionality for specific communities.

Risk of customers suffering excessive discomfort to stay within peak allowance

Customers indicated that they were having to make trade-offs regarding which appliances to run during the peak period; half of vulnerable customers indicated that they turned off air conditioners when they received an alert. These data do not alone indicate that customers are subjecting themselves to excessively high temperatures but interviewees reported enduring periods of discomfort. Vulnerable customers might be more inclined to seek to make savings in this way and as a result suffer disproportionately more discomfort.

Need to avoid replacing one source of anxiety with another

As discussed, vulnerable customers reported feelings of anxiety when alerts were received or when they sensed they were at risk of exceeding their peak allowance. Once again, it was unclear whether this was a result of concerns about losing the incentives or simply of exceeding the agreed peak allowance. Customers related concerns about the significant fluctuations in power bills between winter and summer and the Power Plans concept is designed to reduce these fluctuations. It seems vital to ensure that in seeking to alleviate one source of stress, another is not created or exacerbated.

Focus on ensuring effective communication with vulnerable customers

Vulnerable customers consistently report reacting less readily to alerts than non-vulnerable customers – when questioned whether they reacted to alerts, 61% of vulnerable customers reported doing so often or sometimes compared with 69% among non-vulnerable consumers. Similarly, the share of vulnerable customers reported switching air-conditioning off or increasing temperature in response to alerts was 10 percentage points lower than non-vulnerables. This requires further analysis to understand why vulnerable customers were less able to respond, despite indications they had more to gain by doing so.

Introduction

The purpose of this report is to describe a mixed methods research project aimed at improving our understanding of the experience of energy vulnerable households under changes to electricity tariff structures. The research is a collaboration between Bankwest Curtin Economics Centre, WACOSS and Horizon Power and draws on a rich dataset resulting from a pilot study in regional Western Australia (WA) conducted by Horizon Power over the 2016/2017 summer period.

Changes to the electricity market in WA

Policy with respect to the supply of electricity in Western Australia remains fluid, reflecting the desire to bring more competition into the market and the need to reduce the amount of subsidy provided to the electricity industry. Moreover, shifts in technology and consumer preference have seen rapid growth in alternative energy systems and a consequent pressure on existing utility business models. The government of Western Australia initiated an Electricity Market Review (EMR) in 2014 some findings from which were published in 2016. However that process stalled and has been, at least temporarily, abandoned following a change of leadership in 2017. The government's goal at the time the EMR was initiated was to achieve full retail contestability in the South Western Interconnected System (SWIS) by July 2019 (Economic Regulation Authority, 2016), but several obstacles present themselves, not least the change of government in 2017. The local regulator (IMO) was initially subsumed into the National Electricity Market (NEM) regulator (AEMO) on the east coast but exactly how (or if) competition in WA will be delivered remains unclear. Recent discussions with the Energy Minister and Treasurer indicate the status quo will be maintained for the time being, as we watch market developments and the impacts of new technologies and await the emergence of some policy and price stability within the NEM.

Notwithstanding the changes in the SWIS, electricity provision to the Remote and Regional Area of Western Australia (the RRA) remains a monopoly, with service delivered by state-owned Horizon Power (HP), and there are no plans for that to change in the short term. While not subject to the regulatory changes affecting the SWIS, HP is under pressure to control costs and has been affected by the same changes to technology and consumer preferences. It is worth noting that the cost of power delivery and the development of new infrastructure is higher in the RRA, as are the savings to be made by deferring or avoiding additional investment. However, as State policy equalises domestic power prices across the state, considerable subsidies must be provided to consumers in the RRA and there are significant savings to be made by reducing or deferring the need for more power generation in this area.

The Power Ahead trial

Recognising these challenges, Horizon Power developed the 'Power Plans' pricing concept, based on a model similar to the mobile phone plans now familiar to most households and allowing for more cost-reflective pricing. The Power Ahead pilot allowed the key features of Power Plans to be tested with the cooperation of customers, and the results were used to refine the Power Plans concept which was then presented to government for consideration for a more widespread roll-out.

The Power Plans concept is described in more detail later in the report, but in essence it is a pricing scheme intended to reduce peak power usage, recognising that heavy power users contribute disproportionately to the cost of power delivery, especially at peak times. During the pilot, Horizon Power allocated each customer a peak usage allowance to simulate customers' willingness and ability to change consumption patterns and drop to a lower cost plan. Moreover, the plan enabled customers to earn incentives equivalent in value to what they would receive by selecting a smaller power plan in a retail environment.

Significance of the work

We believe the work carried out during this pilot and the results presented in this report to be valuable from a number of perspectives. Firstly, the setting of the research is unique, focusing on a remote community in Western Australia (Port Hedland) with a complex mix of fly-in-fly-out workers and permanent residents, including many Aboriginal ones. Secondly, the Power Plans concept being tested is unique in the Australian market and represents a quite different approach from those being tested or adopted in other jurisdictions, most of which are built around time of use (ToU) tariffs. Finally, all households in the community – both those participating in the trial and those not – have been fitted with a smart meter allowing a much more granular picture of behaviour during the trial period to be gained than is achievable in most similar research projects.

Organisation of the report

The report is organised as follows: first we discuss the background to the project and the broader policy and market issues currently impacting the electric utility sector in Western Australia; then we provide some background to the Power Plans project; describe the pilot project in more detail and discuss the methodology for the research described in the report; present the main findings of the research and finally, we discuss the findings and deliver our key conclusions.

Background

Background

In this section we describe some of the market and policy context surrounding the study and underpinning the need to review the way in which electricity is delivered and charged for in Western Australia.

Background to electricity supply in WA

The supply of electricity in WA defined by two distinct regional models operating within the Southwest Interconnected System (SWIS) and the Remote and Regional Area as discussed above.

The SWIS operates as a single interconnected network centred on the Perth conurbation. Limited competition exists in generation and retail to larger commercial and industrial customers, with full retail contestability having been planned "as soon as practical" (Department of Treasury WA, 2017) prior to the change of government in 2017, but now appearing to be on hold for the time being. Both generation and retail continue to be dominated by the incumbent player (Synergy) while transmission and distribution remains a monopoly (Western Power).

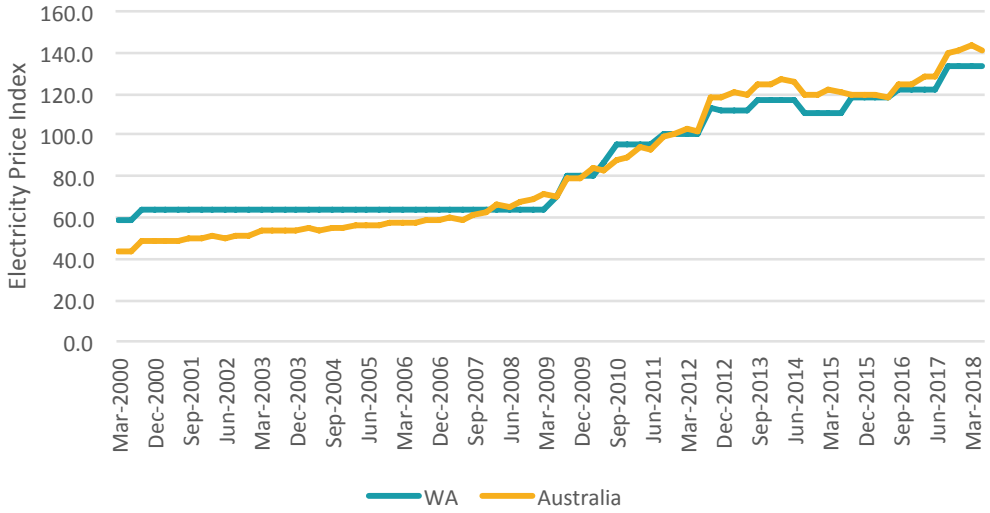
The RRA is serviced by a single, vertically integrated supplier, Horizon Power, which is owned by the State Government but required to be commercially focused (referred to as Government Trading Enterprises or GTEs). The region is characterised by a number of microgrids of differing sizes centred around main population and / or industrial centres. Horizon Power has some 40,000 residential and 9,000 business customers and manages supply in 35 communities. Generation is characterised by local diesel or gas turbine power plants which are costly and suffer from high greenhouse gas emissions.

After Tasmania, Western Australia is the highest per capita consumer of electricity among Australian States. Electricity consumption per capita has risen steadily since the late 1970s and overall consumption has grown by 2.5 times in the last 40 years, with consumption being highest in the northwest of the state, due primarily to the need for air conditioning. Other states, meanwhile, have recorded a modest decrease (Cassells *et al.*, 2017) over the same period.

Electricity prices across the whole of WA are currently regulated, in part to ensure consistent prices to domestic consumers across both SWIS and RRA, where cost of delivery can vary significantly.

Figure 1 shows the price index for domestic electricity since 2000 in WA and in Australia (Dec 2011 = 100). As can be seen, WA had higher prices than the Australian average in the early 2000s, prices outside WA has since risen more quickly and today WA enjoys slightly lower prices. Although the fixed component of electricity price in WA doubled in mid-2017, the sharp increase in electricity prices in other States is responsible for this gap (Cassells *et al*., 2017).

Figure 1 Electricity price index in WA and Australia as a whole (reference year 2000)



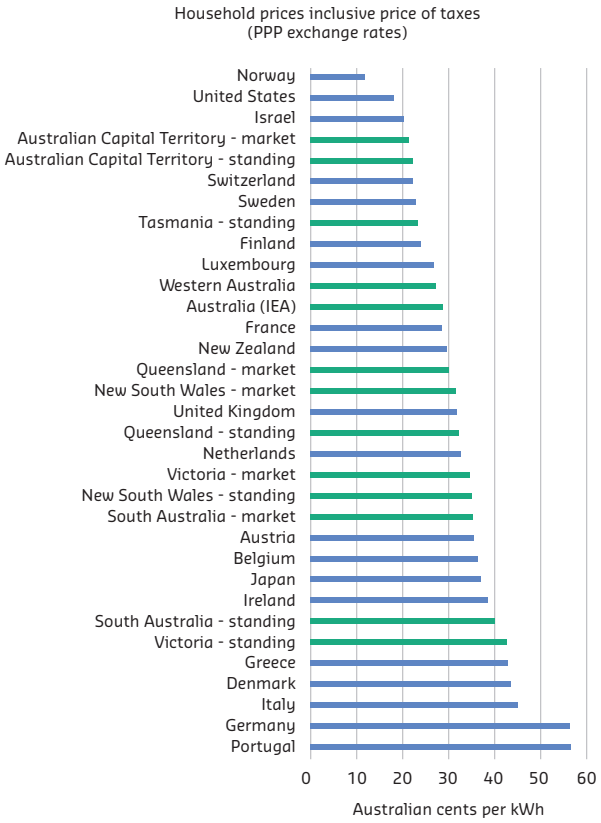
Source: (ABS, 2018) Cat No. 6401.0 Consumer Price Index, Table 11 (Reference period of index Mar.2011=100).

The chart also highlights, the sharp price increases in WA between 2009 and 2013 when the regulated price regime that existed prior to this period was changed and the attempt to create a competitive market began. According to the AEMC (2014), the price rises mark "...a move toward prices that reflect actual costs of supply, higher cost of fuel used for generation, increased network operating costs following a period of under investment and increases attributable to environmental policies." Nevertheless, despite an 86 per cent increase in prices since 2009, the estimated total cost of delivering electricity was still higher than the price (Public Utility Office, 2014), suggesting more rises may ensue. While prices actually decreased (-4%) in 2014 due to the carbon price repeal, AEMC (2014) projects that electricity prices will continue to climb in WA for the foreseeable future.

Electricity prices in Australia were a little below the OECD average until 2010 but persistent price increases meant that by 2011 this advantage had been eroded and by that time Australian electricity prices were 10 per cent higher than average prices in Japan, 20 per cent higher than the EU, 70 per cent higher than the U.S. and 130 per cent higher than Canada.

As Figure 2 shows, currency movements since 2011 have had an effect on relative power prices and in 2013 household electricity prices in Australia were close to the IEA median.

Figure 2 International electricity price comparison, 2016



Source: CME (2016).

In WA the electricity tariff by-laws set out the fees and charges that Synergy and Horizon Power may charge domestic electricity consumers. Table 1 shows the daily standing and per unit electricity prices in July 2018 (a unit is a kilowatt-hour or KWh).

Table 1 Home Plan (A1) Standard Tariff

Home Plan (A1) Tariff	Prices Effective 1 July 2018
Supply charge – cents per day	101.5493
Electricity charges – cents per unit	28.3272

Source: Energy Operators (Powers) Act 1979 - Energy Operators By-laws 2006 (WA).

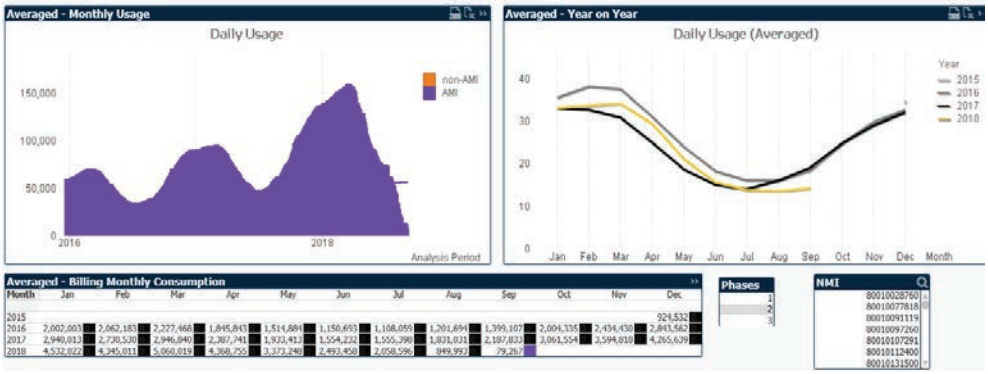
With average electricity consumption lying at around 15KWh per day, electricity expenditure for households in WA increased by 10.4 per cent in 2017 and 7 per cent in 2018 representing a $1,843 annual cost for the average household (WA Budget Paper 3, 2018). The 2017 increase was mostly the result of a doubling of fixed part of electricity tariff as mentioned previously (Cassells *et al*., 2017). A rise in the fixed charge may impact disproportionately on low income and low consumption households, as they cannot manage their costs by reducing consumption. Note also that there is significant regional variation in power consumption. Data supplied by Horizon Power and Synergy indicate that the average energy consumption in the NWIS (Pilbara region) is around twice that consumed in the Perth metropolitan region (see Table 2).

Table 2 **Average yearly electricity consumption, WA regions, 2017**

Region	SWIS	Esperance	Gascoyne/ Mid West	West Kimberley	NWIS (Pilbara)
Average use (kW hour)	5,444	4,821	6,405	9,833	10,890
Average cost	$1,618	$1,453	$1,873	$2,780	$3,060

Note: Average cost = (Average consumption) x A1 tariff ($0.2647) + Daily supply charge rate ($0.4860) x 365.
Source: Bankwest Curtin Economics Centre | BCEC analysis using data from Horizon Power and Synergy.

Note also that there is much greater seasonal variation in electricity consumption in the Northwest regions given the seasonal extremes of climactic variation in the tropics (as shown in Figure 20).



Source: Horizon Power 2018.

As discussed above, in light of the change of government in WA in 2017, the regulatory and market environment is uncertain and may remain so for the foreseeable future.

Need for cost reflective pricing

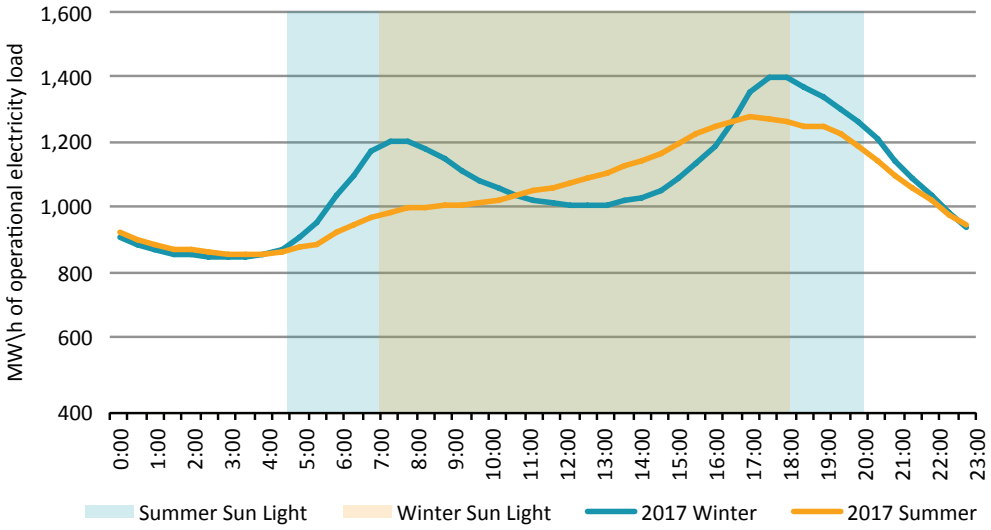
In common with other regions of Australia and elsewhere globally, provision of electricity in the RRA is facing a number of key challenges. Disruptive technologies and changing consumption habits are having a profound impact on utilities and utility business models. Home generation, and more recently storage, have become more readily available to home owners and the affordability of these systems has been improving. At the same time, home air-conditioning has become more ubiquitous and in the north of Western Australia is considered something of a necessity owing to the extreme climactic conditions. The addition of new loads such as electronic devices, is also contributing to an increase in demand and future applications such as electric vehicle charging will ensure this pattern of consumption continues. Taken together, these changes are having a disrupting effect on the market and affect different consumer groups in different ways (see Figure 3). It is well known that the cost of power, the quality of home construction and thermal insulation and the efficiency of appliances are major affordability issues for households, as will be discussed in the following sections.

Figure 3 Disruption in the electricity sector

Source: Horizon Power (2017).

The challenges facing the electricity sector are encapsulated in the so-called 'duck curve' curve in Figure 4, which shows the typical summer and winter electricity loads in Western Australia by time of day. These curves show the average summer and winter consumption curves for WA, highlighting a winter duck curve with morning and evening peaks and a gradual daily ramp-up to an evening peak in summer.

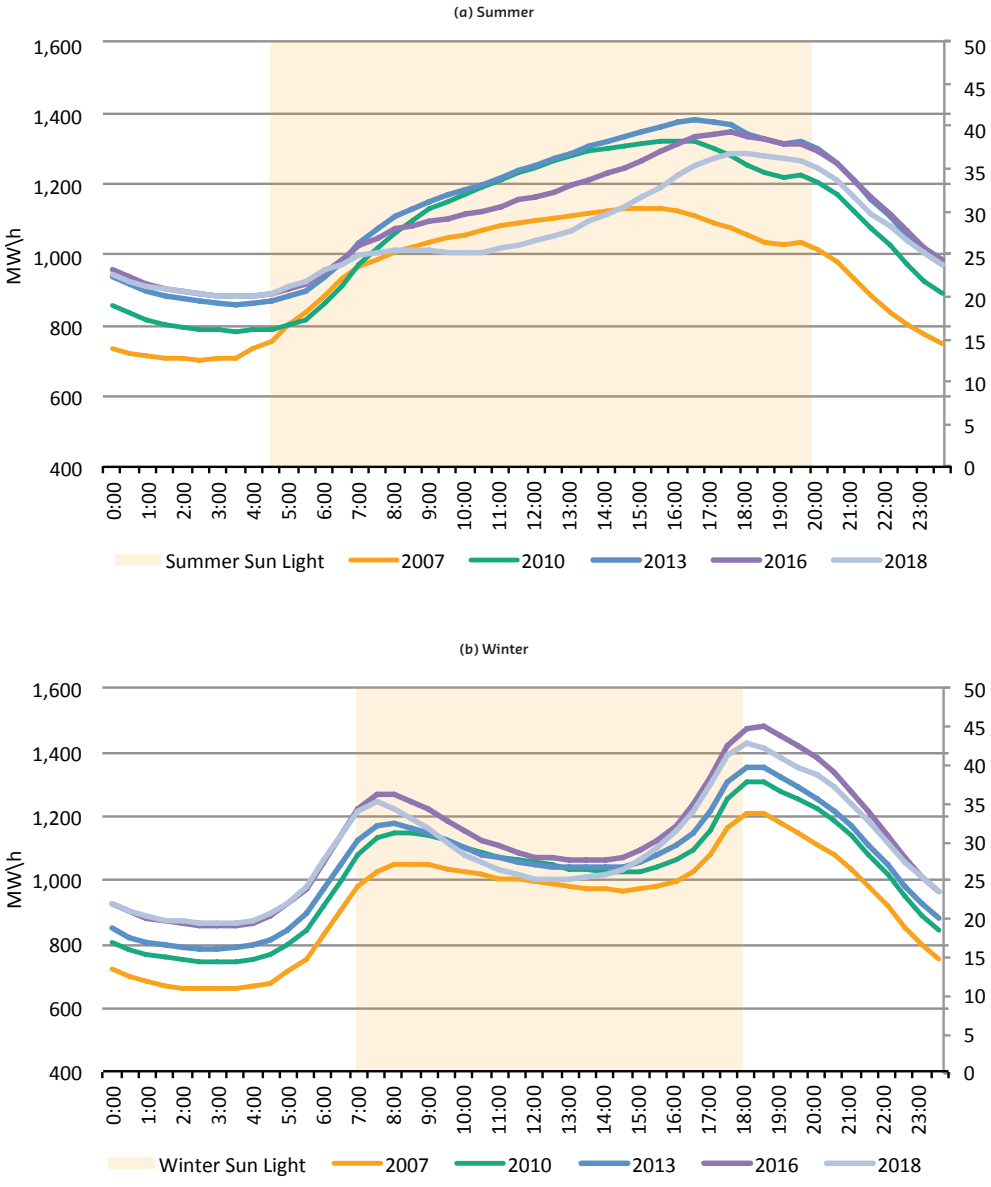
Figure 4 Summer and winter electricity load in WA, by time of day, 2016



Source: Bankwest Curtin Economics Centre | AEMO Market Data.

Figure 5 demonstrates the effects of increasing self-generation over time in WA, and helps to visualise the challenge facing utilities created by the introduction or increased use of these technologies. Daily consumption patterns in WA have changed over the last decade with Figure 5 showing clearly the trend towards more pronounced morning and evening peaks in winter, and a larger and fatter afternoon and evening peak in summer. Taking into account the tropical climate in the north west of WA, we would expect a stronger, sustained summer peak load combined with lower and less 'peaky' winter consumption.

Figure 5 Comparison of summer and winter electricity loads in WA, 2007 to 2016

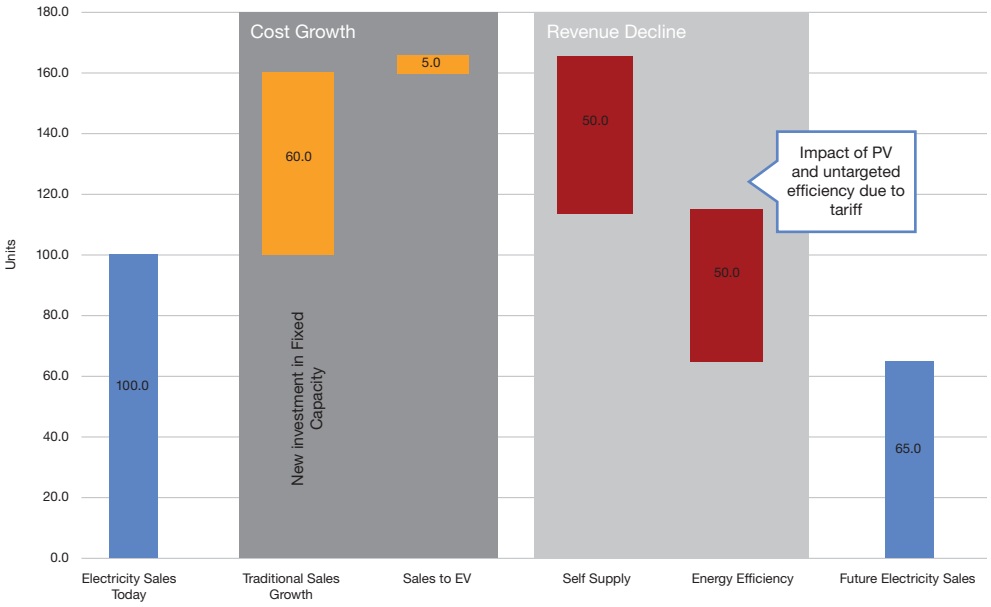


Source: Bankwest Curtin Economics Centre | AEMO Market Data.

Increasing demand at peak times from air conditioning and the proliferation of electronic gadgets has created the need for more capacity to cope with the peak demand. By contrast, excess solar generation at off peak times has led to under-utilisation of generation capacity during these periods.

This worsening of utility asset utilisation has had a significant impact on utilities like Horizon Power, creating a shortfall in cost recovery, as illustrated in Figure 6. The ultimate impact of this will be to drive up the price of electricity to customers unless measures are taken to bring load and non-dispatchable generation[1] into balance.

Figure 6 **Impact of PV and untargeted efficiency on future revenue for electricity providers**



Source: Horizon Power (2017).

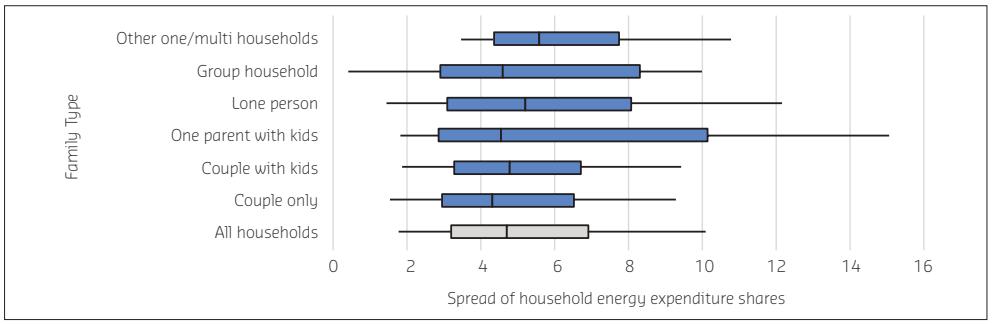
Such changes to the electricity market system in turn creates two issues of particular relevance to the study described in this report. One is the absolute rise in the cost of electricity delivery and its price to consumers. The other is the potential for wealth transfer between different groups of consumers.

As was discussed previously, the price of electricity could potentially rise as a result of the need for additional investment in capacity to meet peak demand. The *Power to the People Report* (Cassells *et al*., 2017) highlighted that low income households spend proportionately more of their income on electricity (with 10% of low income households spending more than 10 per cent of their disposable income on electricity, compared to an average of 4 per cent of spending for the average household) as shown in Figure 7. Single parents in particular face a wider spread and greater burden of energy expenditure, with around a quarter spending over 10 per cent of their income on energy costs alone, and one in ten spending at least 15 per cent. These lower income households are therefore more likely to be impacted by any rise in prices.

1 Non-dispatchable generation refers to generation on the system that cannot be called upon when required to generate electricity; solar and wind generation, for example, fall into this category.

Figure 7 Variation in household utility expenditure shares in WA by family type: 2009 to 2017

State	Lower		Typical		Higher
Percentiles	10th	25th	50th	75th	90th
Couple only	1.5	2.9	4.3	6.5	9.3
Couple with kids	1.9	3.3	4.8	6.7	9.5
One parent with kids	1.8	2.8	4.6	10.2	15.1
Lone person	1.4	3.1	5.2	8.1	12.2
Group household	0.4	2.9	4.6	8.3	10.0
Other one/multi households	3.5	4.3	5.6	7.8	10.8
All households	**1.8**	**3.2**	**4.7**	**6.9**	**10.1**

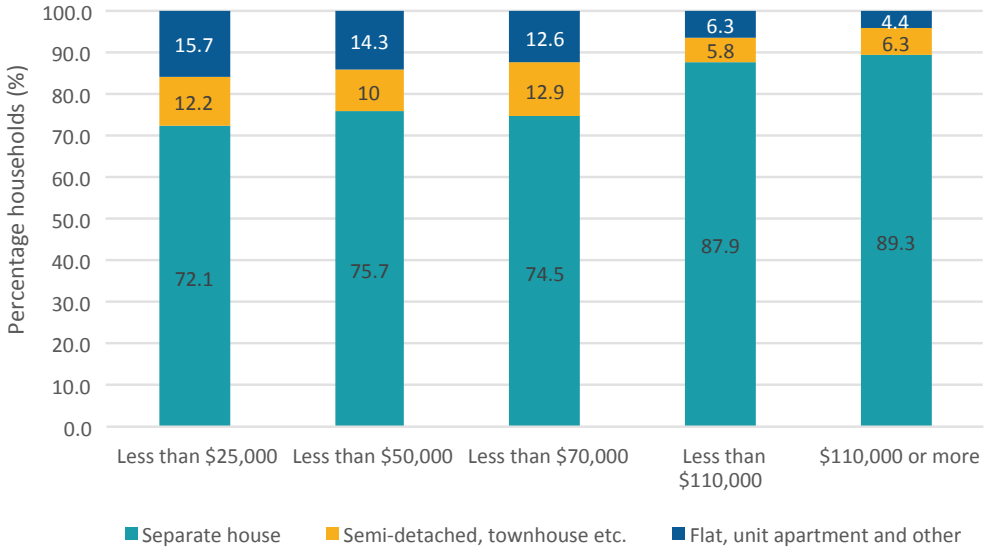


Source: Bankwest Curtin Economics Centre | Authors' calculations from HILDA.

Consumers who are able to install self-generation and take advantage of other means to reduce their energy consumption (such as home insulation and energy efficient appliances) are able to mitigate the effects of rising utility electricity prices, and have benefited significantly from the opportunities to do so. On the other hand, customers who are unable to afford (or as tenants, are unable to install) such measures, including vulnerable customers, must endure the full impact of increasing prices and may have to shoulder a bigger share of the cost of capacity upgrades.

The potential problem facing low income customers is confirmed through analysis of housing tenure. Previous research (Cornwell *et al*., 2006) has shown that lower income earners are more likely to be renters. These findings are confirmed in Figure 8, which shows that over 40 per cent of the lowest income households in Perth are renting either privately or from the State Government.

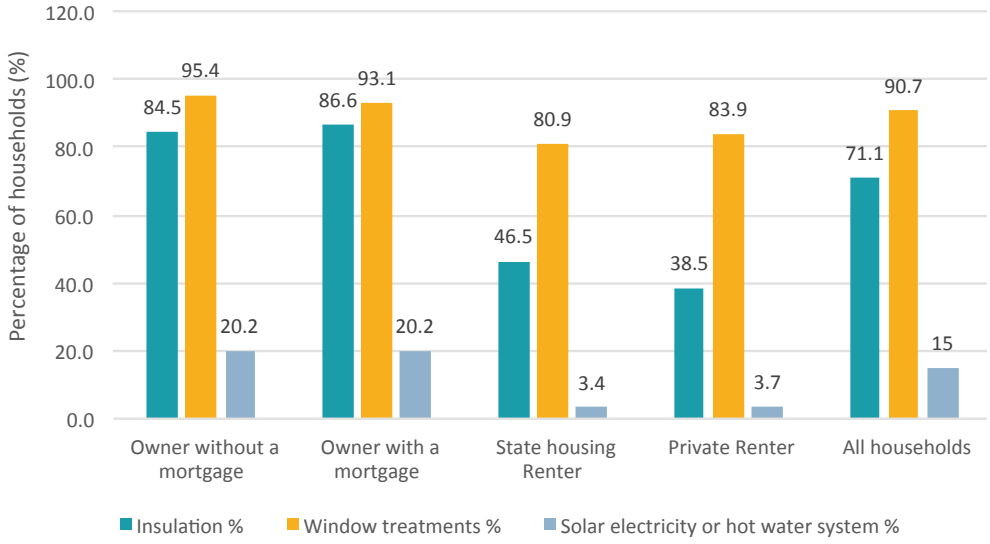
Figure 8 Household tenure type of GHI distribution in Perth, 2009-10



Source: ABS. Cat. No. 4656-5.

The same research shows that rental properties are far less likely to be equipped with solar power or solar hot water than owner-occupied premises (see Figure 9), reflecting the lack regulation or financial incentives for landlords to invest in home power or thermal generation. Power bills are, after all, the responsibility of the tenant, and any savings from such measures fall to them, not the landlords who would be required to make the investment.

Figure 9 Percentage of dwellings with insulation in Australia, 2009-10

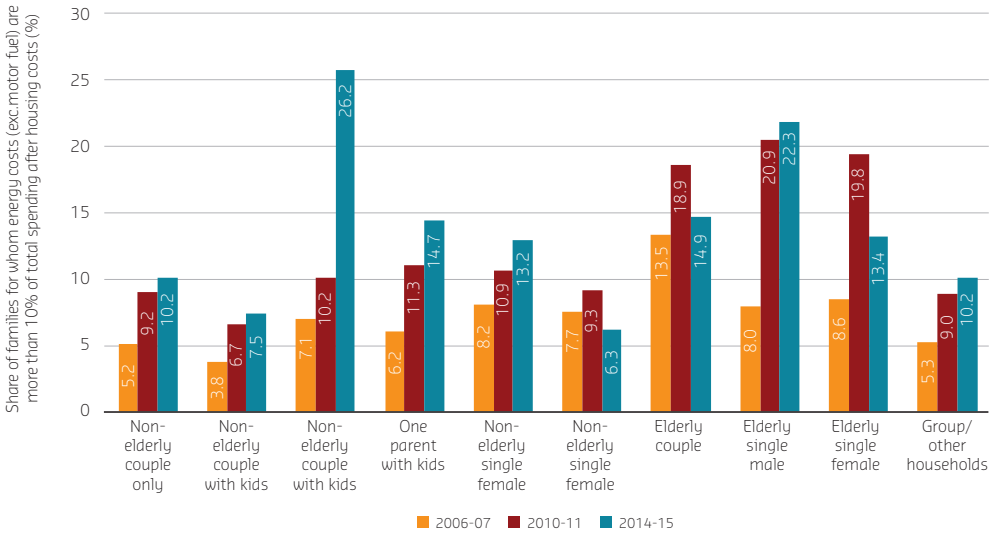


Source: ABS. Cat. No. 4656-5.

Consideration of the growth in prevalence of a basic measure of energy poverty (defined as those households reporting spending greater than 10 per cent of oncome on energy costs) highlights the manner in which rising costs are impacting disproportionately on different household types.

Figure 10 highlights single parents and elderly singles as potentially vulnerable household types who are spending disproportionately. Couples with kids also show a dramatic recent increase in the number of households committing more than 10 per cent of spending on energy, and while we note these households tend to be in higher income groups that can afford to spend more on energy this rising spending might lead to increased financial stress.

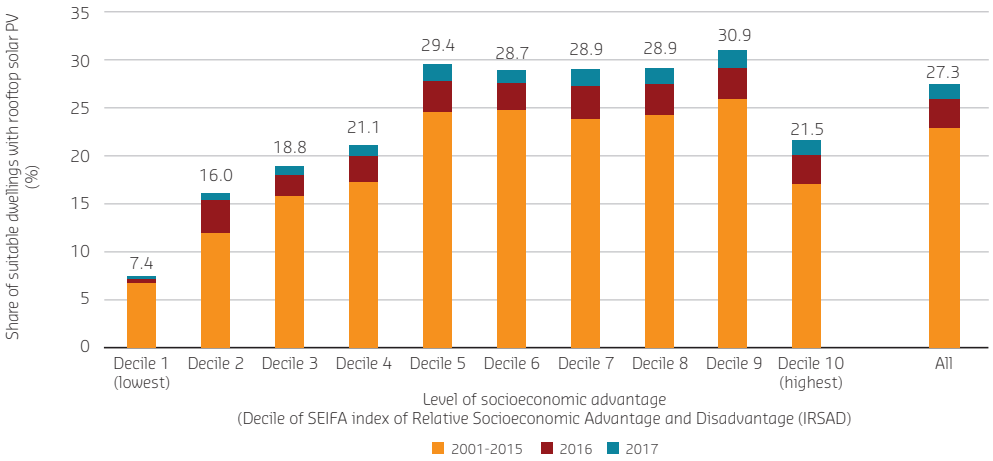
Figure 10 **Shares of WA households committing more than 10 per cent of spending towards utilities, by family type, 2006 to 2015**



Source: Bankwest Curtin Economics Centre | Authors' calculations from HILDA.

Comparison of access to solar power by income decile (Figure 11) also highlights the manner in which low income households are less likely to be able to benefit from these new technologies and installation incentives, and are more likely to face rising electricity prices as a result of their inability to access cheap energy from the sun.

Figure 11 **Shares of suitable WA dwellings with solar PV installed by level of socioeconomic disadvantage, 2001 to 2017**



Notes: Dwellings deemed suitable for Solar PV installation currently include separate houses, or semi-detached row or terraced houses, a classification that follows ABS Cat.No 4631.0 (Table 11). Local Government Areas are classified into deciles of the SEIFA Index of Relative Socio-Economic Advantage and Disadvantage using 2011 Census data collated in Abs Cat. 2033.0. The number of Solar PV installations in each LGA are aggregated from postcode level using ABS concordances.

Source: Authors' calculations using Clean Energy Regulator data on solar PV by postcode to June 2017, ABS Census 2011 and 2016 data, and Abs Cat. 2033.0.

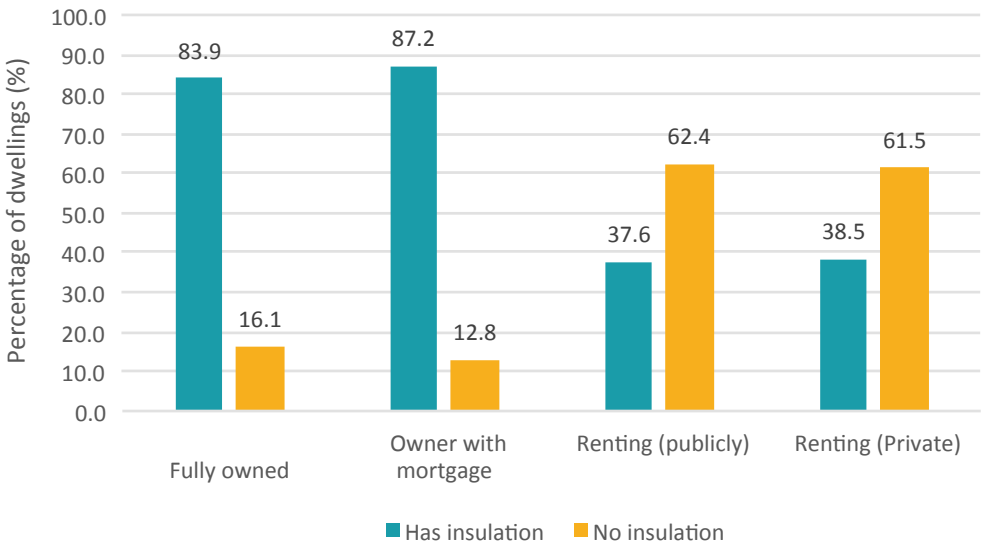
Table 3 Shares of suitable dwellings with solar PV installed to June 2017, by state and socioeconomic disadvantage

	Share of suitable dwellings with rooftop Solar PV installations State or territory						
Level of disadvantage	NSW	Vic	QLD	SA	WA	Tas	NT
Decile 1 (most disadvantaged)	16.5%	0.0%	4.2%	29.7%	7.4%	21.2%	0.0%
Decile 2	20.6%	14.0%	36.1%	30.4%	16.0%	11.0%	12.7%
Decile 3	21.8%	18.5%	28.7%	34.7%	18.8%	13.7%	3.2%
Decile 4	21.0%	21.4%	30.3%	34.3%	21.1%	15.0%	5.5%
Decile 5	20.3%	18.5%	38.4%	33.0%	29.4%	15.6%	0.8%
Decile 6	16.4%	19.3%	26.2%	38.5%	28.7%	11.1%	7.3%
Decile 7	16.0%	16.8%	37.9%	31.8%	28.9%	14.4%	10.9%
Decile 8	12.0%	19.8%	35.5%	62.2%	28.9%	13.6%	18.1%
Decile 9	14.4%	13.6%	30.5%	31.6%	30.9%	15.4%	11.6%
Decile 10 (most advantaged)	11.6%	10.7%	0.7%	30.7%	21.5%	0.0%	5.8%
All	**16.8%**	**16.2%**	**33.7%**	**33.2%**	**27.3%**	**14.0%**	**12.3%**

Note: Illustrative weekly residential household energy costs are calculated for households consuming 15kW/h on Tariff A1.
Source: Bankwest Curtin Economics Centre | Authors' calculations from WA Treasury.

Western Australia has lagged behind other jurisdictions in ensuring access and equity for lower income households, as shown in Table 3. Rising energy costs provide a strong incentive for those who are able to install solar PV (that is, own their own home and can afford to do so) to invest in rooftop systems and reduce their future energy costs, reducing their contribution to paying for shared generation and distribution infrastructure, and driving up costs for those unable to do so.

Figure 12 Percentage of dwellings with insulation in Perth, 2009-10



Source: ABS. Cat. No. 4656-5.

Data for Perth shown in Figure 12 provides further evidence, showing that while more than 80 per cent of owner-occupier dwellings have insulation, only around 37 per cent of rented houses benefit from thermal efficiency measures. It seems then that low income earners, who would arguably benefit most from energy saving measures, are less likely to have access to them since they are more likely to be renters.

Even if they are not renters, efficiency improvements such as high performance appliances or insulation tend to be more costly and beyond the means of low income households, compounding the impact of electricity price rises. Those who are less well-off spend a greater proportion of their income on essential services and at the same time are less able to mitigate the impact of price rises. Table 4 provides insight into the household financial stressors in WA by region, confirming the pressure to which low income households are subjected as a result of electricity costs.

Table 4 **Household expenditure by region and financial stress markers**

Expenditure group	Financial Counselling data, Budget week 2017							
	All	Perth	Rest of WA	Lowest quintile	Income: Centrelink and NSA only	Income: Wages only	Housing: Rent only	Housing: Mortgage only
Current housing costs	48.5	49.3	46.7	48.2	46.3	50.9	44.2	55.2
Food and non-alcoholic beverages	18.1	17.4	18.9	19.3	20.2	15.1	20.5	15.0
Transport	10.3	10.5	10.4	10.4	9.8	11.2	10.4	9.9
Utilities	5.5	5.0	6.0	6.3	6.3	4.5	6.4	4.3
Communication	4.7	4.4	4.8	4.8	4.6	7.6	5.1	4.1
Health	3.6	4.2	3.3	3.4	3.4	6.4	3.5	3.5
Personal care	2.5	2.2	2.9	2.0	2.1	5.1	2.7	2.3
Education	2.1	3.2	1.5	1.4	2.3	3.2	2.0	2.0
Recreation	1.6	1.3	2.0	1.2	1.4	3.2	1.5	1.5
Clothing and footwear	1.0	0.6	1.3	1.0	1.1	1.3	1.1	0.7

Source: Bankwest Curtin Economics Centre | BCEC analysis using data from the Financial Counselling Network.

Moreover, increasing peak electricity demand from heavier users tends to have a disproportionate effect on system costs. Higher income earners tend to have higher consumption since electricity costs are a smaller share of household costs, making these households less sensitive to price. They are also more likely to have access to new technologies like electric vehicles that increase overall electricity demand. Heavier consumers therefore contribute disproportionately to the cost of delivery, but their contribution is shared across all users, increasing the potential for wealth transfer between consumer groups.

The aim of Power Plans is to arrive at a pricing structure that is more cost reflective. Expanding peak capacity relative to the average is especially costly from a social welfare perspective, since it increases the likelihood of assets being under-utilised. It also has the potential to increase the likelihood of wealth transfer discussed previously. Recognising that peak load contributes disproportionately to overall system costs, Power Plans incentivises customers to reduce electricity consumption during the peak period. This helps to mitigate the need to build additional generation, transmission and distribution capacity required to cope with increasing demand during peak periods. It can also reduce operating costs by avoiding the use of costly peaking generation and lessen wealth transfer by ensuring those who contribute most to peak load pay a higher price.

Relationship to previous BCEC work

This work continues on from earlier research carried out for BCEC and reported in *Energy Poverty in Western Australia: A Comparative Analysis of Drivers and Effects* (Cornwell *et al*., 2016). It draws on some of the data collected during that project and seeks to ask some of the same questions of interviewees. The work is complementary in the sense that it offers insights into experiences in remote and rural WA in contrast to the previous work, which drew interviewees from the Perth metropolitan area and neighbouring suburbs only.

Description

of pilot and research undertaken

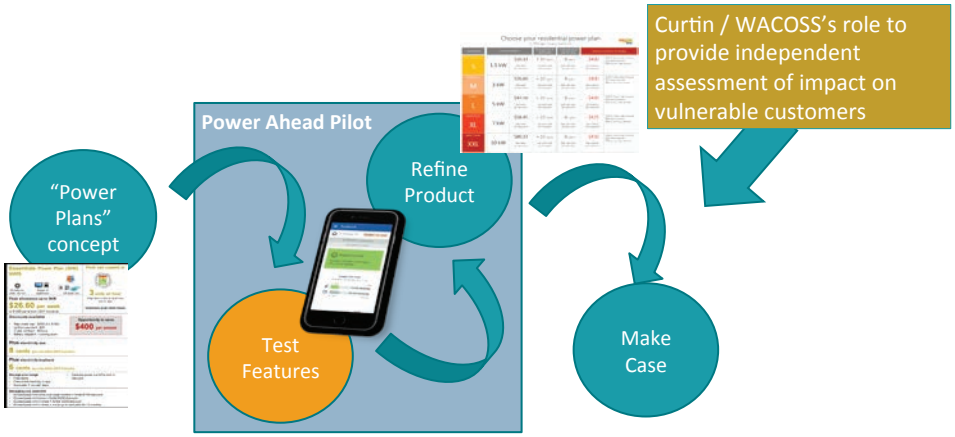
Description of pilot and research undertaken

In this section we describe the wider pilot scheme of which the specific research described in this report forms part.

Introduction

The pilot Power Ahead project was designed to test consumer behaviour when presented with incentives to reduce their consumption during peak periods of electricity demand. The pilot is a forerunner of a tariff which could be made available to electricity consumers, termed "Power Plans", described in the forthcoming section. The process objectives of the pilot are shown in Figure 13.

Figure 13 Percentage of dwellings with insulation in Perth, 2009-10



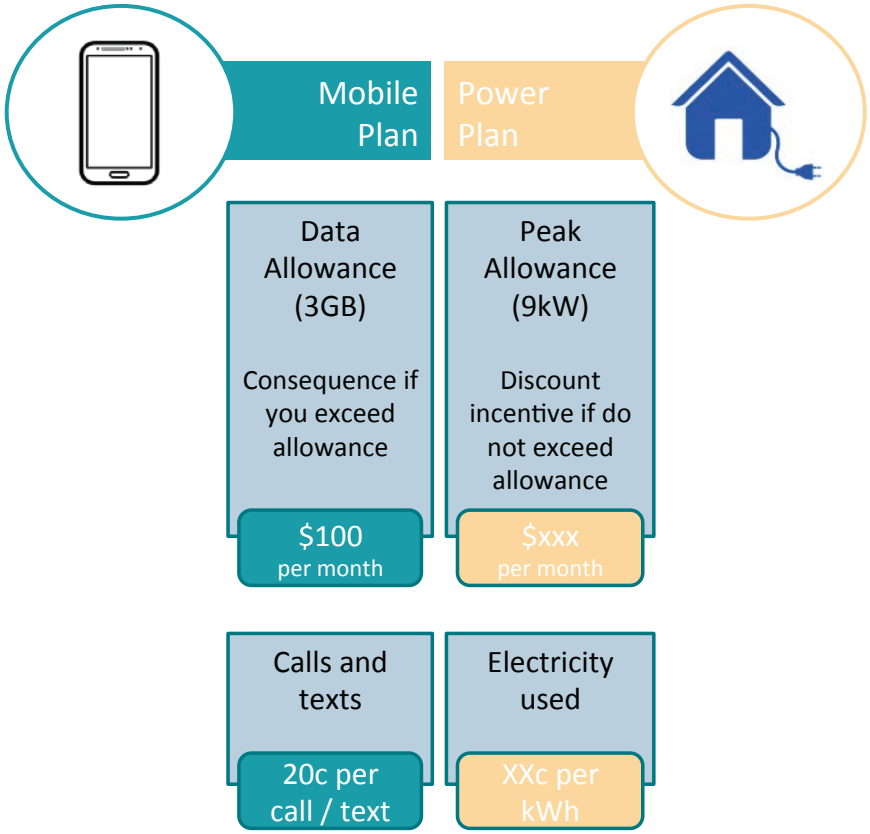
Source: Horizon Power, own research (2017).

Stage 1 was to conceptualise the Power Plans approach. Stage 2, and the core of the Power Ahead pilot project, was to test the features of the Power Plans product and subsequently refine it based on the findings. Finally, in stage 3, a case would be made to the Western Australian government for adoption of the Power Plans product with a view to making it available to Horizon Power's customers (requiring legislative change to electricity tariff regulations[2]).

The Power Plans concept is illustrated in Figure 14.

2 Note that at the time of publishing this report the submission had been made to the Western Australian government and go-ahead was given for Horizon Power to trial Power Plans with customers in a number of communities in the RRA on an opt-in basis with a view to moving to opt-out if that was successful.

Figure 14 Comparison of Power Plans and mobile plans



Source: Horizon Power (2017).

As discussed previously, the pricing mechanism within Power Plans is intended to be more cost-reflective, recognising that there are high fixed costs but relatively low marginal costs in electricity delivery. Each plan has a standard format, with different "size" options available; customers pay a fixed monthly charge for the plan and agree during the on-peak period (during summer between 1 and 8pm) to remain within a fixed electricity usage budget. Customers then pay for usage in the normal way but at a lower rate.

The Power Ahead pilot involved 407 customers in Port Hedland, WA, drawn from three constituent domestic consumer groups – vulnerable customers, non-vulnerable customers responsible for their own bills (both residential and business) and customers whose utility bills are paid for by their employer. Participants were allocated a **peak usage allowance** for on-peak electricity consumption and were offered varying monetary incentives relating to their ability to meet these reduction targets during peak times. Customers in the trial were randomly allocated their peak usage allowance target, grouped in 5 per cent increments up to a 30 per cent usage reduction target, such that there was an equal distribution of customers and customer types in each group. Targets were seasonally adjusted based on customer's historical consumption data for the previous 12 months.

The trial differs from the planned future implementation of Power Plans in its use of randomised targets. The intention is that customers will be free to choose their targeted power plan expenditure and level of reduction, with advice from Horizon Power based on their historical consumption data. The learnings from the trial will help inform how achievable different savings targets are for different types of households. The ability to shift load improves the likelihood that savings can be made and improves the level of savings, but customers can still make savings even without reducing appliance use if they have a 'less peaky load profile'. The peak usage allowance could be used to:

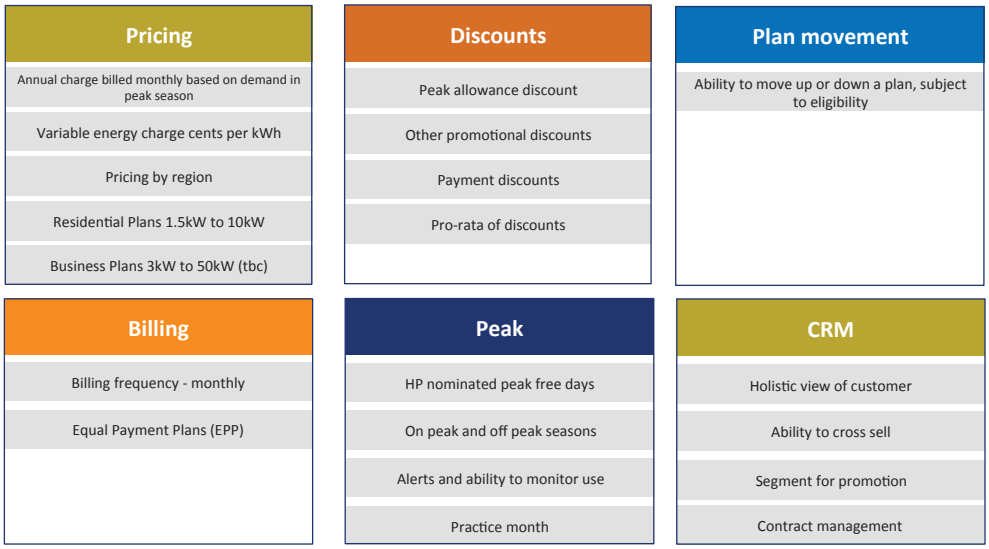
- understand price elasticity parameters;
- quantitatively describe a participant's willingness and ability to reduce peak consumption; and
- assess a participant's ability to move to a lower consumption target.

It is important to note that customers remained on their existing tariff during the research pilot (as required by legislation), but were provided with information about their progress against their allocated target (peak allowance) via a smart device application. Meeting their targets would result in them receiving incentive payments, while exceeding targets would result in the progressive loss of those incentives. They also received alerts and notifications based on a predictive algorithm if Horizon Power believed they would exceed their peak allowance, and the smart app also provided some level of personalised advice for reducing consumption. From time to time during the pilot Horizon Power did not send customers alerts, as a way to test different behaviours; if no alert was sent, customers did not lose any incentive payments for their breaching the allowance. This approach ensured that no customer was actually worse off as a result of participating in the pilot and Horizon Power continued to comply with their legislated tariff obligations.

Peak allowance

The underlying logic of the Power Plans concept is to "achieve more cost-reflective pricing and reduce long run costs by changing electricity usage behaviours while giving customers more choice, value and control over their power consumption." System costs are highly dependent on peak load and Power Plans seek to reduce peak usage, thereby obviating the need for poorly utilised peak capacity. An overview of the considerations relating to the Power Plans approach is summarised in Figure 15.

Figure 15 Considerations regarding Power Plans



Source: Horizon Power (2017).

Power Plans define a maximum peak allowance which reflects a consumer's current peak usage based on their last 24 months history, with larger allowances having higher absolute prices than smaller ones (although with a lower per unit capacity cost). The peak usage allowance is defined in power terms (e.g. 3kW) but in fact consumption is averaged out over each hour and is effectively an energy limit (in this case 3kWh/hr). Customers pay for usage in the normal way, but at a much lower rate than is currently the case (for example 8c/kWh as opposed to 26c/kWh). Customers have the opportunity to earn a rebate at the end of the summer period, the value of which is reduced each time they exceed their allowance.

In this way, those who contribute most to increasing peak capacity pay more for their electricity. All consumers on Power Plans are incentivised to remain within their peak allowance through the opportunity to earn discounts on their future bills if they do manage to do so during the on-peak period. The on peak period as defined as 1pm to 8pm in the summer months (January to March). Consumers who are highly successful in reducing their peak consumption also have the opportunity to drop to a lower capacity, cheaper plan, thereby further reducing their energy costs. An additional benefit to consumers is that, with a larger fixed element to their bills, they have more visibility on their monthly payments which are more predictable, much like mobile phone plans.

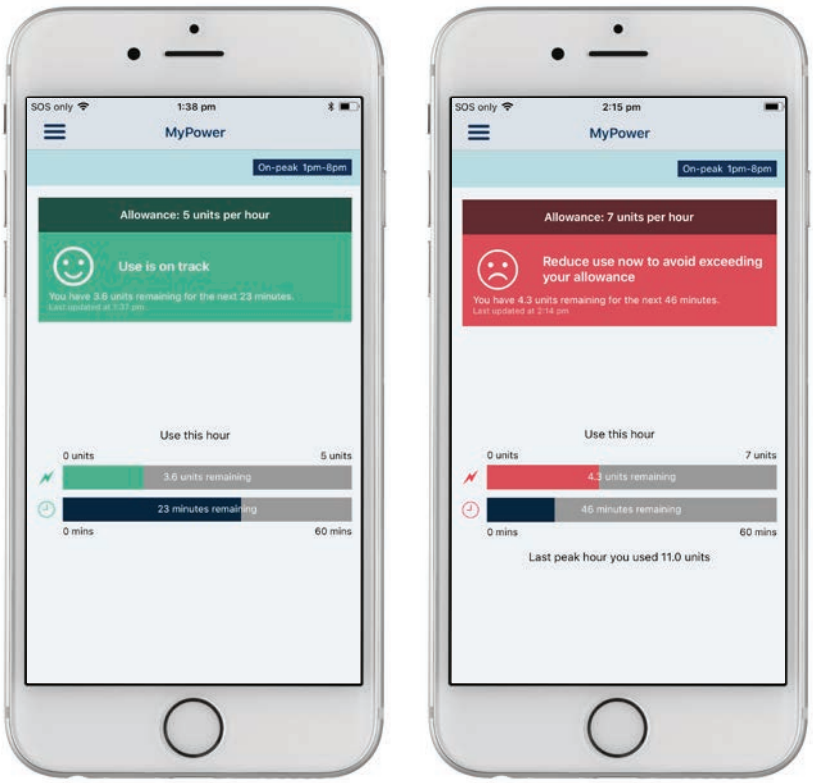
Horizon Power meanwhile benefits from a flatter demand curve and a reduced need to invest in increasing peak capacity or use high-cost peak generation. One potential downside of the tariff is that it lessens the incentive to reduce total consumption with implications for efforts to reduce carbon emissions, although shifting demand could allow improved utilisation of solar energy as discussed in section 2.3.

Shifting demand and aligning fixed costs with the 'fixed' component of revenue will commercially make it more attractive for Horizon Power to allow for increased penetration of rooftop solar. Rooftop solar is limited in many towns in order to maintain reliability and quality of supply. As these technical issues are resolved, commercial issues will also need to be resolved. The cost reflective structure of Power Plans essentially resolves this issue. In short, Horizon Power's view is that Power Plans are more likely to increase the penetration of renewables (especially storage) to reduce carbon emissions. This was recognised by the Clean Energy Council, which jointly bestowed Power Ahead with their Innovation Award.

Customer App

Customers were provided with an application for their smart device which allowed them to monitor their usage in near real time, as illustrated in the screenshots in Figure 16.

Figure 16 Screenshots of smart device application



Source: Horizon Power (2017).

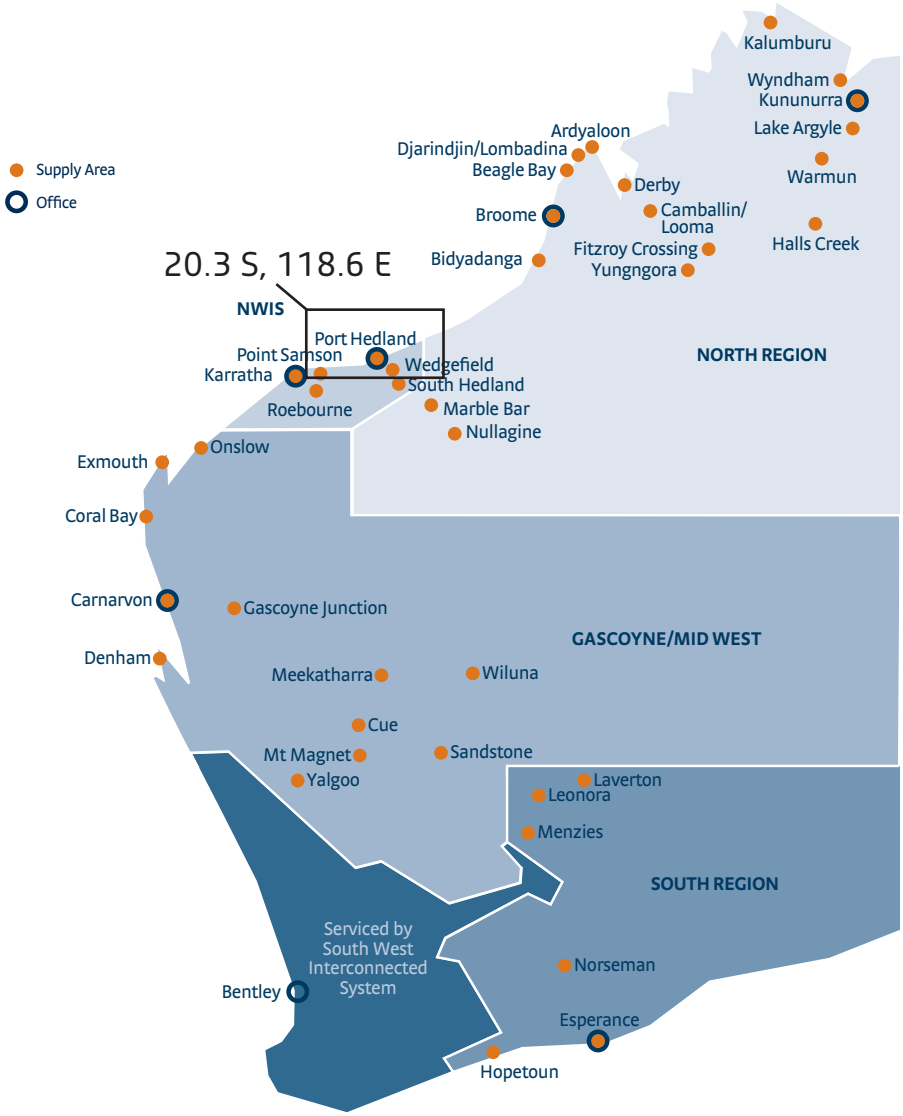
The app allowed alerts to be sent to customers if they were in danger of exceeding their peak allowance, encouraging them to take action accordingly. It also provided users with tips and advice on how to reduce consumption, and can deliver historical data on how they have performed relative to the plan.

For those without access to a smartphone, customers could be alerted through SMS (text) messages of a possible breach. In a number of specific hardship cases, customers were offered a smart device by Horizon Power in order to facilitate their participation in the trial.

Background to trial location – Port Hedland

Port Hedland is a port and mining town critical to WA's iron ore and LNG industries, being an important railhead for a number of significant iron ore mines in the Pilbara region. The town is located in the tropics as shown on the map in Figure 17.

Figure 17 Port-Hedland location



Source: Horizon Power (2017).

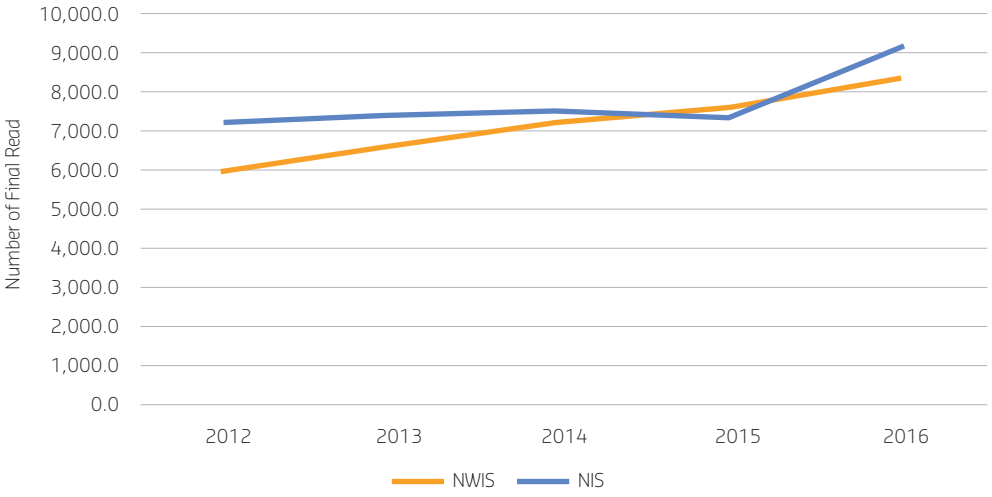
It has a population of some 16,500 (2015), the majority of whom reside in Port Hedland or the adjacent conurbations of South Hedland and Wedgefield. Figure 18 illustrates the main centres of population within the conurbation of Port Hedland and the locations where we carried out interviews with vulnerable customers.

Figure 18 Port-Hedland population centres

Source: Google (2017).

The population includes a significant Aboriginal community which makes up 15 per cent of the total, compared with less than 4 per cent in wider WA. The economy is based primarily on the resources industry as a result of which many inhabits are employed on a fly-in-fly-out (FIFO) basis. There is a relatively high turnover of staff and frequent movement of households both within and in-and-out of the town. Horizon Power estimates that in 2016, 58 per cent of active properties in Port Hedland had a final meter read (that is, the customer moved out during that period). This number has been on the increase, as can be seen in Figure 19 .

Figure 19 Number of final meter reads in Port Hedland by year

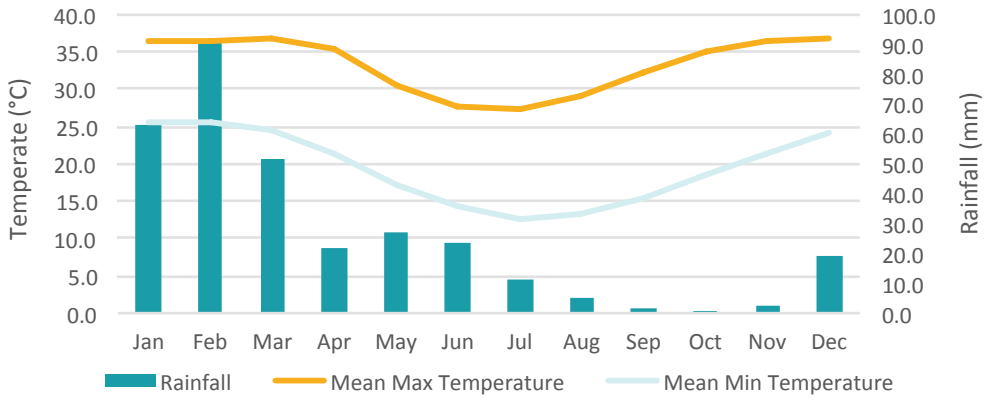


Note: Horizon Power (2017).
Source: NWIS = North-West Interconnected System (Pilbara), NIS = Non-Interconnected System (other areas)[3]

The average salary in the town is $79,000, higher than the WA average of $74,000, reflecting the relatively well-paid jobs available within the resources sector. However, this average hides a wide spread of incomes, and belies a significant number of households on low incomes or in receipt of benefits.

The town's location north of the 26th parallel ensures that the climate in Port Hedland is rather hot in the summer months, as can be seen in Figure 20. Average daily maximum temperatures are consistently above 35ºC for 6 months of the year with relative humidity above 50 per cent in the period December to March. Temperatures can reach as high as 50ºC and air-conditioning is considered a must by many, if not all, households for at least part of the time.

Figure 20 Port-Hedland climate condition



Source: Australian Bureau of Meteorology (2017).

3 The NWIS relates to a series of small scale interconnected networks centred around major conurbations in the RRA; NIS on the other hand relates to areas of the RRA where no significant interconnectivity if present.

There is a high proportion of state owned housing, which previous research has shown (Cornwell *et al.*, 2016) is often poorly insulated. There is also a significant amount of company-owned housing provided to FIFO employees. Since utility bills for these properties are met by the company, this has been shown to result in higher than necessary electricity consumption. Figure 21 shows a selection of properties in the Port Hedland area.

Figure 21 Port-Hedland housing

Source: Various real estate broker websites (2017).

Characteristics of vulnerable customers

Within the Port Hedland area Horizon Power identifies 274 properties as being associated with vulnerable customers who hold a concessions card. This represents just over 6 per cent of all households in the town. For the purposed of the Power Ahead pilot, Horizon Power defined 'vulnerable customers' as residential customers who pay their own electricity bills, have annual consumption of less than 50MWh and at least one of the following:

- Receive a rebate (obtain from billing data) including the Energy Assistance Payment and/or Dependent Child Rebate;
- Household income less than $52,000 per annum (obtain from activation survey); or
- Household income between $52,000 and $104,000 per annum and at least 3 household members under 15 years of age (obtain from activation survey);
- Holder of a concession card (other than a WA Senior's card); and
- Essential services flagged as life support customer or living with a disability (note that these vulnerable customers are excluded from the pilot).

It is worth noting that eligibility for the WA Energy Assistance Payment is restricted to Centrelink Health Care Card, Centrelink Pensioner Concession, Veteran's Pensioner Concession or Veteran's Gold Card holders. The WA Seniors Card is not means-tested and, while holders receive a smaller rebate on their electricity costs, they are not included in this analysis as vulnerable customers.

As the Power Ahead pilot summary data in Table 5 shows, vulnerable customers are likely to:

- have a lower household income than the average customer;
- have no full-time employed household member;
- be in receipt of some form of concession; and
- be a renter.

They are likely to occupy similar sized homes to non-vulnerable customers, but at the same time are less likely to be in receipt of an employer subsidy for their power bills, increasing their vulnerability. In our analyses in this report we did not make independent assessment of whether a customer was in fact vulnerable, but simply accepted Horizon Power's definition.

Table 5 Socio-demographics of the 407 Power Ahead trial participants and 41 vulnerable participants

Power Ahead Participants	Vulnerable Residential	Other residential
Income	50% < $52,000	56% over $104,000
Employment	48% no full time employed occupants	92% at least one full time employed occupant
Concessions	70 %	1%
Third Party Bill Subsidy	10% (largely Dept. of Housing)	35%
House Type	30% not in separate house	20% not in separate house
Tenure	65% rent; 25% own	60% rent; 30% own

Source: Horizon Power (2017).

Vulnerability research

Within the context of the broader pilot, Bankwest Curtin Economics Centre, in collaboration with WACOSS, provided an independent assessment of the effect of the proposed charging regime on vulnerable customers. This specific intervention occurred toward the end of the pilot and in the subsequent analysis of the results. A total of 41 participants in the trial were classified as vulnerable based on whether they were a pensioner or received some form of concession on their energy usage and their self-reported income and household size from the intake survey.

There is no formally accepted definition in the literature to date of the term 'energy vulnerability' (Middlemiss and Gillard, 2015). There is a substantial body of research relating to wider issues of vulnerability which can provide us with the basis for a definition which encompasses the likelihood of exposure to harm, sensitivity to that harm and capacity to adapt in response to it (Hinkel, 2011). In this context Middlemiss and Gillard (2015) propose that energy vulnerability represents the "...the likelihood of a household being subject to fuel poverty, the sensitivity of that household to fuel poverty, and the capacity that household has to adapt to changes in fuel poverty."

As they point out, this is subject to change over time, reflecting changes to both a household's own circumstances and in the external environment (see also Spiers, 2000) such as the change in tariff arrangements that are proposed by Horizon Power.

Previous BCEC research reports (*Energy Poverty in Australia, Power to the People*) have discussed the factors relating to energy poverty at length, noting that in general terms a household is in energy poverty when it cannot afford sufficient energy to provide essential services (such as lighting, cooking and essential appliances) and to maintain an acceptable level of comfort (seasonal heating or cooling). The amount of energy required to do so will vary depending on household size and composition, the quality and energy efficiency of housing and appliances. In practical terms energy poverty is measured as households with incomes below 60 per cent of median income who are spending more than 10 per cent of disposable income on energy (p4-6, Energy Poverty in Australia). It is important to note this definition can lead us to overlook those households who are in practice spending less than 10 per cent of their income on energy as a consequence of restricting their energy use below comfortable and acceptable levels for affordability reasons. Such households are hard to identify using consumption and expenditure data alone.

Table 6 **A typology of energy vulnerability factors and their constituent elements**

Factor	Components	Stressors
Access	Poor availability of energy carriers appropriate to meet household needs	External
Affordability	High ratio between cost of fuels and household incomes, including role of tax systems or assistance schemes. Inability to invest in the construction of new energy infrastructures	External / internal
Flexibility	Inability to move to a form of energy service provision that is appropriate to household needs	Internal
Energy efficiency	Disproportionately high loss of useful energy during energy conversions in the home	Internal
Needs	Mismatch between household energy requirements and available energy services; for social, cultural, economic or health reasons	Internal
Practices	Lack of knowledge about support programmes or ways of using energy efficiently in the home	Internal / external

Source: Bouzarovski *et al.*, 2014

Within Western Australia there are specific provisions within Section 6.4 of the Electricity Customer Code that oblige retailers to put in place additional support provisions for customers who are struggling to pay their bills.

The code defines "payment difficulties" as a state of immediate financial disadvantage that results in a residential customer being unable to pay an outstanding amount as required by a retailer by reason of a change in personal circumstances.

The code further defines "financial hardship" as a state of more than immediate financial disadvantage, resulting in a residential customer being unable to pay an outstanding amount as required by a retailer without affecting the ability to meet the basic living needs of the residential customer or a dependant of the residential customer.

Retailers are required to offer customers facing short-term payment difficulties with the option of putting in place a payment plan to meet their outstanding debt, and to make additional allowances for those experiencing financial hardship, which include not charging interest on outstanding debts, referral to financial counselling services and other assistance including reduction or waiver of fees and charges.

In the context of this study, an estimate of the proportion of vulnerable customers within the trial region was identified by Horizon Power based on their 'concessional' status (that is, they are in receipt of a concession including Dependant Child Rebate or the Energy Assistance Payment, requiring a Commonwealth Health Care Card, Pensioner Concession Card or Veterans Concession Card) as the utility does not have access to income data. We note that in practice this may mean that there are low income working households within the town who may be experiencing energy poverty or financial hardship but are not entitled to or in receipt of a concession. To this end, for the purposes of the trial the definition of vulnerable customers was extended to include those whose responses to the intake survey indicated they were on a low income (less than $52,000 per annum income) or had a moderate income and larger family (more than three children under 15 years old and under $104,000 per annum income). Overall there are 274 concessional customers within the Port Hedland trial region, accounting for 6 per cent of customers. 407 households were recruited for the Power Ahead Pilot, including 41 'vulnerable' or concessional customers.

After customers were recruited to the trial, a survey was conducted that provided further information of the demographics of this group (Table 4).

The first part of the vulnerability analysis looked at the outcomes for all customers in the trial and compared the actual benefits/costs realised by each of the different constituent groups under study with the control group.

In particular, we looked at the capacity and willingness of regional electricity consumers, including vulnerable households, to adapt to their peak allowance. We used standard statistical methods to analyse the data and draw conclusions regarding the efficacy of the tariff arrangements for each group.

The second part, was aimed at gaining a qualitative understanding of customer experiences with the new Power Plans, which we examined through a set of questions posed in face to face interviews carried out between 29 and 31 March 2017. These questions sought to understand whether respondents believed that the Power Plans had:

a) changed how they consume energy;

b) affected their general well-being;

c) increased their feelings of control; and

d) lessened their feelings of vulnerability with respect to their electricity bills.

We also sought to gain an understanding of how the smart device application supported them in achieving their energy goals. The questionnaire used in the semi-structured interviews with vulnerable customers is included in Appendix 1.

All 41 customers classified as vulnerable within the trial were contacted by Horizon Power and asked whether they wished to take part in the specific vulnerability research. Following this initial contact, a total of 13 interviews were organised, of which 7 interviewees actually attended individual interviews. Interviews were conducted either in the local leisure facility or in Horizon Power's Port Hedland office.

In addition, we were able to arrange a focus group discussion involving a total of 5 participants of which 1 was also a participant in the pilot project. This was arranged through a local health centre aimed primarily at serving the needs of the local indigenous community; the focus group was conducted at the health facility itself.

Interviews lasted between 1 and 1.5 hours and were combined with assisting customers to complete the post-pilot questionnaire that was required by Horizon Power. This was done mainly as a way to maximise the time available given that there was a degree of overlap between the questions we were seeking to answer in the vulnerability research were also being asked as part of the post-pilot questionnaire.

A member of Horizon Power staff was sometimes present during the interviews and conducted the post-pilot questionnaire part of the discussion. Some of the interviews were conducted without a Horizon Power representative present as we separated the two parts of the interview.

Interviewees were self-selecting and we cannot completely ignore the possibility of either selection bias or bias owing to the presence of a Horizon Power employee at the time of interview. However, it was felt that the familiarity that the interviewees had with the Horizon Power personnel brought benefits in terms of ensuring a more meaningful discussion.

Results

Results

In this section we present the findings from the study. We base our findings primarily on the results from the post-pilot questionnaire and the series of interviews with pilot-participants and non-participants in Port Hedland carried out in March 2017. We also provide some brief insights with respect to actual usage during the pilot period.

Evidence from post pilot survey and interviews

The post pilot survey elicited a 100 per cent response rate and the results suggest that the pilot was generally well-received by participants. Among vulnerable customers, 76 per cent stated that they had received good service during the pilot scheme while only 6 per cent stated the service was poor. When asked how interested they would be in "...the possibility of being charged for electricity in a similar way to paying for a monthly mobile phone plan or internet plan" around 46 per cent of vulnerable customers stated they would be interested or very interested; this compares with 45 per cent for non-vulnerable customers. Note that the final financial incentive was only paid if the survey was completed which may explain the very high response rate.

Initial questioning sought to ascertain how customers felt about the way they were currently billed for their electricity. Specifically, customers were asked how they felt not knowing what their summer bills would be and a high proportion – over 80 per cent – indicated that this made them feel anxious. They were further asked how the fact that they were currently unable to monitor their usage and observe the effects of making changes made them feel. A majority – once again over 80 per cent – indicated that this made them feel frustrated as the comments below illustrate.

> *"[I get] a bit more information about the amount of electricity I'm using, what's using the most, what [I] should...turn...off"*
> *Kath*

> *"Well that's why I did it for an incentive...I don't...know what I'm going to get, [but] anything's a help"*
> *Jo*

There was a general sense from the interviews that electricity was simply unaffordable and that life is particularly challenging for those living above the 26th parallel. Both participants and non-participants pointed to their greater reliance on air conditioning compared with consumers in the SWIS region.

> *"...summertime we've got to have these air cons running 24/7 and we... receive a big bill out of it...maybe [Horizon could offer] more of a rebate... they should take into account how hot it gets up here."*
> *Kath*

> *"But anyway what I was going to say is that it becomes too much for mum when they're there than sending a letter out saying to me that this bill has to be paid"*
> *Kath*

Examination of participants' bills over the last year revealed some extremely high consumption (annual bills of as high as $7,000 were observed, more than double the average consumption within the NWIS region ($3,060) and four times the average for the rest of the state ($1,618). As discussed, more than 80 per cent of the 407 respondents to the post pilot survey expressed anxiousness about high summer bills and stated their openness, in principle, to a tariff which smoothed annual bills.

Qualitative responses suggested that participants were able to cope reasonably well with the requirement to remain within their peak allowance, although it should be noted that only 40 per cent of vulnerable customers reported that they found it easy to remain within the allowance throughout the pilot. A majority of vulnerable customers (63%) kept all their incentives with a further 18 per cent losing only one, which seems to confirm that customers were able to make the necessary changes to stay within their allowance.

Many vulnerable customers reported having made either "a lot" or "quite a bit" of behavioural change in order to remain within their allowance. Among vulnerable customers who had lost no more than 1 incentive, 40 per cent made at least "quite a bit" of effort. Interestingly, a similar proportion of those who lost either 2 or all their incentives also professed to have made significant efforts, which may suggest that they had little capacity or ability to effectively reduce their consumption.

Vulnerable customers reported having to make difficult choices in order to remain within their allowances, such as whether to use the oven to prepare a cooked meal or to run the air conditioning. Indeed, there was some suggestion from the interviews that consumers were curtailing cooling despite experiencing discomfort. This finding is consistent with findings from previous research (Cornwell *et al.*, 2016).

> *"Sometimes [I had to turn the air conditioning off] while I have got the oven on"*
> *Evie*

> *"Around...half two to half four [I] did actually drop my air con to 24 [degrees], other times I just weather through"*
> *Evie*

> *"And a couple of times he has left the pool pump going all day, and I said, "Put it back on the timer." ...plus the [lodger] was washing his clothes separate."*
> *Jo*

Vulnerable participants reported being motivated by earning incentives although a high proportion of them also reported feeling anxiety, especially when they received alerts about a possible breach. We were unable to confirm whether this related to a desire to abide by the conditions of the peak allowance or concern at the potential loss of the incentives. We did not question participants specifically on this point but it seems reasonable to infer from other comments made relating to the incentives that it was more a concern about losing them which drove the anxiety.

As we observed, participants reported anxiety relating to higher, uncertain summer bills and Power Plans have the potential to reduce this anxiety, but some stated that they felt subject to increased levels of stress relating to staying within the peak allowance. Interviews suggested that households found it particularly challenging to manage energy usage and keep within the allowance when friends and family were visiting. A number of those interviewed made reference to other solutions that might be helpful in managing these situations, such as prepayment meters, which they were aware of and believed to have been effective in Northern Territories. This solution was

perceived as especially useful in dealing with situations when Indigenous families were involved in 'family business'. This finding raises the question whether Power Plans are necessarily the most appropriate solution for vulnerable customers, even if conceptually the new tariff could help to address some of their concerns about energy usage.

A frequent concern expressed during interviews was a lack of information about the best type of air conditioning and a number of interviewees called for more education about the best appliances to purchase. Evidence seemed to suggest that households relied on poor quality air conditioning, especially 'through-wall' units since these can be moved from property to property. Use of this type of appliance serves to exacerbate the problem of high consumption during peak periods.

One further observation we made was that when they received an alert, vulnerable customers reported taking action less frequently than non-vulnerable customers. We did not seek to investigate why this was the case during the interviews, but possible reasons include:

- The means of communication ineffective or the messages themselves unclear to the recipients;
- Lacked of knowledge about what to do to reduce consumption, e.g. vulnerable customers reported not knowing how to get best out of their air conditioning systems by combining them with using fans; and
- Vulnerable customers, hampered by poorly insulated homes and a low efficiency domestic appliances, may find it more challenging than others to remain within the allowance and remain comfortable despite their best efforts.

These findings merit further investigation and may suggest a need to look more closely at the means of communication with customers.

Usage analysis

Usage results confirmed that Power Plans can be successful in reducing daily load variability through either the reduction of peak usage or the shifting of load from peak to off-peak periods. This could also result in lower seasonal variation in bills, which would be beneficial to customers by giving them greater visibility on summer expenditure.

On average participants in the survey were able to reduce their peak consumption by 11.5 per cent. Moreover, those who were given more aggressive targets were generally able to achieve greater reductions in peak usage. As would be expected, there were limits to this and reduction targets of greater than 20 to 30 per cent were shown to be unachievable.

Based upon this data it is estimated that around one quarter of consumers would be able to reduce consumption by 15 per cent meaning that 20 to 30 per cent of customers would be able to drop to a smaller plan, assuming the size of the plan were initially set based on prior consumption patterns.

Consumers on average reduced consumption by 0.14kW in response to alerts, as they sought to remain within their peak allowance. Responses were consistent across types of consumer, whether vulnerable or not, and irrespective of demand size or the target the consumer had been set.

We can conclude from this that customers tend to respond to the alert in similar ways to manage their peak allowance, for example by turning off an air conditioner. This is confirmed by post pilot survey data which suggested that turning off air conditioning was the most likely reaction to an alert.

The usage results suggest that around two thirds (65%) of *vulnerable customers* would be better off with Power Plans, the corollary being that this two thirds are currently paying more than they need and subsidising non-vulnerable customers, a situation most would consider to be unfair. However, this also implies that one third of vulnerable customers would be worse off under Power Plans, and this impact on this group clearly needs to be addressed.

As we mentioned in the Section 3.4, the very hot and sometimes humid climate condition in Port Hedland, means most households have at least one air-conditioner and over half of them have more than four. Survey data suggests that vulnerable customers live in houses quite similar in size to non-vulnerable customers, with only slightly fewer electrical appliances on average. In addition, a great many vulnerable households are not benefiting from roof insulation or other forms of energy-efficiency measures which might serve to reduce overheating. Moreover, they frequently suffer from an inefficient air conditioning system that has a big impact on their electricity consumption. This must at least partly explain the very high bills as has been observed in section 4.1.

Despite vulnerable customers having significantly lower incomes than other households, it was also observed that, while more vulnerable customers are in receipt of concessions, they are much less likely to be in receipt of subsidies from employers. A number of interviewees from the Indigenous community indicated that they received periodic payments from their native title organisations, but this was ad hoc and intermittent. The lack of subsidies further increases the relative burden on them when their household budget is already under strain.

Customer stories

In this section we present some illustrative stories, extracted from the seven individual interviews conducted with vulnerable pilot participants.

Val's Story

Val lives in her own old double storey townhouse in Port-Hedland. Val indicated that she believed their house had some insulation on the roof, but this seemed to be having little effect. Val described the house as a "hot box" during peak heat days during which they might experience temperatures over 44 degrees for a continuous 3 to 4 day period. The upstairs area would be so hot and humid that she would need to lower the setting on her air-con as she needs to rest during the day.

To control her costs, she had been trying to watch her electricity consumption constantly even before this trial started; consequently she could manage to stay within her allowance and managed to never get an alert during the pilot period.

> *"I've been mostly [consuming] about half of my allowance, a little bit more... I have always been doing that, it [this trial] just made me more mindful of what to use and be a bit more organised... I don't have a dishwasher, I don't have a lot of fancy gadgets. I've never ever run my air cons lower than about 23, 24 [degrees]... even on hot days I know that in a couple of hours it [the temperature] is going to fall down, so I bear with it... I didn't turn the oven on more than about 3 times or 4 times throughout the trial period."*

Given her careful control of consumption, her electricity bill is about $600-700 for every 2 months and she is in receipt of the $600 governmental air-conditioning rebate. Given the cost, she nearly always asks for (and receives) a 4 weeks extension period from Horizon Power to make her payments.

> *"I ring Horizon, they're gorgeous. I have such an impeccable record that they give me an automatic 4 week extension."*

Evie's Story

Evie is a retirement age single woman living with her niece in an old-fashioned, uninsulated 2 bedroom duplex rented from government. She complained of the house becoming a "hot oven" during peak heat, so she has the air-conditioning switched on most of the time. She suffers from sleep apnoea and has a special breathing machine that needs to be on during the night. The main energy source in the house is electricity and she has a number of large appliances; 3 air-conditioners, electric oven, electric stove top, large washing machine, large fridge and freezer and separate freezer in the shed. Her normal summer season bill is as high as $370 a month.

During the trial, she received several alerts and tried to change her consumption although her family that stayed over during school holiday didn't support her in this effort.

"when I got a flash [alert] I was just running around and everything that we didn't need we switched off... I always do the washing in the morning (even out of trial time... I will turn [unnecessary appliances] off but sometimes I will forget ... if I leave the house I try to turn everything off but then again if you're in a hurry [I sometimes forget]..."

She receives a financial support from "Land Native Title group" ($1,000 out of electricity bills in a year), so she has much less stress with regards to her energy bills, but normally she usually asks for a time extension from Horizon Power to pay off the bills:

"Because we get the assistance from the native title, I'm pretty all right about it ... and don't worry about electricity bill."

Ruth's Story

Ruth is a single mum living with her 2 primary school age daughters, 2 teenagers who have now moved to a boarding school and one older one daughter with grandchildren who stays with her frequently. They live in a governmental single storey semidetached 2 bedroom new build house, which she believed to have reasonably good insulation. She relies on her pension and Centrelink benefit and also receives rebates and concession for energy consumption.

She leaves the door open and gets the air flow through the house, so can have the air-conditioning and fans off most of the time, so the electricity bills are about $100 every two months. With the help of the concession, she can pay her energy bills in instalments in advance to Centercharge (about $80 per fortnight).

"I don't have the fans on and I don't have air conditions on ... as I said I just leave the two doors open, let the air flow through it. That's it."

Fred's story

Fred is a single man living on his own farm with a small shed and a caravan. He receives a pension and is building a new shed and stable for his property himself. During the Horizon Power pilot he learnt a lot and tried to change his electricity usage. As a result (and perhaps because he had a relatively generous allowance) he didn't receive any alerts during the trial.

"... with the program I only do washing in the mornings and normally maybe once a week ... I downsized my fridge from a big fridge, full size to a half size fridge. I emptied all the freezers out and turned them all off ..."

As he pointed out, this program with its useful tips on the app gave him awareness about his usage and this awareness brings him more feeling of control.

"Yeah, I did look at the tips (on the App) ... when I started it, I would do my washing at any time of the day, but as soon as learned this, [My washing] was morning only ..."

Fred had an atypical issue with an electric fence he had erected to protect his livestock which appeared to be consuming a significant amount.

"Well, without this App I didn't know, I didn't think electric fence was using that much power, I thought it was the welder or whatever, the washing machine or the air conditioner, but turning it [the electric fence] off and then seeing the drop in the power bill yeah, I'm surprised."

Kath's story

Kath is a single mother living with her 16 years old daughter and two dogs in a government single storey semi-detached 3 bedroom house since 2004. She frequently has her grandchildren come to stay at the house. She relies on the Centrelink benefit and payments to cover her living costs. Although they don't have too many appliances and a big property, the evidence suggests she is a heavy consumer. She declared she was struggling with paying utility bills as a single mum on Centrelink benefit, since their electricity bills are very high especially during summer. She indicated that having a new type of tariff that smooths out the bills wouldn't really reduce Kath's stress levels. She frequently has to defer payments.

"Yeah well I've got one now for $600. I put $200 on it yesterday and I've got it extended until next month ... summer-time we've got to have these air cons running 24/7 and we do actually receive a big bill out of it ... I've got a big washing machine that I probably run almost nearly every day."

However, she started to learn a bit more about her consumption during the HP pilot and has tried to change her behaviour to reduce her usage. She indicated that she hadn't received any alerts about exceeding allowance during the trial.

"We're now turning off the air cons when we're not at home ... if I know it's going to be in the 40 degree, I'll put it [the air-conditioning] on in the morning like 10, 10:30 ... and then by 3 or 4 o'clock I'll turn it off" ... "Yeah I do that (washing machine) in the morning now, yeah."

Gina's story

Gina and her husband live together with 4 young kids in a government rental property that is well insulated and they both work full time. She is getting a subsidy from the government (her employer) for her electricity bills. She is very high consumer with nasty bills in the peak months.

"I work it out to about a hundred dollars a week, and I pay two hundred dollars a fortnight."

They have two fridges and freezer and leave one split air-conditioner on all day in summer and turn on the rest at 5pm. She felt this was necessary for the comfort of her young family.

"I leave one air conditioning on in the main living area during the day, so when we come home it's somewhere comfortable."

She also stuck to doing her laundry every day during peak hours. As she declared she didn't change anything in this consumption routine during trial:

> *"I didn't change anything really. So, I would, I leave one air conditioner on... during summer."*

It was clear that one of the reasons for this lack of change was that she worked out that she had been allocated a comfortable allowance. However, she also pointed to the significant challenges that having a young family posed for changing consumption since regularly laundering clothes, for example, was essential and because she and her husband worked all day it was tricky to shift consumption out of the peak period.

Jo's Story

Jo lives together with her husband and a dog in a privately rented old house with 5 bedrooms and 2 bathrooms and a swimming pool. Her husband works in the port, and she has a cleaning business. They have also rented a room to a friend who is a truck driver.

She is a high consumer with high bills especially during summer, and she always gets nervous about her ability to make payments:

> *"It's about $600 or $700, that's the lowest and then this goes right up to $1,400."*

High consumption is partly explained by their lifestyle and partly that their old home is not insulated and becomes very hot in summer. They have two fridges and freezer, electric hot water, air-conditioners, electric oven, pool pump and a washing machine. They leave one split air-conditioning on all day in summer and turn on the rest when they come back home.

Jo uses an electric oven and electric stove every day to cook, since they rarely eat out at restaurants. The pool pumps run for 2 hours during day in peak hours and the rest work over night. She finds she has to do the laundry every day during peak hours and it's not always a full load which is wasteful of energy. This is partly driven by the need to have clean work clothes each day and partly by the fact that the lodger and they do their laundry separately.

Although they had quite high consumption they never received any alerts, suggesting their allowance was quite high. Although she tries to control consumption herself, she has found it challenging to get buy in from the other occupants who are not always supportive of her efforts to control the electricity consumption.

> *"I'm inclined to walk around [and if] the husband ... leaves the light on, [I] go flick it off ... and a couple of times he has left the pool pump going all day ... The man who rented the room, he's come from a house where it [electricity] was all paid for, he had a company house and all the people in those houses they just leave things running 24/7."*

As she mentioned, if they could save energy and save power costs they could have better life:

> *"If I got $200 cheaper I might be able to go out for a meal somewhere one night."*

Concluding comments

The cameos presented highlight the challenge faced by households trying to reduce consumption and points to a number of specific issues which make this particularly difficult:

- External constraints such as working patterns can mean shifting power consumption (e.g. performing household chores at different times) is highly inconvenient;
- Poor insulation and poor quality appliances can lead to higher than necessary consumption even when efforts are made to shift patterns of consumption; and
- Variations in household membership both changes the amount of energy consumed but also makes controlling consumption more difficult.

Discussion

and conclusion

Discussion and conclusion

As noted earlier in this report, usage data suggests that a high proportion of vulnerable customers would be better off under Power Plans and a large majority of those who took part in the trial indicated a positive attitude towards the proposed approach. In consequence, the benefits of the approach are acknowledged and the value of extending the trial of Power Plans to a wider set of communities is supported.

However, some key areas of concern were noted from the results of the research and in this section we discuss some areas which would merit further analysis as well as some possible solutions to address these specific areas of concern.

Issues arising

Based on the evidence gleaned from the post pilot survey, the usage data and the interviews with vulnerable customers, a number of key concerns present themselves:

Some vulnerable customers could be worse off under Power Plans

While usage data suggests that two thirds of vulnerable customers could expect to be better off under Power Plans, the remaining third of this customer group are set to be worse off. Customers already find power bills to be high (given high power costs and the fact that the location necessitates significant usage of air-conditioners during the summer months), so the potential for bills to rise further when customers exceed their peak allowance is clearly of significant concern. Vulnerable customers' capacity to pay is already limited, especially given bill variability, and the change will see some of these customers even more challenged. It is also important to distinguish between overall costs and capacity to pay at a particular point in time. The findings of the research would suggest that the variability in costs over the year are an important factor with regards to the ability to pay. The smoothing effect of Power Plans should help to mitigate this issue by reducing bill shock from larger summer bills.

Risk of customers suffering excessive discomfort to stay within peak allowance

Customers indicated that they were having to make some hard choices regarding which appliances to run during the peak period. Interviewees reported turning off air conditioning despite uncomfortably high temperatures, and having to choose between cooking and cooling. The survey results support this picture, with two thirds of vulnerable customers indicating that they 'often' or 'sometimes' kept air conditioners switched off as part of their daily routine, and nearly half saying that they 'often' or 'sometimes' turned them off when they received an alert. Similarly, roughly half of vulnerable customers reported changing the temperature setting as part of the trials. This data does not, in and of itself, indicate that customers are subjecting themselves to excessively high temperatures that might be putting their health at risk, however interviewees did report enduring periods of discomfort. Vulnerable customers were reportedly no more likely to turn off air conditioners than other customers, but a potential risk is that those least well off might be more tempted to chase savings at the expense of their comfort and health. For older customers and those with ongoing chronic health issues there is a possibility that this behaviour could put them at serious risk of harm. The incentives are relatively more valuable to low income consumers and as a result they may be willing to suffer disproportionately more discomfort. It should be recognised that customers may seek to reduce consumption through turning off air conditioning simply as a means to reduce costs and that this behaviour would be demonstrated irrespective of the implementation of Power Plans. Understanding customer motivations is therefore critical.

Need to avoid replacing one source of anxiety with another

As discussed, vulnerable customers reported feelings of anxiety when alerts were received or when they became aware they were at risk of exceeding their peak allowance. It was unclear whether this was a result of concerns about losing the incentives or simply of exceeding the agreed peak allowance. During interviews, customers clearly related concerns about the significant fluctuations in power bills between winter and summer and it was acknowledged that the Power Plans concept may help to reduce these fluctuations. However, it is vital to ensure that in seeking to alleviate one source of stress another is not created.

Focus on ensuring effective communication with vulnerable customers

Vulnerable customers consistently report reacting less readily to alerts than non-vulnerable customers – when questioned whether they acted on alerts, 61 per cent of vulnerable customers reported doing so 'often' or 'sometimes' compared with 69 per cent among non-vulnerable consumers. Similarly, roughly 10 per cent fewer vulnerable customers reported switching air-conditioning off or increasing temperature in response to alerts than non-vulnerable customers. It would be valuable to understand why this is the case and whether this reflects a need to review the approach to communicating with vulnerable customers. While interviewees generally stated that they took action when they received alerts, non-verbal cues suggested that some were less certain about this aspect than their verbal replies would imply. It is worth noting that the responsiveness to alerts may be influenced by other factors going on in the home such as family conflict or overwhelming stress from the inability to cope with multiple financial demands. It is suggested that these aspects would merit further investigation.

Possible responses

Perhaps the most significant findings with respect to vulnerable customers is the expectation that roughly one third of them will be worse off under Power Plans. In light of the already high financial burden of energy bills related to the climatic conditions in the northwest of WA, this is clearly an issue that requires action if the new tariff arrangement is to receive widespread support.

Effective responses will require the reasons why some vulnerable customers are worse off are better understood. Different measures may be required, according to whether the intent is to address particular aspects of hardship such as:

- fundamentally high consumption resulting from, say, the particular household arrangements. This could include, for example, the number of people living in a household, the age of the householders, whether householders were suffering from ill health or whether there was family conflict which might prevent effective control of energy consumption;
- a lack of capacity to reduce consumption owing to the characteristics of the property such as energy efficiency as well as whether the householder is renting and the security and length of tenure; or
- an inability to meet peak consumption targets through a failure to understand the behavioural changes required in order to reduce consumption or what actions would be effective in meeting those requirements.

It is well established that vulnerable customers are more likely to be renters and consequently less likely to have access to measures such as home insulation, even when they are housed in a government property. This must be recognised in establishing formal policy to ensure fair and equitable outcomes arise from any tariff changes.

Establishing policy and regulatory approaches must also take account of the potential risks that incentivising a reduction of consumption could have on some types of vulnerable consumers. The results of the analysis point to two important sources of risk:

- Vulnerable customers have a high incentive to "win" discounts which are proportionately more valuable to them and may endure undue discomfort in order to do so. This implies that they might suffer disproportionately more than other customers
- Increased worries about exceeding their peak allowance, and consequently losing discounts, might significantly increase levels of stress experienced by vulnerable customers.

A number of possible approaches present themselves to address this issue and ensure that vulnerable customers do not unduly suffer as a result of these proposed changes and these are discussed in more detail in this section.

Exempting those specific vulnerable cohorts likely to be at risk

One option could be to simply exempt the entire vulnerable group, or at least those sub-groups who are set to lose out from the new tariff. It is our understanding that Horizon Power's preference is to include all customers in the new arrangements in order to maximise the benefits to the network. On the other hand, it may be sufficient to obtain compliance from the majority of (less-vulnerable) customers to achieve the network outcomes (i.e. reduced need for new generation/cost of supply) and therefore avoid unintended consequences and unnecessary risks. However, it should be noted that two thirds of vulnerable customers would be better off under Power Plans and that changing behaviour is only a minor factor in determining this improvement. This suggests that it might be counter-productive to exclude all vulnerable customers from the tariff, and better to target support to those customers that would be worse off.

Providing subsidies or rebates to compensate

Another option would be to provide subsidies to those set to lose out from the changes. This would need to be reviewed in the context of existing support mechanisms for vulnerable customers, and recognise the particular challenges facing households in the region. Given the quite varied set of conditions described by customers during the interviews, there is a question about whether it is necessary and desirable to have a single approach or model that applies to all consumers. There is a potential equity and social justice issue in applying 'the same' incentives or penalties to low income households, which might result in the additional cost of service impacting them disproportionately. The same absolute amount of incentive/penalty may represent a greater proportion of very low income household's disposable income, and a small increase in costs could be the difference between having the capacity to pay or going into debt.

Recognising that personal household circumstances might vary considerably, a number of possible options present themselves.

- Different groups could be awarded different levels of concessions or excluded as appropriate. Grouping might include subsets of aged, frail, single parent families and so on;
- Some groups could simply be exempted from the new tariff and may remain on a standard fixed tariff. A variation on this could be a 'no worse off' clause that gives some customers the choice to opt in to gain a benefit, but shields them from additional costs or penalties;
- Alternatively, customers could be allowed to opt out during a trial period and be no worse off, if it turns out that they are disadvantaged by the new arrangement;
- There could be adjustments to the level of the peak allowance, or on the incentives that can be earned (or both) for a particular customer grouping; or
- There could also be more flexible rules in terms of meeting targets or on losing incentives.

Another possible approach would be to move the worse off vulnerable customers onto Power Plans and provide them a rebate on their fixed cost component. This could send them a more economically efficient signal to reduce peak costs but also provides them benefits of very cheap energy (<10c/unit) for around 90 per cent of the year.

Providing improved energy efficiency

Improving the insulation of properties or providing higher efficiency appliances (particularly air conditioning) in properties occupied by the most vulnerable customers could help to reduce bills and mitigate the effects of any changes to the tariff structure. One option might be for Horizon Power to bundle the cost of more efficient air conditioning into the bill over a five or ten year period. The high rates of tenancy turn-over demonstrated in Figure 19 clearly has implications for the effectiveness of such a scheme and may limit the feasibility of such an approach. While there may be lower barriers to implementing such a scheme in government housing, many vulnerable customers are private renters and it is unclear how such measures might be legislated for or regulated in the private rental market. Specific sub-groups with ongoing tenure arrangements, such as aged pensioners or families in Aboriginal communities, may be able to be targeted in this manner. Note that schemes such as the energy efficiency rating approach used in the UK (which requires private landlords to carry out an energy audit and advertise this to renters) may have little impact with the most vulnerable customers, where they lack the flexibility of choice about where they rent.

Support for solar installation

In a similar way, providing support to the most vulnerable through the installation of solar PV or thermal could help to address the challenges facing them. This approach suffers from some of the same challenges as providing improved energy efficiency given the high proportion of renters among vulnerable customers. Increasing the amount of solar PV on the system, unless it is combined with storage, also has the potential to reinforce the issues faced by Horizon Power in balancing supply and demand already discussed in section 2.3 and which Horizon Power is trying to address with Power Plans. This option might only be viable for locations where the majority of the power is directly consumed during peak solar generation – for example residential aged care.

Households in much poorer quality housing (with no thermal insulation) may have much less capacity to reduce electricity use without putting health at risk. Larger families may have more trouble reducing use or ensuring compliance, and where there is family conflict it could even put people in danger of harm. In these cases, the 'real' personal cost is much higher and/or the changes required would be much greater. Interestingly, there appeared to be no correlation between the size of household and the ability or otherwise to stay within the peak allowance within the trial data, but it seems intuitive that the more people in a household, the more difficult it may become to control consumption. Indeed, this factor was alluded to by a number of interviewees stating that they felt they were not supported by other household members in their efforts to reduce peak consumption.

Optionality for specific communities

The comments made by a number of interviews with regards to prepayment meters suggests that it may be appropriate to consider other options for specific vulnerable cohorts and to take account of differences between various community groups. While it is understood that Horizon Power wishes to achieve 100 per cent compliance in order to maximise the benefits associated with cost reflective pricing, we would point to our comments above about the impact on the overall benefits of not having full compliance, especially when vulnerable customers are relatively light users. Alternatively, Horizon Power may wish to explore different options such as:

- allowing consumers to switch plans or enter into different payment arrangements during periods when they have large family gatherings;
- allowing visiting families to transfer or share their home power plan; or
- providing some additional flexibility when changes in consumption can be attributed to family visits and cultural business.

This area is worth exploring in more detail with Aboriginal community organisations and stakeholders to develop appropriate and effective alternative options. Note that prepayment metering options will continue to be available for Aboriginal communities. Horizon Power will consider making this type of product more widely available for customers that value this style of arrangement. This would be opt-in and subject to discussion with WACOSS and support from government. A study on this will be considered in 2018/19.

Appendix

Appendix 1: Interview questionnaire

Analysing the effect of electricity tariff changes on vulnerable customers: A mixed methods approach

DRAFT Interview questions

Household membership and broad energy usage patterns

1. Could take a couple of minutes to give me a description of your house and the different people in your household. Does it feel hot in the summer/cold in the winter, in a good state of repair?
2. How do the members of your household use energy in their various daily or weekly activities? Does your electricity consumption change at different times of the year, say when it is hotter/colder/school holidays/school term?

Usage and paying for home energy

3. Could you tell me roughly how much you spend on electricity and gas per week (or month or year whichever is easiest).
4. Could you tell me about how you budget for your electricity and gas bills and any particular strategies that you have used to reduce your expenditure on electricity or gas.
5. Can you tell me about any particular activities that make it particularly easy or difficult to change the amount of electricity or gas that you use? (e.g. medical appliances).
6. Can you describe any types of assistance or help that are available to you if you are having trouble paying for an electricity or gas bill?

Effects of energy costs on daily life and well being

7. Could you tell me about any effects that the costs of gas and electricity have on other parts of your life or the type of activities you engage in?
8. How do you view the affordability of your energy bills compared to your other household expenditures?
9. Do you get feelings of anxiety around paying your energy bills; for example, do you worry about finding the money to pay your bills when they arrive or about being cut off? Have you had any experiences of being disconnected from electricity or gas?

Comparison of before and after trial

10. Did you find that the new tariff arrangement made you change the way in which you used electricity – how much, when, what appliances and so on?
11. What was the reason you modified your behaviour; was it the app/alerts or something else?
12. Did you think that either the tariff itself or the associated app allowed you to feel more in control of your energy consumption?
13. Did you feel that having the new tariff and/or app affected your feeling of well-being and lessened any feelings of vulnerability?
14. Is there anything that the tariff or the app DID NOT incorporate that would have been useful to you in terms of managing your energy bill?
15. Do you have anything else to add about your energy consumption or the trial?

Appendix 2: Post pilot survey questions originated and administered by Horizon Power

Questions sets are organised in three level of Residential, Opinion and Context as following tables show. First set of questions in Residential Section will ask about critical questions that check the ability of participants to respond to demand reduction alerts and see how they can try to achieve it and change usage behaviour, while the second set of questions (Opinion Section) will ask about customer opinion on the on-line support application and how they can improve it to be more applicable. Third Section has been called context and will ask some questions to identify situation of vulnerable customers and clarify awareness of the context for all participants.

SECTION 1	Pilot "Residential"	Respondent base	Survey skips
Sub-Section intro	**Changes in your home and appliances during the pilot.** **During the pilot you may have had changes to the number of people living in the house or changed some appliances.**	All residential	This is intro text to help guide the respondent to the questionnaire flow.
R1 *(numeric response)*	How many people within the following age groups live in your house now? | <15 {R1_1} | 15 – 24 {R1_2} | 25 – 34 {R1_3} | 35 – 44 {R1_4} | 45 – 54 {R1_5} | 55 – 64 {R1_6} | 65+ {R1_7} | |	All residential	If respondents fill in an answer to at least one of these categories, they do not need to fill in an answer to all of the others (they will be assumed to be zero).
R2a *(Radio button)*	Did you move house during the pilot? | Yes {1} | No {2} | | ◯ | ◯ {Skip to R3} | *PopUp: If respondent answered "Yes", display the following text in bold font:* ***"Please make sure you answer the rest of the questions in this survey about your new house, including whether there were any changes from your old house to your new house."***	All residential	If 'No', skip to R3.
R2b *(Radio button & Adjustable text box).* *Text box is mandatory if other is selected.*	Which of the following best describes your new house? | Separate house with four or more bedrooms {1} | ◯ | | Separate house with less than four bedrooms {2} | ◯ | | Semi/detached/duplex/townhouse etc. {3} | ◯ | | Flat/unit/apartment {4} | ◯ | | Other (please specify) {5} | ◯ | *If 'Other (please specify)' is selected please comment:* {R2b_text} | |	If 'Yes' at R2a	
R3 *(Radio button)*	Does your house have insulation? | Yes {1} | ◯ | | No {2} | ◯ | | Don't know {97} | ◯ | | Not applicable as we have people living above us (e.g. apartments) {98} | ◯ |	All residential	

<table>
<tr><th>SECTION 1
continued</th><th>Pilot
“Residential”</th><th>Respondent base</th><th>Survey skips</th></tr>
<tr><td>R4a
(Radio button)</td><td>Since you completed the survey at the start of the pilot, has the number or type of air conditioners at your house changed?
<table><tr><td>Yes {1}</td><td>◯</td></tr><tr><td>No {2}</td><td>◯</td></tr><tr><td>Don’t know/can’t say {97}</td><td>◯</td></tr></table></td><td>All residential</td><td>If ‘No’ here and responded ‘No’ at R2a, skip to R5.</td></tr>
<tr><td>R4b
(Grid array)</td><td>How many of each of the following types of air conditioners do you have now?
<table><tr><th></th><th>None {0}</th><th>One {1}</th><th>Two {2}</th><th>Three {3}</th><th>Four or more {4}</th></tr><tr><td>Reverse cycle split system air conditioners (on the wall) {R4b_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>Older in-the-wall or through-the-window air conditioners {R4b_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>Ducted air conditioners (reverse cycle) {R4b_3}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>Ducted air conditioners (evaporative) {R4b_4}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>Those who said either: *‘Yes’ or ‘Don’t know/can’t say’ at R4a or *‘Yes’ at R2a (i.e. moved premises)</td><td></td></tr>
<tr><td>R5
(Radio button & adjustable text box)

This text box is mandatory if ‘yes’ is selected.</td><td>Is there anything else you’d like to tell us about changes to your appliances or household that may have impacted your electricity use compared to last summer?
<table><tr><td>Yes (please specify) {1}</td><td>◯</td></tr><tr><td>No {2}</td><td>◯</td></tr></table>If ‘Yes (please specify)’ is selected please comment: {R5_text}
<table><tr><td></td></tr></table></td><td>All residential</td><td>If say ‘Yes’, insert a free text response box.</td></tr>
<tr><td>Sub-Section intro</td><td>Changes in your energy use during the pilot.
We challenged you to try to shift some electricity use to off-peak (morning and night) and to stay under your peak allowance during on-peak (1pm to 8pm).</td><td>All residential</td><td></td></tr>
<tr><td>R6i
(Radio button)</td><td>Did you make changes to stay under your peak allowance?
<table><tr><th>Yes – a lot {1}</th><th>Yes – quite a bit {2}</th><th>Yes – a little {3}</th><th>No {4}</th><th>Don’t know/ can’t say {97}</th></tr><tr><td>◯</td><td>◯</td><td>◯</td><td>◯
{End of residential questions}</td><td>◯
{End of residential questions}</td></tr></table>Note that the question text is all that differs between R6i and R6ii. Can discuss whether the text displays differently but the responses are stored as a single question id (in which case the question id will be R6).</td><td>Those whose peak allowance did not change in February.

To be provided by a lookup table.</td><td>Those who say ‘No’ or ‘Don’t know/ can’t say’ go to the next section of survey (that is, next residential premises, first business premises or the opinions section).</td></tr>
</table>

<table>
<tr><th>SECTION 1
continued</th><th>Pilot
“Residential”</th><th>Respondent base</th><th>Survey skips</th></tr>
<tr><td>R6ii
(Radio button)</td><td>Your peak allowance changed in February. For the next few questions, think only about the new allowance you had for February and March.
Did you make changes to stay under your new peak allowance?
<table><tr><th>Yes – a lot {1}</th><th>Yes – quite a bit {2}</th><th>Yes – a little {3}</th><th>No {4}</th><th>Don’t know/ can’t say {97}</th></tr><tr><td>○</td><td>○</td><td>○</td><td>○ {End of residential questions}</td><td>○ {End of residential questions}</td></tr></table></td><td>Those whose peak allowance did change in February.

To be provided by a lookup table.

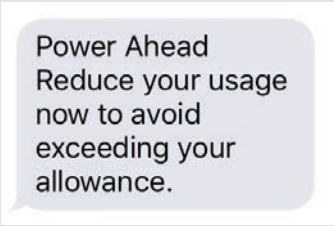
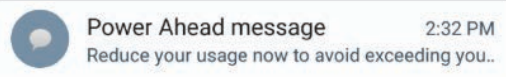
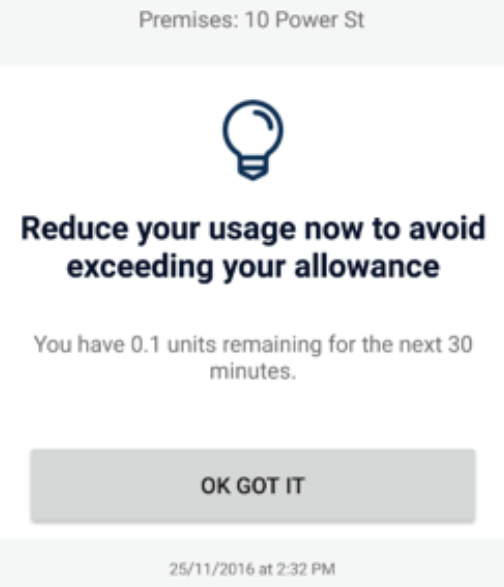
Those not asked R6i.</td><td>Those who say ‘No’ or ‘Don’t know/ can’t say’ go to the next section of survey (that is, next residential premises, first business premises or the opinions section).</td></tr>
<tr><td>R7
(Grid array)</td><td>What sorts of changes did you make?
(Select one answer for each option).
<table><tr><th></th><th>Often {1}</th><th>Sometimes {2}</th><th>Rarely {3}</th><th>Never {4}</th><th>Don’t know/ can’t say {97}</th></tr><tr><td>Changed the time you did things {R7_1}</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td></tr><tr><td>Generally reduced your electricity use {R7_2}</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td></tr><tr><td>Reacted when you received alerts {R7_3}</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td></tr></table></td><td>Those who gave a response of ‘Yes’ at R6i or R6ii.</td><td></td></tr>
<tr><td>R8
(Radio button)</td><td>Could you keep these changes up for 6 months over every summer?
<table><tr><td>Yes {1}</td><td>○</td></tr><tr><td>No {2}</td><td>○</td></tr><tr><td>Don’t know/can’t say {97}</td><td>○</td></tr></table></td><td>Those who gave a response of ‘Yes’ at R6i or R6ii (i.e. same as R7).</td><td></td></tr>
<tr><td>R9
(Radio button)</td><td>Was the effort required to stay under your peak allowance worth the financial incentive? Remember, if your peak allowance changed in February, think only about the allowance you had for February and March.
<table><tr><td>Not worth the financial incentive {1}</td><td>○</td></tr><tr><td>Somewhat worth the financial incentive {2}</td><td>○</td></tr><tr><td>Worth the financial incentive {3}</td><td>○</td></tr><tr><td>Don’t know/can’t say {97}</td><td>○</td></tr></table></td><td>Those who gave a response of ‘Yes’ at R6i or R6ii (i.e. same as R7).</td><td></td></tr>
</table>

<table>
<tr><th>SECTION 1
continued</th><th>Pilot
“Residential”</th><th>Respondent
base</th><th>Survey
skips</th></tr>
<tr><td>R10
(Grid array)</td><td>In what way or ways did you change your air conditioner usage to stay under your peak allowance?
<table>
<tr><th></th><th>Often
{1}</th><th>Sometimes
{2}</th><th>Rarely
{3}</th><th>Never
{4}</th><th>Don’t know/
can’t say
{97}</th></tr>
<tr><td>Changed the temperature it was usually set to {R10_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Changed the temperature when you received an alert {R10_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Kept one or more units turned off as part of your peak routine {R10_3}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Turned one or more units off when you received an alert {R10_4}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Turned the air-conditioner on earlier in the day {R10_5}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
</table></td><td>Those who gave a response of ‘Yes’ at R6i or R6ii (i.e. same as R7), but also with the following condition being met: Those who stated >1 Air Conditioners in Activation survey (to be provided by a lookup table) or at R4b of this survey.</td><td>Others skip to R11.</td></tr>
</table>

<table>
<tr><th>SECTION 1 continued</th><th>Pilot
“Residential”</th><th>Respondent base</th><th>Survey skips</th></tr>
<tr><td>R11
(Multi response)</td><td>Did you typically change your use of any of the following appliances to stay under your peak allowance? (Select all that apply).
<table><tr><th></th><th>{1}</th></tr><tr><td>Shower times/use of electric hot water systems {R11_1}</td><td>◯</td></tr><tr><td>Cooking appliances (electric ovens, hot plates, microwaves) {R11_2}</td><td>◯</td></tr><tr><td>Spare fridges/freezers {R11_3}</td><td>◯</td></tr><tr><td>Washing machines {R11_4}</td><td>◯</td></tr><tr><td>Clothes dryers {R11_5}</td><td>◯</td></tr><tr><td>Dishwashers {R11_6}</td><td>◯</td></tr><tr><td>Water bores {R11_7}</td><td>◯</td></tr><tr><td>Pool pumps {R11_8}</td><td>◯</td></tr><tr><td>Spas {R11_9}</td><td>◯</td></tr><tr><td>Vacuum cleaner {R11_10}</td><td>◯</td></tr><tr><td>Lights {R11_11}</td><td>◯</td></tr><tr><td>None of the above {R11_12}</td><td>◯</td></tr></table></td><td>Those who gave a response of ‘Yes’ at R6i or R6ii (i.e. same as R7).</td><td></td></tr>
<tr><td>R12
(Adjustable text box)

This text box is mandatory.</td><td>What change had the biggest effect in terms of helping you stay under your peak allowance?

Free text response:</td><td>Those who gave a response of ‘Yes’ at R6i or R6ii (i.e. same as R7).</td><td></td></tr>
</table>

SECTION 2	Pilot "Opinion"	Respondent base	Survey skips
Sub-Section intro	**Alerts** **During the pilot, you received alerts to let you know that you may exceed your peak allowance if you didn't reduce your use. These alerts were sent via SMS and via a notification and pop-up in the smartphone app and looked like the pictures below.** SMS  Notification  Pop-up Message  	Those who received at least one alert during the pilot. A lookup table will be provided.	

<table>
<tr><th>SECTION 2
continued</th><th>Pilot
“Opinion”</th><th>Respondent
base</th><th>Survey
skips</th></tr>
<tr><td>O1
(Grid array)</td><td>Did you rely on the following types of alerts?<table><tr><th></th><th>Yes
{1}</th><th>No
{2}</th><th>Don’t know/
can’t say
{97}</th></tr><tr><td>SMS {O1_1}</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>App notification to phone
{O1_2}</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>Pop-up message in app {O1_3}</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>Those who received at least one alert during the pilot.

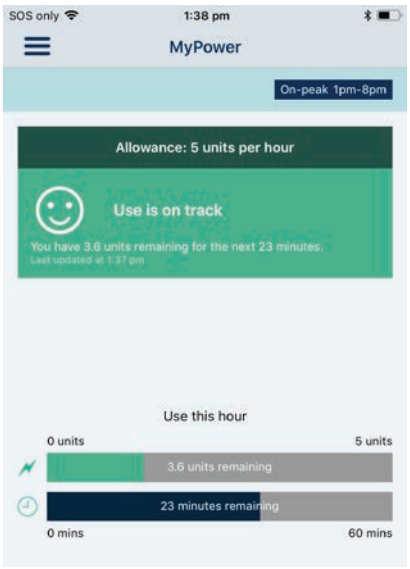
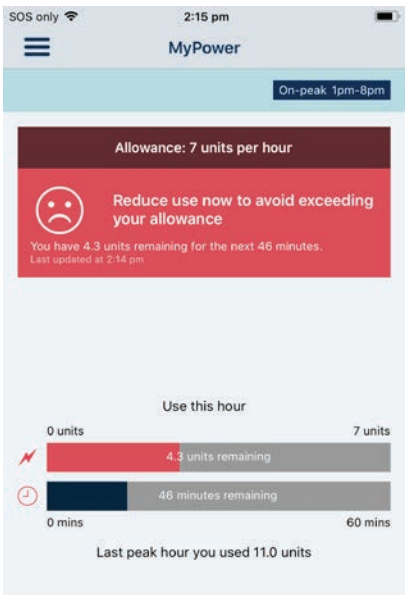
A lookup table will be provided.</td><td>Others skip to O3.</td></tr>
<tr><td>O2
(Radio buttons)</td><td>Did receiving alerts help you to stay under your peak allowance?<table><tr><td>Yes {1}</td><td>◯</td></tr><tr><td>No {2}</td><td>◯</td></tr><tr><td>Don’t know/can’t say {97}</td><td>◯</td></tr></table></td><td>Those who received at least one alert during the pilot.

A lookup table will be provided.</td><td>Others skip to O3.</td></tr>
<tr><td>Sub-Section intro</td><td>Power Ahead App
At the beginning of the pilot you downloaded the Power Ahead app to help you track your electricity use for each peak hour.
  </td><td></td><td></td></tr>
<tr><td>O3
(Grid array)</td><td>During the practice month (December) how helpful was the app?<table><tr><th></th><th>Not helpful
{1}</th><th>Somewhat helpful
{2}</th><th>Helpful
{3}</th><th>Don’t know/
didn’t use it
{97}</th></tr><tr><td>To understand your electricity use {O3_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>To help you respond to an alert
{O3_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All partici-pants.

(Note that a business decision was made to ask the app questions of all partici-pants.</td><td></td></tr>
</table>

<table>
<tr><th>SECTION 2
continued</th><th>Pilot
“Opinion”</th><th>Respondent
base</th><th>Survey
skips</th></tr>
<tr><td>O4
(Grid array)</td><td>During the practice month (December) how helpful was the app?<table>
<tr><th></th><th>Not helpful
{1}</th><th>Somewhat helpful
{2}</th><th>Helpful
{3}</th><th>Don’t know/ didn't use it
{97}</th></tr>
<tr><td>To understand your electricity use {O4_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>To help you respond to an alert {O4_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>To help you generally in the pilot {O4_3}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
</table></td><td>All.</td><td></td></tr>
<tr><td>O5
(Grid array)</td><td>Overall, how easy did you find using the app?<table>
<tr><th>Difficult
{1}</th><th>Fine
{2}</th><th>Easy
{3}</th><th>Don’t know/ didn't use it
{97}</th></tr>
<tr><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
</table></td><td>All.</td><td></td></tr>
<tr><td>O6
(Grid array)</td><td>How easy did you find the following specific features of the app?<table>
<tr><th>Feature</th><th>Difficult
{1}</th><th>Fine
{2}</th><th>Easy
{3}</th><th>Don’t know/ didn't use it
{97}</th></tr>
<tr><td>Checking your incentive balance {O6_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Knowing whether it was on or off peak time {O6_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td colspan="5">{Only ask the following options for participants with more than one premises – a lookup table will be provided}</td></tr>
<tr><td>Switching between premises {O6_3}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Identifying which premises dashboard you were viewing {O6_4}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Identifying which premises the notifi-cations and alerts were sent for {O6_5}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
</table></td><td>All.

The last three options are only asked for those with more than one premises – a lookup table will be provided.</td><td></td></tr>
</table>

SECTION 2 continued	Pilot "Opinion"	Respondent base	Survey skips
O7a *(Radio buttons)*	The app provided you with the following screens to track your use during peak time.   	All.	Those who respond 1 go to O7b, others go to O8.
O7b *(Adjustable text box)* *Non mandatory.*	Why didn't you find these screens useful? Free text response:	Those who gave a response of 1 at O7a.	

<table>
<tr><th>SECTION 2
continued</th><th>Pilot
“Opinion”</th><th>Respondent
base</th><th>Survey
skips</th></tr>
<tr><td>O8
(Grid array)</td><td>The app provided information and tips to help you stay under your peak allowance. How useful did you find the following?
<table><tr><th>Feature</th><th>Not helpful {1}</th><th>Somewhat helpful {2}</th><th>Helpful {3}</th><th>Don’t know/ didn’t use it {97}</th></tr><tr><td>Weather notifications for conditions that may impact peak use {O8_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>The ‘Reduce energy use’ page with the appliance table and tips to reduce your use {O8_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>The tips that displayed during off-peak times, reminding you that you could use more appliances without losing financial incentives {O8_3}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.</td><td></td></tr>
<tr><td>O9
(Adjustable text box).

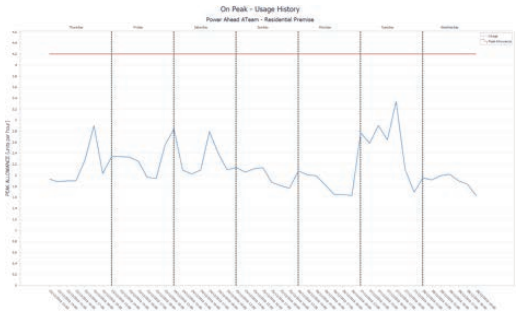
Non-mandatory.</td><td>What else would you like to see in the app to help manage your peak allowance?

Free text response:
<table><tr><td></td></tr></table></td><td>All.</td><td></td></tr>
</table>

<table>
<tr><th>SECTION 2 continued</th><th>Pilot "Opinion"</th><th>Respondent base</th><th>Survey skips</th></tr>
<tr><td>O10a
(Grid array)</td><td>Thinking more broadly about other Horizon Power services, how much would you like to see each of the following features in an app?
<table>
<tr><th></th><th>Not helpful {1}</th><th>Somewhat interested {2}</th><th>Very interested {3}</th><th>Don't know {97}</th></tr>
<tr><td>View your billed electricity consumption {10a_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>View past and current bills {10a_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>View enquiries raised via My Account {10a_3}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Pay your account {10a_4}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Change bill to paperless billing {10a_5}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Move house online (move-in/move-out) {10a_6}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Request a payment extension {10a_7}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Outage updates {10a_8}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Historical electricity use displayed in graph format {10a_9}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Historical electricity use displayed in number format {10a_10}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
<tr><td>Select alert options for things like when direct debit payments are made etc {10a_10a-11}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr>
</table></td><td>All.</td><td></td></tr>
<tr><td>10b
(Adjustable text box)

Non mandatory.</td><td>Are there any other features you would particularly like to see in a Horizon Power app?

Free text response:</td><td>All</td><td></td></tr>
</table>

<table>
<tr><th>SECTION 2
continued</th><th>Pilot
“Opinion”</th><th>Respondent base</th><th>Survey skips</th></tr>
<tr><td>Sub-Section intro</td><td>Managing your peak allowance.
We set you a challenge to remain under a peak allowance (units per hour) for each hour during the peak period.</td><td></td><td></td></tr>
<tr><td>O11i
(Radio button)</td><td>In your household, did it get easier to stay under your peak allowance as the pilot progressed?
<table><tr><th>Didn’t get easier {1}</th><th>Became somewhat easier {2}</th><th>Became much easier {3}</th><th>Remained easy throughout {97}</th></tr><tr><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>Those with at least one residential premises – a lookup table will be provided.</td><td>Others skip to O11ii.</td></tr>
<tr><td>O11ii
(Radio button)</td><td>In your business premises, did it get easier to stay under your peak allowance as the pilot progressed?
<table><tr><th>Didn’t get easier {1}</th><th>Became somewhat easier {2}</th><th>Became much easier {3}</th><th>Remained easy throughout {97}</th></tr><tr><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>Those with at least one business premises – a lookup table will be provided.</td><td></td></tr>
<tr><td>O12i
(Grid array)</td><td>Each week you were sent a graph of your electricity use like the following picture.
 
How useful did you find these graphs?
<table><tr><th></th><th>Not helpful {1}</th><th>Somewhat helpful {2}</th><th>Helpful {3}</th><th>I didn’t use them {98}</th></tr><tr><td>At the start {O12i_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>On an ongoing basis {O12i_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>Those who received graphs of their usage – a lookup table will be provided.</td><td>Others skip to O12ii.</td></tr>
</table>

<table>
<tr><th>SECTION 2 continued</th><th>Pilot
“Opinion”</th><th>Respondent base</th><th>Survey skips</th></tr>
<tr><td>O12ii
(Radio buttons)</td><td>The following picture is a graph showing a customer’s electricity use during peak hours.
 
How useful do you think a graph like this would be?
<table><tr><th>Not useful {1}</th><th>Somewhat useful {2}</th><th>Very useful {3}</th><th>Don’t know {97}</th></tr><tr><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>Those who did not receive graphs of their usage – a lookup table will be provided.

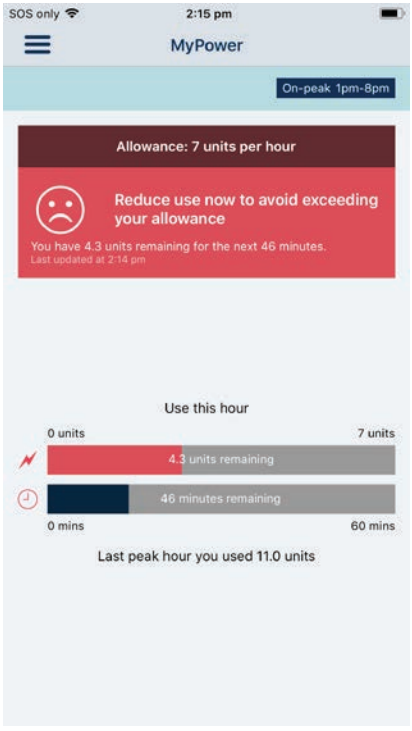
This is the opposite of those who are asked O12i.</td><td>Show same image of graph as O12i.</td></tr>
<tr><td>O13i
(Radio buttons)</td><td>In your household, did other people support your efforts to remain under your peak allowance?
<table><tr><td>Yes {1}</td><td>◯</td></tr><tr><td>Somwhat {2}</td><td>◯</td></tr><tr><td>No {3}</td><td>◯</td></tr><tr><td>Not applicable {98}</td><td>◯</td></tr></table></td><td>Those with at least one residential premises – a lookup table will be provided.</td><td>Others skip to O13ii.</td></tr>
<tr><td>Sub-Section intro</td><td>Peak free days.
There were some days in the pilot that were peak free, meaning you could use as many units in an hour as you liked without losing your financial incentive.</td><td></td><td></td></tr>
<tr><td>O14
(Grid array)</td><td>On peak free days, did you still try to save energy between 1pm and 8pm?
<table><tr><th></th><th>Yes {1}</th><th>Somewhat {2}</th><th>No {3}</th><th>Don’t know/ can’t say {97}</th></tr><tr><td>Household {O14_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>Business {O14_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.

Don’t display household row for those with zero residential premises and don’t display business row for those with zero business premises.</td><td></td></tr>
</table>

<table>
<tr><th>SECTION 2
continued</th><th>Pilot
“Opinion”</th><th>Respondent
base</th><th>Survey
skips</th></tr>
<tr><td>O15
(Grid array)</td><td>Did you specifically move any of your electricity use to these peak free days?
<table><tr><th></th><th>Yes
{1}</th><th>Somewhat
{2}</th><th>No
{3}</th><th>Don’t know/
can’t say
{97}</th></tr><tr><td>Household {O15_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>Business {O15_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.

Don’t display household row for those with zero residential premises and don’t display business row for those with zero business premises.</td><td></td></tr>
<tr><td>O16i
(Radio buttons)</td><td>In your household, if you could choose one day a week to be peak free, which day would it be? (Choose only one option).
<table><tr><td>Monday {1}</td><td>◯</td></tr><tr><td>Tuesday {2}</td><td>◯</td></tr><tr><td>Wednesday {3}</td><td>◯</td></tr><tr><td>Thursday {4}</td><td>◯</td></tr><tr><td>Friday {5}</td><td>◯</td></tr><tr><td>Saturday {6}</td><td>◯</td></tr><tr><td>Sunday {7}</td><td>◯</td></tr><tr><td>Any weekday (it doesn’t matter which) {8}</td><td>◯</td></tr><tr><td>Any weekend day (it doesn’t matter which) {9}</td><td>◯</td></tr></table></td><td>Those with at least one residential premises – a lookup table will be provided.</td><td>Others skip to O16ii.</td></tr>
<tr><td>O16ii
(Radio button)</td><td>In your business premises, if you could choose one day a week to be peak free, which day would it be? (Choose only one option).
<table><tr><td>Monday {1}</td><td>◯</td></tr><tr><td>Tuesday {2}</td><td>◯</td></tr><tr><td>Wednesday {3}</td><td>◯</td></tr><tr><td>Thursday {4}</td><td>◯</td></tr><tr><td>Friday {5}</td><td>◯</td></tr><tr><td>Saturday {6}</td><td>◯</td></tr><tr><td>Sunday {7}</td><td>◯</td></tr><tr><td>Any weekday (it doesn’t matter which) {8}</td><td>◯</td></tr><tr><td>Any weekend day (it doesn’t matter which) {9}</td><td>◯</td></tr></table></td><td>Those with at least one business premises – a lookup table will be provided.</td><td></td></tr>
<tr><td>O17
(Grid array)</td><td>How much did you value having a peak free day?
<table><tr><th></th><th>Of little value
{1}</th><th>Valued
{2}</th><th>Highly Valued
{3}</th><th>Don’t know/
can’t say
{97}</th></tr><tr><td>Household {O17_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>Business {O17_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.

Don’t display household row for those with zero residential premises and don’t display business row for those with zero business premises.</td><td></td></tr>
</table>

<table>
<tr><th>SECTION 3</th><th>Pilot
“Concepts”</th><th>Respondent base</th><th>Survey skips</th></tr>
<tr><td>Sub-Section intro</td><td>Pilot concepts.
The pilot has involved concepts like on-peak / off-peak and a peak allowance, which may be new to some people.</td><td></td><td></td></tr>
<tr><td>C1
(Grid array)</td><td>If your friend was in the pilot and showed you their usage screen that looked like this, which of the following statements would be correct advice or information to give them? Please mark each suggestion below as correct or incorrect advice.
 

<table>
<tr><th></th><th>Correct {1}</th><th>Incorrect {2}</th></tr>
<tr><td>Monitor your use during the peak time. {C1_1}</td><td>◯</td><td>◯</td></tr>
<tr><td>You have a peak allowance, which is the number of units you can use each hour during the peak period. {C1_2}</td><td>◯</td><td>◯</td></tr>
<tr><td>One way to reduce your units per hour is to run both your dishwasher and washing machine while making dinner at 6pm. {C1_3}</td><td>◯</td><td>◯</td></tr>
<tr><td>If you look like you are going to go over your peak allowance, you can expect to receive an SMS alert from Horizon Power. {C1_4}</td><td>◯</td><td>◯</td></tr>
<tr><td>If you exceed your peak allowance after receiving an alert, you will lose some of your financial incentive. {C1_5}</td><td>◯</td><td>◯</td></tr>
<tr><td>One way to help you earn your incentive is to do your washing and vacuuming in the morning. {C1_6}</td><td>◯</td><td>◯</td></tr>
</table></td><td></td><td></td></tr>
</table>

<table>
<tr><th>SECTION 3
continued</th><th>Pilot
“Concepts”</th><th>Respondent
base</th><th>Survey
skips</th></tr>
<tr><td>C2
(Radio buttons)</td><td>If your friend then asked you when peak time is, what would you tell them?
<table><tr><td>8am to 8pm {1}</td><td>◯</td></tr><tr><td>1pm to 8pm {2}</td><td>◯</td></tr><tr><td>10am to 9pm {3}</td><td>◯</td></tr><tr><td>Don’t know/can’t say {97}</td><td>◯</td></tr></table></td><td>All.</td><td></td></tr>
<tr><td>Sub-Section intro</td><td>Current way of billing.
We’d like to understand how you feel about the way you are currently billed for electricity.
{Insert image of current bill style – to be provided separately}</td><td></td><td></td></tr>
<tr><td>C3
(Grid array)</td><td>How does not knowing what your summer electricity bills will be make you feel?
<table><tr><td>Anxious {1}</td><td>Somewhat anxious {2}</td><td>No different {3}</td></tr><tr><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.</td><td>Reduce response options, convert to grid array, no longer a rating scale.</td></tr>
<tr><td>C4
(Grid array)</td><td>At the moment you have no way to monitor your electricity use and see the effects of any changes you make. How does this make you feel?
<table><tr><td>Frustrated {1}</td><td>Somewhat frustrated {2}</td><td>No different {3}</td></tr><tr><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.</td><td>Reduce response options, convert to grid array, no longer a rating scale.</td></tr>
<tr><td>Sub-Section intro</td><td>The pilot.
We’d like to understand how you felt at various stages through the pilot. If you had more than one premises, please just provide your overall views. If you lost all of your incentives, please consider the timeframe before you lost your final incentive.</td><td>All.</td><td>Guiding text.</td></tr>
<tr><td>C5
(Grid array)</td><td>How did you feel about the opportunity to earn financial incentives for managing your peak allowance?
<table><tr><td></td><td>Not interested {1}</td><td>Somewhat interested {2}</td><td>Very interested {3}</td></tr><tr><td>Household {C5_1}</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>Business {C5_2}</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.

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</table>

<table>
<tr><th>SECTION 3 continued</th><th>Pilot "Concepts"</th><th>Respondent base</th><th>Survey skips</th></tr>
<tr><td>C6
(Grid array)</td><td>How did you feel during the on-peak period when you needed to stay under your allowance?<table><tr><th></th><th>Anxious {1}</th><th>Somewhat anxious {2}</th><th>No different {3}</th><th>Motivated to earn incentive {97}</th></tr><tr><td>Household {C6_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>Business {C6_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.

Don't display household row for those with zero residential premises and don't display business row for those with zero business premises.</td><td>Reduce columns and no longer a rating scale.</td></tr>
<tr><td>C7
(Grid array)</td><td>How did you feel when you received an alert?<table><tr><th></th><th>Anxious {1}</th><th>Some-what anxious {2}</th><th>No different {3}</th><th>Motivated to earn incentive {4}</th><th>Didn't receive an alert {98}</th></tr><tr><td>Household {C7_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>Business {C7_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.

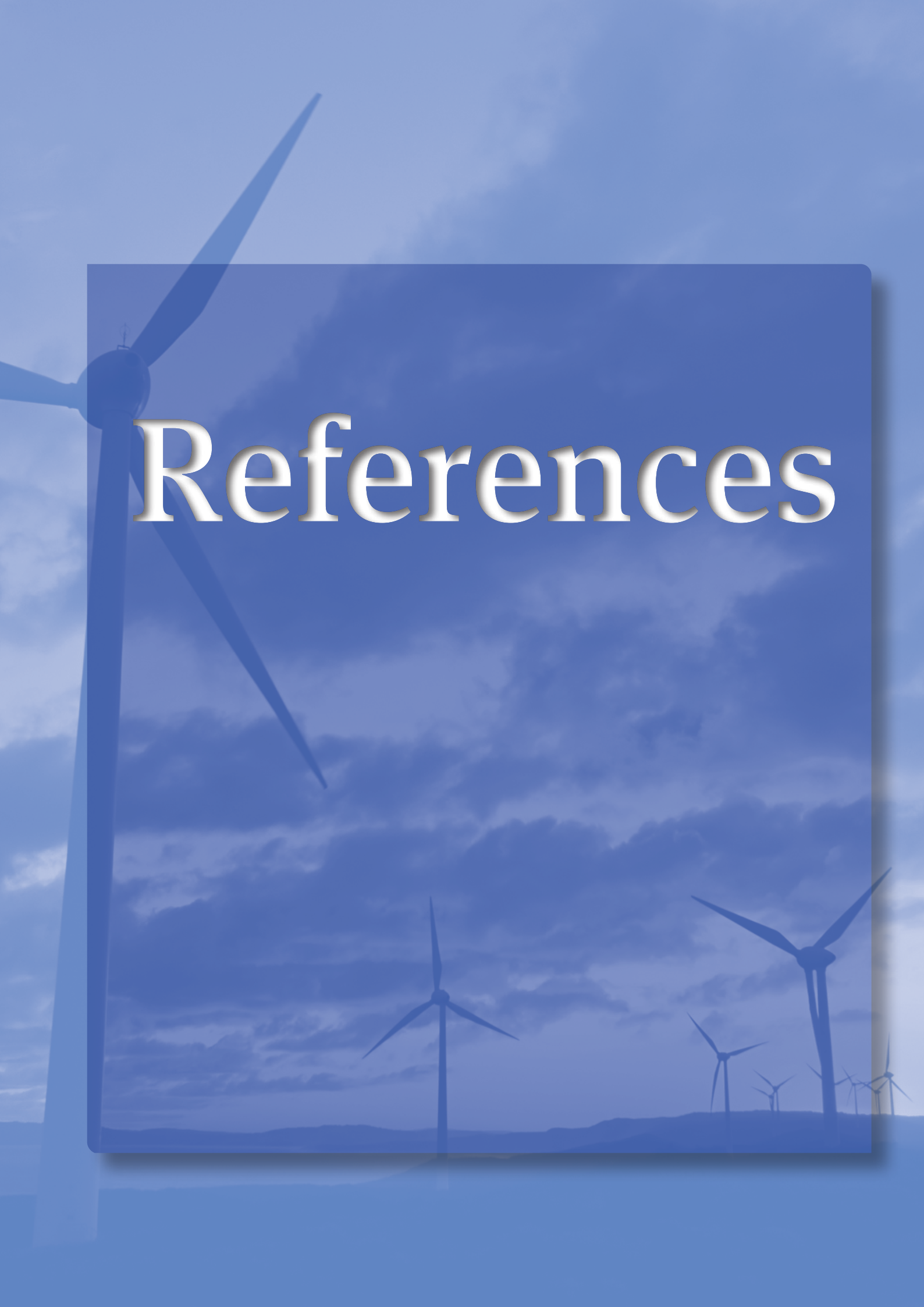
Don't display household row for those with zero residential premises and don't display business row for those with zero business premises.</td><td>Reduce columns and no longer a rating scale.</td></tr>
<tr><td>C8
(Grid array)</td><td>How did you feel when you exceeded your peak allowance?<table><tr><th></th><th>Anxious {1}</th><th>Some-what anxious {2}</th><th>No different {3}</th><th>Motivated to not go over again {4}</th><th>Didn't exceed my peak allow-ance {98}</th></tr><tr><td>Household {C8_1}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr><tr><td>Business {C8_2}</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.

Don't display household row for those with zero residential premises and don't display business row for those with zero business premises.</td><td>Reduce columns and no longer a rating scale.</td></tr>
<tr><td>C9
(Radio buttons)</td><td>Overall, how would you rate our level of service to you during the pilot?<table><tr><th>Poor service {1}</th><th>Acceptable service {2}</th><th>Good service {3}</th></tr><tr><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.</td><td>Reduce columns and no longer a rating scale.</td></tr>
</table>

<table>
<tr><th>SECTION 3
continued</th><th>Pilot
“Concepts”</th><th>Respondent
base</th><th>Survey
skips</th></tr>
<tr><td>C10
(Radio buttons)</td><td>How interested are you in the possibility of being charged for electricity in a similar way to paying for a monthly mobile phone plan or internet plan?
<table><tr><td>Not interested {1}</td><td>Somewhat interested {2}</td><td>Interested {3}</td><td>Very interested {4}</td><td>Don’t know {98}</td></tr><tr><td>◯</td><td>◯</td><td>◯</td><td>◯</td><td>◯</td></tr></table></td><td>All.</td><td>Reduce columns and no longer a rating scale.</td></tr>
<tr><td>C11
(Adjustable text box)

Non mandatory.</td><td>Do you have any final comments about any aspect of the pilot?

Free text response:
<table><tr><td></td></tr></table></td><td>All.</td><td></td></tr>
</table>



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