

AusNet Electricity Services Pty Ltd

Electricity Distribution Price Review 2022-26

Appendix 3E: Community Perception Towards Solar and Innovation Propositions (JWS Research)

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Community Perceptions Toward Solar and Innovation Propositions

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Background, objectives and methodology



Background

The Victorian Government plans to legislate increasing the Victorian Renewable Energy Target (VRET) to 50 per cent by 2030¹. The Victorian Minister for Solar Homes launched the \$1.3 billion *Solar Homes program*² in July 2019. The program supports the installation of new solar panels, batteries and hot water systems on thousands of houses across Victoria and provides a 50 per cent rebate for eligible households³. There has been such a positive response from the public that the Program is on track to see a record year of solar installations on Victorian roofs⁴.

While the uptake of distributed energy resources (DER) is positive, it ultimately places pressures on the network that it heretofore hasn't experienced. There are requirements to upgrade the network to accommodate the changing environment. Further to this, there is a need to prepare for future technology changes and innovation. And the question remains, who should pay for necessary network upgrades? How should the costs of preparing for future needs and demands be handled?

AusNet Services therefore wishes to undertake qualitative research to explore the perceptions and impressions of their customers when it comes to preparing for the next iteration of renewable energy innovations. This will enable them to uncover beliefs, issues and concerns that customers have regarding the next steps in the evolution of renewables.

It is important to note that the purpose of this qualitative research was to uncover consumer response (initial reactions, thoughts, concerns, questions) to information about an innovation expenditure to reduce the costs of network transformation. **It is beyond the scope of qualitative research to identify the extent to which people support such investment.**

¹. Source: <https://www.premier.vic.gov.au/more-renewable-energy-to-boost-jobs-and-cut-power-bills/>, accessed 5/9/19.

². Source: <https://www.solar.vic.gov.au/victorias-rooftop-solar-revolution-kicks-today>, accessed 25/7/19.

³. Source: <https://www.sustainability.vic.gov.au/You-and-your-home/Save-energy/Solar-power/Install-solar-power>, accessed 25/7/19.

⁴. Source: <https://www.solar.vic.gov.au/>, accessed 28/8/19.



Research objectives

The key objective of the qualitative research was to understand customer response to innovation that ensures the electricity network is prepared for future demand, brought about through the increased uptake of DER.

Specifically, the research was designed to provide a comprehensive understanding of the following issues among residential and small business customers:

- current or intended uptake of distributed energy resources
- the concept of an 'innovation' expenditure, i.e. funds allocated to invest in new technology and innovation
- the level of comfort with the idea that AusNet Services could limit or control solar exports to enable more solar connections and exports overall
- support and perceptions of AusNet Services innovation propositions and proposed expenditure options
- response to the idea of innovation to reduce the costs of network transformation
- who should pay for network augmentation going forward.



Qualitative research methodology

Qualitative research in the form of **face-to-face and online group discussions**, were conducted with people from metropolitan and regional locations across Victoria. The group discussions were structured as follows:

Face-to-face focus groups			
Outer metropolitan Melbourne (Berwick): Residential customers of AusNet Services.	1 x younger group (25-54 years)	1 x older group (55+ years)	2 groups
Online group discussions			
Residential AusNet Services customers (across the whole distribution network), outer metropolitan Melbourne and regional Victoria.	1 x residential customers (25+ years)		1 group
Small business AusNet Services customers (across the whole distribution network), outer metropolitan Melbourne and regional Victoria.	1 x SME customers		1 group
Total			4 groups

Six to eight participants took part in each face-to-face group discussion, and 15 to 17 people participated in each of the online group discussions. A mix of genders, ages, education and socio-economic status were represented within each group discussion. A mix of industries and businesses based away from home were included in the SME group. Face-to-face group discussions were conducted on 19th August 2019, online group discussions ran from the 20th to the 22nd August 2019.

A large, stylized letter 'W' in a dark blue color. The interior of the 'W' is filled with a satellite image of the United States, showing state boundaries and city lights at night. The 'W' is positioned on the right side of the page, with its leftmost vertical stroke extending towards the center.

Executive summary



Snapshot of key findings

Current reliability of electricity supply is acceptable

In the main, people are satisfied with the reliability of their electricity supply. Interruptions to supply are infrequent, and notifications of when power will be restored are valued. There is an assumption that infrastructure will need to be updated to accommodate the increasing population and associated demand.

There is an expectation of a shift toward renewables

It is largely assumed that future electricity supply will move away from coal and toward a greater reliance on renewables. Increased penetration of rooftop solar panels and batteries, as cost of entry declines, are expected to help facilitate this.

The limitations of the grid are 'new news'

People are generally unaware that the grid cannot store power and that it was not designed to handle two-way flow. When informed about solar export constraints, people are concerned that generated renewable energy is being 'wasted'.

There is support for increasing solar export capacity

Customers evaluate program options on a number of factors including cost to household, the amount of export enabled and potential for reducing voltage impacts. In considering these trade-offs, customers claim they are prepared to share the cost for this, with government and the energy sector.

Innovation projects to support network improvement are well regarded

Overall, there is support for the three innovation projects described, at a cost of \$7.5 million. The cost per household of \$1 per year is acceptable. However, people seek information about the expected benefits or outcomes, and specifically a timeline – as a means to keep the distributor accountable.



Future electricity supply



Top of mind associations with electricity are around the cost

When people discuss electricity, the first topic of conversation is typically about affordability and increasing costs.

Following price, the source of the electricity is considered. Many customers know that much of Victoria's electricity comes from coal fired power stations (Latrobe Valley is cited). Clean, green, environmentally friendly sources such as solar, wind and hydro are well regarded.

Ensuring the security of future energy supply is important

Customers are generally satisfied with the reliability of supply. Many people, but not all, accept some level of interruption to supply. These occur during hotter temperatures (when people are less accepting of outages), but also during maintenance works. Irrespective of the nature of the outage, notifications of when power will be restored are valued as these reassure people that the issue is being attended to.

Maintaining the existing level of reliability is accepted, however there is a concern about how this will eventuate with an increasing population.



It is expected that our future electricity will be sourced from renewables

There is an expectation that there will be a shift away from coal as our electricity source. Improvements in technology, and reducing entry costs of distributed energy resources for households, are thought to assist this.

It is important that this shift takes place in order to reduce Australia's emissions and address the community's environmental concerns.

New technologies must traverse a balancing act when it comes to environmental benefits

The benefit to the environment of producing more electricity through greater penetration of rooftop solar panels and batteries is clear.



However, people are unclear whether the overall impact on the environment is in fact positive. There is some low-level concern about the environmental impact of manufacturing this technology and also how the products are treated (recycled) at the end of their lifespan.



Distributed energy resources

Most people cannot see any disadvantages with increased penetration of rooftop solar panels

The benefits of more people getting solar panels are two-fold. For the household, it results in a reduced electricity bill. For the broader community, there are environmental benefits through reduced emissions.

Some people (mistakenly) believe that more solar panels will improve reliability of supply, as there is less perceived reliance on the grid.

Among those who are able to think of a disadvantage, there is a concern that electricity costs for those people who do not have solar panels may increase, as the cost of maintaining the grid is shared among a smaller number of people.

There appears to be very low awareness of the limitations of the grid

There is no understanding that the electricity grid was originally set up for one-way electricity delivery and now needs upgrades to allow additional solar to keep connecting. This raises concerns about generated energy being ‘wasted’.

Many people also do not understand that energy sent to the grid cannot be stored.

Once explained, people understand the need to ensure the grid can handle an increase in DERs

In the absence of any information, people intuitively think that distributed energy resources should ease pressure on the grid – through less reliance on drawing electricity from the grid.

There is acknowledgement that the energy sector and government have provided incentives to further solar panel uptake. It then is surprising that the grid is not set up to accommodate this. There is a risk that people could turn away from new technology that does not deliver to expectations (e.g. the ability to generate a return from a feed-in tariff).



Solar export constraints

People are generally unaware that not all excess rooftop solar energy can be exported to the grid

The information provided explains why constraints need to be in place, but also leads people to the conclusion that the network should be upgraded.

Constraining solar exports is seen to be ‘penalising’ people who are ‘trying to do the right thing’.

For many households, and particularly for SMEs, the decision to get solar panels is a financial one. Over time, there must be return on investment. The inability to be paid a feed-in tariff for excess solar generation has the ability to impact future solar uptake.

There is support for innovation program options that improves solar export capacity

In considering the export enabled options, participants compare cost, amount of export enabled, potential voltage impacts, as well as future network needs.

There is support for a program or work that enables as many customers as possible to export their solar generated energy. The rationale here is that:

- People install solar panels with an expectation that they will be able to export their generated electricity.
- Increased solar exports benefits everyone through increased renewable energy in the grid.

Expenditure is viewed in the context of impact to the individual

It is important to note that solar export constraint programs were evaluated in the context of cost to the household and business. The program entailing no solar constraints was not considered burdensome for households and business.

While there is some support for upgrading the network ‘properly’, i.e. removing all solar constraints, a level of scepticism remains that this is achievable. There is a view that the goal post will continue to move.

To this end, other people support a more cautious approach, obtaining the most solar export for dollars spent, but one that allows for learnings and modification as the program progresses over time.

Expenditure should be a shared cost

People generally agree that improving the network to enable greater export of rooftop solar energy should be a shared responsibility as there are shared environmental benefits.

That said, there is a view that government and the energy sector should also share in these costs.



Innovation propositions

\$1 per household per year for energy transformation innovation is generally supported

A payment of \$1 per year per household is not considered to a prohibitive amount.

A cap of \$7.5 million over five years is not considered excessive (particularly in the context of cost per household) when the outcome is delivering to our energy future and moving toward more environmentally friendly ways of generating electricity.

That said, customers feel that there needs to be tangible customer benefits. It is expenditure that needs to be managed well.

There is support for all three innovations projects

Each are seen to contribute to an improved network service.

Unlocking the potential of the network

This project is considered to have the potential to benefit many people. People are motivated by the idea of enabling more customers to be able to safely export more solar power.

‘Smart’ technology is not a well understood term, and risks raising concerns about untried and untested technologies.

Improving remote supply and addressing bushfire safety

The opportunity to address bushfire safety is highly emotive and a strong argument for this project.

Improving electricity reliability through Stand-Alone Power Systems is also well regarded. People are concerned for others in remote locations. However, the benefit toward the broader customer base is not understood, as people are not aware of the existing shared cost of network maintenance.

Other questions centre around ‘isolating’ remote customers (through removing them from the grid) and the suitability of diesel generators (from an environmental standpoint).

Preparation for the impact of electric vehicles

Of the three projects evaluated, preparing for electric vehicles generates the least interest. People are yet to be convinced that electric vehicles will take off, and become mainstream. It is also unclear how this project benefits everyone (the idea of supporting the network during peak demand is understood by some people, but complex for others).

That said, there remains support for ensuring the network is prepared for emerging technologies.



Smart systems

Smart systems are untried and untested, but could provide system benefits

On balance, people are supportive of smart systems if these can reduce solar constraints.

However, there is some concern that not enough is known about smart systems. This could mean spending money on infrastructure that will not deliver what is intended. Further, mention of 'reducing' solar constraints suggests only part of the problem is being addressed – is this really the solution?

For some people, mention of technology such as this leads to concerns that systems could be hacked into and their privacy is compromised.



Key messaging considerations

Future energy is renewable energy

People support efforts to shift electricity generation to renewable sources. Efforts that can realise this future are well regarded.

An opportunity to increase the renewable mix in the grid

It does not make intuitive sense that increased distributed energy resources (and the ability to export into the grid) places greater pressure on the grid. Information to link innovation investment with the ability to increase export capacity, and thus the renewable mix within the grid, is required.

Talk about network benefits rather than new technologies specifically

Information needs to centre around the network (and customer) benefit. Enabling greater solar export provides a shared benefit through reduced emissions. Messaging about 'smart systems' to enable this can lead to questions and confusion. Transparency is important, but clarity of outcomes is required.

A cautious approach to improving solar export capacity

People are generally unaware of the limits on solar exports, but support remedying this. A cautious approach is appropriate. This enables a test and learn scenario and ensures modifications to the approach can be made over time as the market evolves. It is also a responsible approach to the use of customer monies.

Innovation to meet future needs is appropriate

There is agreement that there is a need to invest to cater to the future needs of customers and changing technologies. Enabling more solar exports, providing reliable supply for remote customers, addressing bushfire safety, and being prepared for emerging technologies are important propositions.

A large, stylized letter 'W' graphic that serves as a background element. It is filled with a satellite night map of the United States, showing city lights and road networks. The 'W' is positioned on the right side of the slide, with its leftmost vertical stroke extending towards the center.

Detailed findings



Issues landscape



Top of mind associations with electricity are around the cost, and to a lesser degree, the source

Renewables are often cited

Renewable energy sources such as solar, wind and hydro are also discussed (unprompted). Clean, green, environmentally friendly sources are well regarded, although it is acknowledged that much of Victoria's electricity comes from coal fired power stations (Latrobe Valley is cited).

"I think our electricity comes from coal stations in the Latrobe Valley, but I'd like to see more clean, sustainable energy production in Australia." (Regional, SME)

"Most of our electricity comes from the coal fired electricity generators located in Gippsland. Other renewable sources such as solar, wind and hydro contribute various amounts at times." (Regional, residential)

Top of mind associations with electricity

It's expensive

The cost of electricity is perceived to continually increase. Customers want to ensure they are getting the best 'deal'. However, comparing retail offers is difficult – it is hard for people to know if their offer is the best one available.

Not something that people think about much

However, most people have experienced an outage at some stage. People in rural areas are perceived to be more susceptible than most.

"They are all promising you better, better, better. You can't compare apples with apples. They don't promise the same thing, other companies bamboozle you, this for overnight, this for on peak, off peak." (Outer metro, older)

"Expensive bills is the first thing I think of!" (Regional, older)

"Cost. It adds up. Kids leaving lights on all the time." (Outer metro, younger)

Supply is mostly reliable, but with increasing population we need to ensure security of future supply



People take it for granted that their electricity will be available at the flick of a switch. A reliable supply of electricity is also essential for business owners to be able to run their businesses.

The biggest supply problem occurs during the summer months, when hotter temperatures bring a greater reliance on air conditioners, and with that, corresponding power outages. To a lesser extent, some people also struggle with outages when there is heavy rain or wind, particularly in regional areas (e.g. Dandenong Ranges).

- Many people, but not all, accept some level of interruption to power supply. Notifications of when power will be restored are valued as these reassure people that the issue is being attended to.
- Maintaining the current level of reliability of supply is generally acceptable.
- There is however a concern about how current levels of supply will be maintained given increasing population (therefore increased demand), increasing temperatures, and aging infrastructure.

Despite the stated importance of it, most people know little about where their power comes from. There is some basic knowledge about coal fired power stations – of which, some are known to have shut down.

“Reliability is key for my business – to know that my guests have power means less stress for me.” (Regional, SME)

“I have no issues regarding reliability. I find that even during periods of extreme weather, my power is stable to a satisfactory level. Planned power outages are always over allowed for, so I am able to properly prepare, and when there has been an issue causing a black out, the power is rarely out for long.” (Regional, residential)

“Considering we are in the 21st century, technology and reliable electricity supply is useless. Summer hits and we lose power every month.” (Regional, SME)

“I appreciate the mobile notifications I get here if there's any issues. ...I rely on electricity for heating and cooling to control health issues, so it's pretty important to me that it's reliable and that I'm kept informed of any outages.” (Regional, residential)

“Since one of the main power stations closed down, we seemed to have a high frequency of days with power outages, usually hot days when it's overloaded by air conditioners. This is unsatisfactory and the government should be looking at building greener alternatives. The outages make it clear that the supply is not adequate.” (Regional, residential)

“We haven't upgraded the super-structure, we had two million people in Melbourne, now it's five million, putting more and more strain on it.” (Outer metro, younger)



Distributed energy resources



There is an expectation that the future of electricity supply will comprise a greater reliance on renewables

It is largely assumed that in the future there will be a **move away from coal**, and more emphasis will be placed on alternative sources of energy and technologies. Among those mentioned are **gas, solar, batteries, hydropower, wind farms and potentially nuclear power**. The shift is expected to come about due to:

- improvements in technology;
- greater accessibility of distributed energy resources through reduced costs;
- environmental concerns (a need to reduce emissions); and
- the fact that coal is a finite resource.

The fact that eventually up to half of our electricity will come from 'distributed sources' is endorsed and generally not a surprise to most people.

When it comes to **battery technology**, knowledge is limited, other than that it is currently perceived to be expensive. Questions centre around:

- How big are batteries – do they take up a lot of space?
- Are there any risks, e.g. health concerns from radiation, cancer, fire, leakage?
- How is the battery disposed of?

"I think new technologies like electric storage batteries recharged by solar will be the next major change for electricity usage in our home. This will have a positive impact as it will reduce the stress and need for electricity sources from our aging coal-powered stations." (Regional, residential)

"I didn't realise 50% would come from renewables but that doesn't surprise me at all. I think the shift is fantastic and is the only way to go." (Regional, SME)

"The increased development of solar and battery technology will render the electricity grid as a back up option for many businesses if they are prepared to make the initial investment. This will mean we are much less at the mercy of one-off weather conditions, maintenance issues or demand surges." (Regional, SME)

"From my understanding, the size of the batteries is what is prohibitive. Batteries to store enough power for a house would need to be HUGE. Just look at batteries to charge mobile phones – a battery with one charge is bigger than the phone itself. Until that technology is improved, it will continue to be the biggest barrier to storing solar." (Regional, residential)

"How many batteries would be needed for it to be beneficial? Would there be enough room? What about safe storage? How long would they last? What happens to them when they come to the end of their life?" (Regional, SME)

There is no consensus on whether new technologies will push electricity costs down



People are hopeful that new technologies (particularly solar panels installed at home) will:

- reduce their electricity bills through generating their own electricity; and
- be better for the environment through reduced emissions.

However, it is not a given that this will eventuate:

- Some people remain unclear about whether installing solar panels does indeed provide a return on investment. Initial purchase and installation costs are perceived to be high. Rebates and feed-in tariffs have reduced over time. Although people discuss the environmental benefit of solar panels on their home, overall cost benefit is an over-riding factor that simultaneously needs to be satisfied.
- There is low-level concern about the manufacture and disposal of solar panels and batteries (in terms of environmental impacts). There is a concern that this may negate the environmental benefits obtained from emissions reduction during their lifespan (e.g. are they recycled or placed in landfill).

"Batteries are worse than coal. You bury them and they are there forever... it's like plastic water bottles and plastic bags. They were great but now we have realised we have a real problem." (Outer metro, older)

It is unclear what the impact of greater penetration of new technologies (like solar and batteries) will be.

- For those who have solar panels, there is an expectation that their electricity bills will reduce (although stories circulate about people with solar panels whose bills have not reduced).
- Some people think that the cost of electricity for everyone could go down as there is a perception that the reliance on the grid would be reduced. Less people purchasing electricity could increase competition and push prices down.
- However, there is a concern that prices could actually go up for everyone else because there will be fewer customers for providers to obtain revenue from.

"We have solar panels at work, and battery, and they don't save you that much over time. I wouldn't get them at home. Especially in winter, you get nothing. They cost \$40,000, it is going to take many years to get it back, they were going to get 30c/kw, now they get 12c." (Outer metro, older)



For SMEs, cost is a key barrier to installing new technologies, but other factors also come into play

Some SMEs already have solar panels installed on their business premises. For those who do not, a number of factors prohibit the installation of solar panels, including:

- the cost of purchase and installation;
- time – SMEs are typically time poor and it is not a priority for their business;
- the premises are rented; and
- the location of the business premise – issues mentioned include overshadowing and bush areas.

Consideration of battery technology follows similar issues.

“Most business owners I converse with are looking at alternates to the grid, solar being the most favoured. I feel the cost will rise as the providers will still try to obtain revenue, but with fewer consumers, the price may rise. ...the cost of new technology could benefit your business, the issue is the initial cost to implement it.” (Regional, SME)

“I do know that I can buy panels and use them at work but we can’t afford them at the moment, but in the future we might look at it.” (Regional, SME)

“There is no intention to change. It is not something which is front of mind. There are many other more pressing issues in small business.” (Regional, SME)

“Our only power source at work is the grid. I do not own the building that my business operates from – we rent the space – so that is the main barrier for me installing solar. I could have a conversation with the owners however I am one store in a large complex.” (Regional, SME)

“We have no options as we are in a densely bushed area. I have had multiple assessments for solar from various companies and told it would not suit.” (Regional, SME)



Despite this, most tend to think only of the positives associated with renewable energy sources

Positives with more people getting solar power:

- ✓ Better for the environment
- ✓ Cheaper electricity bills for the individual
- ✓ Cheaper to install now compared to in the past
- ✓ Greater reliability of supply and less blackouts – this is assumed to come about through a reduced reliance on the grid
- ✓ Job creation (installation and maintenance).

However, it is acknowledged that a secondary source of power is required for when the sun is not shining.

Few disadvantages cited of more people getting solar power:

- Many people cannot envisage any disadvantages.
- Among those who are able to think of a disadvantage, the only possible disadvantage is that electricity costs for those people who do not have solar panels may increase, as the cost of maintaining the grid is shared among a smaller number of people.
- There is mention of the need to upgrade the electricity network to allow for greater feed in of solar electricity, but this is not commonly known.

"All new houses... it should be law that they have solar panels. There are more people coming into the state and more drain on the power. We don't want the stuff that is bad for the environment. If houses can generate some of their own electricity, it takes some of the drain off power companies."
(Outer metro, older)

"Positives to getting solar are that the grid is not overloaded, environmentally the impacts wouldn't be as bad, at the moment I can't think of any negatives of more people getting solar. Another possible advantage is that the cost of electricity could go down." (Regional, residential)

"Power outages would be less frequent, or have a smaller impact. Prices would decrease, because they'd have to be competitive. I see no disadvantage." (Regional, residential)

"I feel there could be fewer consumers to pay for the constant upgrading of the grid which could impact on reliability of electricity." (Regional, SME)

"Our transmission lines and systems will need to be upgraded if there are more people feeding into the grid. I think the take up of solar has moved faster than the poles and wires can deal with. There are limits on the amount of power that can be fed back into the system." (Regional, SME)

It is news to many that the grid cannot store power and is not designed to handle two-way flow



There is no understanding that the electricity grid was originally set up for one-way electricity delivery and now needs upgrades to allow additional solar to keep connecting. Many people also do not understand that energy sent to the grid cannot be stored. On being provided with this information, a number of questions arise.

Questions and concerns:

- Why is it becoming a problem for the network?
What can happen?
- Who is going to pay for the grid upgrades?
- How much will it cost?

"I'd never contemplated the fact that systems were built for one-way traffic. But of course it makes sense that upgrades need to take place to allow for more modern power usage." (Regional, residential)

"Clearly needs to be a major investment and upgrade to the power grid for a renewable energy future." (Regional, SME)

"If as a country we want to utilise the sun for power effectively, then our network should be upgraded to be able to make the most of it, as well as working on ways to store the energy in batteries so it can be used in peak times and not just lost." (Regional, SME)

(The information provided to group participants explaining solar connections may be found appended to this report.)

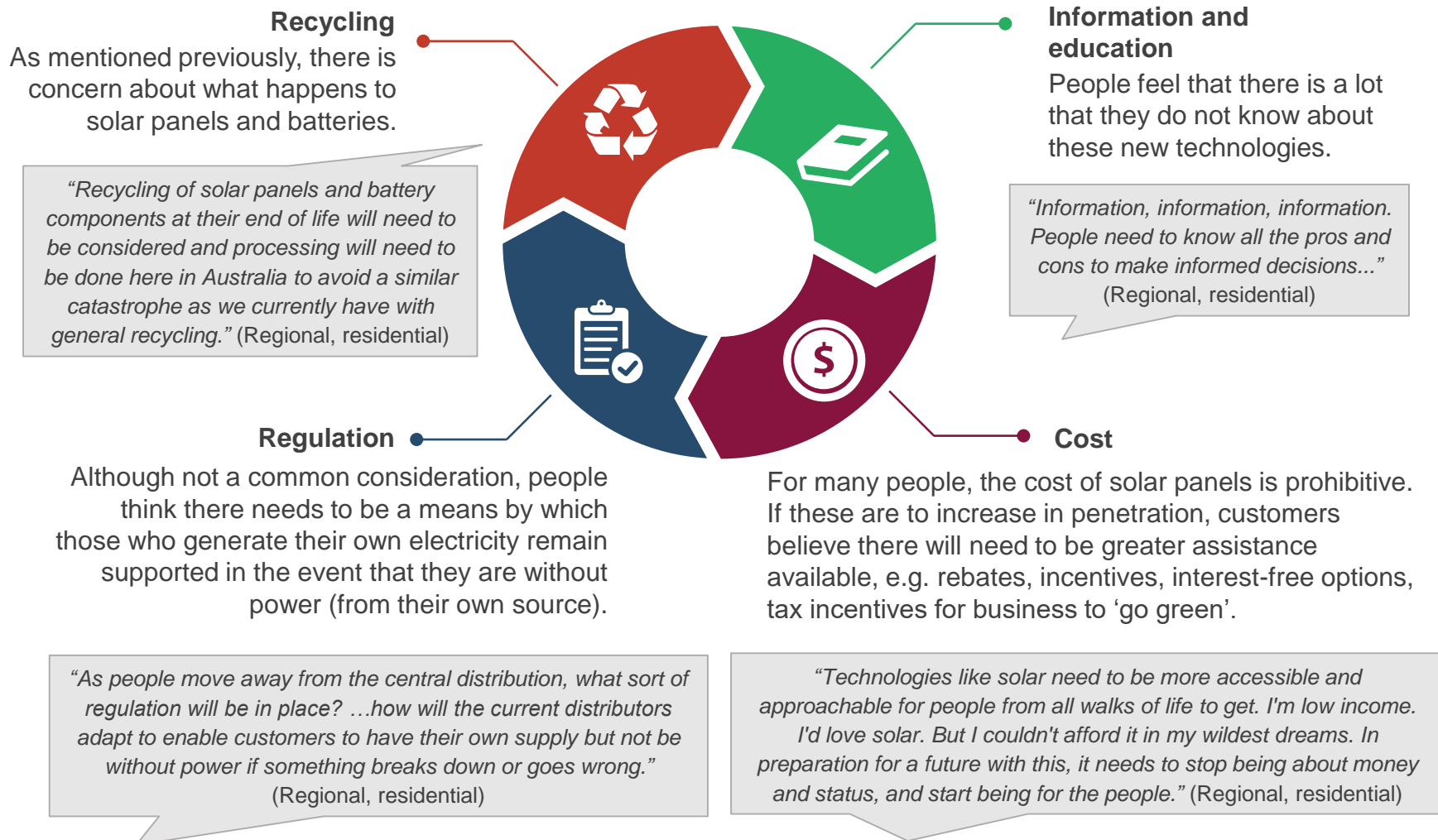


Future planning



At a broad level, there are some factors that need to be considered to prepare for greater uptake of DERs

Primary considerations for future electricity use, where people increasingly generate their own electricity, are primarily viewed through a solar panel lens. Four key themes arise.



Many people understand the need to ensure the grid can handle the increase in new energy sources



Generally people do not know what impact the increase in distributed energy resources will have on the grid. Intuitively people think that it should ease pressure – if more people generate their own electricity, then there will be less reliance on the grid overall.

The fact that not all of the distributed solar energy that is created can be fed into the grid raises some concerns:

- Generated renewable power may be ‘wasted’ – although in time, greater penetration of batteries may address this.
- There is a risk that fewer people and businesses will install solar panels in the future, if they cannot ‘make money’ by selling their electricity back into the grid.

People are surprised that with the ‘push for solar’, we aren’t better prepared.

- Further, if not adequately set up from the start, people could turn away from new technology that ‘does not work properly’.

“I can’t believe in 2019 that they haven’t figured this out yet. I would hope that in future it will be able to be stored.” (Regional, residential)

“You have total chaos if you start to overload the system. Blocks of suburbs that could have outages for a couple of days. We need to be thinking of something different.” (Outer metro, older)

“It seems we’re always playing catch up, with not enough forward planning. E.g. we have solar, but there are issues.” (Regional, residential)

“I just don’t get all the grid stuff... I imagine your solar panels go up, you use that for your electricity and you don’t have any electricity bills. I had no idea how it works. I just thought it sounded like a great idea, get solar panels and never get a bill again.” (Outer metro, older)



There is a need to be prepared for the future, but it is unclear who should bear the costs

There is agreement that we need to be prepared for a future of greater household and business solar panel penetration. When it comes to major infrastructure needs and planning for a city, it is not an uncommon view to feel that we do not plan ahead.

People generally understand that there will be a cost associated with this. However there is no consensus on who should be responsible for this.

- There is an assumption that ultimately everyone will end up paying for it somehow (through taxes or increased bills).
- Despite privatisation, many people believe the government should assume at least some responsibility for payment.
- While AusNet Services currently maintains the lines, and therefore should contribute towards grid maintenance, it is not expected that the company should assume sole responsibility for costs.

The perceived risk of not preparing for this future need is that customers will suffer more frequent power outages.

"Although some companies like Tesla seem to want to be ahead of the curve, we can't expect private companies to take the lead in this. It should be our state and federal governments leading the way. We were promised lower prices with power privatisation, that went so well, didn't it? If they handle it the way they've done the NBN, it's going to be a messed up and this, like the NBN, is vital infrastructure that should be treated more seriously, instead of patched up and slipshod." (Regional, residential)

"I feel the responsibility falls in a few areas, the research and development to allow costs to be affordable, the government to forecast the need and requirement for solar and the providers to allow people to sell back to the grid, helping supply the important resource." (Regional, SME)

"It becomes everyone's responsibility if it is to work in the future, but the distributors will have to make sure that the grid can handle it, so I think that they will have a major role to play as well." (Regional, residential)

"Whoever pays, we will all end up paying one way or another, be it with increased power prices or our tax." (Regional, residential)

"As it is, small businesses struggle to some extent to keep their businesses going. Don't we already pay some type of maintenance fee/tax in our current electricity bills? Aren't we already paying for this kind of thing via our taxes?" (Regional, SME)



Solar export constraints

People are generally unaware that solar export constraints exist, and this presents a concern



Low awareness of export constraints

- Most people are not aware that not all excess rooftop solar energy can be exported to the grid.

Information provides a case for upgrade

- The information provided explains why constraints need to be in place, but also leads people to the conclusion that the network should be upgraded.

'Unfair' to limit exports

- Limiting exports is considered to be 'penalising' people who are 'trying to do the right thing'.

May impact solar uptake for some people

- Particularly SME, for whom it is a financial decision.
- However, for other people, the main reason to get solar is to reduce their electricity bills and do their bit for the environment. Some people hope to live completely 'off the grid' one day.

Support for removing constraints

- In the main, people support the idea (and largely assume it was already the case) that excess solar power should be able to be exported back to the grid without constraint – provided this can be done safely.

"Yes, people should be able to get return for all the energy they generate. Constraint removal is only feasible if appropriate safety measures are in place, it would be the ideal but not if assets and life are at risk. Sounds like we need infrastructure upgrades to support this. I would only be indirectly impacted (most likely by outages during upgrade) and potentially pass through costs." (Regional, residential)

"We're in trouble. What is going to happen now with our solar panels, is it going to fry every electrical appliance in the house?" (Outer metro, younger)

"Yes, I think more should be done to ensure that people can sell their surplus generation back to the network. Yes, I support the idea of removing any limitations or constraints on exporting." (Regional, residential)

"I would probably wait until some of the kinks are ironed out of the current system before investing in solar panels myself." (Regional, residential)

"Businesses are not going to invest in solar power if it is not going to offset their bills. I would be less likely to invest the money into solar power if I am not going to see a financial offset." (Regional, SME)

(The information provided to group participants explaining managing solar exports may be found appended to this report.)



Constraints should be removed insofar as possible, but not until the infrastructure is upgraded

Select verbatim comments

"I believe that more should be done by the distribution companies to ensure that people can sell all their surplus back to the grid. The constraints should be removed but not before upgrades are made to the network to handle the extra load. More education to the general public would assist with this change happening. Currently this has no impact on me personally, however if I was to invest in a solar system I would expect that I could utilise the power I generated in all ways possible." (Regional, residential)

"There needs to be a whole lot more done to ensure people can sell all their surplus electricity back to the grid as it would be financially beneficial as well as limiting any waste that is produced. I support the removal of any constraints as long it is safe and will not cause any problems with the network." (Regional, residential)

"Solar technology is about the future of energy and about preserving what is left of our environment for future generations. If that means each user is constrained to some degree whilst it is sorted, then, big picture, it is a small price to pay temporarily to protect our offspring into their future." (Regional, residential)

"Much more needs doing re surplus solar or take up will stall. One would think that removing constraints from exports is obvious. Review by government needed to change this. No real impact on our business as we don't produce surplus solar." (Regional, SME)

"Why hasn't this been addressed earlier? Surely it was a problem that was, to some extent, foreseeable? The waste of resources is really disappointing." (Regional, residential)

"The constraints, whilst frustrating and probably coming as some surprise to some consumers who were sold a different story, are currently in place for a reason. There are consequences if they are not there including the destruction of household electrical appliances, etc. Either way, the consumer is going to pay until this problem is sorted. So, no I don't think the answer is to simply remove constraints without a stable fix. The constraints are of course only a band-aid fix and should not be viewed by the industry nor government as anything more." (Regional, residential)

"What they are saying is that they need to upgrade the grid, which will put all the prices up." (Outer metro, older)

"Yes I do think that more will need to be done in order for people to sell surplus solar back to the grid. I support removing the constrictions however before this can happen more will need to be done so that this can be supported. We can't remove them if it is going to cause a major issue at the grid. The infrastructure will need to be updated to handle it. I would consider solar at the business if this happened." (Regional, SME)



Increasing solar export capacity

There appears to be support for expenditure to improve the solar export capacity and reduce voltage impacts



In considering the export enabled options (see Appendix for detail), participants compared cost, amount of export enabled and potential voltage impacts, as well as giving consideration to future network requirements.

Program 1: No extra cost but very significant solar export limiting.

Additional overall cost: \$0



Low support comes from older cohorts

Program 2: Small increase in allowed solar exports.

\$0.50c per annum for residential customer.

\$3.50 per annum for business customer.

Program 3: Allows most solar export for dollars spent

\$1.00 per annum for residential customer.

\$7 per annum for business customer.



Support comes from SME and residents

Program 4: No solar constraints, but very high cost

\$7.00 per annum for residential customer.

\$49 per annum for business customer.

Lower support for programs 1 and 2.

- Program 1 is supported by some people who do not have solar, do not envisage they will have solar and do not want to bear any costs.
- Greater perceived benefit in spending more and gaining more (when comparing program 2 to program 3 and 4).

Higher support for programs 3 and 4.

Program 3:

- Most solar export for dollars spent (compared to program 2).
- Fewer voltage impacts, a potential benefit for everyone.
- Undertake a cautious approach – the system may require further upgrades if new challenges are discovered.

Program 4:

- Under this program, the network is improved ‘properly’ (although some scepticism about this).
- Some people will recoup the money through feed-in tariffs.
- More people might be encouraged to install solar panels.
- People who select this option express concern about voltage impacts, and expect these to be fully addressed under this option.

Support leans toward the programs that enable greater solar export capacity



Support is highest for the programs that ensure as many customers as possible are export enabled (programs 3 and 4). The view is that, on balance, the expenditure per household or business is relatively small to ensure that the problem is fixed, or at least improved significantly. There is a concern that if we don't do something now then power bills could increase, which people categorically don't want.

Reasons for preferring program 3 Select verbatim comments

"My preference is program 3. I believe \$1.00 per annum for residential customers and \$7 for business is very affordable. 178,000 less customers with voltage impacts is something to be taken in great consideration as well. My question would be what would the \$38.1M overall cost cover? How long would it take to implement such a project?" (Regional, SME)

"I chose program 3 as it seems the most practical for the money spent. The high cost for program 4 rules that out and program one is no change at all. Though program 2 has benefits, the third option has 3 x the outcomes for double the cost." (Regional, residential)

"It is not as expensive as the last one, but at least you actually get some value for the money. In between, has quite a lot of voltage impacts, less costs, but not as much as program four." (Outer metro, younger)

"I chose three for best cost benefit ratio. Happy to pay a little, wary of paying a lot – no doubt every option will need upgrading down the track." (Regional, residential)

"If you do program 3 you can work out what upgrades can be done. Can upgrade further as you work out more bugs." (Outer metro, younger)

Reasons for preferring program 4 Select verbatim comments

"I know option 4 sounds like it's a lot to us as individuals, but as government costs go it is moderate. It should be done completely and properly the first time. It will most likely avoid further upgrade costs in the future. The costs to us as individuals are reasonable and hopefully the technology will progress enough in the next decade. We can all be using alternative technology as a power source, even renters." (Regional, residential)

"I don't think \$7 a year is high at all! Not for what it gets you. I think it is far better to go for the best technology possible rather than settle for less when less isn't anywhere near as good. I think \$7 a year is completely fine, I expected it to be far higher. My only question now is "What are we waiting for?" (Regional, residential)

"Fix the system. If you are going to do it, you may as well do it properly." (Outer metro, younger)

"Considering the amount electricity has gone up over the years, option 4 is my likely choice as \$7 per annum would be less of an increase than getting higher bills. I'm pretty sure I save more than that on each bill with the feed in tariffs, and having no constraints means that I can feed in more without it impacting the grid." (Regional, residential)



The programs raised questions around what the costs covered and how long the annual charge lasted for

Program 3

Questions include:

- How are the constraints applied? Are they shared among all solar providers or do they only impact some? (Note that here, customers are thinking from a retail perspective, not a distributor perspective.)
- Is there a mechanism by which customers can ensure that they are among the export enabled customers?

Program 3: Allows most solar export for dollars spent.

Additional overall cost:
\$38.1m

\$1.00 per annum for residential customer.
\$7 per annum for business customer.

70,000 solar customers export enabled.

Around 178,000 less customers with voltage impacts.

Program 4

Questions include:

- Will everyone who wants to take up solar panels be able to export their unused electricity or only 95,000 solar customers? Will some customers miss out?

Program 4: No solar constraints, but very high cost.

Additional overall cost:
\$626m

\$7.00 per annum for residential customer.
\$49 per annum for business customer.

95,000 solar customer export enabled.

Program 3 and 4

Questions relevant to both programs 3 and 4:

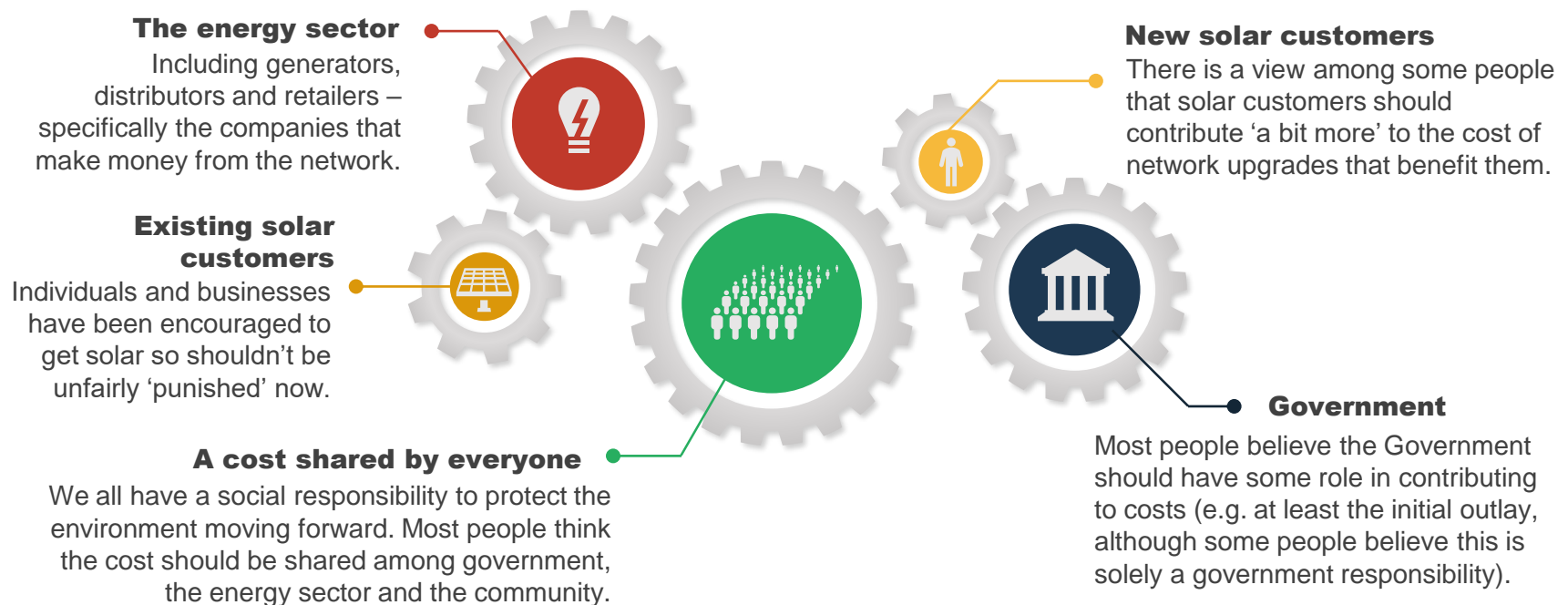
- What is the overall expenditure going to be used for? What is the technology that is involved?
- Are the costs per annum for the customer fixed? Or will they increase over time? For how many years will the charge apply?
- Are there any other fees or charges that will be applied in addition to the annual customer cost?
- How long will it take to implement the program of work?
- How does this upgrade benefit everyone?

Investment to upgrade the network should come from everyone, including government and the energy sector



When it comes to who should pay for the increased investment required to prepare for the future, where greater export of rooftop solar energy is enabled, people generally believe this is a shared responsibility. It is important to note that this was considered following review of potential program options, meaning that participants were of the view that the maximum cost would likely be \$7 per annum per residential customer, \$49 for business customers.

- On the one hand, some people feel it is a government responsibility (some quite adamantly) – particularly given the government has undertaken efforts over the years to encourage solar uptake.
- However, there is a view that there are benefits for everyone – environmental benefits, potential for a more reliable supply of electricity, and possibly cheaper electricity (through greater contribution of solar electricity into the grid – perceived to be cheaper to generate).





Who should pay?

Select verbatim comments

Government

"The government should set aside money – then all customers should also pay a small amount. We're all in this together." (Regional, residential)

"The governments over time encouraged as many people and businesses to buy solar panels, whilst the power companies racked in huge profits. The simple answer is the government should pay for the betterment of the community." (Regional, SME)

"Ultimately the government should bear the brunt of most costs associated with upgrades considering we pay taxes for this. It should be a social responsibility that everyone pays for, it should be broken down so that people that don't have solar don't pay as much, people who already have solar pay a little more and new customers pay a fee that is reduced over time to the same as people who already have solar." (Regional, residential)

"Until such time as solar installation is affordable for everyone and becomes the norm, this should still be paid for by the distributors and the government. The households with solar have already invested. It is not their fault that the infrastructure is becoming unsustainable – this is the responsibility of the distributors." (Regional, residential)

The energy sector

"What about the power companies who have made billions over the last 20+ years? Shouldn't they have to bear a cost and responsibility for allowing the system to reach this state?" (Regional, SME)

A shared cost

"The need for upgrading the network to cope with inconsistencies created by solar in my opinion should be borne by all householders as they require the service. Without solar, in our current generation climate, black outs would be even more frequent during peak summer loads." (Regional, residential)

"I think it's a social responsibility that should be borne by everyone. I don't think that needs to be a prohibitive figure though and businesses and individual households who will benefit from solar should pay a higher amount." (Regional, SME)

"I think there should probably be different charges depending on when customers came on board – and a fee for everyone to support network upgrades for the benefit of the environment. We can't just expect to exploit our environment with no cost to us." (Regional, SME)

"If everyone paid a little bit, then the government contributed the most, and the power companies invested in their own stuff and made it competitive, we could have a functional system in no time. But it's not a private benefit to have solar. We have five years to shift our impact on global warming. We can't be elitist about this anymore." (Regional, residential)

"I think it should be a cost spread evenly on all bills. ...we are not talking about upgrading a skate park. We are talking about upgrading a system that most of the population rely on, so that it can better serve the community in the future and be more environmentally friendly." (Regional, residential)

Allowing more solar exports back to the grid benefits us all



Some people are unable to nominate any benefits of more solar electricity exports into the grid. Among others, environmental benefits are top of mind. Some people (mistakenly) believe greater solar exports will have a positive impact on reliability of power supply. When prompted, the possibility of cheaper electricity also emerges as a potential benefit – however, this was not something that was immediately apparent.

Less carbon emissions are better for the environment, and solar energy is considered to be more sustainable in the longer term than other forms of generation.



Better for the environment

"I think a benefit is less pollution from burning coal – this is a benefit to us all, particularly to those like me who live near coal fired power stations. ...We are actually considering moving away as there is sure to be health issues later in life caused by living here." (Regional, residential)

"There is a certain amount of 'feel good' value to using solar energy as it is perceived as environmentally friendly." (Regional, SME)



Fewer power outages

A steady power supply leading to a reduction in blackouts.

If more people are contributing toward the available power in the grid, there is the expectation that prices could potentially reduce in future.



Electricity prices do not increase

"If we are exporting back, there is no argument to raise their prices, we are generating the electricity for them." (Outer metro, younger)

"In summer, when we have problems with supply, that would even out the blackouts in summer." (Outer metro, younger)

"Of course there are benefits as more power into the grid means less blackouts." (Regional, residential)

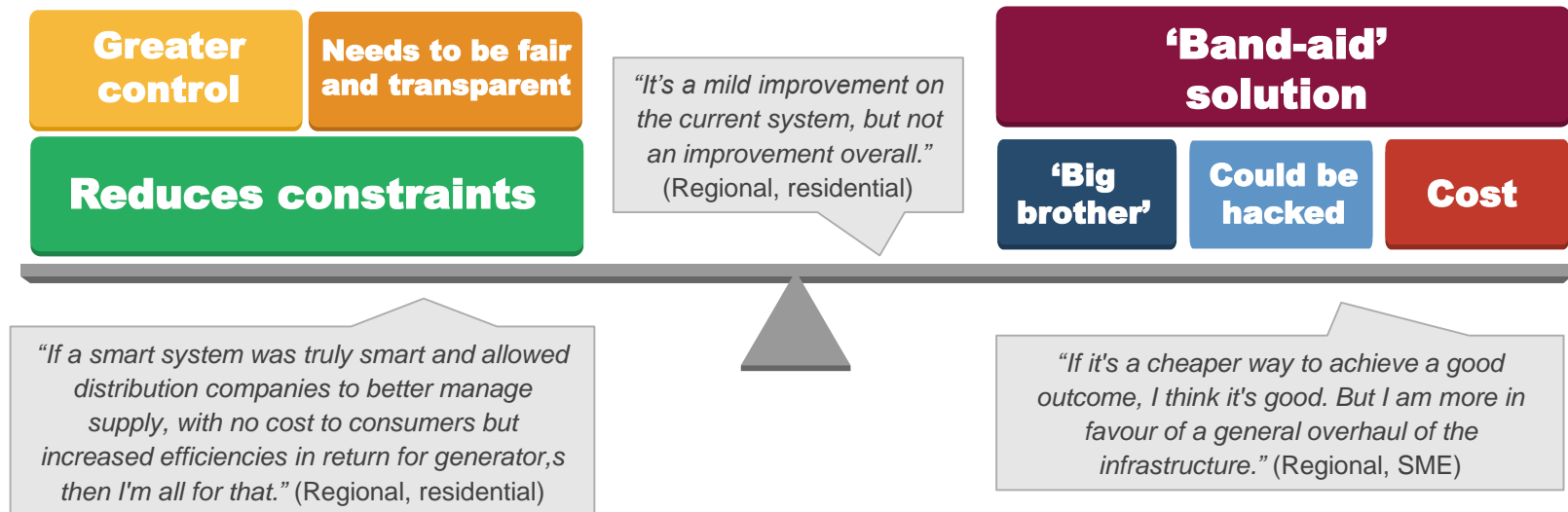
"...this should make up the shortfall from coal while catering to additional demand by consumer takeup of EVs." (Regional, SME)



There is support for smart systems to reduce export constraints provided it is done in a fair, transparent way

On balance, people tend to be supportive of smart systems, primarily because they claim to reduce solar constraints – affording customers greater potential to export their unused solar electricity. People don't want constraints unless they are deemed to be necessary. There is an overarching hope that the system will be implemented in a way that is transparent and fair for everyone.

There are concerns however that smart systems will not solve the issue of constraints – rather they will only provide a temporary solution. Others worry that it gives too much authority to power companies. Finally, there are concerns that the system could be hacked into, and that it could end up costing customers money.



Smart systems information provided: A solution that could be used in the future is that for customers that would otherwise face a limit on their ability to export their solar energy to the network, smart control systems can be used. This would most likely involve installation of a device at customer's premises. (Full description appended to this report.)

A large, stylized letter 'W' that serves as a background graphic. It is filled with a satellite image of North America, showing the United States and parts of Canada. The landmasses are dark, while the water bodies are a deep blue. A network of white lines, representing roads or infrastructure, is visible across the land. Two bright, glowing points of light are visible: one in the upper left (near the Great Lakes) and another in the lower right (near the Gulf of Mexico).

Innovation propositions



Energy transformation innovation...

What it refers to

Many people are not sure exactly what energy transformation innovation refers to, however within the context of the wider conversation:

- Finding new types of renewable energy.
- Developing current types of renewable energy.
- Decentralisation of the network through DER.

Whose responsibility it is

Should be a collaborative approach:

- Primarily involving government.
- Network businesses.
- Private business enterprise.

Who should lead it

There is a preference for the industry to take the lead themselves:

- Energy sector, e.g. retailers and distributors (i.e. Energy Australia, Origin, AusNet Services).

Others mentioned government agencies:

- CSIRO.
- Australian Energy Commission.

Academic experts (environmental scientists, etc.) should also be consulted where appropriate.

"I associate energy transformation innovation with cleaner, greener energy options." (Regional, residents)

"I believe it's the transition to new and innovative energy resources, clean renewables." (Regional, SME)

"To me, I think it means the ever changing way in which we import and export solar power." (Regional, residents)

"I feel it should be a collaborative approach, the leading gurus in this space doing what is economically and environmentally sound, all areas, network, government and private enterprise should be responsible." (Regional, SME)

"I do think there is a place for both government investment and private investment in transforming our archaic network." (Regional, residents)

"The network businesses should be at the forefront of finding and implementing new technology, with backing from our government to get it done." (Regional, residents)

"I think there are a few energy suppliers like Energy Australia and Origin that are in the market and leading the way." (Regional, residents)

"I don't know of any specific organisations, but any organisation that is currently researching harnessing renewable energy sources should take the lead." (Regional, SME)

"Australian Energy Commission should be leading energy transformation innovation in close consultation with affected parties." (Regional, SME)

Most people support energy transformation innovation expenditure when positioned as \$1 per household per year



Information provided to participants: *AusNet Services have a range of innovation projects they hope to undertake. These projects are designed to deliver improved network services to customers and enable customers to get the most out of their solar and battery technology investments.*

A cap of \$7.5 million on energy transformation innovation expenditure over five years from 2021 to 2025 is proposed. The bill impact of this would average \$2 per year across all AusNet Services' customers. Households would pay approximately \$1 per year.

The budget of \$7.5 million is an acceptable amount. A payment of \$1 per year per household is not considered to a prohibitive cost.

"Is \$1 a year something to complain about?" (Regional, residential)

Some people, both residents and SMEs, wonder if realistically this will be enough.

"...it seems a bit light on, I would have thought to spend as much as needed to get it right, enable the consumer to benefit long term, cost, reliability of electricity." (Regional, SME)

"That seems like a small expense per household to move the infrastructure towards more solar and battery technologies. Hopefully their plans are big picture and long term for cleaner energy." (Regional, SME)

There is a need to be moving toward more environmentally friendly ways of generating electricity.

"We need to be doing everything we can to find greener, cleaner, renewable energy sources. Coal, gas and oil won't last forever – neither will the earth if we keep destroying it." (Regional, residential)

It is critical that there is a customer benefit.

"I would support the proposed energy transformation innovation expenditure as it is a very small cost to the customer that hopefully will yield innovation and new technology that will eventually save much more for every household in the future." (Regional, residential)

"The cost does not sound onerous and I support innovation and research and forward planning, but will the money lead to actual outcomes?" (Regional, residential)

There is support for the improvement of network services via the three innovation projects

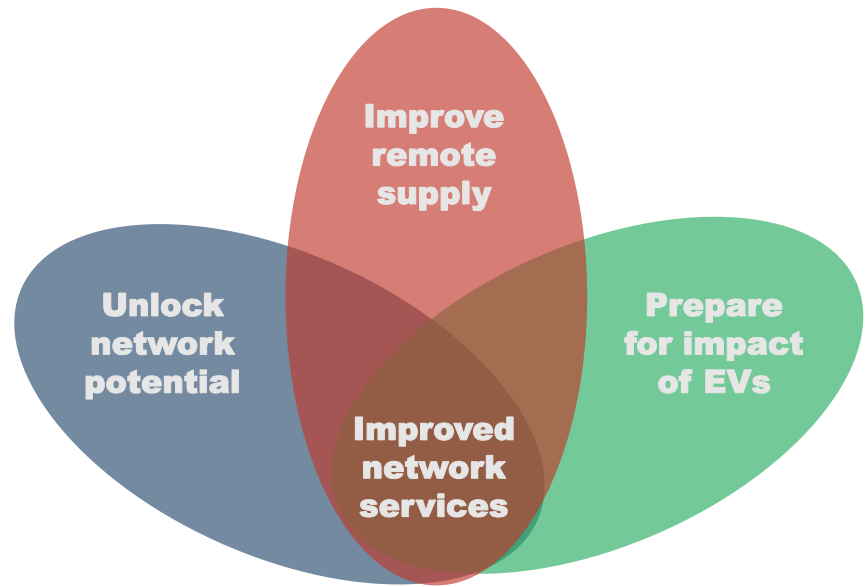


Participants were provided with information about three innovation projects designed to deliver better services and reduce costs to customers. The total cost of required expenditure is \$7.5 million. (*The information provided to group participants outlining the innovation projects may be found appended to this report.*)

Overall, there is support for all three innovation projects as described. They are perceived as being complimentary, with each contributing towards an improved network service. People are curious about them, and would welcome further information, such as:

- expected benefits and outcomes;
- timeframes to complete projects; and
- what happens if we don't make the investment.

Unlocking the network potential is perceived to have the greatest benefit for the most people (and was chosen by many people as the preferred option). The second most preferred project was improving remote supply, followed by the preparation for electric vehicles (EVs) (although this project is still supported overall).



"I would support investment in all three projects. They are good for the future sustainability of the network. In the scheme of things, \$7.5 million does not seem much when we spend a lot more on trivial things. I think community consultation and education are what's needed to move these ideas along." (Regional, residential)

Support for the innovation projects

Select verbatim comments



"Yes, I support them entirely. Anything that can be done within reason to support a cost-effective constant electricity supply should be done. To increase my support, I would like the companies and government departments to keep us informed through the media. It seems a drop in the ocean, I personally feel I could take a hit in the pocket to have a viable cost-effective constant electricity supply." (Regional, SME)

"I 100% support efforts to explore alternatives. It seems like very little. I'd be happy if it was \$1 a month rather than a year, if it meant things progressed faster or were done to a higher standard. It's not a lot. In terms of what I'd want to know... I'm not sure. I'd want to know the pros and cons and the outcomes of the projects I guess." (Regional, residential)

"I am just happy that there is someone thinking about what we might need for the future. Because we'll get to a point one day and we'll be in a mad panic, oh, the next power station has been shut down. You have someone thinking about it now." (Outer metro, older)

"Yes definitely, anything that is going to make less of an environmental impact whilst providing the much needed resources is always a good thing." (Regional, residential)

"I think the cost that has been mentioned seems reasonable and affordable. In general, I'd support the mentioned projects, it's something that needs to happen as the populations grows and we become more reliant on electricity." (Regional, SME)

"Yes it would have my support because if nothing is done the threat of blackouts loom large. Clear strategic plan to be published showing cost benefit analysis. Investment appears minimal to me for such a key project. Consumers would be keen to know what may happen if investment wasn't taken also if similar things are being done overseas in more mature markets." (Regional, SME)

Support is greatest for innovations that benefit a number of people



	1. Unlock network potential	2. Improve remote supply	3. Prepare for impact of EVs
Positives	<ul style="list-style-type: none"> Interpreted as benefiting the 'many' rather than the 'few' (i.e. more than the other two propositions). Empowering communities to support themselves by sharing power via mini-grids. Allows the export of more solar power back to the grid. Could increase the uptake of solar and battery technologies if more exports are allowed. 	<ul style="list-style-type: none"> People are very supportive of doing everything possible to reduce bushfire risk, it is an emotive issue. Remote customers will have more reliable electricity supply. Outages due to falling trees is removed. 	<ul style="list-style-type: none"> The use of emerging technology to future proof ourselves appeals to people. As demand for electric vehicles rise, we will be prepared for them. The ability for electric vehicles to export energy back to the grid is welcome news.
Concerns	<ul style="list-style-type: none"> Not intuitive what smart technology entails; concerns that it could be untried and untested. It incurs the greatest cost, however, as previously mentioned the overall budget of \$7.5 million is acceptable to people. 	<ul style="list-style-type: none"> Unclear how it would benefit all customers, predominantly seen as benefiting remote areas. Risk of certainty of supply to remote communities if all their poles and wires are removed. Use of diesel generators negates the environmental benefits of solar technologies. Concerns the SAPS are going to be an unfair imposition on rural customers. Is this something they want? Where do they go? How much space do they take up? 	<ul style="list-style-type: none"> Unclear how it would benefit all customers, predominantly seen to only benefit those with electric vehicles. Not everyone is convinced that electric vehicles will become mainstream, and even if they do it won't be for some time in the future.



Individual innovation projects

Select verbatim comments

	1. Unlock network potential	2. Improve remote supply	3. Prepare for impact of EVs
Positives	<p><i>"I like the idea of a mini-grid, also it allows more customers to safely export more solar power and being able to trade their energy over the grid, I am also community-focused."</i> (Regional, SME)</p> <p><i>"I think this option benefits the most amount of people and enables exporting back to the grid safely and effectively."</i> (Regional, residential)</p>	<p><i>"Where we live and the surrounding areas are prone to bushfire, reducing the risk of this is a no brainer for me."</i> (Regional, residential)</p> <p><i>"Those in remote areas always seem to be forgotten, I think having a stand alone power system would greatly benefit those remote communities."</i> (Regional, SME)</p>	<p><i>"Other than animal agriculture, transport is our greatest environmental threat. It therefore makes sense to move away from petroleum based vehicles as soon as we can. So, to me, it makes sense to get the technology right now as we lead quickly up to this change, rather than save the work for later and potentially risk the same issues we are having currently with our flawed two-directional energy system."</i> (Regional, residential)</p>
Concerns	<p><i>"The negatives may be that with the testing of new technologies – no reliable solution is found, or the budget is not enough to get to the solution."</i> (Regional, SME)</p> <p><i>"Smart tech seems like a band-aid solution. This solution doesn't seem to have forward planning."</i> (Regional, residential)</p>	<p><i>"Is the new system a reliable one? What are the costs to the consumer of running a SAPS system – and can it be serviced easily in remote locations?"</i> (Regional, SME)</p> <p><i>"I'm not sure how people living remotely would feel about having to house their own mini power station... I really don't know if it would be a blessing or imposition."</i> (Regional, residential)</p>	<p><i>"To me it sounds like a future type thing and not what is happening at the moment."</i> (Regional, SME)</p> <p><i>"To be honest I can't see electric vehicles taking over fuel for a very long time in Australia. So I think this could be a bit wasteful."</i> (Regional, regional)</p>



Additional information that customers seek

Some key themes arise around the type of information customers seek on the innovation projects.

Timeframe under which projects will be undertaken (and their expected lifespan)

"I'd want to know more about the long term. Is option one only going to work for the next 5 years? 10 years? Is it something that could carry through to the next generation? Given it is 60% of the budget, it should be an option that is a long-term solution." (Regional, residential)

"I'd like to know time frame for the projects, what specialists and environmentalists are attached to the project, how it would reduce the carbon footprint and reduce power prices. I'd like to also know when they'd stop relying on coal power and solely on renewables." (Regional, residential)

Expected benefits or outcomes

"As estimated timeline, an outcome, similar to the desalination plant. There is a light at the end of the tunnel, you are not just throwing money at it." (Outer metro, younger)

"You always want to know how a project will affect you and what the benefits of that project are." (Regional, SME)

"I would want to know what the expected results were as well as the timeframe to see any possible changes." (Regional, residential)

"What it is, the project, etc. and how it will benefit the consumer, in the present and long term." (Regional, SME)

Where to find more information

"I support development and improvement of any infrastructure system, I would need more information of profit and margins the distribution companies are taking in before and after such improvements and would want guarantees they aren't going to dip further beyond initial estimates into Australian tax payers pockets to complete the projects." (Regional, residential)

"I would love to see AusNet publish information packages on their innovation work – even if it were just text messaging linking users to internet webpage information." (Regional, residential)

A large, stylized letter 'W' that serves as a background graphic. It is filled with a satellite night-time image of the United States, showing city lights and state boundaries. The 'W' is positioned on the right side of the slide, with its leftmost stroke extending towards the center.

Final thoughts



Final thoughts

People are initially quite surprised to hear about the limitations of the electricity grid. However, following review of the information, people are encouraged to hear that plans are afoot to better prepare for the future.



"I'm actually quite delighted that someone out there is seriously looking into cleaner energy supply. I hope that it happens soon, and doesn't just stop at the bare minimum, but actually pushes through to become clean energy." (Regional, residential)

"It has all been interesting. It's not something I really knew anything about. I'm pleased there are plans to explore renewable energy sources." (Regional, residential)

"I now look at 'electricity' in a different way. I've learnt there is a lot that can be done to save our planet. If the AusNet project goes ahead, I would like to receive regular updates. It's an area of high interest for me." (Regional, SME)

"I didn't know that this topic was so vast. I think it's very good innovation and I am happy for the environment." (Regional, SME)

"If people understand the benefits, not just now, the long-term benefits and why those costs are important. That will convince people." (Outer metro, younger)

"The final sections giving insight into what AusNet are actually doing is insightful. They were slowest to roll out smart meters, so it is good to see they are pushing forward with technology." (Regional, SME)

"I didn't know there was a problem with them taking my power back and I did a lot of research, and never once did I think that. It's a waste, we have a resource there that is going to waste. We have so much technology, let's adapt it into changes that are more sustainable." (Outer metro, younger)

A large, stylized letter 'W' that serves as a background graphic. It is filled with a satellite night-time image of the United States, showing city lights and state boundaries. The 'W' is positioned on the right side of the page, with its leftmost stroke extending towards the center.

Appendix: Stimulus material



Handout 1: What are solar connections?



When people buy a solar system, they can have more control over their energy bills, save money and help the environment. This is because they can use power captured in their solar panels rather than just from the energy grid.

They can also earn money for the power they export, or “feed-in” to the electricity grid. It is the connection to the distribution network that enables them to do that.

However, the network needs to be upgraded to enable high levels of two-way electricity flows – it was originally set up for one-way electricity delivery and now needs upgrades to allow additional solar to keep connecting.

Solar generation is highest in the middle of the day when the sun is high in the sky. Energy sent to the grid can’t be stored because **the grid is not a battery** – essentially, what’s in the grid is ‘use it or lose it’. During these times the amount of solar export is becoming problematic for networks.



Handout 2: Managing solar exports

As we have discussed, the electricity network was designed to provide a one-way flow of electricity to customers. The network has a limited ability to accept solar exports and it is starting to reach these limits. Increasingly, it will not be able to reliably handle significant increases in solar exports without further upgrades.

If the extra solar generated by everyone was exported (or fed) into the grid, the stability of the grid might be compromised – that is, the ability of the network supply to meet demand.

Another problem is that when there are lots of people generating their own energy and feeding it back to the grid, it can cause the voltage on the network to rise.

- Voltage can be thought of as the 'electrical pressure' in the network. The voltage at each house in the network decreases the further it is from the distribution transformer. As more current is exported into the grid from solar panels, this increase in voltage gets worse. If the voltage in surrounding houses rises above regulated limits, household appliances could be damaged.

To prevent these kinds of issues, once the voltage rises to a sufficiently high level the solar installation trips off, meaning that solar customers cannot export and cannot use their solar system to offset their own energy consumption. It may take some time for the solar panels to turn back on.

To prevent the above situation, networks can constrain or limit the amount of excess electricity that people are allowed to export back into the grid. Today, constraints on the amount of excess electricity that people can export to the grid is low (i.e. less than 15% of customers are constrained). However, this number is rising and the forecasted take-up in solar over the next few years will further increase the number of customers who are constrained.

Handout 3: Options to improve the electricity network for increasing numbers of solar panels handout



AusNet Services can undertake a variety of network upgrades to remove the need to constrain people's exports and increase their ability to export excess electricity from their solar panels back into the grid. There are four possible options to how we can address this constraint issue and determine how much solar to enable on the network:

Program 1: No extra cost but very significant solar export limiting. More solar exports will be constrained over time.

Additional overall cost: \$0

Around 95,000 solar customers export limited.

Around 235,000 customers with voltage impacts.

Program 2: Small increase in allowed solar exports.

Additional overall cost: \$18.9m

\$0.50c per annum for residential customer.
\$3.50 per annum for business customer.

Around 15,000 solar customer exports enabled,

Around 52,000 less customers with voltage impacts.

Program 3: Allows most solar export for dollars spent.

Additional overall cost: \$38.1m

\$1.00 per annum for residential customer.
\$7 per annum for business customer.

70,000 solar customers export enabled.

Around 178,000 less customers with voltage impacts.

Program 4: No solar constraints, but very high cost.

Additional overall cost: \$626m

\$7.00 per annum for residential customer.
\$49 per annum for business customer.

95,000 solar customer export enabled.



Handout 4: Smart systems

Currently, limits are placed on the amount of solar energy that some customers can export because we need to ensure that the network is not overloaded – constraints are placed on customers to ‘be on the safe side’.

A solution that could be used in the future is that for customers that would otherwise face a limit on their ability to export their solar energy to the network, smart control systems can be used. This allows constrained customers to export most of the time. At times that the network is overloaded, technology allows the network to remotely manage constrained customer’s solar exports, in real time.

This would most likely involve installation of a device at customer’s premises. Customers would also need to give the network permission to control their solar exports at these infrequent times when the network is congested (and at risk of voltage issues).

Handout 5: Innovation projects to maintain (or reduce) cost and give customers more choice handout



AusNet Services undertakes a lot of innovation, especially innovation that allows them to deliver better services and reduce costs to customers.

1. Unlocking the potential of the network to support new customer needs

These projects would cost approximately \$4.5 million or 60% of the total network transformation innovation expenditure of \$7.5 million.

These projects seek to test new technologies and techniques that can move the distribution network from the existing network that is managed from a central location to decentralised, local networks that are managed through 'smart' technology

The aim is to allow customers to use their energy technologies (solar, batteries, etc) and our network in ways that they want to. For example, customers could be able to:

- safely export more of the solar power that they generate;
- be part of an energy mini-grid that could share their power with their community;
- take advantage of new business models to trade their energy over the grid.

2. Improving remote supply and addressing bushfire safety through the use of stand-alone power systems

These projects would cost approximately \$1 million or 13% of the total network transformation innovation expenditure of \$7.5 million.

Poles and wires need to be regularly maintained. Remote customers are serviced by long stretches of powerlines, the cost of which is shared across the entire network.

A trial of Stand-Alone Power Systems will test the effectiveness and cost-benefit of these in improving supply reliability and reducing bushfire risk.

Stand-Alone Power Systems can improve electricity reliability and reduce safety risks in remote areas by removing the existing powerlines and replacing them with on-site, complete power supply solutions installed on a person's property. This solution would include a rooftop solar system, battery storage and a back-up diesel generator.

These Stand Alone Power Systems (SAPS) would replace power supplied via the traditional network and ultimately benefit all customers because expensive maintenance efforts are no longer required.

Handout 5: Innovation projects to maintain (or reduce) cost and give customers more choice handout (cont'd)



3. Preparation for the impact of electric vehicles

These projects would cost approximately \$2 million or 27% of the total network transformation innovation expenditure of \$7.5 million.

AusNet Services are interested in undertaking innovation projects to prepare for the future adoption of electric vehicles. Because they will quickly impose very heavy demands on the network once the numbers start to increase, electric vehicles will impact significantly on the costs and quality of service to all customers, regardless of whether they have an electric vehicle or not.

AusNet Services want to innovate to reduce the likely cost impacts on customers which have been experienced in the past when large new loads come onto the system, such as air conditioners.

The innovation projects would look at ways of managing the impact of electric vehicles through modelling and trials of tariffs designed for electric vehicles (including peak/off-peak tariffs). The innovation projects would also explore the practicality and benefits of using electric vehicles to support the network during periods of peak demand (e.g. heatwaves). This could involve electric vehicle owners putting electricity back into the grid (from their battery) or into their house at these times.

THERE ARE OVER 720,000 AUSNET ELECTRICITY CUSTOMERS...

FIND OUT WHAT THEY'RE THINKING.



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