

Managing distributed energy resources on low-voltage networks

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Many of the challenges and opportunities associated with Australia's rapid uptake of solar PV and battery storage are playing out in the physical infrastructure of local distribution networks. This puts distribution network service providers (DNSPs) on the frontlines of managing the transition to a more distributed grid - a transition which is driven by an increasingly large cohort of self-interested prosumer homes & businesses.

Prosumers want to make the most of their resources on-site by boosting self-consumption, increasing energy self-reliance and maximising energy bill savings. They also expect to be compensated for their contributions to the grid. At the moment, their primary contribution is export of solar energy, but other opportunities to make more sophisticated contributions are opening up as new distributed energy resource (DER) management technologies emerge; these contributions include grid services like power quality management, and energy market participation.

DNSPs and integrated utilities, meanwhile, must manage DER uptake in the present while maintaining a forward-looking view about how to best engage with prosumers to maximise the contribution of their assets to the network as penetration levels grow. While 'blind' PV export limiting is currently one common approach, adoption of modern DER management solutions promises to bridge the gap between prosumer and utility to find shared value.

This presentation will cover the relationship between prosumers and DNSPs, looking at distribution network-level virtual power plants (VPPs) as a starting point for effectively integrating distributed energy resources (DERs) into the broader energy system. It will include examples from around Australia and from SwitchDin's project portfolio.

Key takeaways:

- 1) Distribution network service providers (DNSPs) and integrated utilities are at the forefront of the transition towards a more distributed energy system, playing a major role in how small-scale systems connect with and operate on the grid
- 2) There is potential for DNSPs & utilities use VPPs to manage generation and loads at zone & local transformer levels to maximise use of local generation and manage peak demand & power quality
- 3) Network-focussed VPPs can unlock value for DNSPs themselves and local residents/customers, while also acting as a cornerstone for DER participation in the broader energy system

Automated, real-time, network-level control

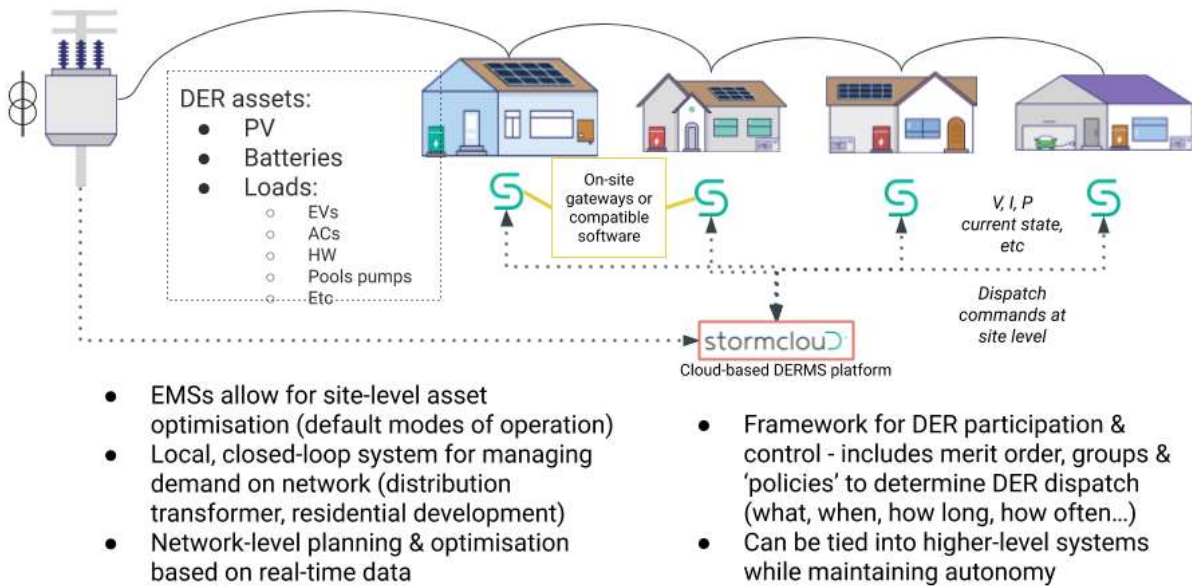
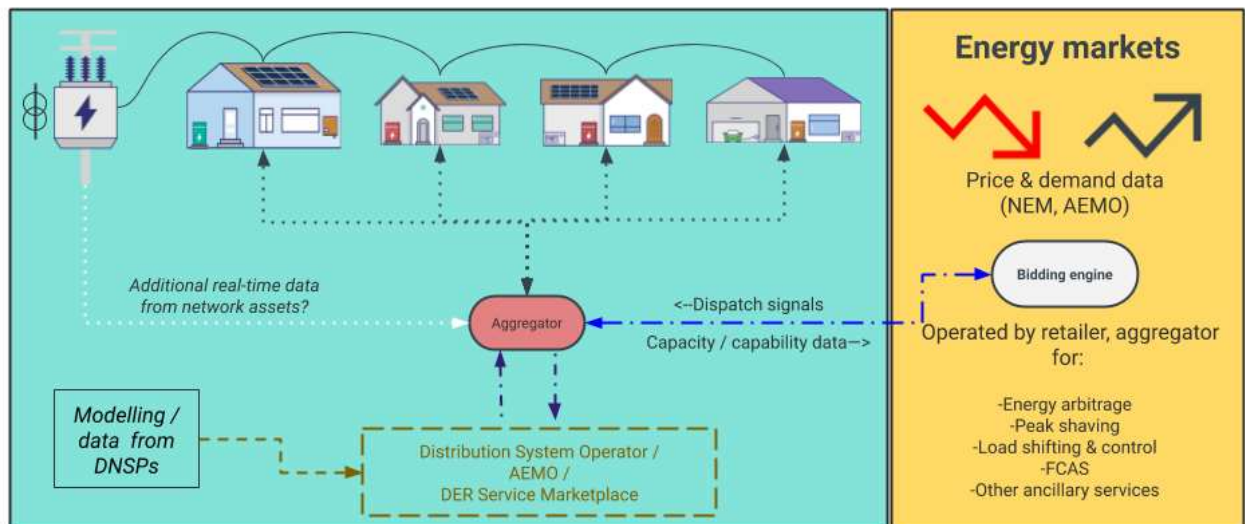


Figure 1. Automated, real-time control of DER on the low-voltage network level

Integrated VPP for networks & energy markets



VPP operation will be modulated in accordance with the needs of networks

Figure 2. Example diagram of a virtual power plant for a low-voltage network integrated with wholesale spot market for energy and other services

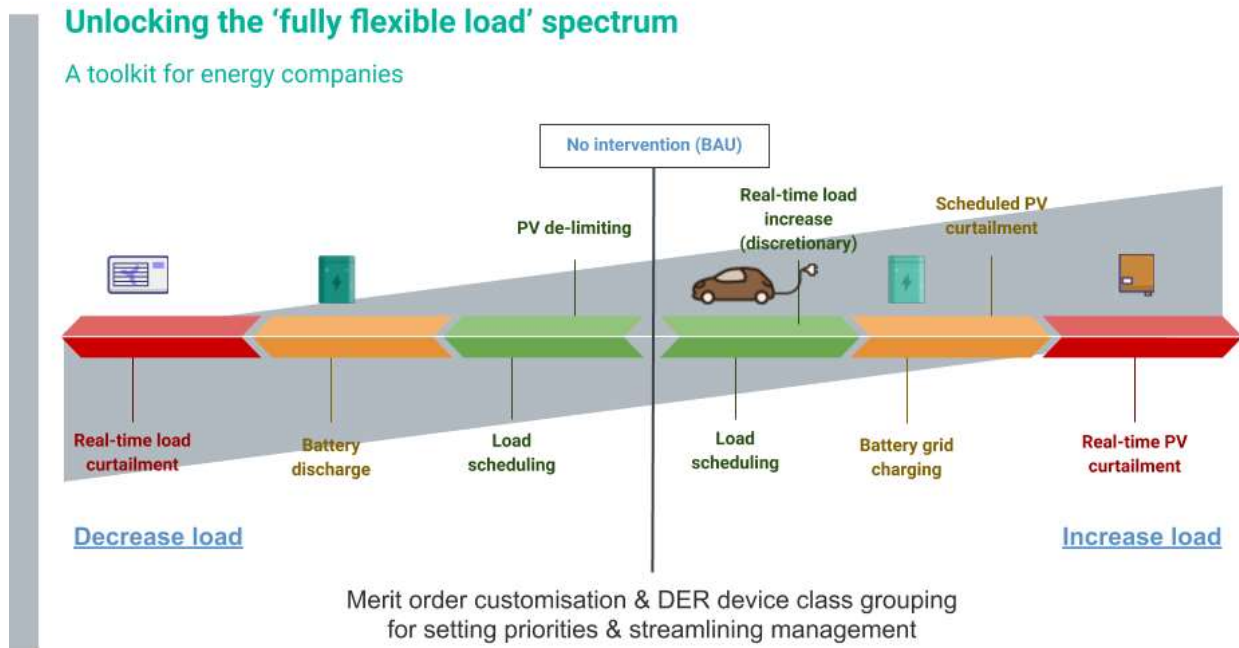


Figure 3. The spectrum of 'fully flexible loads' in DER management