“BOOT comes to households: has the sharing economy arrived in Australia’s electricity market?

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Professor Bruce Mountain

Victoria Energy Policy Centre

VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

Outline

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2. **Case study**
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Background

- Circa 3m homes with rooftop solar
- Installed capacity in <100 kW market: 15,700 MW
- Annual (residential and SME) rooftop PV production (2021) in the NEM ~ 18 TWh (about 100% more than large scale solar, ~ same as hydro, 50% more than gas and 30% less than wind)
- Annual solar self-consumption in typical solar home with 5kW (inverter) ~ 2 MWh
- Annual export in typical solar home with 5kW solar ~ 5 MWh
- Residential solar+battery bundles ~ 40k (voluntarily disclosed), total number of BTM batteries may be much higher ~ 120k (almost all likely paired with solar).

There are two “Build Own Operate Transfer” (BOOT) solar+battery bundles in the market today

- Nectr
  - 87.67 c/day (DMO 88c/day)
  - 25.63 cents/kWh (DMO 27.48 c/day)
  - 7 year fixed price
  - 6.6 kW PV (5 kW inverter)
  - Tier 1 9.8 kWh, 5 kW battery
  - Zero upfront, bundle transferred to customer at end of year 7.
  - “System price” (for early exit) = $12 775
- On
  - 73 c/day
  - 26.9 cents/kWh
  - 7 year fixed price
  - 5.6 kW PV (5 kW inverter)
  - 10.1 kWh, Alpha ESS
  - Zero upfront, bundle transferred to customer at end of year 7.
  - “System price” (for early exit) = $14,820

BOOT is one of several “VPP” battery-based residential retail offers

- Origin “Loop”: $3,500 battery subsidy + $240 credit for 5 years (customer to supply at least 5 kW PV, Origin will not discharge more than 200 kWh to the grid).
- Simply Energy: $20 per month for 2 years (plus discount on consumption rates).
- ShineHub: 45 c/kWh when battery discharges to the grid.
- sonnenConnect: stay with your existing retailer. Get $24 per month and $100 sign-on bonus.
- Tesla Energy (through Energy Locals): ???? Details impossible to find on website

An area of active exploration and discovery. Surely set to boom?

BOOT from the retailers' point of view

- Income:
  - Electricity sales at specified rates
  - Solar surplus feed-in to grid
  - Battery dispatch to the grid at peak period (when spot price > variable sales price) "VPP uplift"
- Expenditure
  - Equipment (scale economy in bulk purchase and installation)
  - Grid supply for self-supply short-fall

Nectr case study: a house in Sydney (excluding battery dispatch to the grid)

- PV production (6.6 kW PV with 5kW inverter): 8.4 MWh p.a.
- Own use (before and after solar): 6.7 MWh p.a.
- PV to house: 2.8 MWh p.a.
- PV to grid: 2.6 MWh p.a.
- PV to battery: 3 MWh p.a.
- Battery to house: 2.75 MWh p.a.
- Grid to house: 1.2 MWh p.a.
- Battery cycles 204 p.a.

Source: Spendwatt.com analysis (with thanks)

Do the numbers work for Nectr?

- House: 6.7 MWh @ 25.63 cents/kWh + 87.67 c/day = $2 055 p.a.

- Nectr:
  - Income:
    - $2 055 (from house) +
    - $130 PV feed-in (2.6 MWh @ $50/MWh)
    - Annual “VPP uplift” (don’t know how much yet)
  - Battery+solar ($12.775k) annuitised over 7 years at 8% p.a. = $2,453 p.a.
  - So, to get an 8% ROI, annual “VPP uplift” must = $2,453 - $2,185 ($2055+$130) = $269 p.a. (and assuming zero residual value in customer relationship at end of year 7)

What price and volume combination gets the required “VPP uplift?”

- Assume average price received when dispatched to the grid = $500/MWh
- Assume opportunity cost of replacement grid supply to household = $80/MWh
- Solve for volume of sale to market to get VPP uplift of $269 p.a.
  - So, V*(500-80)= 269 therefore V= 0.6 MWh p.a.
- Q: How many equivalent (full) battery cycles (at 10 kWh/cycle) is 0.6 MWh p.a.? A: 61
- Q: How many 5-minute trading intervals are needed? A: Can’t be sure but if all at average price of $500/MWh then 1,465 p.a. or 4 per day (20 minutes).
- *(Maximum possible income from 10kWh/5kW battery for dispatch to grid at Market Price Cap for 5 minutes is $6.25. So 43 5-minute intervals at Market Price Cap will be worth $269 per year.)*
- Q: Is this plausible? A: Yes, I think so. (c.f. Origin VPP deal - $3.5k battery discount and guaranteed credits of $240 p.a. for 5 years; AGL VPP credits of $180 +18c/kWh for feed-in; ShineHub 45 c/kWh for feed-in; Simply Energy $240 p.a.).

What might we conclude from this?

- Retailers' ability to achieve scale economy on equipment and installation and to arbitrage in wholesale market suggests the BOOT Solar+Battery offers we see in the market looks viable.
- Value to customer is astounding:
  - 7 year fixed price at discount to default offer;
  - Zero upfront and full ownership and control of battery+solar bundle after 7 years;
  - Super-simple.
- Will the model become more or less viable in future:

  + Battery and solar prices likely to reduce relative to grid prices;

  + V2G likely to enhance options further;

  + storage likely to become ever more valuable as fossils leave;

  - discriminatory NUoS export charges (but do they apply to exports from the battery to grid???).

What are the economic, strategic and policy implications?

- Solar+battery BOOT deals will surely find many customers. Battery-only deals (customer supplies the solar) also look attractive. Distributed battery with “VPP” (what a misnomer!!!) surely likely like to become a big part of market.
- The industry is decentralizing. Will it pick up pace?
- Network volumes decline greatly with addition of solar+battery (in our case study 6.8 MWh p.a. before solar to 4 MWh p.a. after solar to 1.2 MWh p.a. after battery+solar). Income to DNSP drops from ~ $680 p.a. to ~ $120 p.a. What happens to the shortfall? If it is to be recovered from solar+battery customer, NUoS would need to rise 6-fold and will kill the incentive to export and participate in VPP. Market will surely not tolerate this. So, how to adjust? Are networks headed for a future as essential but subsidised services (like buses, passenger trains & letter mail)?
- The line between supplier and customer is increasingly blurring. What does this mean for:
  - Regulatory arrangements: who needs to be protected from whom?
  - Market arrangements: how do customers and suppliers find each other?
  - How do planners, market operators, market participants, regulators, policy makers determine the aggregate volume of reliable distributed storage when they think about expansion of the central system ?

The sharing economy does seem to be coming to the electricity market. Will policy makers respond to the opportunity?