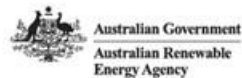


Project EDGE

Demonstrations Insights Forum | 07 March 2023



A photograph of a lush green forest with many tall, thin trees. The sky is visible through the canopy, showing a clear blue color. The trees have dense green leaves, and some sunlight is filtering through. The overall scene is bright and natural.

Acknowledgment of Country

We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture.

We pay our respects to their Elders past, present and emerging.

Agenda



Time	Description	Presenter
1.00 - 1.05pm	Introduction	Dom Holden
1.05 - 1.40pm	EDGE Preliminary Results	Nick Regan (AEMO)
1.40 - 2.15pm	Emerging Insights from customers of DER Aggregators	A/ Prof Josh Newton (Deakin University)
2.15 - 2.30pm	Q & A & Meeting Close	Dom Holden

Project EDGE

Preliminary Results – Dynamic Operating Envelope (DOE) Conformance

Nick Regan (AEMO)



Conforming with DOEs is key to aggregated DER operating within network limits while providing energy services



Focus of this analysis

Subset of the research question 4 regarding the ability of aggregated DER to **operate within network limits** while participating in wholesale dispatch. The analysis:

- Tested the ability for aggregators to **dispatch in compliance with DOEs** at the:
 - DUID level (portfolio), and
 - NMI level.
- Explored the **implications** of DOE breaches on networks, AEMO and consumers.

Relates to Research Question 4:

How can the Distributed Energy Resource (DER) Marketplace facilitate activation of DER to respond to wholesale price signals, operate within network limits and progress to participation in wholesale dispatch over time?

Within Project EDGE, Dynamic Operating Envelopes (DOE) breaches are defined as the limits set by the Distribution Network Service Providers (DNSP) to constrain both load and generation. There are differing DOE calculation methods and allocation principles being explored within this trial.

Specifically, the trial looks at DOE conformance from two views:

Market Operator Visibility = DUID Level DOE

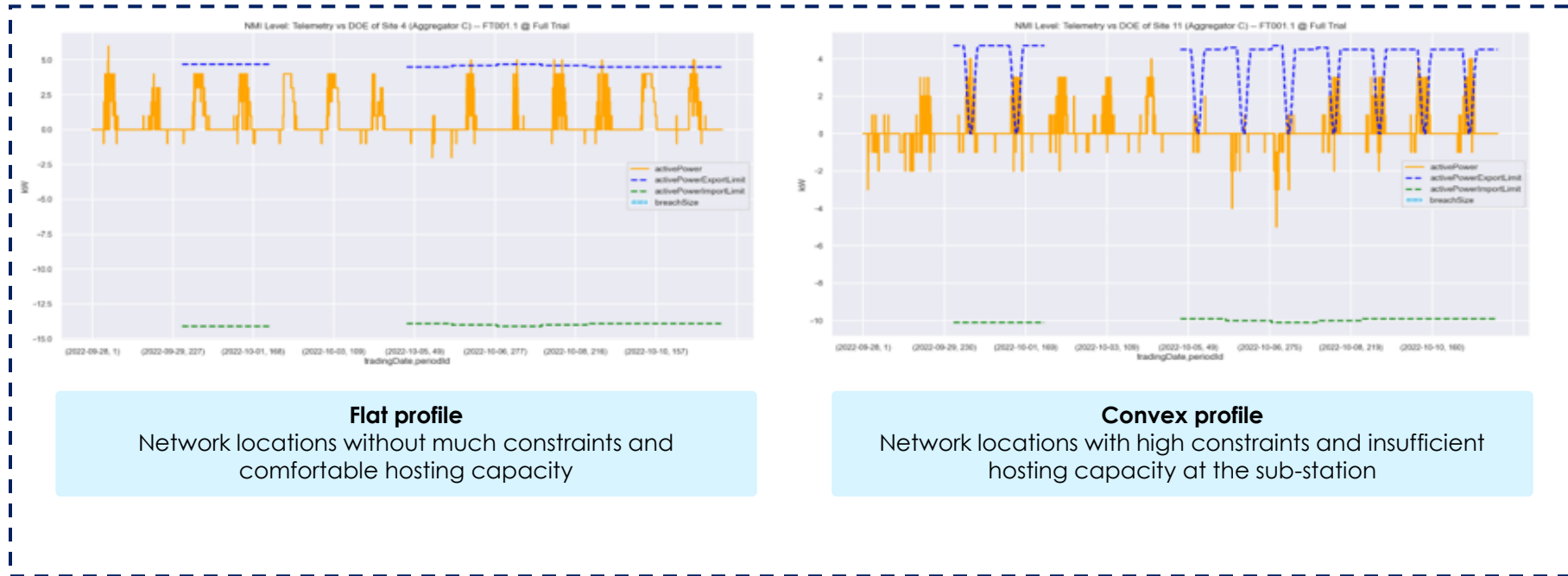
DSO Visibility = NMI Level DOE

In the trial, AEMO considers DUID-level DOEs (sum of all NMI level) as a coarse check against DER aggregator bid qty but doesn't reveal whether individual sites within the portfolio will breach.



DOE conformance is of interest to both DNSPs and AEMO, DER aggregators need capability to self constrain their bids and manage conformance operationally

NMI level DOE breaches are being observed in EDGE, severity and duration are greater in constrained areas



Network locations with higher constraints have longer and higher breaches.

Given these are the key times when the network is likely to be constrained, it is important to work with aggregators to remedy material breaches before wide-scale roll out of DOEs.

Initially identified contributing factors

- Site uncontrolled load forecasting error (weather and behavioural)
- Customer manual override
- Others TBC

EDGE is testing two different bidding definitions 'Net NMI' and 'Flex' for visibility purposes

A key research topic for Project EDGE is around gaining operational visibility of DER. Aggregator bids can have 2x definitions of quantity, 'Net' (including uncontrolled load) and 'Flex' (DER only).

Operational visibility of DER is required at the aggregated DER fleet level, not individual devices.

This topic aligns with the current Scheduled Lite rule change and is independent of current FTA rule change.

Flex

Controllable (Load and/or Generation) : Sum of controllable devices (load and/or generation; *not individual devices*) across the participant's registered portfolio of NMIs

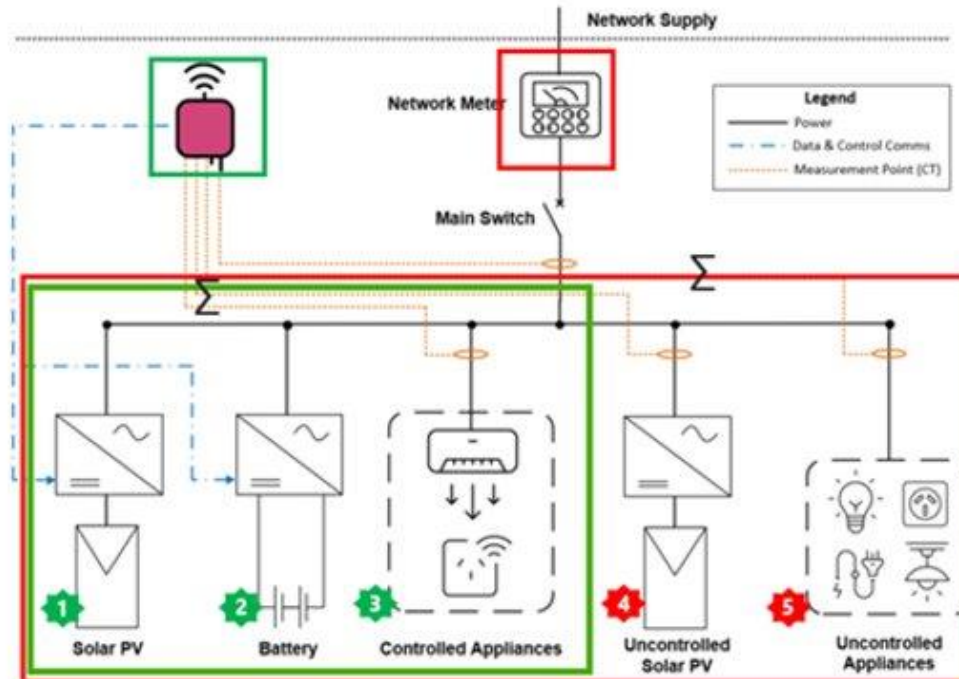
-> Only controllable assets are considered when calculating the capacity

-> Measurement at a real/virtual measurement point

ps: not individual devices but aggregated of all controllable devices

-> Visibility of 'summation of' all controlled assets is provided via Bi-directional offer and telemetry

-> $\sum (1 + 2 + 3)$



Net NMI

Aggregated Net Connection Point Flow: Sum of net connection point flows across the participant's registered portfolio of NMIs i.e. Net at NMI

-> All Controllable and uncontrolled assets considered when calculating the net connection point flow value

-> Measured at Connection point (i.e. NMI)

-> Visibility of Net position at NMI is provided via Bi-directional offer and telemetry
Separation of controlled & uncontrolled assets is not required or visible

-> $\sum (1 + 2 + 3 + 4 + 5)$

NMI level DOE breaches are being observed in EDGE, Contributing factors require further investigation



The results observed generally within each field trial are outlined below. Analysis to date is limited to Aggregator C, analysis across full sample planned.

Under Net NMI Bidding Mode	Under Flex Bidding Mode (noting smaller sample to date)
50 % of active NMIs breach DOE limits at least once	20 % of active NMIs breach DOE limits at least once
Export limits are breached around 20 % of the time	Export limits are breached around 11 % of the time
Import limits are never breached	Import limits are never breached
The average breach size was 1.92 kW	The average breach size was 1.29 kW
The average consecutive breach duration was around 22 minutes	The average consecutive breach duration was around 4 minutes
96% of compliant periods had more than 50% of headroom, averaging 6 kW	99% of compliant periods had more than 50% of headroom, averaging 5.81 kW

Could DOEs applied just to DER help?

- Aggregators expressed that a DOE applied to Flexible DER could help mitigate breaches caused by uncontrolled load / solar.
- DNSP has noted that Flex DOEs would likely be more conservative than Net NMI to cover uncontrolled load forecasting errors.
- On open question is whether the initial conservatism can be overcome with time through machine learning
- Further analysis is planned to inform assessment of benefits of the respective DOE allocation approaches (Net & Flex)

Potential impacts of DOE breaches being investigated

Operational planning

- Impact to visibility
- How do NMI breaches affect operational forecasting and planning?

Economic optimisation

- Could the unused limits be re-allocated to NMIs more likely to breach instead?

Customer

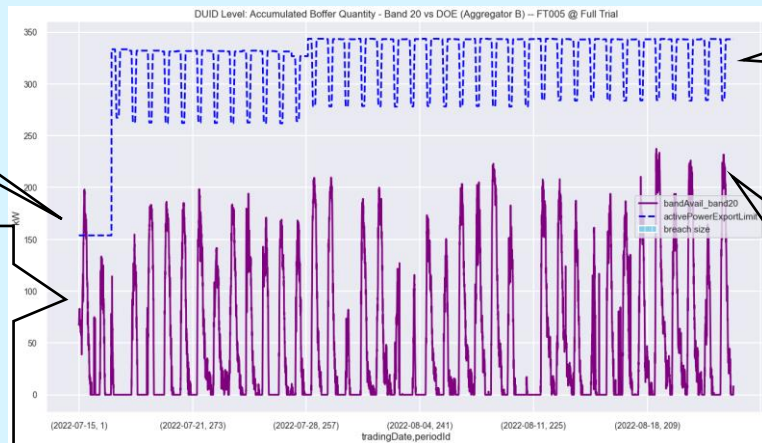
System security

- How do NMI breaches impact system security (local & NEM)?
- How material could these breaches become as DOEs are used more and more to manage PV flows to the grid during min demand times?

Although rare, DUID level DOE breaches have been observed, impacts look manageable but work is needed to protect customers



Bidding breach (intention)



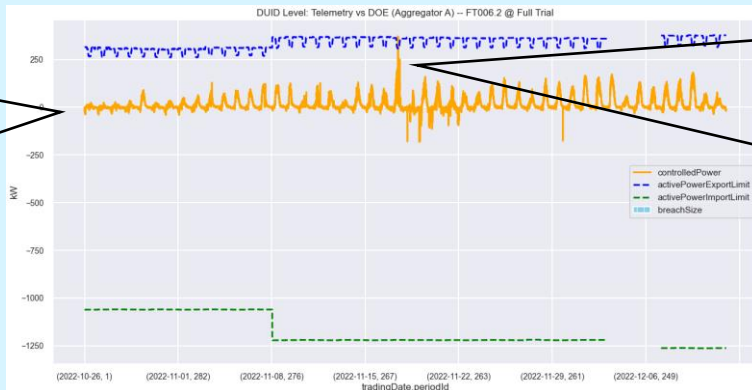
DUID level DOE bid breach

DUID level DOE export limit

There is an increase in the scale of DOE limits a day after new NMIs were registered, indicating a delayed reflection of increased fleet size in DOEs.

DUID level cumulative generation bid quantity (band 20)

Performance breach (actual)



DUID level telemetry (net controlled generation and load)

- The aggregator's aggregated net controlled generation and load exceeded the aggregated DOE export limits.
- The breach size is 53.97 kW (20%), 1 min duration
- Cause is under investigation

Influencing factors

There is no established method to synchronise new NMI enrolment in an aggregator portfolio with DOE updates from the DSO for those NMIs. This means for a period of time aggregators do not have all DOE limits that apply to their portfolio.

Implications of DOE breaches

- **Economic (TBC):** Value of unutilised DOE capacity vs constrained bid underway
- **Operational Planning (TBC):** Under investigation
- **System Security**
 - AEMO:** Manageable if Dx limits provided at the distribution and transmission network interfaces (e.g TNI) align with the bid qty received by aggregators (controllable DER qty only required for visibility) so that Security Constrained Economic Dispatch is preserved
 - DNPS:** Curtailment triggers are protection mechanisms for networks, meaning that DOE breaches have a lower impact on the network itself than on customers (e.g Inverter Power Quality settings)
- **Customer:** DOE breaches can impact voltage level (gradually reducing the life of electronic equipment) and power quality (flicker).
- Voltage increases trigger curtailment of export in newer PV inverters with a power quality setting, reducing the use of their PV and export of neighbouring customers.
- Net NMI DOEs hold customer to account for uncontrolled load/generation causing a breach.

Summary Findings: DOE Conformance



Focus of this analysis

Tested the ability for aggregators to **dispatch in compliance with DOEs** at the:

- DUID level (portfolio), and
- NMI level.
- Explored the **implications** of DOE breaches on networks and consumers.

Question 4:

How can the Distributed Energy Resource (DER) Marketplace facilitate activation of DER to respond to wholesale price signals, operate within network limits and progress to participation in wholesale dispatch over time?

Hypothesis A:

DER participation in wholesale energy markets can be achieved progressively, as DER fleets reach materiality thresholds, aligning with Energy Security Board (ESB) Visibility and Dispatchability models.

Preliminary Insights:

- NMI DOE compliance in constrained areas is currently poor and would need to be improved in a wide-scale roll out of DOEs
- An imbalance between active and passive DER customers could diminish participation incentives and value to active customers
- Models that allow separate trading of controllable (Flex) devices could enable more efficient participation by aggregators
- Aggregators need highly integrated and scalable systems to manage portfolios in a high-participation future
- Need to define DSO-AEMO limit interface in a way that aligns with DER bids
- Coordination process to be defined between active start date of new aggregator site after enrolment and corresponding DOE update from DSO

The impacts of these results are?

- Industry preferences differ between Net NMI DOE (export/import) and Flex DOE applied to the controllable DER (aligns with aggregators control and ability to conform) – need to be resolved
- The trade-off could be that Flex DOEs are potentially more conservative initially
- System Security at the local and transmission network levels is largely manageable, focus should be on customer protections
- NMI DOE compliance needs to improve to mitigate the need for network solutions, Solar PV disconnection and voltage rise that add more costs and lost revenue to customers
- DER aggregators need capability to self constrain their bids and manage conformance operationally

Turning insights into action: Industry Discussion



How should industry progress this discussion?

DOE point of allocation – resolving different industry preferences for Net and Flex

- Raised in AER Flexible Export Limits Issues Paper (Oct 2022)*
- Consider aggregator and DNSP capabilities to manage risk
- Consider Roles & Responsibilities required for each option:
 - Responsibility for whole site (Net)
 - Multi-trader sites (exists now without FTA2): Access to uncontrolled load, division of DOE among traders (Net or Flex)
- **Who should drive this definition? Who should be involved?**

DOE capacity allocation among customers*

- Previous EDGE forums presented Uni Melb results showing a spectrum of Dynamic Operating Envelope 'Objective Functions' that guide the allocation of spare network capacity among DER customers and how this relates to the idea of "fairness" for customers.
- Increasing "fairness" to participating DER customers will directly reduce the total capacity that can be allocated, dispatchable DER capacity and the social welfare of the network (benefits to all consumers including those without DER).
- **How should capacity allocation policies be set? Who should drive this? Who should be involved?**

Improving DOE Conformance (esp in constrained network locations)

- DOE compliance needs to improve to mitigate the need for more costly network solutions
- More sophisticated applications of DOEs (e.g. reallocation mechanisms) could mitigate risks but need further exploration
- Severe penalties could deter active DER market participation, limiting whole of system benefit and customer value
- **What incentives/penalties are appropriate for non-compliance with DOEs?**
- **Who should identify non-conformance? Who should define the penalties? Who should enforce them?**

*https://www.aer.gov.au/system/files/Flexible%20Exports%20-%20final%20Issues%20Paper_0.pdf



Emerging insights from customers of DER aggregators Project EDGE

A/Prof Josh Newton, Deakin University

This research has been conducted with the support of:



Housekeeping

Recording in progress

- This webinar will be recorded for the benefit of those who are unable to attend
- The recording will be available on the AEMO website

Questions and answers

- There will be an opportunity for questions at the end of the webinar

Background



A focus of our Project EDGE research to date has been on understanding the **perceptions of the general public** towards the active management of DER

Our review of the DER literature identified several research gaps relating to the **customers of DER aggregators**, including

- How can companies increase trust and reduce risk perceptions?
- What is required to develop relational interactions with customers?
- How can customers be retained long-term?
- How can ease of use be reconciled with customisation?
- Who are the voices that people listen to and trust?
- What must an aggregator do to ensure a smooth acquisition and installation process?

Our study sought to address these gaps

Background



We interviewed customers from the three aggregators participating in Project EDGE

While we are still finalising our report, the following presentation provides a summary of some of the emerging insights we have identified thus far

Emerging insights

Adoption motivations: Benefits



Identified motivations for adopting DER and joining a VPP aligned with findings from other DER and Project EDGE research

Motivations included:

- Financial benefits (household)
- Financial benefits (community)
- Energy independence/self-sufficiency
- Energy resilience (household)
- Energy resilience (community)
- Environmental benefits
- Growing a domestic industry
- Peace of mind

Adoption motivations: Benefits



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- Peace of mind

“ My understanding is that the VPP scheme would enable us to sell to the grid during periods of peak demand when the electricity price is high, and to store our own energy and use it when the energy price is low. That, I guess, was potentially a monetary benefit. We didn't think it was going to generate a lot of money, but we saw it as being more efficient than one, flat, low feed-in tariff.

Adoption motivations: Benefits



Identified motivations for adopting DER and joining a VPP aligned with findings from other DER and Project EDGE research

Motivations included:

- Financial benefits (household)
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- Energy independence/self-sufficiency
- Energy resilience (household)
- Energy resilience (community)
- Environmental benefits
- Growing a domestic industry
- Peace of mind

“ But for me, participating in this sort of thing should help lessen future investment in infrastructure. And I know that if we spend millions of dollars upgrading lines, then, as the consumer, I've got to pay for that. I'll wear it later, bit by bit over many years.”

Adoption motivations: Benefits



Identified motivations for adopting DER and joining a VPP aligned with findings from other DER and Project EDGE research

Motivations included:

- Financial benefits (household)
- Financial benefits (community)
- Energy independence/self-sufficiency
- Energy resilience (household)
- Energy resilience (community)
- Environmental benefits
- Growing a domestic industry
- Peace of mind

“ But it's quite simple: if you become energy sufficient... nobody could charge you. Nobody could charge you.”

Adoption motivations: Benefits



Identified motivations for adopting DER and joining a VPP aligned with findings from other DER and Project EDGE research

Motivations included:

- Financial benefits (household)
- Financial benefits (community)
- Energy independence/self-sufficiency
- Energy resilience (household)
- Energy resilience (community)
- Environmental benefits
- Growing a domestic industry
- Peace of mind

“ One of the biggest things is that if there is a black out, I'm of the understanding that if you've got a battery, you've always got power. We have had a few up here and the way the current market is, we may or may not have more up here during the coming summer and that probably is, apart from possibly only having a supply-only bill, yeah, that would probably be the biggest benefit, I think, to a consumer.

Adoption motivations: Benefits



Identified motivations for adopting DER and joining a VPP aligned with findings from other DER and Project EDGE research

Motivations included:

- Financial benefits (household)
- Financial benefits (community)
- Energy independence/self-sufficiency
- Energy resilience (household)
- Energy resilience (community)
- Environmental benefits
- Growing a domestic industry
- Peace of mind

“ The same reason that we went solar in the first place, and participation in this [VPP] that if the grid needed support, because it was done in need, if we had surplus here, why just leave it in the battery? ”

Adoption motivations: Benefits



Identified motivations for adopting DER and joining a VPP aligned with findings from other DER and Project EDGE research

Motivations included:

- Financial benefits (household)
- Financial benefits (community)
- Energy independence/self-sufficiency
- Energy resilience (household)
- Energy resilience (community)
- Environmental benefits
- Growing a domestic industry
- Peace of mind

“ I mean that's another benefit is if my power is in the grid and therefore used and therefore there is less need for baseload coming out of a coal fire power station, that's an excellent thing as well, absolutely.”

Adoption motivations: Benefits



Identified motivations for adopting DER and joining a VPP aligned with findings from other DER and Project EDGE research

Motivations included:

- Financial benefits (household)
- Financial benefits (community)
- Energy independence/self-sufficiency
- Energy resilience (household)
- Energy resilience (community)
- Environmental benefits
- Growing a domestic industry
- Peace of mind

“ And look, I guess, in the bigger picture if it took off there might be more jobs in Australia. There might be a whole emerging industry. So, look, I just thought look, it's for the right reasons, let's be a part of this.”

Adoption motivations: Benefits



Identified motivations for adopting DER and joining a VPP aligned with findings from other DER and Project EDGE research

Motivations included:

- Financial benefits (household)
- Financial benefits (community)
- Energy independence/self-sufficiency
- Energy resilience (household)
- Energy resilience (community)
- Environmental benefits
- Growing a domestic industry
- Peace of mind

“ Well, I guess you could say it's the savings on your bills, and you could also say it's being independent so that I'm not exposed to what happens with blackouts and things like that all the time. But basically the most important thing is to just be warm, even cooling. I know it'll be helpful with cooling, but just as an older person, to have the confidence to know that you can just have the heater on and that you're providing for it, that is really incredibly important. It makes a difference between moving from where you live and not.

Adoption motivations: Blurring of benefits



Customers often blurred the benefits of DERs and VPPs



[When asked to describe the benefits of joining a VPP]

It's fantastic. We had a blackout in the last week because there were a lot of storms in the area and our power didn't go off, and everybody else's did.

Has several potential implications:

- May be a challenge to communicate the distinct benefits of DERs versus VPPs among certain customer cohorts
- Technical or service issues encountered with one of these technologies could potentially be misattributed to the other
- Could establish expectations that are difficult for the focal technology to deliver on

Adoption motivations: Barriers



Identified barriers to adopting DER or joining a VPP aligned with findings from other DER and Project EDGE research

Barriers included:

- Insufficient stored energy to cover self-consumption needs
- Insufficient financial returns
- Data security

Adoption motivations: Insufficient financial returns



Insufficient financial returns were a persistent concern of customers, and one that may pose reputational risks for aggregators

“ I do think there should be some equity between exported and imported prices. I'm not expecting to make cent for cent, but I'm expecting to see at least 50%, every day of the week, for every kilowatt we put in. If they can't make – that's 100% mark up when they get it. If they can't meet that, that's ridiculous. That's ridiculous.”

- Dissatisfaction with financial returns had not stopped customers from joining an aggregator (although whether a similar pattern is observed among the broader population remains to be seen)
- However, aggregators may be held responsible by customers for offering low export rates, even if aggregators' ability to influence the size of those rates is small

Adoption motivations: Data security



Customers were giving aggregators access to the heart of their home, and they wanted assurances that this wouldn't leave them vulnerable to hackers

“ As they took control, the concern that I had was how good's their software? Potentially once you open up that channel, could they get hacked? Could they get hacked and someone just shut you down through that controller? Because I've given them open access to that controller. One of the things if the program tries to go wider, then what controls are in place? What firewalls, what security provisions are there to stop some hacker saying, "Bang, I'm going to shut everyone down, I'm going to cause disruption"?

- Recent data breaches had left customers increasingly aware of data safety and security
- Given the centrality of DER to a household's energy consumption, some customers wanted assurances that aggregators were protecting their DER access from unscrupulous third parties

Adoption motivations: Bundling



If offered as part of an attractive bundle of energy services, customers did not need to see the distinct value of a VPP to still join a VPP

“ We were just with our other retailer. Then [aggregator] contacted us and said, ‘This is what we do. We can do your electricity. We can do your gas bill.’ One of the thing that attracted me to [aggregator], it wasn’t the VPP that attracted me so much, but it was quite useful because they said that they could manage our electricity and our gas, and then if we had credit in the electricity account, they said, ‘You can use that credit in the electricity account to offset your gas bill.’”

- Many consumers are not deeply invested in energy technologies; they just want a service that ‘unlocks’ the use of electrical appliances and devices
- For this cohort of consumers, bundling VPPs into integrated energy offerings that provide them with a broad set of benefits could provide a way to drive the uptake of VPPs

Customer touchpoints: Sales teams



Customers appreciated sales teams that treated them with respect

“ I think it all stems back to the salesman that arrived here on day one. I was able to build great working rapport with him, and I don't know. I guess I've a believer of if you cooperate with people and you deal with people fairly, they will deal with you fairly. I got the sense that this was a company that did care. It just built trust.

- Sales reps that are seen as courteous, knowledgeable, and happy to answer questions lay a foundation for establishing trust in the aggregator.

Customer touchpoints: Sales teams



Customers appreciated sales teams that treated them with respect

“ Well, he didn't come to the house. Everything was estimated through drawing and only the [aggregator] people and the local company came and they look at the roof structure, they said, “No way can we put 13.5 kilowatt panels”. And when they both came and I go, “My goodness. Your quote is grossly inaccurate.” Because if they can only put seven, that's like 40% less. And why am I buying more panels that basically don't generate solar, right?”

- This respectful and personalised approach to selling was contrasted with experiences that some customers had had with sales reps from other energy companies, many of whom adopted a more transactional or non-personalised approach to the selling process

Customer touchpoints: Sales information



For some customers, joining a VPP was a leap of faith

“ I've always found that the rates that the people quote, the import/export, all that sort of stuff, it's just hard for people to understand it, so it's difficult to be able to comprehend the figures and things like that. Yeah. Look, to be honest, I didn't know what rate I was paying for the tariffs and all that sort of stuff, just – yeah, very confusing, it's just difficult.

- Many customers struggled to understand the charges and terminology used to describe the aggregator's product offering or else wanting (and failing to find) information that described the net financial implications of joining a VPP
- Due diligence activities (e.g., seeking information from independent third parties) helped address some of these informational requirements
- Nevertheless, joining a VPP was still seen by some as a leap of faith, particularly in terms of understanding the net financial implications

Customer touchpoints: Installation



Proactive communication and coordination were key to ensuring a positive installation experience

“ Very smooth, very informative, every step was explained very clearly. Everything was labelled properly, yeah, good confidence [in] installer.”

- If DER assets were purchased through the aggregator, customers expected the aggregator to:
 - Coordinate the third parties required to complete installation
 - Proactively keep them apprised of where the installation process was up to and what they needed to do next
- Installations that did not meet these expectations tended to be perceived negatively

Customer touchpoints: VPP activity (1)



There is a delicate balance in how much information customers wanted about the VPP trading 'black box'

“ What we do is we sort of leave it up to them. When we joined with them, they told us about the VPP, and they said that we could use an app to participate in the energy trading, or we could just leave it up to them and they'd do it for us. To be honest, I haven't got time to be sitting there, trading our electricity in half-an-hour blocks. I just said, 'You do it.' So I haven't really done any of that, I've relied on them to manage that side.

- While some customers were happy to manually control VPP activity, most preferred for this activity to be automated

Customer touchpoints: VPP activity (1)



There is a delicate balance in how much information customers wanted about the VPP trading 'black box'

“ So there's been a few times I've wondered whether I'm being controlled or not, whether it's saying, "No, we can't take in the grid", but I haven't had a definite moment yet where I've said, "They're controlling my system." I haven't found it yet. It's really had no impact on me that I've noticed.

- One consequence of the desire for automation was that VPP activity remained a 'black box' for many customers in that they were not always aware of when – or even if – active management of their DER asset was occurring
- The challenge for aggregators will be finding the right balance between facilitating automation and providing customers with the information they need to keep them appraised of how their DER asset is being used

Customer touchpoints: VPP activity (2)



Efforts to motivate additional export activity should pass a 'better off overall test'

- Customers were not averse to increasing their VPP trading, so long as they would be 'better off overall'
- To assess whether they would be better off overall, customers were looking for:
 - Greater certainty about the implications of additional VPP trading activity for energy self-consumption

“ Not really any potential downside, only that it needed to be managed in such a way that we're not exporting power to the grid and leaving our battery empty at night, then we have to rebuy it at, potentially, a higher price. So it's more about the management of exporting the power to the grid to ensure that we retain enough for our own use.

Customer touchpoints: VPP activity (2)



Efforts to motivate additional export activity should pass a 'better off overall test'

- Customers were not averse to increasing their VPP trading, so long as they would be 'better off overall'
- To assess whether they would be better off overall, customers were looking for:
 - Assurances that additional trading would not accelerate the depreciation of their DER asset

“ So longevity of the battery. How long it would do. The deep cycle of it, about where it empties, how many cycles you could get out of it. I suppose the efficiency level – how long that would last. A lot was towards longevity of the system. Because you're going to spend that kind of money. “Is this good for a season? Is it good for 10 seasons? Is it good for 20?” And certainly what I was getting was it was going to be long enough to – for us to get 10-15 years down the track and see what other – where we'd moved to then, as we're going to reassess where our battery systems are, or where we look at next.”

Customer touchpoints: VPP activity (3)



Highlighting regularly unused stored energy could motivate additional exporting activity

“ If I'm knowing that I didn't need the energy myself and then I was going to generate it the next day, yeah, I'd export. And if it was easier to figure out how to do the export. Or if I didn't need to do it manually or if I could set something on an app somewhere to say I can export 50% or 60%. That would be good.

- While customers wanted to ensure they had sufficient stored energy to meet their self-consumption requirements, they also didn't want any additional stored energy being consistently unused
- One means of motivating additional VPP activity may therefore be to:
 1. Highlight the amount of underutilised stored energy each household has
 2. Offer the account holder an opportunity to export this underutilised energy through a VPP

Customer touchpoints: VPP activity (4)



Additional VPP activity could be positioned as a form of philanthropy

“ Oh, if they notify me... look, let me donate 30% a day of your battery it's going to help these affected communities or flood affected, yeah, I'd be happy to do it.

- Customers indicated that they would be open to one-off or short-term requests for additional exports if the beneficiaries of those exports were vulnerable communities
- There were two provisos:
 - Customers don't want to be personally disadvantaged
 - Customers want to know the impact of this philanthropically focused activity

“ One of the ones that I do find easy to understand is the equivalent of taking so many cars off the road... Yeah, it's a bit tricky. Maybe it's about so many houses, your power will power enough – power 10 homes for six months or something... But I think it needs to be something that you can quantify that's not tonnes of greenhouse gases because no one knows what that looks like.

Customer touchpoints: Sharing VPP value (1)



Customers wanted to be treated by aggregators as a more equal partner in recognition of the value they were bringing to the relationship

“ I feel ripped off that we're only getting the 10c for it. That hasn't gone up, even with the cost prices going up. And I just feel it's – it doesn't sit well with me, the money we're getting back for it.

- Customers were often pleasantly surprised with the relational style of service they received from aggregators
- However, they were generally less impressed with the financial returns they were receiving, with many believing that they were putting more into their relationship with aggregators than they were receiving

Customer touchpoints: Sharing VPP value (1)



Customers wanted to be treated by aggregators as a more equal partner in recognition of the value they were bringing to the relationship

- Suggested means for developing a more equal partnership included:
 - Offering greater VPP financial returns to better recognise the upfront costs being borne by customers

“ The stored power should be – it should be a reasonable percentage of what we will pay for it... If we are going to be part of the actual system, which we should be, it needs to be worthwhile.

Customer touchpoints: Sharing VPP value (1)



Customers wanted to be treated by aggregators as a more equal partner in recognition of the value they were bringing to the relationship

- Suggested means for developing a more equal partnership included:
 - Providing greater support services, such as assisting with the ongoing maintenance of DER assets

“ They can come out and say, "Hey, we're going to look at it, inspect your system, make sure there's no updates we can do or recommend anything to you." And do that as a service then that comes with it. Because ultimately, they're the ones who are going to get benefit from it as well. And I think there has to be more of a cooperative [approach].”

Customer touchpoints: Sharing VPP value (2)



Customers wanted government to recognise the value of their exports by continuing to support DER acquisition and VPP development

“ There probably are grants that might be relevant on a state or federal government level that will possibly assist them in better developing that technology, and the truth is it does need to be developed better. So that's probably where I would sit it, I would sit it at the level of infrastructure spending in technology and development around the delivery of those services because it is a little clonky and flawed, and if they get the model right it can actually do a lot of social good, so yeah.

- Although customers were not looking for direct recognition from government for the value being generated through the VPP, they were keen for:
 - Existing rebates to be maintained, particularly given the large upfront costs associated with purchasing DER
 - Government to continue funding R&D into the systems underpinning VPPs

Customer touchpoints: VPP app



The value proposition for engaging in trading was often deemed insufficient to justify overcoming the associated learning curve

“ There are two sides to the application. One is to look at current generation on our side. I find that very easy. On the side of managing the exportation of power to the grid, I find that very confusing. I don't know - I have no idea what to do with it.

- Some customers spoke of their difficulty in understanding how the trading function worked within their VPP app

Customer touchpoints: VPP app



The value proposition for engaging in trading was often deemed insufficient to justify overcoming the associated learning curve

- An interesting tension was apparent, however:
 - At one level, customers highlighted how training or explanatory material would have been useful so that they had greater awareness for what the trading process entailed and how to engage with it

“ There could have been a document that they sent out. There was like an agreement letter that said, 'We will pay this feed-in credit, this feed-in credit', but that was sort of all. They didn't really explain the trading at all in documentation form, it was just what you saw through the app.

Customer touchpoints: VPP app



The value proposition for engaging in trading was often deemed insufficient to justify overcoming the associated learning curve

- An interesting tension was apparent, however:
 - At another level, customers indicated that the financial pay-off to overcoming this learning curve wasn't sufficient to do so, particularly against a backdrop of competing life priorities

“ I haven't been losing sleep over it. Honestly, I haven't followed up with them in order to do that. It's one of those things in the back of my mind, if I'm ever sitting around one day and I have nothing else to do, maybe I'll ask them. But to be honest, I just get carried away with day-to-day, with work, whatever, you just get side-tracked.”

Customer touchpoints: Customer evaluations (1)



Further management of' expectations about what DERs and VPPs can and cannot achieve may be required

- While customers were generally satisfied with their aggregator, several consistent gaps were identified between what customers expected and what they experienced:
 - Some customers had heightened expectations about what their battery could achieve or how it would interact with the VPP

“ If there's one issue I have, basically if there is a blackout, we do get blackouts here occasionally, and basically the battery only works the lights. It doesn't work the power. Obviously because – they say some devices use too much power to – and they can't function off the battery. Well, anyway but – that's something that's annoying when you have a lot of energy stored up and you can't use it, that's annoying.

Customer touchpoints: Customer evaluations (1)



Further management of' expectations about what DERs and VPPs can and cannot achieve may be required

- While customers were generally satisfied with their aggregator, several consistent gaps were identified between what customers expected and what they experienced:
 - Others hoped that joining a VPP would deliver greater direct benefits to their community

“ Again, I think from what I said there, was the idea of community – of people that didn't have solar panels being able to benefit from people who did have solar panels.... Yeah. Now, that wasn't the reality of what was happening. It was – yeah. But that, in my head, that's what I was hoping.... Because I don't think that people who – I was expecting them to get a direct benefit of it. And what was happening was it was just getting channelled back into the grid, but not at a reduced cost. Not – the 6c they were charging me; this was getting pulled in and passed out at full price to whoever needed it. And that's what – I would have loved to have seen.

Customer touchpoints: Customer evaluations (2)



Having a strong brand and maintaining expectations through strong, proactive interactions were key to building trust

“ If I had gone with some company that was just a fly-by-night company that was doing really cheap panels that had a poor reputation, but I went with them anyway because they were cheap, I don't think I'd participate in a program. I wouldn't give them control of my system.

- Aggregators are more likely to be able to build and maintain the trust of their customers if:
 - They have a strong brand based on a reputation for delivering good service
 - This brand positioning is:
 - Validated by independent third parties
 - Reinforced by personal experiences

**Next steps and further
information**

Next steps



Research soon to commence includes surveying energy aggregator customers to evaluate:

- Experiences to date
- Satisfaction with the aggregator
- Perceptions of information, notifications, and incentives received by the aggregator
- How to motivate enhanced exporting vs. self-consumption

Further information



Reports will continue to be made available via AEMO's Project EDGE news and knowledge sharing page:

<https://aemo.com.au/initiatives/major-programs/nem-distributed-energy-resources-der-program/der-demonstrations/project-edge/project-edge-news-and-knowledge-sharing>

If you have any queries about the research, please email me at j.newton@deakin.edu.au

Questions?

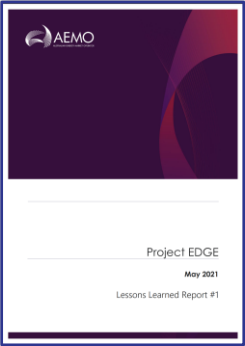
Project EDGE Publications



Knowledge Sharing Reports



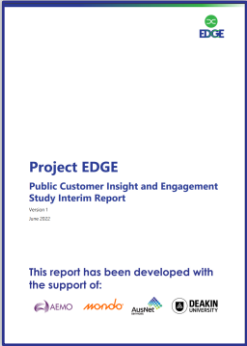
[Fact Sheet](#)



[Lessons Learned #1](#)



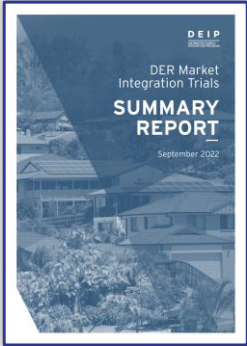
[Public Interim Report](#)



[Customer Insights Study](#)



[Customer Insights Literature Review](#)



[DEIP DER Market Integration Report](#)



[Community Perceptions of DER](#)

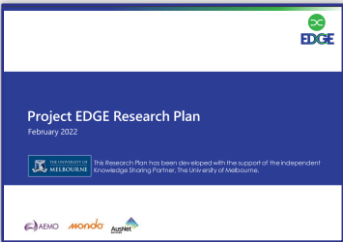


[Cost Benefit Analysis](#)

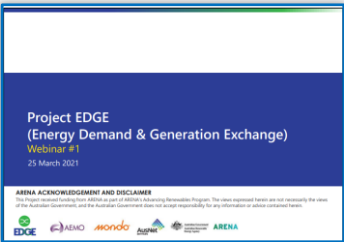


[Lesson Learnt #2](#)

Presentations & Webinars



[Research Plan](#)



[Webinar #1](#)



[Public Interim Report Webinar](#)

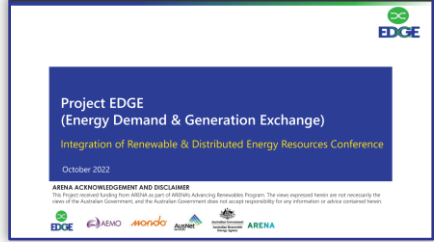
Conferences



[Energy Systems Integration Conference](#)



[DEIP Dive DER Market Integration Conference](#)

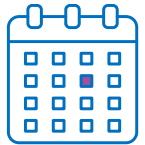


[Renewable and Distributed Resources International Conference](#)

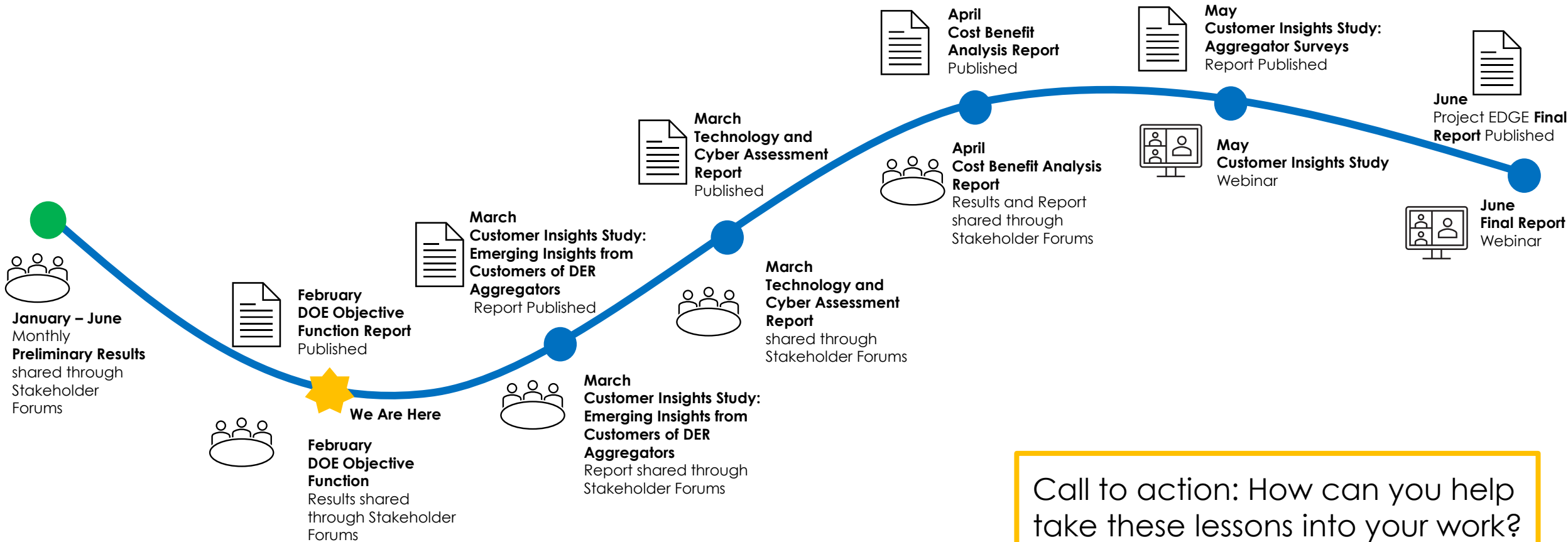
For further news and knowledge sharing publications, please visit the [Project EDGE website](#)

For any questions, comments or feedback please contact: EDGE@aemo.com.au

Project EDGE - 2023 Knowledge Sharing Roadmap



PROJECT EDGE Knowledge Sharing Calendar



Call to action: How can you help take these lessons into your work?

What have we achieved to date?

Project EDGE is an innovative, first of its kind trial demonstrating a proof-of-concept DER Marketplace to inform current and future reforms in line with Australia's Energy Security Board Post 2025 NEM initiatives.



EDGE



200+
Residential and Commercial & Industrial Customers



350+
DER assets including Rooftop Solar, Batteries, controlled Hot Water systems and other loads

Project EDGE brings together:

- Diverse mix of customers
- DER equipment,
- Manufacturers
- DER device control systems

EDGE includes Retailer and Non-Retailer Aggregator business models.



2MW+
Flexible capacity available



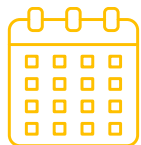
15+
Knowledge Sharing Reports and Presentations published on Project EDGE website:

- Project EDGE Research Plan
- Public Interim Report & Customer Insights Study with recorded webinars
- Cost Benefit Analysis Process and Methodology Report
- 2 Lessons Learnt Reports
- University of Melbourne Public Webinar



100+
formal engagements with stakeholders including:

- 3 monthly forums to support communication with key stakeholder groups
- 1-1 engagements with the ESB, AER, AEMC, and ENA
- Engagements with aggregators participating in the project
- Engagement to align activities with reform initiatives.



PROJECT ACTIVITIES:



INFORMING REFORM

- Current and past:
- Scheduled Lite
 - Integrating Energy Storage Systems
 - DEIP DOE WG
 - Dynamic Operating Envelopes (DOE)
 - Flexible Trading Arrangements
 - DER Data Exchange
 - DER Network Services

PRESENTATIONS

- Presented at the following Domestic and International conferences in 2022:
- Energy Systems Integration Group
 - Australian Renewable Energy Agency DEIP Dive
 - Association of Power Exchanges
 - International Conference of Renewable & Distributed Energy Resources