DS3

Distributed Storage and Solar Study

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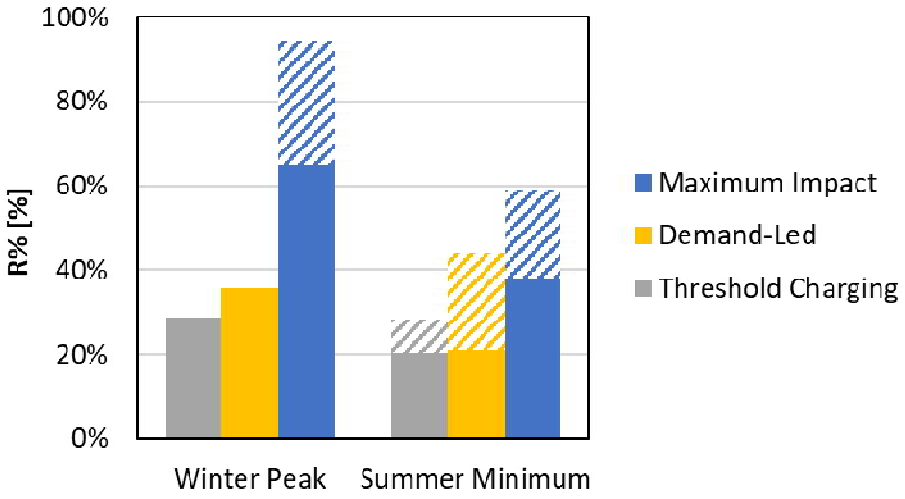
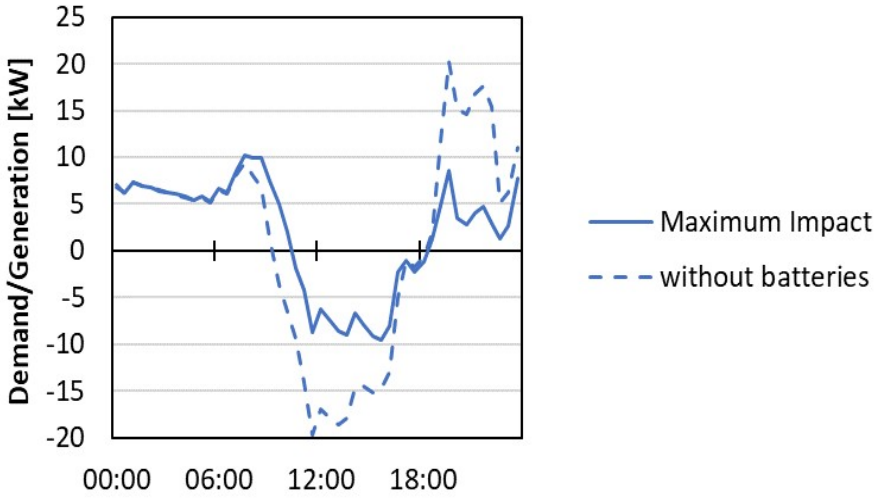
NORTHERN POWERGRID

DS3

Key Project Findings

Data Analysis – Reduction





Network – Benefits and learnings

- Average reduction in both generation and peak demand is achieved even when batteries are not controlled
- Battery storage can help flatten the substation demand
- Demand pattern has a strong impact on the achievable reductions
  - Low consumption may not discharge batteries resulting in high SoC the following day
- Charging/discharging level depends on the demand profile therefore threshold should be set accordingly
  - Reducing threshold from 200W to 100W increased battery activity by 33%
- Forcing the battery to charge/discharge achieves much greater results
- Recommendation to amend NPg policy

Community – Benefits and learnings

- Recruitment through tenant liaison officer tenants knew and trusted
- Important to have a familiar face as main point of contact
- Tenants were not tech savvy which made identifying and troubleshooting issues hard
- Size and aesthetics were important - small battery size fitted nicely in the outhouse and viewed out of the way
- Accurate and efficient data flows are necessary to accurately calculate savings
- Battery required broadband connection and tenants were happy to use their connection

Flexibility Services CBA

- Determine ceiling price and available compensation for flexibility services to resolve network constraints
- Reinforcement use cases based on RIIO-ED1 unit costs
- Compensation methodology based on conventional reinforcement costs
- Assumptions
  - Discount rate, asset life cycle, flex duration, service requirement (days, hours, capacity)

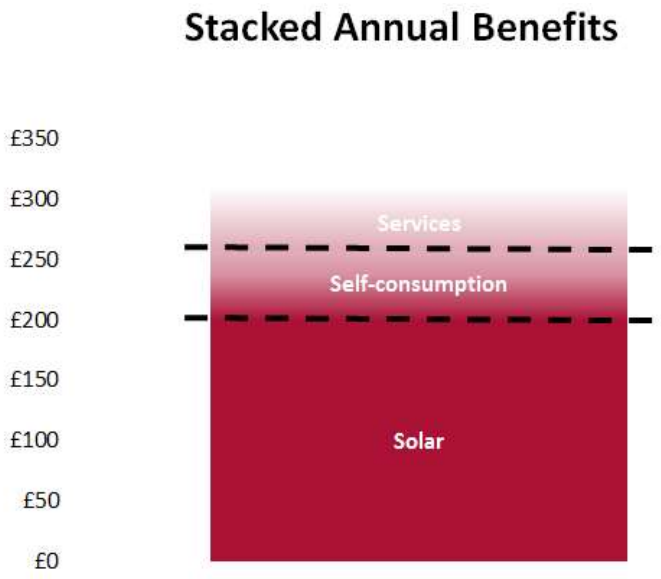
Compensation Methodology

- Avoiding reinforcement
  - Savings made by **avoiding** reinforcement
  - Calculate annual compensation* based on how long flexibility is needed for
- Deferring reinforcement
  - Savings incurred by **deferring** reinforcement (considers **future cash outflow**)
  - Calculate annual compensation* for deferral period
- kW/h rate based on max utilisation (243 days, 3 hours per day)
- **Deferring reinforcement rate < Avoiding reinforcement rate**

*Annual compensation = (Availability + Utilisation) * safety margin

Conclusion [1/2]

- Batteries can benefit both customers and network
  - **Threshold charging:**
    - Network benefits: **25%** average impact reduction
    - Customer benefits: self-consumption savings <£60 p.a.
  - **Maximum impact:**
    - Network benefits: **50%** average impact reduction
    - Customer benefits: self-consumption savings + services incentives > £60 p.a.



Conclusion [2/2]

- DNO benefit even when batteries operate at the discretion of the customer
  - Small upfront capital support could be viable to stimulate storage uptake in certain areas
- Batteries have a greater impact when controlled
- Annual compensation may be offered for service prevision to defer/avoid reinforcement
- Batteries could be a competitive alternative to reinforcement but revenue streams need to stack-up
- £/kW is lower for large scale batteries
- Deferring reinforcement rate << Avoiding reinforcement rate