

AusNet Electricity Services Pty Ltd

Electricity Distribution Price Review 2022-26

Appendix 3B: Residential Customer Experience (RMIT)

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Understanding diversity in electricity customers

Towards meaningful engagement

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1. INTRODUCTION

AusNet Services is conducting customer engagement and research to inform planning for their Electricity Distribution Price Review strategy and the upcoming 2021-25 regulatory proposal to be submitted to the Australian Energy Regulator. The '*Understanding diversity in electricity customers: towards meaningful engagement*' project was designed to trial innovative research methods that aimed to:

- Develop a rich understanding of key issues facing AusNet Services' customers

The Centre for Urban Research at RMIT University conducted in-depth research with 20 households living in the AusNet Services distribution area. The research was conducted between January and April 2018, and includes three categories of households:

- **Early adopters** – those using or preparing to install electricity generation technologies combined with battery storage at their home;
- **'Energy vulnerable' households** – those experiencing (or at evident risk of) hardship, deprivation or wellbeing impacts associated with energy; and
- **Other households** – those that were not early adopters and did not indicate energy vulnerability.

This report presents the research findings and is organised as follows: Section 2 describes the project methodology. Section 3 presents the case study narratives for each of the three household categories. A summary of findings and recommendations is provided in Section 4.

2. METHODOLOGY

The research followed an ethnographic methodology¹ to investigate residential customers' experiences and concerns, their understandings of peak demand issues and demand management initiatives, and their engagement with new energy technologies.

This qualitative methodology uncovers thematic depth and is useful in avoiding the assumptions common in quantitative research and large-scale surveys. Conducting research face-to-face in a conversational format enables researchers to identify important links between knowledge and action, and the malleability of energy-related understandings in light of new knowledge and considerations introduced through the interview process. Conducting research face-to-face and in participants' homes also allows the researcher to observe and respond to body language, and make further observations about the home, its contents and occupants, and physical surroundings.

The sample size of 20 households is typical for qualitative research with households, and provides a rich basis for thematic analysis. This research is not intended to be representative of a wider population; however the experiences and stories discussed here are likely to be more widely shared. The research aims to illustrate diversity in the lived experiences of a range of household types in the AusNet Services distribution area. This research could be used to design a large-scale survey to test the findings with a wider representative sample.

¹ Ethnography is a qualitative methodological approach that aims to understand a culture, or group of people, from their own experiences and circumstances. In this project, the methodology is followed to understand householders' experiences through in-home semi-structured interviews and observations.

Recruitment

Recruitment activities targeted early adopters and household types which are more likely to be energy vulnerable, i.e. households with children (including sole parents), older households (over 65 years), renters, sole occupants, women-headed households, households with health issues or disabilities, and low-income households (see Table 1). Only some households in these categories experience energy vulnerability – the research team classified each case study as ‘energy vulnerable’ or ‘other’ based on household circumstances indicated during the interview.

AusNet Services performed most recruitment activities and provided potential participants’ contact details to the RMIT research team. RMIT identified two additional participant households. Recruitment activities sought to attract a range of household types (listed above) but there was no screening or selection of households from those which agreed to participate – the first 20 households available participated in the research and all were included in this report. All participant households were given a \$50 supermarket voucher to thank them for their time.

Data collection and analysis

This project was conducted with the approval of RMIT University’s Human Research Ethics Committee and meets all requirements regarding informed consent and participant confidentiality.

The researcher met face-to-face with one or two adult members of the household in their home (17 households) or a public location (3 households). The interviews were semi-structured to cover a range of topics and facilitate an open-ended conversation. Some questions differed depending on whether the household was an early adopter. The interview engaged householders in the following topics or themes:

- main electricity-related concerns (as identified by household)
- energy use, tariffs and bills (including any financial challenges)
- reliability of supply
- peak demand and demand management (including providing an explanation of peak demand to each household for discussion – see Appendix B)
- new energy technologies and distributed generation
- experiences, wants, and needs regarding engagement from the electricity sector

The researcher spent 60-100 minutes with each household. The researcher examined the household electricity bill if available and tailored the conversation with each household based on in-home observations and face-to-face insights. A questionnaire was used to collect participant and household characteristics.

- The households interviewed live in and around Buxton (2), Kinglake (1), Wangaratta (2), Yackandandah (7), Wodonga (1), Grantville (1), Cranbourne (1), Lilydale (1), Healesville (1), Ringwood (1), Lalor (1), and Reservoir (1).

All interviews were professionally transcribed and analysed to identify an overarching narrative or story in relation to the research themes identified above. These were then written into household case studies (Section 3). The case studies were analysed thematically by the research team to identify common and divergent concerns as summarised in Section 4.

Table 1 Summary of participant household types

HH#	Early adopter*	Kids (≤ 18)	Sole parent	Older (over 65)	Health/disability	Sole occupant	Women-headed	Renter	Energy vulnerable
1	yes			yes					
2	yes								
3	yes	yes							
4	yes			yes	yes				
5	yes								
6						yes	yes		yes
7		yes						yes	yes
8				yes		yes	yes		
9				yes					
10				yes		yes			yes
11		yes							
12		yes	yes		yes		yes		yes
13					yes	yes	yes	yes	yes
14		yes							
15		yes	yes		yes		yes	yes	yes
16		yes	yes				yes		
17		yes	yes		yes			yes	yes
18				yes			yes		yes
19								yes	
20		yes							
Total	5	9	4	6	5	4	7	5	8

* 2 x installed solar PV and battery storage systems, 3 x planning solar PV and battery storage systems

Reading this report

Householder quotes are represented in italics and are included verbatim. As such, they may contain grammatical or typographical errors. Omissions from quotation are indicated with ellipsis points (...). Where clarification is required, supplementary text for quotations is provided in square brackets ([]).

Household participants are referred to with pseudonyms to protect their privacy. Additional demographic and household characteristics are provided in Appendix A.

Limitations

Cultural and linguistic diversity (CALD): Only two interviewees were born overseas and only one spoke a language other than English at home. A specific project on additional findings and challenges that may be present in CALD households is likely to be beneficial.

Young people: There were no participants under 30 years of age, their views and experiences may vary.

Sample bias: As with most energy research, households with an interest in energy and/or environmental concerns about energy may self-select into the project. Some other types of households may self-exclude. Potentially energy vulnerable and early adopter households were deliberately targeted for inclusion. Two thirds of participant households lived in areas developing community renewable energy initiatives. However, there was not a noticeable difference in support for renewable energy between these households and those living in other areas, or in their responses to being asked why they volunteered to be interviewed.

3. CASE STUDIES

3.1 Early adoption of solar PV and battery storage

Simon – From off-grid to grid-connected early adopter

Simon and Lara recently installed a grid-connected 5 kW solar and 7 kW battery system on the house they bought in a regional city. Their home is larger than average but only uses 4 kWh electricity per day. They installed excess capacity due to plans to disconnect from mains gas and install electric heating and cooking appliances. Having previously lived for 35 years in *‘a substantially self-sufficient’* off-grid home in the country, the couple have *‘self-taught skills’* and strong knowledge of energy technologies and energy efficiency. Their new system has a *‘standby power backup’* to provide power during an outage. Rob described his solar array:

‘Each panel individually is optimised for its power supply. It obviates the need to have one or two or three strings of panels and each panel can perform to its best capacity, and if one panel gets shaded it’s only that panel’s that affected rather than the whole string, similar job to micro inverters’.

The household has had little exposure to energy bills. With concerns about the contribution to climate change however, Simon said *‘I actually think energy’s not expensive for what it is... it’s waste that makes it expensive’*. Although initially being environmentally motivated to adopt solar technologies, Simon said there’s now a strong economic case to transition to renewable energy. Simon agreed to be part of the research because he wants to *‘contribut[e] to the discussion about people being more aware of electricity... it’s not something we should take for granted’*.

Simon anticipates significant changes in the ways households get and use energy. He said, *‘we’re moving to a distributed network generating system... for the north-east [of Victoria], we need to be active participants in that’*. Simon hopes to be able to *‘trade battery power’* but said current trading platforms *‘are just not appropriate for us’*. Simon’s motivations to trade power are not *‘peer to peer trade on a specific level’* but to sell power locally so *‘it would be used closer to generation source... that’s important because that avoids waste’*. He does not anticipate significant financial benefits from exporting electricity, even during critical peaks, and thinks that financial rewards are *‘not adding anything more to our sense of social responsibility’*.

New energy initiatives are expected to benefit the local community. He said a community retailer will deliver regional economic gains, *‘at the moment every time you pay your power bill that’s money leaving your community, [it] doesn’t have to be that way’*. Simon also sees diversification opportunities for local businesses, *‘it’s not far off a farmer being able to say, “well that paddock up there, that would be perfect and I’m going to be a farmer of electrons converted into money via solar panels, rather than electrons converted into meat”’*.

Affordable ‘universal access’ to electricity is a high priority. Simon is *‘a big supporter of the fact that we have a socialised distribution system’* where *‘we all pay similar distribution charges, network charges’* and *‘people in remote and rural areas are essentially having their power subsidised’*. In regards to future distribution of the costs of upgrading infrastructure to accommodate distributed generation, he said that *‘it would be a real shame to lose... current levels of equity in accessing the system’*. Simon is *‘happy to participate in the grid’* and said that households like himself *‘in the fortunate position of having enough money to invest in rooftop solar shouldn’t disadvantage other people from accessing the system’*.

Simon supports transitioning remote communities off the grid but advocates strong engagement. He said it's *'the most cost-effective way to supply their power, you would increase their reliability, you would decrease bushfire risk'*. However, he said work is needed to *'overcome community's insecurity or feeling [off] being given a hard deal... "you're disconnecting me from the grid"'*. He said the energy sector needs to help communities see *'that's not the outcome, you're actually getting a better deal... a better service in a different way'*. He said the energy sector needs to be *'transparent'* about *'the constraints on the system'* and that more insight will lead *'local people to say, "well okay we can invest, and it actually helps AusNet in their job"'*.

Simon raised questions about the roles of consumers, government and utilities in demand problems.

He recalled:

'jingles from the electricity ads of the 1970s and the 60s [promoting the] all electric home... have all of these things turned on... your life will be happy because we're just using, using, using... we're not trying to advertise that now which is wonderful, but we did ramp up electricity use deliberately'.

Simon is keen to see households reduce energy waste but that *'making electricity tangible is the tricky thing'*. As evidence that households face challenges becoming more energy efficient, he pointed towards the response when he rang his retailer to ask about the economic value of replacing a gas heater with a reverse cycle unit, *'just blew their mind, couldn't comprehend that at all, but for me, it's a perfectly legitimate question'*.

Simon thinks *'it should be government's responsibility that we have a reliable electricity infrastructure'*.

He sees current demand problems as a *'failure of government policy... or actually not having a government policy'*. He identified the *'hands off nature of having to do it by regulation makes it hard for an organisation like a distributor to embrace [demand management]... is it in their benefit?'*. He sees *'an ideal system'* involving distribution happening *'close to consumption and community ownership'* as helping address demand management problems: *'demand management is a short-term solution to a current problem, in the long term it shouldn't be an issue'*.

Simon is interested in getting an electric vehicle. He sees lack of charging options and limited choice of vehicles as short-term issues but is concerned about longevity and recyclability of batteries and high costs to early adopters. Perceived benefits include simplification of car designs (*'fewer moving parts'*), fueling the car from his own renewable power supply, and assisting at times of network constraint by selling power stored in the car battery, *'like selling your tank of fuel back to the service station and buying another lot when the prices were cheap'*.

Steve and Faye – Using solar and battery storage as part of a mini grid

Steve and Faye are retirees in their 60s and participants in the Yackandandah mini grid. They installed solar panels and a solar hot water system when building their home 8 years ago. Last year they joined the Yackandandah mini grid project and increased their solar array to 5 kW to compensate for the solar feed-in-tariff reduction. They also installed battery storage, something they hadn't actively considered prior to hearing about the mini grid. Personal economic outcomes were a consideration, *'who knows where electricity prices are going to go?'* (Steve). Faye said that *'it's more than that for us'* and described the *'economic side of it'* as a *'bonus'* on top of *'knowing that what we're doing is clean... you're not polluting the air'*. Steve said, *'the most important fact for me is I'm creating something here locally, or Yackandandah's creating something locally'*. The battery backup capability allows the couple to offer hospitality to others during an outage.

The mini grid builds community strength and pride. Faye said, *'we know that our project has gone to Canberra, we know it's gone overseas... we're a test case'*. Faye and Steve want to see *'the real idea of the mini grid... come to fruition... sharing electricity between us'* and identified finding *'a retailer that will work with us'* as *'one of the problems'* (Steve). Faye likened the community electricity retailer proposal to a local initiative to reopen the local petrol station, *'some brilliant people decided that perhaps we could run a community petrol station... we've achieved that and so [the money is] put back into the community'*.

They see community ownership as benefiting their small town and community including: providing work and confidence for local teenagers; funding construction of a new supermarket; improving health and aged care facilities; and generating sufficient economic activity to keep two banks open.

Despite distrusting the energy sector, the mini grid increased their trust in AusNet Services. Steve self-identifies as *'a number cruncher'* but said, *'comparing electricity bills is a nightmare'*. The couple are concerned that energy market complexity disadvantages consumers, particularly vulnerable households. Faye said *'they've done that for a reason. Because most people can't sit on the phone for a couple of hours'*. She noted difficulties for those that are not *'computer savvy'* such as Steve's elderly mother. Faye and Steve's distrust was also founded on a retailer experience requiring Ombudsman intervention, and energy cost impacts of exporting gas.

Steve was initially sceptical about AusNet Services' involvement in the mini grid project, *'my question to the AusNet was, when we did all this mini grid, "What's in it for you guys?"'*. He was satisfied with the explanation and the couple became strong proponents of the mini grid, *'Mondo and AusNet have been incredibly generous with what they've offered here... they certainly looked around to try and [reduce] the cost [for households]'*.

Faye and Steve are aware that distributed generation impacts the grid but want distribution of costs to be 'fair'. They think that distributor profits (particularly when overseas-owned) should be invested in grid upgrades instead of passing costs to consumers. Faye was concerned about the impact of current energy costs on financially constrained households:

'We know there are people out there that can't afford to turn electricity on for heating, cooling, cooking. How's that fair? And how is it fair that a CEO can earn \$15 million and have a clear conscience, knowing that there are people in the community that simply cannot afford to put on a heater to keep warm?'

Steve said *'they are still making huge profits... fair enough they can't cover all of [the costs]... but what did AusNet declare last year or something, 2 billion [profit] or something'*. Steve heard that distributors may

be able to manage distributed generation impacts by helping households install battery storage and supports this approach.

Steve is more interested in electricity data and technology than Faye. Since installing solar panels, Steve manually reads the smart meter and records their weekly electricity export, import and use figures in a spreadsheet. He said, *'we are sending into the grid 15.5 kWh on average per day, we were creating 23.7 [kWh] and we were using 8.2 [kWh]... including charging the battery'*. Steve often looks at the computer portal which tracks the mini grid's impact, *'we've put 200,000 kilowatt hours into the electricity grid'*. The couple are not interested in electric vehicles, *'I don't see the economics of it'* (Steve) and *'especially people that live in the country that have to travel distances'* (Faye).

The couple manage energy use, but thermal comfort is a priority. They don't have a dishwasher or clothes dryer, and they mostly sweep rather than use a vacuum cleaner. Their home is double glazed, well insulated, and oriented to gain winter warmth from the sun. They minimise use of gas heating during the day and use electric panel heaters to warm the home in the evening (including maintaining around 15°C overnight). In summer they regularly use ceiling fans in combination with evaporative cooling because Faye needs to avoid overheating due to a health condition.

Faye and Steve don't consider themselves to be customers of AusNet Services. Steve said, *'definitely not'* and Faye said, *'I suppose indirectly we are because we rely on their power poles... but as a paying customer, no'*. They participated in the research to encourage change in the energy sector, *'if someone doesn't stand up and say what's happening and what you'd like to see, it won't happen'* (Faye).



Chris – Planning solar and battery storage to power a newly built ‘smart home’

Chris works in telecommunications and describes himself as a ‘hobbyist microelectronics nerd’. He enjoys experimenting with new technologies including micro hydro systems, wind turbines and smart control. Chris and his wife Zara built a large ‘smart home’ in a rural area, where they live with three children. Chris likes the way the smart garage door opens automatically when their car approaches, and said their automated lights are convenient when family members get up during the night. He described the voice activation features (including Google Home) and coloured lighting features as ‘a gimmick’. The home has CCTV surveillance.

Chris experienced frustration realising his aim of powering his home with solar PV and batteries. He said long delays in getting a quote for a new electricity connection to his block of land held up planning because the cost was integral to deciding whether to have an off-grid or grid-connected system. He eventually opted for a three phase grid-connection to run a 30 kW ducted air conditioner and said, ‘100% solar is still not the answer, without having to really curb your lifestyle’. The home is double-glazed and heavily insulated, with a wood boiler incorporating LPG and (solar) electricity for hot water and in-floor hydronic heating. Chris wants a 10 kW solar PV system with battery storage and was ‘a bit disheartened’ that the local mini grid project could only accommodate smaller systems – he expects to be able to install a larger system as part of the Yackandandah mini grid later this year.

Economic advantages of solar power and local generation are Chris’ primary interest, ‘it’s obviously double-edged. One is the whole green thing, but two is obviously financially. It’d be definitely beneficial over time... I know it’s a cost of entry but over time it all catches up’. He sees economic benefits to the community from the mini grid project and wants a community-owned energy retailer, ‘we would change our retailer tomorrow to be part of a community retail type situation’.

Chris has interest and skills in analysing electricity data but is not interested in demand management. After they moved in, Chris got smart meter data from his retailer to work out why his first electricity bill indicated high consumption (60 kWh/day), ‘I took the spreadsheet and drew a heap of graphs, and really delved deep into the data to understand what was what’. A wiring issue causing electricity waste was identified and fixed. The home now uses 15-22 kWh/day. Chris hasn’t since accessed his usage data but said he ‘would show great interest’ in it if it was sent to him. Chris uses a device to log data on electricity consumption in his off-grid shed.

Chris said he wouldn’t respond to price signals, ‘we didn’t put a large ducted reverse cycle air conditioner here because we wanted to turn it off on hot days... I want to be cool whether it costs me more or not’. Chris thinks adding smart control to his hydronic heating boiler may be useful, ‘if we’ve been at Falls Creek snow skiing for the weekend or whatever... from a smart phone app, turn [it] on’, or to turn off automated air conditioned cooling when plans change and no-one is coming home. He is sceptical about direct load control, ‘there’s no real smarts in what it does, it just turns something on or off. So maybe I wouldn’t be so happy about that’. Chris thinks other people would also prefer comfort over responding to demand management. However, Chris suggested ways that other households could change the timing of their activities to maximise financial benefits from solar:

‘I say, “Have you changed the way you do things? Do you turn your dishwasher or your washing machine on during the day... Do you do things like crank your air conditioner up while you’re creating as much energy as you’re going to use... Cool the place massively and then shut everything down, lock it off and hopefully it’ll all stay cool”’.

Chris said he is vigilant about energy waste, *'I'm a bit of a Nazi too, and tell [the children] to turn their lights off and not waste power... that comes back to my culture of growing up as a child'*. While aware of smart standby power devices, Chris hasn't opted to use them.

Chris wants more communication from AusNet Services. He reported delays getting the new connection up and running and said, *'if someone had picked up the phone and rang me once every two weeks, once every month almost, and gave me an update I would have been fine'*. He is also interested in understanding the justification for line upgrades in his area *'as a consumer who in the end's paying for some of their decisions... just some communications as to why. Now, some people probably couldn't give two hoots about why, but I think there's a lot of people that would'*. Chris suggested a range of communication channels:

'I'm open to any form of communications, whether it be electronic mediums or mail or... This town also has a big response to, like town forums and things like that... it can be a two-way communication forum... I'm very busy sometimes so I don't take the time to give a lot of feedback, whereas in a community forum possibly it's easier to.'

Chris doesn't see himself as a regular customer of AusNet Services, *'I mean at some point you're an AusNet customer when you live in one of their areas, but they're not the retailer... I was an AusNet customer for the brand new connection.'* Chris understands AusNet's interest in the local mini grid as *'justifying the existence of the poles and wires... because a mini grid can't exist without their poles and wires, so if everyone went off-grid there'd be no service charges back into the customers... their income and revenue streams would drop dramatically'*.

Chris suggested the costs of grid upgrades to accommodate renewables should be 'distributed', *'the retailers... the network owners or the distribution company are making a margin. So it could be a distributed cost across probably the retail or the distribution network, and the customer'*. He sees the upgrades as essential infrastructure and a *'cost of living'* regardless of whether households benefit directly like the National Broadband Network:

'NBN, it's a huge government cost that all taxpayers are paying for whether you use it or not. We see the elderly that go, "I want nothing to do with it." It's like, well, you're still paying for it in some way, shape or form'.

Beth and Andrew – Planning an off-grid home

Beth and Andrew are recently retired farmers in their early 60s. They live in regional Victoria and are planning an off-grid solar and battery system to avoid paying \$42,000 for a new electricity connection to the site of a new home being built on their farm.

Neither Andrew nor Beth have technical backgrounds, but both are university educated. Their farming business was energy intensive and they are relatively energy engaged as suggested through:

- being aware of electricity distributors' role and the contribution of network charges to energy;
- having used AusNet Service's *myHomeEnergy* portal²; and
- regularly using a government comparison website to compare energy tariffs.

The couple asked around the community and educated themselves about renewable energy options.

The technology options they are considering include a ground source heat pump for heating and cooling, and solar, wind, and mini hydro generators. Beth said:

'You think you know stuff but then you talk to people... someone only a few weeks ago mentioned a hydroelectric, electric system... two bodies of water top and bottom or one each end and a pipe and a little pump – and we could do that'.

They are still working out what size solar and battery system to install. Their current home uses about 12 kWh per day. They have two fridges and two freezers to store home-grown fruit and meat, *'when you kill an animal you need space for it...the rest of [the energy use] is almost negligible'* (Beth). They use wood for heating and air conditioning is used for family visits, *'you don't want your visitors to be going, "Oh God it's hot in here, let's go home". They're a bit wussy'* (Beth).

Electricity pricing and fairness are major concerns. Andrew said, *'electricity prices just keep going up and up'* and *'we're getting to that stage of life... our income is not what it was so any ways we can save money short and long term'*. The couple see going off-grid as a way to reduce their future living costs and are keen to eliminate daily supply charges. Beth linked electricity pricing to the powerlessness they felt as farmers selling milk to large corporations, *'it's like being a dairy farmer. You just cop the price that you cop and you have no say in it'*.

Beth agreed to be interviewed because, *'if it can help AusNet to work out their pricing to be a bit more customer orientated... it's got to be beneficial'*. They wanted households to be consulted about sector decisions, *'put a questionnaire in with the power bill'* and be rewarded for participation, *'5% discount off their power bill if they fill it in... something that benefits them'* (Beth).

The couple were concerned about high demand households being subsidised by others, *'I bet a lot of those elderly [people] haven't got it turned on because they can't afford to use it'* (Andrew). Although Beth thought direct load control sounded *'a bit big brotherish'* she said *'it's probably necessary'* to avoid outages and impacts on households who rely on appliances for their health.

Andrew and Beth wonder whether leaving the grid could negatively impact others but, under current energy policy, see off-grid as the best way to meet their priorities:

'We're sort of copping out a bit, aren't we?... because it's in [the electricity sector's] best interest, as well for people, to stay connected to the grid, isn't it? To put panels on their roofs and to put their power, excess power back into the grid... I don't know.' (Beth)

² The couple were disappointed to find that the portal no longer worked.

'[If] the electricity prices were reasonable and the costs of [a new connection], we wouldn't have to think about going off-grid. It's only just the costs and where the power is sourced from, as in fossil fuels and things, which we want to get away from.' (Andrew)

They are keen to see financially constrained households and renters benefit from adoption of new energy technologies – either directly or through reduced energy costs:

'I think the hard part is if [access to emerging technologies is] confined to people who own their home... and who've actually got a bit of extra money to spend... if all the people who do get solar panels on their roof, and there's already a lot, pump all this extra power into the grid, you know, you'd hope it would make it cheaper somewhere along the line for the rest... it doesn't seem to be happening.' (Beth)

The couple expressed distrust in the energy sector and pricing. They wanted to pay for renewable energy but did not trust retailer claims on this topic. They understood their tariff to include an 11pm to 7am off-peak rate but pointed out that their electricity bills do not list the tariff times, raising the possibility that *'they've changed it and we didn't realise'* (Beth). Beth gets up early and does a load of washing and uses the bread machine before 7am but she opposed *'opportunistic'* time-of-use peak rates (3pm to 9pm), *'see that's forcing people, really, isn't it to have a barbecue... everyone's got to have dinner at some point... it should be affordable'*. Andrew felt that peak pricing would only work if accompanied by *'cultural change'* including *'shifting the time people work so they don't all knock off at the same time'*.

They thought that ways to address energy sector issues, including peak demand, were being overlooked, and suggested that times of network constraint should be communicated to raise household awareness and responsiveness. Beth said:

'maybe they could put announcements over [the radio]... everybody turn their air-conditioners down or off... all the other unnecessary things off now otherwise we're going to turn off the power... maybe something like that every summer, two or three times, might get people thinking a bit more about it if it's in their face.'

Some energy issues were attributed to perceived failures in government decision making including: deregulation as a cause of energy price rises; lack of regulation to increase energy efficiency of homes and reduce peak demand; and lack of support for renewable energy, *'it's win win... it's a no-brainer... [but] the lobby groups get in there and put their, put their hands in the Government's pocket's* (Beth).

The couple felt that government should be central to modernising the electricity grid. Andrew said, *'the consumers will end up paying for [grid upgrades to accommodate distributed generation]. Probably the best way for it is to go back to being a national, nationalised system like it used to be with the SEC [State Electricity Commission]'*.

Vince – Developing a plan for a future microgrid

Vince is a semi-retired engineer with enthusiasm for numbers, data, and emerging energy technologies. Vince and his wife live in the Murrindindi Shire. He became heavily involved in the local community after the 2009 bushfire.

Vince is a member of a community group preparing a proposal for a microgrid demonstration project in their area. He contributes technical expertise including modelling scenarios. The former local school building is now being used as a community centre and presents a potential installation site for solar panels, batteries, and an electric vehicles recharge station. The group are interested in being able to sell their community-generated electricity to electric vehicle drivers as an alternative to exporting to the grid.

Vince hopes that socio-economically disadvantaged households in the area can benefit from a microgrid, *‘that’s one of the issues we’re sort of trying to deal with in the microgrid project, is how you deal with people who are struggling to pay their bills’.* They hope that community partnerships can assist with financing arrangements to make participation more accessible. They think that providing advice on energy efficiency and finding cheaper energy plans could help households including those that don’t end up joining the microgrid.

Vince had intended to take his own home off-grid but decided to stay grid-connected because of concerns about overshadowing trees, the size of the standalone system required, and the possibility of a local microgrid – although he doubts his own home will be included in the microgrid due to its location. Vince plans to install battery storage and a 5 kW solar array in a paddock (but would like a larger solar system if AusNet Services could accommodate it). He said the decision to get solar is *‘a combination of economic and environmental reasons... greenhouse issues... and the fact that it now makes good economic sense to get solar panels’.* He has calculated that battery storage is not yet economic in his situation but will be in the near future and he wants to demonstrate the viability of the technologies to others.

Easy access to smart meter data would be useful. Vince said he can get some usage data from his retailer but recently discovered the *myHomeEnergy* portal and tried to download the data without success. He said customer data will be *‘really powerful’* for microgrid planning and would enable him to advise households about the size of solar battery system needed and/or the value of switching tariffs, *‘if that [data] could come from AusNet, in a seamless fashion, that’d be really good, cause then it wouldn’t matter which retailer they’re with’.*

Vince has noticed that most people struggle with complexity in energy issues but thinks the energy sector can build household engagement. He said:

‘if something was sort of explained in a straightforward, no-frills, non-technical, no jargon way, in which people could understand it, then I think you would get a much better-informed audience who would then understand why things happen or why they don’t happen’.

He believes that community power schemes can assist engagement including by putting *‘a human face’* to energy and involving communities.

Involvement in the microgrid development has built trust. Vince said the 2009 bushfire left himself and others with distrust of AusNet Services. He was *‘surprised they were so supportive of community energy’.* Vince said, *‘[AusNet Services] have been so positive in our negotiations with them so far... which we just didn’t expect, particularly from a distributor, we just didn’t think that was part of their business.’* He appreciated that AusNet Services *‘seemed pretty up front about where they hope to be going [with distributed energy generation]’* and noted that *‘running into AusNet people so many times in the*

community power meetings, that's certainly changed my attitude towards AusNet'. However, Vince said he doesn't see himself as a customer of AusNet Services 'at the moment. I know that's changing, with the microgrid we're looking to... we'd start to see ourselves as customers'.

A summer demand management program offered by their retailer also helped build trust in the energy sector. Vince turned off his water pump and other appliances during peak events as part of his participation in this program, *'I was impressed that they doing [demand management]... to see the electricity companies doing it was good'.*

Vince is experiencing early adopter challenges. Instead of user end technology limitations, he said the economic case for battery installation depends on as yet unknown regulatory or economic factors. He doesn't know on *'what basis the network costs would be allocated to a microgrid'*. He identified *'allowability... the conditions under which [electricity] trading can take place'* as *'the biggest regulatory hurdle... one of the reasons why we've been discussing things with AusNet, to just see what is possible now, what might be possible in the future, what needs to change'* so community power can work. Vince said that costs and charges may render trading or selling battery-stored energy during critical peaks unviable, *'you could do it, but it'll cost you an arm and a leg... things seem to be very a much up in the air'*. He said that *'you can talk to half a dozen different people and get half a dozen different answers as to what is the case now and what might be the case in x years time... even the people at AusNet and Mondo Power... are unsure as to what's around the corner'*.

He recognises that distributed generation presents challenges for distributors, *'if the transformer's not rated accordingly then you've got all sorts of problems. I know there's all sorts of issues with synchronisation and stuff'*. He is pleased that AusNet Services is investigating these issues which affect the viability of the microgrid initiative. He understands that upgrading infrastructure capacity *'is a lot more costly here than it is down in the city'* and hopes for *'a balance there where both parties can hopefully be better off'* and the microgrid can cover its costs:

'to be long-term sustainable you can't rely on a subsidy from someone... I think any upgrades necessary in order to enable things like microgrids and stuff to work are just one of the costs that the microgrid has to bear. And it may be that it means that it's not viable'.

Significant but unpredictable changes in the technologies available are expected. Vince cited the rapid *'miniaturisation'* of batteries and solar paint as examples and said *'I can't even imagine what those changes will be. I just know there'll be big changes. You've only got to look back 20 years and you wouldn't believe where we are now'*.

3.2 Energy vulnerability

Kate – Sole occupant renter with declining health

Kate is in her late 50s and has rented a small brick unit in Melbourne's south-east for 26 years. She loves the home's natural light and courtyard where she can garden. Kate appreciates her *'wonderful landlord'* who encourages her to treat the home as her own. He responds to requests and followed up after discovering that insulation had never been installed. Initially Kate rented the unit with her husband but after a divorce she stayed on alone.

Surgery has helped slow the progression Parkinson's Disease. Kate's current symptoms include difficulties with handwriting, memory, anxiety, and regulating body temperature, *'the humidity, it's been a real problem for me. And it turns out, that that's a problem for people with Parkinson's'*. She sparingly uses a reverse cycle air conditioner in the kitchen and only uses a fan in the bedroom – despite finding it very difficult to get enough sleep.

Kate minimises energy use, 'budgets carefully', and 'at this stage' can still afford her energy bills. She is concerned about managing financially if health decline prevents her from working full-time as a security guard. Kate doesn't have a car. Travel by train to work in Melbourne's CBD is tiring:

'I've really, really struggled with the [travel] distance, lack of sleep, shift turnarounds... I'm having to have a serious look at my job... I didn't know I had Parkinson's when I took it on. So that's a major concern for me at the moment, if I can't work I can't afford to live here, it's that simple.'

The neurologist advised her to stop working night shifts, but Kate doubts her employer will allow it.

Kate is unsure why her electricity use has increased and how to address it. She said, *'it's always been reasonable so, I'm a bit puzzled by that'*. Kate is *'careful'* with energy use including running the reverse cycle unit *'at 24 degrees in summer and 17, 18 in winter'*. Kate knows that replacing her old fridge would reduce her electricity bill but is concerned about short life spans of new appliances. Kate maintains one energy luxury, *'a [heated] water bed so I know that that takes my energy, but I'm not willing to swap it for a normal bed because it's so wonderful to get in a warm bed in winter when you're feeling miserable'*.

Kate often opts not to engage with energy issues. She is aware of energy price rises, *'I'm certainly not impressed with the way the electricity and gas bills have been going... everything is going up and our income [in the security industry] hasn't'*. With automatic payment by direct debit, Kate doesn't look carefully at the bills. Anxiety and frustrating past experiences with energy retailers have reduced her willingness to engage, *'I can put off doing something... for a really, really long time'*, and Parkinson's Disease is making it harder to navigate energy issues. She said, *'it involves a lot of crap, basically, and I'm getting less enthusiastic about crap as my brain disappears on me... The ability to compare [energy offers] is virtually impossible'*.

Kate hopes that joining a group electricity plan *'switch'* mentioned on television will reduce her energy bills but isn't looking forward to *'another bloody change... I've always been reasonable with change in my life, but I have noticed it getting harder'*.

The topics of smart meters and bills 'touched a raw nerve' for Kate. She said *'we were supposed to be able to know when we were using energy and when it was cheaper'* but finds the bills confusing and is uncertain about her tariff, *'there are different prices and you cannot for the life of you work out why... based on the information that they've given us'*. Kate suspects that bills are deliberately confusing and assume technical knowledge that householders don't necessarily have:

'there's a sense that they're quite happy with people not really understanding their bills... they're trying to baffle us with bullshit, basically, aren't they? Keep us in the dark'... Some people think about things from more of a technical point of view and some people are not technically-minded'.

A recent email from AusNet Services informed her that her smart meter will no longer be compatible with the myHomeEnergy portal. She was told to *'request an update to a smart meter if you wish to continue enjoying the benefits of being able to monitor, budget and assess your energy consumption'*. Kate is concerned that this means she will stop getting the regular retailer emails alerting her of weekly electricity cost which she finds helpful for budgeting. She is reluctant to call for clarification or request a smart meter update because she is frustrated with the changes and reluctant to deal with call centres.

Despite opposition to privatisation of essential services and distrust in the electricity sector, Kate is enthusiastic about reliability and communication from AusNet Services, *'they own the poles and the wires and all that sort of stuff, and they're my supplier. And thank God they've managed to supply me all the time through this summer, which has been incredible'*. She said, *'if there's something happening they always warn us in advance'*. She was pleased to be interviewed, *'it's always a positive thing if you can actually get to say something to somebody officially to make a difference'*.

Although familiar with the problem of peak demand, Kate was not aware of energy sector interest in demand management. Kate thinks she would be able to shift some energy use out of peak hours – if she knew when this was needed. She hopes demand management would encourage people *'to try and share the load'*, be more *'frugal'*, and reduce environmental impacts of energy use – but thinks that *'these days'* people may be too *'selfish'* to respond.

Kate would prefer to be using renewable energy. She said, *'I would be solar in a heartbeat'* but doesn't want to risk the expense of installing solar panels since the landlord *'could sell his house tomorrow'*. She considered paying extra for GreenPower but does not trust retailers to put the extra cost towards renewable energy. Regarding the issue of upgrading the grid to accommodate household solar she said *'no question, it has to happen, or it should be happening already'*. Kate saw the dilemma about how to fund upgrades as one of the *'many ethical questions in life... who pays for people's pensions and all those sort of things'*. She thought about the problem from different perspectives and decided that government should be involved in the solution:

'Anything that makes people's lives harder in terms of more bills or higher bills is never going to be popular... with me either. So, I suppose I want the company [AusNet Services] to carry the load, but... you've got massive investors wanting more profits and things... We come back to whether it should be run by the government or the private companies... if it's run by the government, then I never have a problem with paying tax... if they were taking [the money] away from us before we knew about it, it's easier than when they're taking it out of our bank accounts'.

John – Elderly man living alone

John is a pensioner in his 70s who never married and lives alone in a house he inherited from his parents. John left his public service job in Melbourne 30 years ago and moved to the country town to care for his parents. He gave up his volunteer job a couple of years ago and is home a lot.

John is 'in good health' but is 'sensitive to the heat'. He has ceiling insulation but radiation from an old factory roof heats up his home. John uses fans and sometimes an air conditioner. He would prefer 'to have air conditioning right throughout the place but... your pennies would run out after a while'. John is 'exceptionally careful... a very cost-conscious person' but energy costs are 'pretty high'. He said he would replace his old air conditioner with a reverse cycle unit if he 'had the money'.

In winter John's 140 year old house 'just flows cold air' and gas bills are a problem. An old ducted heating system and 'two cold spells' last winter led to a \$2600 LPG gas bill. He said he can get a gas concession if he fills and sends a form. His current gas bill (for summer) is \$480 and he's 'had to write to them in Wodonga and say, look, I can't pay it all the time. They were understanding, and on pension day, I'll send them a cheque...that's all I can do'. John's not sure if there is a problem with the heater, 'although you switch it back to low, it wouldn't cut out for another two, two and a half hours... and it was freezing. You needed it...when you get to my age'.

John is not sure what electricity tariff he is on. He said, 'there's an off-peak thing. I can't exactly remember what it is exactly... I think it might be night'. With electric hot water and a pensioner concession he pays about \$80 per month. John is not sure about the value of smart meters, does not use a computer, said any data would have to be sent to him 'in the mail'. However, he finds it difficult to differentiate legitimate communications from 'scams'. He thinks demand management is a good idea but couldn't respond as he's 'just about stretched to the limit as far as economies go'.

'It would be nice to have a holiday... even an overnight holiday' but unexpected costs crop up. John had to fix the starter motor on his 1984 model car which he drives to buy groceries once a fortnight. He doesn't have a pet because 'they're too expensive'. John 'made some enquiries' about selling his home but found he would 'be no better off'.

John is worried about planning for energy provision. He said, 'I don't know how long I'll live, but it concerns me for future generations'. He anticipates reliability problems because of population growth. He has concerns about lack of electricity when there is no wind (in South Australia), and whether enough energy is being stored. John thinks money needs to be spent but:

'they're spending all this money on the Snowy Mountains extension... there's just so much waste out there these days, so... and if they're going to spend it, spend it properly and with the long-term aim to improving conditions of people'.

He believes building more dams is 'potentially cheaper' and would provide employment. He thinks the local initiative to install more renewable energy and 'become totally independent' is a 'good thing'. He supports upgrading the grid to accommodate renewables, 'it's common sense, that's all. You can't stand in the way of progress' and he expects that it will cost households money, 'it's just a fact of life. You've just got to accept it'.

John is concerned about loss of customer service in many sectors but is satisfied with electricity reliability. He said electricity outages don't 'worry me so much, because food's in the freezer, and food's in the fridge and the door's shut'. A storm that morning caused the power to go out, 'it's a natural thing you know'. John was pleased to be consulted about electricity issues and appreciated the 'face-to-face' approach.

Sarah – Family health issues and hardship

A range of health issues have contributed to stress and financial hardship. Sarah is in her 40s and her marriage failed while she was undergoing cancer treatment. The couple had been caring for seven children (including a foster child). Sarah now sole parents two children and is recovering from heart surgeries for a condition associated with poor health. Her younger daughter has learning and physical disabilities. She also cares for her terminally ill mother, *'I went from working full-time and I was studying a post grad in psychology. And then I got sick... and then mum got really sick so everything was just completely flipped around'*. When her husband moved out, Sarah was left with large energy bills, *'I went back to work for a while but I could never manage to catch up'*.

A gas leak contributed to a \$1,200 gas debt. Sarah *'could smell gas'* and *'asked them to look into it...different workmen would come out'*. It took time but *'they replaced all the gas lines'*. The gas usage halved after the leak was fixed. The energy retailer said the landlord is responsible, but the housing agency has not agreed to help with the debt from the gas leak.

Dealing with energy debts has been stressful. Sarah said it was hard to get onto a retailer hardship program, *'you've got to explain your story and then you've got to explain your story again. It's difficult what you're going through in the first place'*. Negotiating payment amounts was also difficult; Sarah pays \$80 per fortnight but resisted demands for higher amounts *'otherwise we won't eat... that money could go towards food or activities for the children'*.

Sarah used up her savings to cover the gaps between income and household expenses. She lives week to week financially and faces large intermittent costs, such as \$1,800 *'for books and materials and uniforms'* for her eldest child to start off Year 12, *'when you're a single parent on a carer's payment, how are you supposed to afford that?'*. Sarah turned to charities for financial help but wants to return to her work as soon as her health and caring commitments allow.

She is concerned for others experiencing disadvantage as 'gas and electricity has gone up so much'. Sarah said, *'I've worked in the homelessness sector and I've worked in with people on low income... I know they can't afford the accommodation or they can't eat... They go into rental arrears because they try to pay their utilities'*. Sarah was sent the Utility Relief Grant forms and advised to *'see a financial counsellor to get the form completed'* but then found out that *'financial counsellors have waiting lists'*. She managed to complete the form herself but worries that *'a lot of people couldn't manage it'*.

Sarah experiences constraints on energy efficiency and potential health impacts. In winter, the home gets *'icy cold'*. There's a gas heater in the living room but they don't heat the bedrooms, *'they're always mouldy, the windows. I keep them open in the bedrooms'*. Sarah requested insulation and ventilation checks for her home, but they were deemed satisfactory.

When she had savings, and because her daughter's health issues were exacerbated by heat, Sarah paid to install external awnings on the windows. To install cooling in her public housing unit, *'I had to write [for] special permission and get medical evidence and everything. And then I had to pay for it myself'*. Heat can cause Sarah's heart palpitations but she minimises use of the evaporative air conditioner, *'during the day, if I'm home, I don't have [the air conditioning] on myself. It's just when the kids are home'*. To cut her electricity costs, Sarah turns all her power points off and doesn't use the television during the day.

The only other way Sarah can think to reduce her bills is to replace the leaking fridge. She said it's *'maybe on its way out'* and *'the energy rating isn't very good'* but Sarah doesn't think it's feasible to get a new fridge. She said, *'I'm not working, I can't get a loan. And then I'm just going to be in more debt, it's just going to make it more difficult to manage'*. Sarah would like help to reduce electricity costs and said

the smart meter isn't useful, *'if I went out and checked the meter, I don't have a clue what I'm looking at, so how's it going to help me if I don't understand?'*

Sarah's linked her distrust around energy issues to government. Sarah was told the government *'won't allow solar panelling on any of their properties'*. She thinks this *'is ridiculous, if it's going to be better for the environment, and it's going to save tenants money who are already on a low income'*. The housing agency also refused free installation of water saving initiatives by the local council, *'they're not allowing [us] to help the environment. It's just silly. It's all caught up in politics and all that sort of stuff'*. Sarah attributed the rise in energy costs to privatisation.

Despite limited prior knowledge, Sarah appreciated being interviewed and learning more about electricity sector issues, *'anything to help, you know like another voice to help... I found it really useful doing [the interview], I found out a lot of information that I didn't know'*. She finds energy bills *'all confusing'* and didn't know what type of tariff she was on. Sarah was satisfied with electricity reliability but said she *'wouldn't have a clue'* about AusNet Service's role. After the interviewer's explanation she mentioned ringing *'the electricity company'* about fallen power lines in her street and being told *'no you need to ring the council'*. She said, *'no-one was taking responsibility for it and I didn't know who else to ring'*.

An explanation of peak demand and its role in rising electricity prices made sense to Sarah. She said, *'it's hard for the electricity companies to accommodate everybody'*. She thought the explanation helped counter misinformation from *'the media and the news'* about electricity companies *'ripping everybody off'*. Sarah said, *'nobody has an understanding of what's actually going on. Nobody probably knows about peak times... if [this explanation is] available to other people, I think that there'd be more understanding'*. Sarah doesn't *'think it's fair to charge people who are already at a disadvantage'* and thought the electricity sector should look for ways to reduce peak demand which *'take into consideration people's situations'*. She said demand management would be more suitable for a *'normal family'* but difficult for herself and some others, *'with my daughter, with her disabilities... she's hyperventilating, and she has her meltdowns, I'm not going to not turn my air conditioner on to settle my child. And same with... elderly people'*.

Sarah didn't know about grid upgrades to accommodate household solar but saw this work as necessary. Regarding costs she said:

'maybe if it could be half the consumer and half the company. And just for the people that are using solar maybe that could be an additional charge. Because for someone like me, I'm going to be paying for something I'm never allowed to have... which I think is unfair'.

Leon – Young family renting energy inefficient home

As a technology enthusiast and a renter, Leon is frustrated that he cannot access efficiency and renewable energy technologies.

Leon and his wife Dana have three children and want to reduce their high energy bills and environmental impact. When the solar hot water broke down their electricity bills went up substantially because, despite Leon's objections, the landlord replaced it with a second-hand electric storage system, *'drives me insane... it's not on a separate circuit... it just turns on and then there's no off-peak'*. He said the home uses 13 kWh per day when they are away. Leon feels powerless as a renter, *'apart from going to VCAT and then suing them – which is never going to end well because they're just going to say "see you later" [terminate the lease] – there's no useful mechanism as a private renter to changing those things'*.

Leon believes the landlord has little concern for his family or the home:

'they won't spend any money on capital investment in their property because they don't care... It's purely a tax deduction from what I can tell of the place... There's been no maintenance done... They have done two [inspections] in six years.'

However, Leon and Dana opt to remain in the home given the lack of affordable rentals, their *'hectic'* schedule of study, work and family responsibilities, and the challenges of moving, *'who wants to move with three kids... it was a maddening process when we moved here'*.

Leon has done what he can to reduce discomfort and energy use. He said, *'our house is a hotbox because it's got bugged all insulation in it'*. In winter Leon decided they wouldn't use oil burner heaters anymore, *'[the family] all had to wear beanies and jumpers because I wasn't paying the electricity bill to turn them on'*. The air conditioners have not been serviced since they moved in – when they use them their daily use goes up to about 40 kWh. To reduce heat in summer, Leon and Dana cook outdoors on three gas burners. Leon describes himself as *'an absolute dictator when it comes to turning the power points off and not leaving things running'* and lamented that he cannot afford to replace his *'shocker'* old fridge.

Electricity costs are a major concern for the family, *'in the last two, three years our price for electricity has gone absolutely through the roof... whenever, they send me letters [it's] to tell me that the price is going up'*. Leon recently completed an engineering course and said that the family's income was limited:

'I've been at TAFE five days a week... so I've been on Austudy for the last year. [Dana] has been on parenting payment for that same period because she's looking after [youngest child] and home schooling her. I have to work [shifts in hospitality] every day I can, pretty much to pay, between the rent, the electricity and, like, normal household costs.'

Leon used credit cards to keep bills paid and owes money to family members who helped out. Leon will soon start teaching part-time.

Between his own technical skills and his electrician friends, Leon said he could install solar PV and a solar hot water if legally allowed as a renter. Leon wants to be part of the Yackandandah mini grid project, *'the only people who are left behind... are people like us right now... I would have got the biggest [solar array] I could have had'*.

Leon thought that AusNet Services 'do as best they can with the system they have' and that energy sector problems are an outcome of privatisation. He said, *'the system's stuffed... no private company, [AusNet Services] or anyone else can possibly run something that should be nationalised and should have money pumped into it.'* Leon sees privatisation, profits and payments to shareholders as incompatible with his grid priorities, such as putting powerlines underground in bushfire risk areas and enabling a rapid

transition to renewable energy, *'you can't turn around to a private industry and say... now you're going to foot the bill... you made 10 years of profit now we've got to suck all that profit back'*. He said that *'as a person who pays tax in this country I want my taxes to go toward [things like] 20 kilowatt transformers... solar panels on every single house... solar hot water services'*.

Leon doesn't think households like his own should bear the costs for solar for future grid investments via higher electricity bills. He sees standard supply charges as keeping energy costs high for households who try hard to minimise use. He thinks *'old age pensioners, people in hospital care'* need air conditioning *'in 40 degree heat'* but that healthy, high demand households should be targeted for peak demand management, *'everyone else can suck it up... say this is how much power you get... It's enough power for everyone else... If you want to pay more than that your service charge goes through the roof'*. Leon also favours direct load control (*'if some dude's sitting in his house, he's not even sitting in house, he's at work all day, he's got his air-conditioner turned on, turn it off'*), wider deployment of batteries, and high energy efficiency standards for housing to reduce peak demand.

Leon wants more diverse perspectives in energy decisionmaking. He thinks decisionmakers are *'white men who are middle aged, Protestant and cisgendered'* and that more women would help shift thinking, *'from this day forward make every single person who's an apprentice make 50% of them women... I think it has to happen the whole way up... the chain'*. Leon also said all university degrees should involve a *'social ecology course'* to support integration of social implications in planning and policymaking.

Leon is impressed with AusNet Services' work in his area. He said, *'I wait to see what AusNet does next... I thought they did an amazing job with the Mondo thing. I think it was actually brilliant but where are you going from that?'*. Despite being inconvenienced when he couldn't leave home to get to work due to fallen powerlines, he expressed satisfaction with reliability and response times, *'[AusNet Services] turned up with everyone and their dog on a Sunday afternoon at 5 o'clock'*.

Diane – Sole occupant with a mortgage and redundancy from work

Diane is paying off a mortgage on her small weatherboard home and recently accepted a redundancy from work. She is in her 60s, lives alone, and is concerned about her financial future.

The impact of rising electricity costs on herself and others is a major concern. She said, *'electricity costs are going up again... [that's a concern] for me entering into that retirement years'*. She usually gets the pay-on-time discount but has equity concerns about pricing, *'I'm opposed to this... "pay by a certain date you only pay this much"... that really discriminates against people that can't pay their bills upfront'*. Having worked in aged care including home visits she said, *'a lot of elderly people that I've come across... would [only] put their heater on if they really, really, really, really needed to, because they're... so cash strapped to pay their bills'*.

Diane doesn't see much reason to engage with electricity issues. She said price rises are *'something you groan about... it's something that you don't have a lot of say over anyway... you just accept that this is the sort of thing that's been going on'*. Diane responds to surveys and observed that surveys don't necessarily give households the opportunity to communicate their concerns, *'if they're wanting feedback from the communities then surveys probably are one way of getting the information about how you think and feel... providing they're asking the right questions'*.

She is unfamiliar with her electricity tariff. She thought there must be *'variations'* in electricity cost at different times of the day but said, *'it's not something that I've looked in to... but I'm sure there is'*. Her bill indicated a flat-rate tariff and 10 kWh daily usage.

Diane wants to install solar electricity but is concerned about lack of rebates and incentives. She heard that *'a lot of people... who have put solar on in the last few years, they're not getting hardly anything back'*. Regarding the community effort to transition her area to renewable energy Diane said, *'the people working within that group aren't pressuring people at all'* but nevertheless she feels *'a subtle pressure'* to install solar. She doesn't want to be *'the one holding things up'* but must *'really weigh up'* whether it's something she can afford.

Keeping the house warm in winter is a priority. While she mainly uses wood for heating, Diane relies on a reverse cycle unit if the fire goes out or when she *'couldn't be bothered collecting wood and chopping it'* – which is likely to happen more often as she ages. The area often has frosts overnight and frozen water pipes can burst resulting in unexpected household costs.

The region had been experiencing an unusually long period of hot and humid weather. With temperatures over 40°C Diane said her dog had *'been really struggling with the heat... she's a real shaggy dog... I try not to leave appliances on for my pet, but sometimes you do have to consider them'*. The dog barks if left outside when there's nobody at home. When going out on a recent *'really hot, really hot night'* she felt she had to leave the cooling on for her dog *'because I wasn't going to be home... [to] open up the house and let the natural sort of coolness come in'*.

Diane tried to improve the home's energy efficiency. She *'had insulation put in the roof, probably about eight years ago'* and *'the west side planks taken off... insulation put in the west side'*. She also *'did some seals around the outside doors... and always use[s] the door stopper... 'cause there's gaps between the door and the [floor]'*.

Diane linked 'peak traffic' (peak electricity demand) with activities in households with children. She said peak is, *'when families are getting up and getting ready and going off to work and school and ... when children get home and then right through 'till after dinner... bathing and showering and stuff'*. She thinks households should be informed about *'better times to use your electricity'* – but is most interested

in perceived environmental benefits from reducing peak demand. Regarding her own flexibility, Diane said that *'to have your air conditioning and watch something on TV' is 'part of your sanity in getting through those days if you're stuck inside or it's too hot to go anywhere... I don't use a lot of power'*. She thought she may be able to cook *'earlier in the day perhaps'* and that if *'it really came to the crunch I'd have to change my thinking... maybe I'll go out and visit someone, or I'll go to a movie, something like that, if it got critical'*.

Diane has heard of 'AusNet' but is not familiar with the role of that 'electricity company'. She said, *'I know someone keeps an eye on the power lines, and any debris or anything like that, and I'm not sure whether that's AusNet'*. Rather than engaging directly with utilities about electricity concerns, Diane rings a neighbour or checks the Yackandandah community Facebook page, *'if you've got any queries... you usually get an answer pretty soon from someone who's in the know'*. She noted her reliance on electricity but has candles and used a recent unexpected outage to walk her dog *'and then the power had come back on... much sooner than what the company had actually said'*. Diane doesn't think reliability in her area needs to be improved, *'on a personal level I'm quite happy with what I've got'*.



Kerry – Parenting alone with teenagers and high bills

Kerry doesn't know why she has 'excessively high' electricity bills. Kerry and her two teenagers live in a small country town that experiences long cold winters. Kerry owns a 'freezing' old weatherboard home, 'a little mining shack'. Kerry had the insulation replaced but the home cools quickly after switching off heating, 'we wear beanies to bed... we get down in the dumps. We get the winter blues'. The electricity bills are 'always \$500' and Kerry noticed that the usage equates to a 5-person household even though there's only three occupants, 'it's ridiculous'.

There is no mains gas in the area and their main source of heating is a wood fire. Kerry spends about \$1,000 on wood each winter. Both her daughters are completing VCE and spend time studying in their bedrooms. Kerry's not sure about '[the] girls in the winter [with] their little heaters in the bedroom... that couldn't be chewing up that much [electricity]'.

Kerry described her use of an old wall unit air conditioner in the living room as 'pretty scabby and economical'. Her daughter's bedrooms on the west side of the house get very hot – one daughter uses a fan. Kerry worries about teenager energy use:

'Terrible. Because they sit in their bedroom on the internet or on their phones. And if they were all in the lounge room you'd only need one source of comfort and heating... But, no. She'll be in there, she'll have the fan on, speaker, computer.'

The family use LPG gas bottles for cooking and there's only one fridge, 'gone are the days of the old tuckerbox freezer in the garage'. Kerry buys energy efficient light globes when she can afford them.

Kerry thought her electric storage hot water unit might use 'about a third' of the electricity. Interviewer examination of the bill indicated that almost three quarters (17 kWh/day) of the usage was dedicated circuit off-peak – this terminology was not meaningful for Kerry and she did not associate it with hot water heating. The hot water system is only five years old and the household water use is average. Kerry didn't know if there was anything she could do about the high hot water bill component but expressed some relief about gaining this knowledge, 'oh, crikey! Thanks for bringing that to my attention'.

The high electricity bills are contributing to Kerry's financial stress. Kerry normally works in the health service sector but receives government income support while recovering from surgery for a spinal injury. She arranged regular deductions from her Centrelink payments to avoid falling behind on energy bills.

Kerry has never learnt to use a computer and doesn't have an email address. She doesn't understand her smart meter but her old analogue electricity meter helped her understand appliance energy use. Kerry said:

'you used to know how much something was [using] ... because you'd flick it on, go out and see how much quicker it was whizzing around? That was great... I remember going once to the washing machine and going, "Wow!" Quite surprised [by] kettles... you can't even do that now... Why is it all digitalised?'

Kerry stays connected via neighbours and local community. Her neighbour passes on information from a community Facebook page where locals communicate about issues such as fire threats or power outages. Kerry was not familiar with AusNet Services and sees local power outages as unavoidable and normal:

'We don't get blackouts. Unless there's the obvious – power poles come down or something... once, I think we had no electricity for three or four days... all our food went off, we all got covered with insurance... Going without power's easier than going without water... You just get very

creative... I was lucky because I had the [gas stove for cooking]... So, there hasn't been a concern, no.'

Rising electricity costs, complex bills and gas exploration and extraction practices, contribute to Kerry's distrust in the electricity sector, *'they don't want us to know. They want to keep us dumb, of course they do. That's their objective'*. Kerry agreed to participate in an interview because she was asked by a trusted community member but expressed doubts about what would be done with the data, *'I don't know what their objective is – is it to get profiles on everyone? Make a fortune. What are you going to do with that info?'*. She doubts that energy businesses would genuinely consult consumers:

'They're not going to do that... We're just collateral damage. That is hilarious. Look what the gas companies are doing to our land and farmers... taking over places. We're just working ants for them. I'm a bit sceptical, you know, cynical... Where's all their profits going?'

Kerry would like to install solar panels and battery storage as part of a local mini grid initiative, *'be great, wouldn't it? If I had the cash, wouldn't hesitate'*.

Financial incentives to shift energy use appeal to Kerry, but she may experience limited benefits due to misunderstandings about what appliances use electricity. Kerry doesn't distinguish between electricity and gas appliances and includes controlled load hot water in potential peak savings, *'if I was told to turn off at peak periods and get an incentive for it, yeah, I'd rearrange things. Things like showers'*. She said she likes *'cooking at lunchtime because I'm too tired come of the evening... TV would be off. Love TV, but I like music more, and I love reading books'*.

It's unclear how returning to work would impact Kerry's ability to shift activities and she doubts her teenagers would respond to electricity price signals, *'[there's] only a very small percent of teenagers that get it. They're not concerned about peak times... You know teenagers, they're self-centred'*.



Greta – Sharing a rental home as a sole parent

Greta is busy - she works casual shifts in a factory, is studying nursing full-time and raising three children under 10. After her marriage ended, it was hard to find a place to live without a rental history, *'they're like, "We don't know anything about you"'*. She now shares a home with a workmate who knew someone with a house to rent, *'we kind of didn't have a choice...[my housemate] had to get out of where he was so... we went and had a look and [the house], seemed okay, but you were sort of under the pump as well'*. Greta said knowing the landlord is *'a little bit awkward'* and problems reported via the real estate agent have been forgotten.

Greta knows why their electricity bills fluctuate widely but there's little she can do. The *'freezing'* home has little insulation, *'paper thin'* roller blinds, and a large living area that cannot be sealed off from other parts of the house. Greta's housemate uses heating extensively in winter to help manage the pain from a long-term neck injury. They often *'hibernate'* in their bedrooms using oil column heaters and electric blankets. Greta and her housemate are *'almost on opposite shifts [at the factory]... so in terms of power in winter it's almost like we're running 24/7 which is a little bit annoying'*. They use up to 70 kWh/day electricity in winter compared to 8 kWh/day in mild weather. The two housemates split energy bills equally and Greta's *'not looking forward to winter again'*.

They limit their use of air conditioning in summer and *'try to cover up the window with like cardboard and stuff just to try and keep some of that heat... put up like a little sprinkler spray system outside'*. Greta uses the ceiling fans and gives her sons *'wet washers and stuff to keep them cool'*. She sometimes uses a portable air conditioner in the bedroom to help them get to sleep. They would like to open a particular window for ventilation but *'the wood is rotten and the glass is probably going to drop out if we open it... we don't want to be held accountable for it'*.

Other than tracking energy with a retailer app, Greta doesn't engage with electricity issues due to time constraints and a feeling of powerlessness. She said, *'I tend to be a little bit vague in paying attention to that stuff... my mind is occupied elsewhere... there's not really anything I can do about [electricity]'*. Greta thinks there is an off-peak rate but said, *'I don't really know actually'*. She *'hates'* that *'nothing is straight forward'*. She thinks smart meters would be useful if they could *'pinpoint what it is that might be you know putting the power up... letting me know what the bigger juicier items are'*. She said the idea of off-peak appeals because of the households' irregular hours *'but then my brain just goes, "Oh don't... just keep it simple". Like you know you've got enough stuff going on in your life let alone having to try and dissect your electricity bill'*.

Greta thinks it would be possible to respond to occasional demand management. She said, *'I want power on those hot days so do what you can to make sure it's there'*. She thought that if a critical event occurred during the daytime she would *'just go out and take the kids out for a swim... other ways I've been known to cool down is taking kids to the movies'*. She thought the concept of direct load control was *'a little bit freaky... it's just a bit odd, that yeah, someone's sort of just controlling your stuff from outside of your house'*.

Greta would like to have solar panels and her housemate dreams of generating energy from wind but their landlord is thinking of selling the home. She thought government could assist with upgrading the *'harsh'* problem of grid costs to accommodate distributed generation, *'[households with solar] should be rewarded for trying to do the right thing'* and so those that cannot afford or access solar generation are not *'copping it anyway'*.

Claire – Semi-retired with an adult child living at home

Claire is in her late 60s, works casually in a library, and worries about energy costs. She has lived on her own after a divorce and her son, in his 30s, has moved back in. Claire appreciated being invited to talk about electricity issues. She thinks consultation is good but that it is hard to get people involved, and that phone surveys are not very engaging.

Her small 1980s home with cathedral ceilings is hard to warm up. Claire was advised that improving the insulation would be expensive due to the lack of ceiling cavity. The reverse cycle unit *'takes the chill off'* but struggles to heat the open-plan living area and she is careful not to use it too much. Claire sometimes uses the wood heater but often goes to bed early to read and be *'cosy'* – she doesn't think the early nights impact her wellbeing. Claire's son uses a tower heater in his bedroom where he spends time.

Claire doesn't want others to be uncomfortable or think she 'scrimps'. When her sister came to stay for six weeks, she *'quietly turned lights off'* and wondered about how much visitors affect the energy bill. She doesn't know much about running costs of different appliances and thought *'it was a bit extravagant'* for her son to run a fan in his bedroom throughout the night. Claire had been told that her 20-25 year old fridge would be inefficient but it's been very reliable. She is concerned that newer appliances have short life spans and is not confident that there would be an overall saving if she bought a new fridge. Claire is curious to know which appliances use significant standby power and looked on the internet but didn't find any clear information.

Claire doesn't know much about her electricity tariff but recalled that off-peak hot water used to be available. She receives her energy bills electronically, then prints and files them. She thought the smart meters were meant to provide data to help households understand appliance electricity use, but she has not found hers useful, *'it tells me nothing'*.

Reliability and communication from AusNet Services has been 'fine'. She is familiar with AusNet's role and considers herself a customer as they fix the outages after storms. She gets advanced warning about planned outages and obtained a gas burner to be able to have a cup of tea during outages.

Claire recalled receiving a text message saying AusNet Services is prepared for summer. She wondered why she received the message as it had not occurred to her that they might not be prepared. Claire then heard in the media that there could be electricity shortages and households might be switched off. Claire doesn't think it's fair to restrict or limit electricity use for everyone during shortages, particularly for the elderly and those caring for babies. She thinks that only heavy electricity use households should experience restrictions at peak times.

If she could afford rooftop solar, Claire would install it. She went to a meeting about a solar initiative in her area and hopes to see local community benefits even if she cannot participate.

3.3 Others

Peng – Small migrant household working from home

Peng and his wife Jia moved to Melbourne from Hong Kong 10 years ago. They have a young child and own their two-storey townhouse in the Maroondah region of Melbourne. Peng is an IT professional and works from home. He thinks consulting residents *'can help shape a better future'*.

Peng wants 'to save as much energy as possible'. He thinks electricity is *'quite expensive compared to other countries'*. The household uses 7 kWh per day including Peng's computer use for work, *'every day... at least 15 hours'*. They use evaporative cooling 10-20 days per year, have LED lights (including a sensor to switch the staircase light on and off), and use a steam humidifier to help their child sleep. They use gas for heating, hot water, and cooking.

Peng thinks that fixed supply charges undermine energy savings. He noticed that supply is a significant proportion of his bill, *'the fixed supply charge, regardless how much you consume... is really not helping to motivate people to use less'*. He said, *'if they modify the supply charge according to your usage, that would definitely help'*.

Price rises have contributed to Peng's distrust in energy services, but he doesn't think the energy sector is solely responsible. Peng said the cost of utilities *'has gone up every year... I don't really know the reason, to be honest. It seems they go up every year by default'*. He said he hasn't noticed any service improvements to *'justify price increases'*. Peng felt *'uneasy'* about the explanation of peak demand impacting costs, *'it's a bit unfair to those people who keep using the electricity at a minimum'*. He said that *'the root cause is not only about electricity company'* but also *'whole city planning'*. He thinks that *'naturally, Victorian people, we don't need much cooling'* and that *'if you keep building those non-environmental friendly properties, that's the problem... the building material, the building code, the design of the building, the design of the properties, that [can] really, really help'*.

Peng has concerns about fragmentation of the energy sector. Peng likened the energy sector to housing construction saying, *'in Australia it's very hard to find the owner of the problem'*. He also said:

'everyone needs to earn money in the whole relationship... [the] concept of the reseller, it's making it too complicated for the consumer... the reseller has no true value to the customer... I think it's a bit messy. I don't know why we need three tiers of companies'.

He sees sector fragmentation as a hindrance to infrastructure improvements such as putting electricity lines underground – something he thinks needs to be done to reduce interruptions to supply. He asked, *'who should pay for it? I don't know. Maybe [the] taxpayer eventually'*.

In Peng and Jia's household, energy-related matters are his responsibility. Peng receives the bills electronically and Jia never sees them. Although not aware of any household benefits from smart meters, he said his retailer has a website where he can see a *'usage graph'*:

'It's quite useful. You get to know the peak - when is the peak, when is the non-peak time. Then you realise that maybe you are using your iron, maybe you are using some specific appliance and you get to know which one you have to watch out [for]'.

Peng said there are peak and off-peak rates in his tariff but he 'can't remember' the times and has 'no idea' about any price variation. He is confident that *'a more sophisticated charging scheme'* could help manage peak demand, *'I believe a lot of customers, they are really smart. They really look at the price... and act accordingly'*. However, Peng said off-peak rates have no impact on their electricity use *'because we use it only when we really need it, so I don't believe there's much we can play around with the timing'*.

Peng is not convinced about the personal benefits of rooftop solar but sees grid upgrades as a priority. He heard that solar *'is not that efficient... over the years I suppose the technology has improved, so maybe it's the right time to look again'*. Peng said he would take his small roof and potential maintenance costs into account to work out the *'return on investment'*. He identified upgrading the grid to accommodate distributed generation as a *'social problem'* and thought that greater use of battery storage might help. Regarding the costs of upgrades to accommodate solar Peng said:

'distributing the cost to households seems not very fair, because not everyone has their solar, right? But who actually needs to pay for it is a very complicated... government should... lead the initiative, definitely they have a role... to me the public good, the public domain thing... the utility infrastructure, they should [be] taking the lead to help to shape the future of Australia'.



Olivia – Living alone after retiring to the country

Olivia is in her late 60s, is satisfied with her electricity service, and trusts the energy sector. She said that even though she *'would like to pay less' for energy 'some people are negative about anybody that gives you anything; the government should [do] this... the shire doesn't do that... [but] we're lucky, we walk in and we turn a switch on... I can afford it... so I count my blessings really'.*

Reliability is a high priority, *'if we constantly got blackouts that would be a problem for me'*, but the occasional storm-related outages are unproblematic. Olivia rings a neighbour and is satisfied once she knows it's a general issue in the area:

'if it means sitting in the dark for a few hours or with a torch or candle it doesn't really affect me... [I've got] a wood heater, so if it happens in the winter I've still got heating. So whilst it's inconvenient it's not a great disaster when it happens'.

Energy is complicated and uninteresting. Olivia moved to regional Victoria after retiring from teaching. Olivia doubts her capacity to navigate energy complexity and said, *'I'm hopeless at maths... I'm not good at looking at figures and kilowatts... not very good at doing the research'.* She described herself as *'not a very discerning consumer'*. Olivia likened choosing a provider and tariff to *'a can of worms'* so she went with a friend's recommendation. Olivia wants energy to be simple and is *'not into gadgets'*. She looks at the graph of her average daily usage but is not familiar with the capabilities of her smart meter and doesn't want more data, *'I'm not into that!'*. Olivia agreed to be interviewed because a trusted community member asked her – but she is not interested in hearing more from her distributor or being consulted about energy issues.

Olivia misunderstands the times for her peak/off-peak tariff. She uses the washing machine after 6pm in an attempt to access cheaper electricity and was unaware that her off-peak rate starts later in the evening. She pays less attention to her bill now that it is sent electronically, *'probably when it comes on the email all I read is the account, the amount [due], whereas if it came through the mail I'd probably look through this a little bit more'.*

Peak demand is not a familiar concept to Olivia. She said, *'it's hard to believe that an electricity company would tell you to use less... business-wise I don't understand it'.* Olivia raised the possibility that demand management might have environmental benefits or be a response to population growth. A subsequent explanation of peak demand provided by the interviewer made sense to Olivia because it fit with her understanding of *'everything is getting bigger'* – including televisions, fridges, kitchens, and houses. She said, *'if they can encourage people like me not to use as much during that peak time, then that would benefit everybody... I can see why it would cost them to deal with that'.*

Olivia thinks larger households would be better targets for demand management but is willing to respond. With LPG instantaneous gas hot water and a wood heater, Olivia averages 8 kWh electricity use per day. She understands her use to be *'mainly just what's needed... nothing in excess'* considering that *'it's not a big double storey house'.* She said, *'typically on an evening after 6pm I might have two lights and a fan on. I'm not consuming a lot... I haven't got kids coming home, and all on computers'.* Olivia thinks new housing contributes to the problem, *'housing estates – there's no verandas... and they're all shoved in huge double storey [houses], no natural shade from the garden. I mean no wonder they're all using electricity'.*

Olivia said that if she knew when a demand response was needed she would consider visiting friends, going for a swim, turning the television off, using ceiling fans instead of the air conditioner, and not

washing clothes, *'because a lot of people banding together can make a difference'*. She raised the response to total fire days as evidence of community willingness to act for the common good:

'we all know how to react to total fire ban days – maybe we should have a plan for critical peak electricity... [the message] comes your phone, it comes from the media and I think most people would honour that. I think that'd be a good idea'.

Household solar is important to Olivia but installation costs are a deterrent. If she could afford it, Olivia would like to install solar panels. She sees a new community-based solar initiative as positive and hopes there will be more financial support from government in the future.

Regardless of whether she does get solar panels, Olivia supports upgrading the grid to accommodate distributed generation, *'any way of getting more solar is worth doing'*. She sees distribution of the costs as *'a dilemma'* she cannot solve, *'probably if I was a solar consumer I wouldn't want to pay any more... because I would have gone on to solar to pay less... I don't know to be honest'*.



Carlo – Elderly retired couple

Carlo and Maria retired from tobacco farming 20 years ago. The financially secure self-funded retirees live in a modern brick home in a regional city. They have solar hot water and use mains gas for heating and cooking. They have a ‘deep freeze’ for storing ‘specials’ from the supermarket and fruit they dry themselves. Their electricity use is about 13 kWh per day in summer. They understand their standby power to be managed by switching everything off at night.

Carlo is in his 80s and said neither of them have specific health problems – ‘*we’re just old and tired!*’ – but Carlo has become very sensitive to heat. The couple use a combination of ducted evaporative cooling, a reverse cycle unit ‘*if it’s humid*’, and ceiling fans. They don’t use cooling when sleeping. Carlo uses thermometers to compare temperatures inside and out and said he usually gets up ‘*at three or four o’clock in the morning*’ to ‘*open the front and back door*’.

Carlo is interested in ‘*mechanical things*’ and ‘*trying to work out what is the most efficient*’. When using heating or cooling Carlo believes it is better to ‘*keep your temperatures level... rather than have ups and downs... You let a house get cold and you try and heat it up, you consume a lot more*’.

Carlo looks after the home energy matters and is concerned about electricity pricing. He attributes price increases to ‘*generating plants shutting down*’ but isn’t certain (‘*that’s a simple view anyway, I don’t know whether it’s like that or not*’). He said it’s not fair that ‘*unless you ask for a discount they’re not going to offer it... especially for older people it should be automatic*’.

Carlo is confident about his peak/off-peak electricity tariff and roughly knows the times for each. However, he thinks the difference between the rates is ‘*just a couple of cents*’ (his off-peak is almost half the peak rate). The pricing has little impact on their activities – Carlo thinks they are washing a bit more at the weekend due to off-peak rates but Maria washes ‘*every day more or less*’.

Reliability is satisfactory despite some outages. Carlo said, ‘*we’ve never had any problems... you get the occasional blackout, but that’s because of something, a tree falling over or something*’. He was not bothered by a 12-18 hour outage when ‘*a cable that blew underground... it didn’t cause us any extra problems or anything... you leave your refrigerators alone*’. Carlo believes that AusNet Services ‘*own the line*’ and perhaps the ‘*generating plants*’ but he doesn’t see himself as a customer.

According to Carlo, large scale battery storage is needed to address peak demand. Carlo said, ‘*you have to do what South Australia did, put batteries in... it’s working I believe*’. Carlo thinks it’s worth encouraging households to reduce peak demand but thinks it may be more appropriate for others to respond, ‘*you can’t turn your fridges off. The air conditioner, I mean we only turn it on when we need it, we certainly don’t run it unnecessarily. I don’t know what else, in our household anyway, other households may be different*’.

Carlo doesn’t intend to install household solar. He said, ‘*if you go solar you really need to go solar and battery*’, but didn’t think there was much point ‘*at my age*’. He expects to see a lot of change in the way ‘*power’s generated*’ and rapid uptake of electric cars. Carlo said ‘*I think electricity supply is very important [for] how the country progresses*’ and thinks nuclear generation may be an efficient option. He suspects that as a result of households installing solar, electricity supply charges ‘*will go up*’ because ‘*they’ll be selling less electricity*’. He said ‘*it was the same with the water. We had water restrictions. They weren’t selling as much water but they had to cover cost so the price of water went up*’.

Mandy – Environmentally-minded family household

Mandy and her husband installed a 3 kW solar array 10 years ago to compensate for the energy use of their swimming pool. Mandy is a health professional and environmental advocate working from their home in a regional city. The couple have 2 teenage children and built the home to be energy efficient. They are not looking to install battery storage because the electricity bill is always in credit due to a 'very generous' solar feed-in-tariff and because Mandy is concerned about the impact of battery disposal. They also experienced 'teething problems' as early adopters of rooftop solar and intend to wait until issues are 'all nussed out'.

Mandy thinks grid upgrades to accommodate solar are necessary and that contributions to the costs should be 'means-based' so 'people on lower incomes and [renters] aren't penalised'. She believes there will be benefits to developing a less centralised energy system including reducing transmission losses and greenhouse gas emissions.

Mandy hasn't been able to access her smart meter data when needed. Installing the pool increased their daily energy use from 11 kWh (for an all-electric 4-person household) to over 21 kWh. Mandy wanted to work out why so filled out paperwork to receive the household's smart meter data. Over a year later she received a 'reimbursement' cheque instead. By the time the data was available the household 'guilt' about pool energy use had been addressed by installing a more efficient pool pump and rooftop solar.

Mandy used to be energy-engaged but her enthusiasm reduced in response to complexity in billing, the retail market, and confusing terminology. Mandy is responsible for household energy matters and for seven years she kept a spreadsheet of kWh used – until a switch to a new retailer meant she couldn't easily integrate usage data into her existing tracking method. Mandy's frustrations with energy sector practices include: a reliance on estimated meter readings and disregard for her self-reads; difficulty getting through to call centres; receiving 'misinformation' from 'not necessarily that well-informed' staff; and lack of clear tariff information (such as times) on bills, including 'ambiguous' terminology, and the way varying base rates, supply charges and discounts reduce tariff comparability. Mandy said:

'if I'm puzzled, and I'm someone who's been quite interested [in energy bills]... then that's no good... there's something quite rotten with the billing system... there's this expectation that the consumer, or the customer, has to... look into it, because otherwise they can be... taken advantage of... if it was all more consistent across organisations so that you could compare apples with apples... it's a moving feast.'

Other concerns also contribute to Mandy's distrust in the energy sector. Mandy heard that overinvestment in the electricity grid or 'gold-plating' had contributed to price rises. She is aware that renewable energy (such as feed-in-tariffs) contributed but it seemed 'a bit unfair' that 'the finger was being pointed at renewable energy'. Mandy said, 'the federal government needs to take responsibility... so that there's some surety and understanding moving forward'.

Despite distrust, Mandy is willing to participate in occasional demand management. She thinks peak pricing might help, particularly if it brings an environmental benefit and encourages energy efficiency. However, she is unsure whether her own off-peak rate starts at 7pm or 11pm (or somewhere in between). The household doesn't alter activities due to their tariff structure – other than off-peak being one of their considerations in timing the pool pump. Mandy also considers environmental outcomes and runs the pool pump for a few hours in the afternoon and again during the night:

'from a financial point of view, we would be better running [the pool pump] at night time during the off-peak, because we could recoup more money by selling our electricity to the grid [in the day time]. Whereas I would rather, from an environmental perspective, be the one to use the energy that we're producing. So we do a bit of both'.

She signed up to a summer demand management trial and is willing to run the pool pump outside of occasional critical peaks but wasn't home for the peak events. Mandy prefers *'the carrot approach rather than the stick approach'* and thinks any demand pricing should not be *'too expensive for lower income people'*.

Mandy thinks engaging households in demand management or community consultation is best achieved via 'key movers and shakers, and respected people in the community' and organisations with the *'knowledge base and understanding and interest'*. She said the interview had *'reawakened her curiosity'* about smart metering and getting back to *'having an interest'* in energy.



Harry – Renting out a room

Harry is a counsellor in his 60s and rents a small weatherboard home in Grantville. Harry lets a room to Travis who helps look after the pets (2 cats and a dog) when Harry works up to 15-hour days across different parts of Melbourne. The two men don't see a lot of each other due to their work hours, *'we're kind of like ships in the night'*.

Harry doesn't think it's feasible to reduce or shift electricity use and doesn't look closely at bills. Travis is much younger and *'watches TV a lot'* and Harry noticed the bill increase about \$40 per month after he moved in. They use about 13 kWh per day, *'I mean we have to use it so it... there's really nothing that I could get rid of to drop the kilowatt hours anyway and still live the life that I want to live. I don't want to be a recluse that sits in the dark'*. He said that usage data and graphs don't really interest him and he wouldn't pay much attention to bills *'unless a bill came in and it was 60 or 100 bucks more [than usual]'*. Harry recalled that there used to be off-peak prices for hot water services and suggested that electricity might be cheaper between 9pm and 5am seven days a week – but he's not sure and doesn't shift timing of activities, *'No. Just do things that have to be done'*.

Harry can pay the energy bills but experienced hardship in the past. He *'was off work for eight weeks after a motorcycle accident'* and without access to sick leave didn't have any income. Their summer electricity use is likely to increase when the landlord installs an air conditioner because the house is *'like an oven'*. They use a wood heater when it's cold.

Reliability is sufficient but frequent planned outages are inconvenient. Harry attributed a few extended unplanned outages to cars hitting power poles, and said AusNet Services *'can't do too much about'* accidents. However, he said his area is getting planned 1-hour outages once or twice a month, often in the morning from 5am to 6am. Although Harry gets *'plenty of notification'* the timing interrupts his routine of getting ready for work, *'it's like doing roadworks at peak-hour; it's just crazy that when we're getting up to go to work, we've got no power to make our cups of coffee... without my coffee I'm a bear with a sore head'*. Harry struggles to get enough sleep and doesn't think he can get up any earlier. In winter he uses a torch to get ready for work. He wonders about the cause of the outages and *'why they don't do it in the middle of the day'*.

As a whole, Harry considers electricity companies to be 'crooks'. He links his distrust to perceptions of *'overcharging for electricity', 'privatisation', 'too many players'* (retailers and distributors), *'not doing enough with renewable energy'*, and *'kickbacks'* from the fossil fuel industry to government and electricity companies. He believes smart meters were installed *'to reduce labour'* and that they emit potentially harmful radiation. However, he *'quite likes'* his electricity retailer and their customer service, *'second-to-none I reckon. They're really, really nice people'*.

Harry thinks the energy sector should spend more time consulting their customers, *'if you want to know something, ask the people that are using it'*. He thinks that surveys would work if given a month to complete and if the aims are explained, *'that the survey is to help them to drive their prices down... worded so that they can see the benefit to them by actually doing that survey'*.

Although not expecting to ever buy a home or be able to install rooftop solar. Harry is happy to contribute financially to upgrades for distributed generation. He said *'if we all want a better world we all have to pay for it... I have no problem with me paying for green energy even if I'm not getting it because it's the trees, planet, animals, you know'*.

Tania – Sole parent working from home

Tania is a self-employed sole parent living with her son in a 1970s brick house in an outer Melbourne suburb. The home used to belong to her grandparents and Tania recently moved in and started renovating.

One of the first things Tania did was install a reverse cycle air conditioner *‘with a good energy rating... I’m pretty strict on that’*. On hot days she keeps the roller shutters down, *‘it blocks out 80% of the heat’*, but *‘on a stinking hot day’* she uses the air conditioner but has to turn it off periodically because the room gets *‘icy cold’*. She leaves the thermostat on the lowest setting based on advice from the installer. Tania plans to use the reverse cycle unit in winter instead of the gas heater because she is *‘scared in case there’s a fault because it’s quite dangerous’*.

Tania said she looks for ways to save energy and described herself as ‘pretty savvy’. She gets a lot of information from watching television and attributed the rise in electricity prices to *‘sky-rocketing’* demand for electricity, *‘we’re using more than we used to... everyone has so much technology’*. Tania bought an energy efficient washing machine and wants a lower energy fridge and microwave. When buying new appliances, Tania said, *‘I do ask questions’* but she doesn’t *‘know if they’re always telling me the right thing’*. She is not interested in accessing or analysing electricity data. She *‘researches’* electricity tariffs *‘every year’* to find the *‘cheapest’* by checking retailer websites to find the highest *‘discount’*.

Tania thought her electricity tariff has peak and off-peak rates but wasn’t sure what times apply for each, *‘I just assume business hours would be peak’*. She said, *‘I have a girlfriend who tells me to wash on the weekends because it’s cheaper... well I can’t really wait for weekends... because it does pile up’*. A check of her bill showed a flat-rate tariff.

Tania doesn’t feel she has a lot of control over her nine-year old son’s energy use. He watches a lot of television on the weekend and Tania is concerned about the energy impact of him using *‘all those lovely Christmas presents’* from family members – including an iPad and several games consoles. She grew up in a *‘strict’* household where she was *‘told to switch off appliances’* but said this doesn’t work now:

‘it’s a different generation of kids... he doesn’t understand when I do say “please switch it off because we’re wasting [electricity]”... They don’t socialise anymore. It’s through technology so... that’s the way forward unfortunately’.

While unfamiliar with peak demand, Tania supports demand management as *‘a way to just try and cut costs where you can... obviously we don’t want to be paying the electricity companies a lot... we can spend our money on better things’*. She is not interested in installing solar panels herself because she thinks they were responsible for cold showers in her previous home. However, Tania doesn’t think households with solar should pay extra costs, *‘if you have solar isn’t that supposed to cut costs?... I don’t think that anyone’s going to want it if they have to pay’*. She thinks government should use tax revenue to modernise the electricity grid.

Tania was not familiar AusNet Service’s role in energy supply, *‘I’ve seen their name and I don’t know if it’s on bills or on TV, on the computer, I really don’t know’.*

Jill – Young family with children

Jill lives in a three-bedroom house in the Kinglake area. Jill looks after their two children and is solely responsible for managing energy bills and energy-related decisions. Her husband, Brett, works long hours as a truck driver and is not at all interested in energy.

Jill's household copes well with electricity outages. Last week a planned full day outage was followed by a 6-hour unplanned outage that evening and another 8-hour unplanned outage two days later. Jill *'was definitely annoyed, it's just harder with the kids and sorting them out with food and things like that'*. Other than using wood for heating, the household relies on electricity for all activities. Without mains water, they cannot flush toilets or use the shower during an outage unless Brett starts the backup generator for the water pump – he might not be home, and this takes some time. Despite the inconvenience Jill also said an outage *'doesn't really bother us, we are used to camping... if it was [out for] over a day I think it would be a problem'*.

Jill doesn't think electricity reliability in her area needs to be improved. Jill had negative impressions of *'SP AusNet'* after their sheds and several neighbour's homes were lost in the 2009 bushfire but she thought the electricity was reconnected relatively quickly (4 days). She said, *'since then everything's pretty well maintained'*. Jill expects outages to occur periodically, *'I always consider the area we live in, it's the bush so it's more likely to have outages [from trees and storms]'*.

Jill's main concern is the rising cost of electricity and she distrusts smart meters. She said she's not sure why electricity prices have gone up but thinks smart meters may have contributed. An electrician fitting an antenna at their home told Jill the meter reads *'every little detail'* and to move her son's bed because the smart meter radiation was a health risk if sleeping nearby.

Jill is very conscious of managing energy use but doesn't engage closely with data, tariff details or choice. She said, *'I think about electricity everyday'* and puts a lot of effort into turning things off – including turning off her son's bedside clock each morning after he gets up. Jill said, *'if it will save even half a cent, I will do it'*. Jill budgets carefully for all regular household costs including energy bills. Although frugal, Jill was not aware that households could access and use smart meter data and doesn't think either she (or Brett) would ever use it. Jill tries to minimise her use of smartphones and computers, preferring to encourage her children to be outdoors and away from television. She is teaching her children *'her ways'* of not wasting electricity.

Jill said she's 'pretty sure' the electricity tariff has an off-peak rate but isn't sure if it starts at 7pm or later. She said she could do a load of washing in the evening because *'the off-peak rate is a fair bit cheaper'* but she often falls asleep early. The timing of activities is also affected by Brett's work, washing *'has to be when it has to be'*. Jill opts not to compare the *'all too confusing'* tariffs and thinks cost differences would be small. She did switch once when her mother-in-law recommended a retailer offering a large pay-on-time discount.

The household uses about 23 kWh per day including the hot water unit, water pump, a beer fridge in the garage (which Jill hopes will eventually be switched off), and considerable use of power tools. Jill would like solar panels but is concerned about the installation cost and overshadowing from gum trees.

4. SUMMARY OF FINDINGS AND RECOMMENDATIONS

ELECTRICITY COSTS A PRIORITY CONCERN

Nearly all households were concerned about electricity price rises and current costs. Most households had ideas about the cause of electricity price rises but were usually certain. Price rises were rarely attributed to peak demand.

- **Thermal comfort challenges.** Many of the households lived in areas with lower winter temperatures than Melbourne, and longer periods of hot weather in summer. Many of the homes had inadequate insulation or other energy efficiency issues. Several households had significant LPG gas or wood heating costs for winter heating, particularly if regularly home during the day (especially older households and those with children). Use of non-electric heating meant that bills were often higher during summer when air conditioning was being used. However, some households relied on fans to keep cool. Ceiling fans were desirable and, where present, well used.
- **Financial hardship.** Some households with children and older households were financially stressed and experienced difficulty paying their energy bills. Some prioritised payment of energy bills (over other costs) to ensure they did not fall behind or get disconnected.
- **Concern for 'worse off' others.** Both financially stressed and financially comfortable households often mentioned their concern for more vulnerable community members who were struggling with bills or thought to be unable to adequately heat or cool their homes.

Recommendation

- Anticipate that current electricity costs and future price rises are a critical concern for all households. Ensure sensitivity to these concerns in all communications and engagement.

ENERGY-RELATED HEALTH ISSUES

Health issues in several younger and older households increased their energy use.

- **A range of health issues in the households interviewed contributed to financial vulnerability and equity issues.** These included Parkinson's Disease, spinal injuries, pain and the effects of surgery, cancer, kidney disease, cognitive development and mental health issues, and physical effects of old age. These conditions do not necessarily qualify the household for energy concessions.
- **Some health issues limited capacity to engage with energy issues and complexity.** Some householders didn't have others to help.
- **Self-rationing.** Concerns about being able to afford energy bills meant that some households may be using less heating and/or cooling than would be most beneficial to their health.

Recommendations

- Engage some households on energy issues through health professionals, or in relation to their health concerns. This may be more effective than engaging them on energy tariff, new technology or demand management issues.
- Sensitivity to health concerns and self-rationing should be considered in relation to all engagement and demand management activities.

COMPLEXITY AND DISENGAGEMENT

Most households did not want to spend a lot of time understanding or investigating energy issues.

- **Complexity.** Electricity bills, terminology, retail offers, and energy sector structure were commonly viewed as too complicated and time consuming for average households to understand and navigate. Households were confused by the combination of retail supply and usage charges, conditional discounts, and new tariff structures.
- **Powerlessness and disengagement.** Household members often indicated a feeling of 'powerlessness' in relation to energy issues – they didn't like the complexity. Disengaging was a way to avoid wasting time that they could not be sure would be well spent and lead to a positive outcome (e.g. a lower bill or a better understanding). Although disengaged, they felt they managed their actual energy use to an extent which fit with their daily lives.
- **Both men and women disengaged.** Most households wanted simpler energy bills and tariffs. This was consistent amongst the men and women we interviewed

SMART METERS AND DATA

Households were aware that they had smart meters but few perceived digital metering to be helping them.

- **Most households thought smart meters were for the benefit of electricity companies.**
- **Most did not think they could or would find their smart meter data useful.** Reasons included:
 - Not interested, or not confident, in data analysis (or use of computers)
 - Find tariffs and/or electricity bills confusing so more detail was unappealing
 - Do not consider exploration of electricity data to be worthwhile, e.g. unconvinced that it would help them identify the appliances which use electricity unnecessarily in their home or reduce their bill
 - Not aware of Victorian Energy Compare website as a potential way to use their data
- **Data was mostly of interest to customers with, or planning, solar PV and storage installations** (see Early Adopter section below and Mandy's case study). Several of these households had obtained or tried to obtain their smart meter data from utilities or the *myHomeEnergy* portal.

A few men enjoyed energy data and analysis. Interest in data did not necessarily translate to interest in reducing or shifting demand.

Recommendations

- Exercise caution in assuming that households want more personalised energy data, have the ability to effectively use and understand it, and will use their data to help reduce and shift their electricity demand.
- Provide access to data for tailored planning and interests (e.g. solar PV and storage installations)

LIMITED SCOPE TO REDUCE CONSUMPTION

Most households had implemented all energy efficiency upgrades to their home which they could afford (if homeowners) and/or improvised to reduce heat loss or heat gain (especially if renting). Most households identified other aspects of their home that raised heating and cooling use, e.g. lack of sealing for draughts, few windows receiving winter sun (e.g. due to trees, valley location, design/orientation), lack of shading of windows in summer, little thermal mass (e.g. old weatherboard homes), and limited ventilation. The main reasons given for limiting further energy savings were:

- **Lack of access to further energy efficiency improvements (especially renters).** Some households could not afford to spend money on their own home or replace inefficient electrical appliances. Some renters had very little affordable choice in the rental market, lived in highly energy inefficient homes, and/or mentioned landlords or property managers whom they perceived to have little concern for tenants' comfort or financial wellbeing.
- **Already frugal with energy or perceptions that they 'don't waste'.** Households usually considered their own electricity use to be little or no more than needed – regardless of their consumption. Few households lived with comforts such as climate control or regular use of air conditioned cooling, but those that did considered it essential to lifestyle or health.
- **Time and other priorities.** Most customers knew about standby power of appliances and managed this to an extent that suited their lifestyle and priorities. Some mentioned the impracticalities and inconveniences of managing standby power use. Parents encouraged their children to turn off unused lights and appliances. However, energy management was sometimes a lower priority than pursuing issues that may have higher impact on childrens' or family health and wellbeing.
- **Refrigeration practices.** Some households continued to use old fridges because of perceived benefits (e.g. more reliable than new appliances) and/or multiple refrigeration appliances to store bulk store-bought or home-grown food, or drinks.

Recommendations

- Provide and/or partner with organisations that can deliver more energy-efficient and affordable rental properties, and/or provide affordable energy-efficiency options for low-income households.
- Engage some households on priority children and family health concerns (e.g. heating and cooling for health conditions) rather than energy issues.

TARIFF AWARENESS AND SHIFTING DEMAND

Few households were confident and correct about the key details of their tariff. Issues included:

- Uncertainty about whether they had off-peak rates
- Uncertainty whether off-peak applied to all electricity use or just the hot water system
- Belief that they had off-peak rates when they didn't
- Uncertainty or misunderstanding about times for off-peak rates

Some households noted unfamiliar or inconsistent tariff terminology on their bills, and/or the absence of information about peak or off-peak times.

Most households thought they did have a peak/off-peak tariff.

- This usually had little or no impact on the timing of household activities

Most households were not aware of peak demand or demand management as an issue.

- Two households were enrolled in a program to reduce electricity use during critical peaks over the 2018 summer and they either tried to respond to the few peak events, or missed responding because they were not at home

Once peak demand was explained, most households supported the idea of demand management programs.

- The idea of utilities wanting households to reduce electricity use was usually new, and sometimes inconsistent with their understanding of electricity businesses priorities (e.g. selling as much energy as possible)
- Most households had not connected the presence of peak and off-peak electricity rates in tariffs to the challenges that demand peaks present to distributors, and peak demand was not widely understood as a contributor to recent electricity price rises
- Reducing electricity or going out seemed feasible on an occasional basis
- Financial incentives appeal but are not necessarily the primary or only reason to respond
- Reasons to respond included helping secure the electricity supply and ensuring vulnerable households were not left without electricity, and perceptions of benefiting the environment and reducing waste of energy
- Some thought there was little they could do because they used only what was needed – but they supported encouraging high electricity use households to conserve
- Households often suggested building more efficient homes as a peak demand solution

Recommendations

- Take household preferences for tariff and bill simplicity into account in pricing decisions.
- Assume low level of tariff understanding and very limited response to daily price signals.
- Provide clear explanations of (and have conversations about) peak electricity demand wherever possible, to help households understand the need for demand management and peak pricing.
- Develop and trial innovative and non-financial demand management strategies for households:
 - Include opportunities to participate on an occasional basis for critical times.
 - Give salient reasons to participate in demand management, e.g. securing supply and protecting vulnerable households.
 - Incentivise activities that some households already do on hot days (e.g. providing free movie tickets or pool passes).

TRANSITIONING TO RENEWABLE ENERGY

If they didn't already have rooftop solar, most households wanted to install it.

- Even those that didn't hope to install solar viewed the uptake of distributed generation (renewable energy) positively
- Renters and financially constrained households wanted a way to proceed with solar PV
- In areas with visible initiatives to transition to renewable energy, there was respect for people involved in driving these projects and belief that community power initiatives can benefit households, community and the economy of the local area

Grid capacity to accommodate solar is necessary.

- **Most households were not aware of the electricity infrastructure implications of distributed generation.** Once explained, there was strong support for modernising the electricity grid to accommodate household generation of electricity – from early adopters, households who hoped to install rooftop solar in the future, *and* those that didn't ever expect to generate electricity themselves. None suggested that grid upgrades for distributed generation are unnecessary. Modernising the grid was seen as an essential energy sector responsibility, and often a national priority.
- **Households recognised that allocation of costs for this work is a difficult issue.** Some found thinking about this new challenge was a bit overwhelming. A few thought that households with rooftop solar should bear some of the cost. However, most did not want solar panel owners to face additional costs. While having solar panels or hoping to in the future may have contributed to this view, even those that didn't expect to generate electricity themselves mostly did not want other households to be discouraged from installing solar panels. Growing renewable energy use in Australia was widely supported.
- **Most felt there must be ways to distribute the costs** of this 'essential infrastructure' to minimise the impact on electricity bills (including for financially disadvantaged households and those unlikely to be able to directly access the benefits of distributed generation). The main approaches suggested were:
 - government involvement, such as using tax revenue to modernise the grid or 're-nationalising' electricity infrastructure
 - redirecting electricity company profits to grid upgrades

Note: The interviews could not cover this topic in detail, e.g. convey the extent of work to be done, or the likely costs. *These challenges would benefit from deeper investigation with households.*

Recommendations

- Anticipate strong household support for modernising the electricity grid and avoiding adverse impacts on less financially advantaged households.
- Further invest in community power initiatives that provide affordable and equitable outcomes for households.
- Provide more opportunities to hold conversations with the community about the need for grid capacity to accommodate distributed generation, and ways for households to get involved (this is also expected to build further trust in AusNet Services and the energy sector).

SATISFACTION WITH RELIABILITY

The customers interviewed were satisfied with the current reliability of their electricity supply (some noted improved reliability in their area in recent years).

- They said planned outages were usually communicated to households well ahead of time
- Unplanned outages were generally seen as unavoidable outcomes of weather events or accidents and they did not express dissatisfaction with response times
- Householders reported accessing extra outage information by contacting AusNet Services directly, speaking with neighbours, or accessing updates from others via social media-based local networks/groups (e.g. Facebook)
- Some households had experienced extended unplanned outages (>12 hours). They reported managing well during outages (even if sometimes inconvenient)
- A few households thought that putting powerlines underground could reduce outages and bushfire risk but the cost may be prohibitive

Note: Regional households may be more adaptable to/tolerant of outages than customers in large cities.

VARIED RECOGNITION OF AUSNET SERVICES AND ITS ROLE

Some households were unfamiliar with AusNet Services and its role in their electricity provision. Many were unaware of the distinctions between generation, transmission, distribution and retailing of electricity, and network charges in electricity bills. With prompting most indicated low-level awareness that businesses other than electricity retailers were involved in maintaining electricity infrastructure in their area. Those that had experienced more frequent and significant outages due to storms or other accidents were more familiar with AusNet Services' role, as were households which had direct or indirect involvement in the 2009 bushfires.

Early adopters were most familiar with AusNet Services, often having liaised with the business extensively when installing solar and storage systems.

Few households, including early adopters, considered themselves to be 'customers' of AusNet Services. This was largely because they did not pay the business directly for services. The electricity bill was not well understood as a combination of generation, network and retail charges.

Recommendations

- Avoid the using the word 'customer' as this suggests an unfamiliar and commercial relationship with AusNet Services. Consider using 'household' or 'resident'.
- Provide (or assist the sector in providing) clear communication about the role and function of the different components and companies involved in Australia's electricity (or energy) provision. This may help clarify AusNet Services role in the system.

TRUST AND DISTRUST

There was a general awareness that households are exposed to energy misinformation – but they didn't know who to believe. Household distrust in the energy sector was linked to perceptions of:

- **High and 'unfair' electricity prices** (including impacts on vulnerable households)
- **Deliberate, unnecessary or inefficient complexity** (including in energy bills, tariffs, and industry structure, i.e. three tiers of companies)
- **Government decision-making** (including privatisation of the energy sector, lack of energy policy to support affordable and renewable energy, and support for the fossil fuel industry.
- **Overinvestment in the grid ('gold-plating')**
- **Excessive profits and salaries in energy businesses**

Although the energy sector *in general* was often seen as failing to deliver good consumer outcomes, this distrust could also be quite compartmentalised and transient. Households' opinions of *specific* energy businesses could be favourable, or be rehabilitated as a result of good customer service or initiatives they viewed positively (such as AusNet Services' support for local renewable energy projects).

Recommendation

- Trust is a cumulative quality or outcome of ongoing effective and positive engagement that can be further built through the recommendations identified above and below.

ENGAGEMENT

There was a wide range of views about distributor or energy sector engagement and consultation with customers.

- Most felt that the sector does not consult electricity users
- Some were very pleased to have been asked their opinions via an interview, and found the process more interesting and informative than expected
- Others did not perceive the interview as a consultation or doubted that consulting individual households would be productive or have an impact on decision-making
- Interest in participating in future engagement activities varied from none to enthusiasm
- Most saw engaging with households on energy issues as challenging
- Households could find it difficult to distinguish between attempts to engage and annoying marketing or scams, particularly if conducted by phone, and/or if recognition of AusNet Services was low, and/or distrust was high
- Some households noted that they were only accessible by face-to-face methods such as community meetings or in-home interviews
- Others said they would engage with newsletters, surveys and social media
- Connecting engagement to supported community initiatives or via local networks was suggested
- Some thought it would more productive to consult organisations familiar with consumer concerns about energy

Recommendations

- A variety of engagement strategies are likely to appeal to different consumers. More research on how to engage different types of households is needed.
- Some households will need to be engaged through face-to-face communication via community meetings/ events and in-home meetings. They will likely need to be 'convinced' of the value of being engaged in the electricity sector and to alleviate distrust or other concerns. Where possible, we recommend making consultation activities visible and relevant to households by linking with community networks and priority concerns.

4.1 Additional early adopter findings

Most the early adopters lived in north-east Victoria and all installed or planned to install 5-10 kW solar PV systems. The 5 kW per phase pre-approval limit and/or the capacity of the mini grid project in their area was a constraint on system size for several households. Early adoption projects mostly arose from householder interest in using emerging energy technologies. However, one couple's off-grid project was a response to the cost of getting an electricity connection to their new home construction site.

- **Personal economic and environmental reasons to install solar and batteries.** All early adopter households identified both economic and environmental benefits as reasons to proceed – even if one or the other was the primary interest.
- **Social benefits of remaining grid-connected.** If affordable to do so, the early adopter households preferred to be grid-connected and see their excess electricity distributed 'locally' to others. They wanted their participation in the energy transition (including mini grid/microgrid projects) to deliver local community benefits such as local employment and economic sustainability. There was strong interest in local ownership and establishing a community retailer in north-east Victoria. Some early adopters also wanted their contribution of clean energy to be returned to the grid, to enable others to use less carbon emissions-intensive energy and reduce electricity 'waste' from transmission losses. Early adopters did not anticipate significant financial gains from selling their excess electricity, and peer-to-peer trading was not a high-level concern.
- **Concern for less financially advantaged households.** The early adopters wanted lower income and rental households to be able to install solar technologies and not end up further financially disadvantaged as a result of the energy transition.
- **Data, technologies and gender.** The early adopter households were all couples and both members strongly supported transitioning their home to renewable energy. However, except for one household, men were usually more interested and involved in the technical aspects and/or energy data analysis.
- **Higher awareness of energy issues but early adoption not necessarily about conservation.** Early adopter energy needs varied widely. All believed in 'energy efficiency' and although most had lower-level electricity use, new energy technologies and gadgets could also be part of a more energy intensive lifestyle. Enthusiasm for technologies did not translate to willingness to respond to demand management in all cases.
- **Navigating complexity and uncertainty.** Some early adopters described planning challenges for their own and/or their community's solar and battery storage projects. Early adopter projects involved substantial time investigating and understanding new technologies, consulting with others, and liaising with AusNet Services to be as well-informed as possible to make key decisions.
- **Improved profile and support for AusNet Services.** Several early adopters were surprised by AusNet Services' engagement and support for distributed energy (including mini-/microgrid initiatives) and these experiences improved recognition, trust and satisfaction with the business.
- **Electric cars.** Two early adopters were interested in getting an electric car. They wanted to fuel it from their own power supply and use the battery to sell power to the grid at peak times. However, they doubted how financially viable this would be. Lack of charging options were a (potentially short-term) issue, but several households thought electric cars would not work for the long trips involved in living in regional Victoria. Other concerns included cost, and longevity and recyclability of batteries.

Appendix A – Demographic and household characteristics

HH	Category	Sex	Age	Country of birth	First language	Work status	Occ'y	Kids (≤ 18)	Housing tenure	Home type	Mains gas	LPG gas	Cooling	Hot water	Solar PV + storage	Pool	kWh/day (approx)*	Income (gross)
1	Early adopter	M	68	Australia	English	Retired	2	-	Own	Free-standing	No	Yes	Fans only	Electric heat pump	Planned	No	9	\$800-\$1250/week
2	Early adopter	M	61	Australia	English	Part-time	2	-	Own	Free-standing	Yes	No	Fans; Evaporative	Solar (electric boost)	Installed	No	4	\$1250-\$2000
3	Early adopter	M	41	Australia	English	Full-time	5	3	Own	Free-standing	No	Yes	RCAC (ducted)	Boiler - wood, electric, gas	Planned	No	15-22	>\$2000/week
4	Early adopter	M; F	66; 61	Australia (both)	English (both)	Retired; Semi-retired	2	-	Own	Free-standing	Yes	No	Fans; Evaporative	Solar (gas boost)	Installed	No	8	Not provided
5	Early adopter	F; M	63; 62	Australia (both)	English (both)	Retired (both)	2	-	Own	Free-standing	No	No	Fans; RCAC	Solar (electric boost)	Planned (+)	No	12	Not provided
6	Energy vulnerable	F	64	Australia	English	Not working	1	-	Own	Free-standing	No	No	RCAC	Electric heat pump	No (wants)	No	10	<\$400/week
7	Energy vulnerable	M	38	Australia	English	Part-time	5	3	Rental (private)	Free-standing	No	Yes	Refrigerative; RCAC	Electric storage	No (wants)	No	13-40	<\$400/week
8	Others	F	67	England	English	Retired	1	-	Own	Free-standing	No	Yes	Fans; RCAC	Gas instant	No (wants)	No	7	\$400-\$800/week
9	Others	M	81	Australia	English	Retired	2	-	Own	Free-standing	Yes	No	Fans; Evaporative; RCAC	Solar (gas boost)	No	No	13	Not provided
10	Energy vulnerable		74	Australia	English	Retired	1	-	Own	Free-standing	No	Yes	Fans; Refrigerative	Electric storage	No	No	10	<\$400/week
11	Others	F	53	Australia	English	Casual	4	2	Own	Free-standing	No	No	Fans; Evaporative	Gas instant	Solar PV only	Yes	15	>\$2000/week
12	Energy vulnerable	F	53	Australia	English	Not working (health)	3	2	Own	Free-standing	No	Yes	Refrigerative; Portable	Electric storage	No (wants)	No	24	\$400-\$800/week
13	Energy vulnerable	F	59	Australia	English	Full-time	1	-	Rental (private)	Unit	Yes	No	Fans; RCAC	Gas storage	No (wants)	No	8	\$800-\$1250/week
14	Others	M	45	Hong Kong	Cantonese	Full-time	3	1	Own	Town-house	Yes	No	Evaporative	Gas storage	No	No	7	Not provided
15	Energy vulnerable	F	47	Australia	English	Not working (health)	3	2	Rental (public)	Free-standing	Yes	No	Fans; Evaporative	Gas storage	No (wants)	No	-	<\$400/week
16	Others	F	34	Australia	English	Self-employed	2	1	Own	Free-standing	Yes	No	RCAC	Gas storage	No	No	5	Not provided
17	Energy vulnerable	F	37	Australia	English	Casual + studying	5	3	Rental (private)	Free-standing	Yes	No	Fans; RCAC	Electric storage	No (wants)	No	8-70	\$400-\$800/week
18	Energy vulnerable	F	69	Australia	English	Semi-retired	2	-	Own	Free-standing	No	Yes	RCAC	Gas storage (LPG)	No (wants)	No	-	>\$2000/week
19	Others	M	62	Australia	English	Full-time	2	-	Rental (private)	Free-standing	No	Yes	Fans only	Gas storage (LPG)	No (wants)	No	13	\$800-\$1250/week
20	Others	F	40	Australia	English	Homemaker	4	2	Own	Free-standing	No	No	RCAC	Electric storage	No (wants)	No	23	Not provided

* Usage usually for summer billing period (unless range given); Pre-solar generation amount, i.e. grid usage for some early adopters was small/negligible

F=Female, M=Male; RCAC=Reverse Cycle Air Conditioning; Occ'y = Number of occupants in home

Appendix B – Explanation of peak demand

In the late afternoon and early evening there are a lot of household activities (lights, air-conditioning or heating, TV and computer, cooking, showers, washing clothes) happening in households. This leads to the spike in energy usage called peak demand. The energy providers have to maintain sufficient infrastructure capacity to supply households during peak demand times and to avoid power outages. The peak demand spikes are extra high on very hot and very cold days. This means that a lot of extra electricity infrastructure is needed to supply enough electricity on these few days of the year. This infrastructure is expensive and is not used for about 98% of the year, but the need for it is a major contributor to recent increases in electricity costs.