AER SAPN forum, 4 April 2019
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Summary of main points

1. **Objective** for today
- Interrogate SAPN's proposed 2020-25 spending related to challenges of DER transition
- Do that not by unpicking engineering assumptions + economic modelling but by locating its plans in context of other DBs & challenges of DER transition more generally

2. Background: we are building 2 way distribution networks for price of 1 and a bit
- $1000B investment by 2050 on whole system (NTR) versus $1B in DB DER investment at current rate
- Won't stay this cheap, & doesn't mean we shouldn't interrogate spending closely, but 2 way grid looks like absolute bargain

3. Current DER-related challenges
- Voltage spikes
  - Note other contributing factors e.g. aircon loads, also voltage inherently hard to keep stable on long skinny lines
- Thermal capacity limits reached in resi areas caused by high PV exports
  - Most or all zone substations will have net upstream flows by 2020
  - System-wide, net negative demand in middle of sunny days

4. **Coming DER-related challenges**
- VPPs discharging aggregated batteries into wholesale market in pm peaks to arbitrage value or charging them during peaks in prep for bad weather next day
- VPPs charging batteries when sudden storm forecast
- EVs charging in evenings
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5. **Current ways** to deal with voltage + capacity issues:
- Constrain PV installation capacity or export - "static limits"
- Transformer tap changes
  - Note in response to consumer complaints given no LV visibility
- Tariffs - solar sponge - especially controlled load hot water

6. LV management strategy for 2020-25
- 3 options for future (2020-25): curtailment (static limits), augmentation & dynamic management
- Other options identified but rejected
  - Allowing DER customers to purchase firm access at time of connection
  - Dynamic pricing for DER exports
  - Changing nominal voltage levels
- Modelling results: DDERM net benefit is $40M
- Equity implications - ie benefits to non-DER consumers: lower wholesale prices:
- Note cost reduction by building a scaled down template model relying on 10% of its network that could then be extrapolated.

7. Observations
- Dynamic DER management similar to UK ENA
- Also broadly similar to whats being trialled elsewhere in NEM
  - eg ISF/ARENA Networks Renewed project with Essential and AusNet
  - Smart inverters used to provide voltage + frequency control services

May be other ways of managing voltage + thermal capacity issues

- Technically - other networks - eg
  - "Rebalancing 3 phases"
  - "Dynamic Voltage Management (DVM) which uses smart automation at zone subs to raise and lower voltage according to need, using real-time data from smart meters."
- Or via demand management program
  - e.g. incentivising new solar on west facing rooves to not add to solar trough

8. **Spending breakdown**
- Can't be sure if $32M capex + $4M opex is prudent & efficient, but can say that
  - <1% of revenue to aid >1/3 resi customers directly + other 2/3 indirectly
  - Each category of expenditure is relevant to current & coming DER issues
  - Spending is in line with what other networks are proposing in next reg period
  - $36M out of total 2020-25 spending of $3.9B = <1%
- Counterfactual = probably static limits, creating equity issues (existing customers favoured over new ones)
- But: its a trial! Highly complex, hasn't been done before: might be delays
  - Consider stakeholder oversight group to monitor development and implementation of the DDREM

9. Questions
- How often throttled? "New solar customers would be able to export solar energy 97% of the time" - 10 days pa - all areas at all times or average across year and state; outliers?
- What happens if DER owners do not comply?
- What is to stop this is becoming more and more common? i.e. How long will DDERM work?
- Spending $36M will allow X? MW of PV/batteries to be connected or exported?
- When will it be fully operational?
- What happens when exports progressively drop below level acceptable to DER owners - eg every sunny summer day?

10. Stakeholder engagement
- Sector stakeholders: my 3 simple criteria for effective engagement
  - Inclusive
  - Informative
  - Responsive
- Wider public
  - DDERM favoured by consumers - Newgate research - high support for dynamic DER management even amongst vulnerable consumers