



The VIPs in the VPP: Social dimensions of household energy users' willingness to participate in a PV and battery storage virtual power plant

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The Users TCP and the International Energy Agency (IEA)

- The **International Energy Agency (IEA)** developed in 1970s following oil crisis as intergovernmental organisation shaping a secure and sustainable energy future, through analysis and policy advice to governments and industry around the world.
- To facilitate global cooperation on energy technology, the IEA created the **Technology Collaboration Programme (TCP)**. Today, the **Users TCP** is the first and only social science-focused TCP of the 38 running. Together, the TCPs connect thousands of experts across government, academia and industry in 55 countries dedicated to advancing energy technology research and application.
- **Disclaimer:** the Users TCP is functionally and legally autonomous from the IEA. Views and findings of the Users TCP do not necessarily reflect those of the IEA.



- Very low levels of self-reported trust in energy companies, as indicated in e.g. ECA surveys
- Wider crisis of democracy, with very low measures of trust in Australian governing institutions, especially over last 15 years
- Rapidly changing DER and demand response policy environment





Aim: identify conditions in which energy users are willing to participate in a PV and battery VPP

Method: Interviews and focus groups with a total of 47 people:

- most with rooftop solar (and, among those, many with Solar Analytics monitoring)
- a few with batteries
- some without rooftop solar
- based in NSW, SA, Queensland and Victoria.



Factors influencing battery purchase

The main motivations for battery purchase are maximising self-consumption (for financial and/or environmental reasons), energy independence and security of power supply.

The main barriers to battery purchase are financial: the cost, the capital required, and the payback period.

Many of the research participants are waiting for 'the right time', which can mean various things.



Understanding of VPP

A small number of participants described a VPP as orchestrated batteries, or that ‘somebody is going to manage the power that everybody is producing so that the grid works’.

However, levels of understanding were low among the majority of participants. A VPP was most commonly perceived to be a mechanism for energy sharing.

Once the basic principles of a VPP were explained to the participants, most would consider participating, but emphasised that they would need more information before making a decision.



Reasons for participation

Financial

- bill savings or income
- assurance 'that I'm getting what I believe is an adequate return'

Social

- grid management, e.g. voltage control: 'I'm okay with allowing some level of control to make sure that things are not dangerous for me or for other people'
- preventing blackouts
- reducing electricity costs for everyone

Environmental

- enabling more renewable energy: 'I think that this would be a way [...] of having more clean energy generated for all'



Barriers to participation

Participants expressed various – often connected – reservations:

- that they would lose control, typically related to loss of access to solar energy if their battery is participating in a VPP event: ‘I’m not sure how much control we would have to give over’
- that they would not benefit – or may even be disadvantaged – financially: ‘if I don’t use my battery [...and] what I’m paying for my power is more than what I’m getting back, it might not even be worth it’
- that a VPP would serve others’ interests and that they would be exploited: ‘I need to understand who is benefiting from this’, ‘Is there any way it can be used [...] against me?’



Conditions of participation

Participants identified the following conditions of their participation as among the most important:

- the possibility to retain at least a portion of the battery's capacity to meet the household's needs: 'I want to make sure we have enough left over'
- the option to opt out of participation – whether specific VPP events, or out of their contract – at any time
- information and transparency – both before entering a VPP program and, for some, to be able to monitor exactly when and how their battery is participating in a VPP



Preferred VPP scale and operator

Preferred scale of the VPP:

- Local: 'once it gets bigger than that, I just feel that there are too many forces just way beyond my imagination that could mess it up'
- No preference: 'I don't care who it goes to. Wherever the system takes it'.

Preferred operator of the VPP:

- Trusted parties include organisations that are Australian, have technical expertise, offer good customer support, or are not-for-profit
- Distrusted parties are commonly seen to include energy retailers and generators



Provisional conclusions

1. For people who have solar and who see themselves as being on a renewable energy pathway towards greater self-consumption and independence of the grid, VPP participation would require a significant shift in thinking. People who do not yet have solar or batteries may be receptive to different meanings that these DER can hold and to VPP participation.
2. People want to feel some sense of control, but this means different things for different people.
3. Many people are attracted by the possibility that a VPP could support community – in line with the various ways people define and perceive their communities.



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