Public

Trial of Small Aggregated Assets BMU in the Balancing Mechanism

Summary Report

Introduction

In June 2023, and in response to industry queries about operational metering requirements to enter units into the Balancing Mechanism (BM), the ESO invited providers to participate in a trial[1]. This trial allowed small scale, aggregated assets (SAA) to enter the BM through a derogation of the operational metering requirements. Octopus Energy entered part of its fleet of managed electric vehicles (EVs) into the Balancing Mechanism in September 2023. This trial is the first time that EVs/charge-points at domestic households have formally participated in the BM, allowing visibility and control of assets unfamiliar to NESO.

The trial explored the ability of this new flexibility source to meet the operational and technical parameters of the BM. The trial provided valuable insight into how EV charging at domestic properties can have a positive impact on NESO balancing activities. It should be noted that the benefits of enduring domestic EV participation in the BM are likely to be higher than those demonstrated by the trial. This is because increasing experience across providers will lead to improvements to forecasting and dispatch functionality.

Key Findings

Demand shifting and flexibility for NESO balancing services

1. Smart tariffs are already shifting flexible household demand in response to wholesale price signals, helping avoid increasing demand during typical peak demand periods and moving this into periods that typically can have a generation surplus.
2. The balancing benefits are improved when BM actions are stacked on top of the initial charging schedules incorporating wholesale market signals.
3. Both downward and upward flexibility was available from households on the flexible tariff across the evening period and throughout the night (17:00 - 07:00). With over 150,000

[1] https://www.nationalgrideso.com/document/282226/download

households now on the Intelligent Octopus Go tariff[2], this corresponds to 100s of MWs of flexibility that are available each night for residual balancing activities.

Technical characteristics of aggregated EVs

1. Octopus forecasted the expected consumption of the households (including EVs) at gate closure, the Final Physical Notification (FPN) of the unit, to an accuracy comparable with the top 10% performing Wind BMUs.
2. FPN accuracy can be significantly improved through using recent historic data as opposed to fixed demand profiles to forecast household load. The forecasting approaches used in the trial were basic and further improvements should be achievable.
3. The trial unit showed an average response time from EVs/charge-points within 2 minutes of receiving an instruction.
4. When responding to instructions, the aggregated unit changed its output to the desired level, averaging a 12% absolute error across all the instructions sent.
5. Active power measurements from domestic smart meters can be reliably reported, via a consumer access device, and used to create a real time aggregated signal for NESO balancing services. 97% of measurements during the trial period were received within the expected read frequency.

Key Trial Data

3MW registered capacity.

BM Metering Requirements: +/-1% accuracy and 1Hz – 1 second latency.
SAA Trial Relaxed Metering Standards: +/-2.5% accuracy and 0.1Hz – 10 second latency - at the individual MPAN with an aggregated feed at 1Hz.
All other requirements of the BM were met.

Conclusion

Analysis of results from the trial has shown that:

1. Domestic EV charging can support effective system balancing through demand shifting in response to price signals.
2. Domestic EVs can provide flexibility for real-time residual balancing.
3. Many of the technical requirements to enter the BM could be met by this new, flexible energy resource.

[2] https://octopus.energy/press/Intelligent-Octopus-Go-1GW/

Next Steps

Following this trial, NESO announced that up to 300MW deliverable capacity SAA BMUs would be able to participate in the BM with the following relaxed metering standards[3], concurrent with an independent review of those standards:

+/-2.5% accuracy and 1 refresh per 60 seconds at the individual asset, 1 refresh per second aggregated.

With respect to the Relaxed Metering Capacity (300MW), ongoing monitoring will consider:

1. Ongoing accuracy of Physical Notifications (PNs) and any changes with size of fleet /numbers of assets aggregated.
2. Accuracy of operational parameters (e.g. MEL/MIL, SEL/SIL) against power output.
3. Accuracy of response to bid/offer instructions, including ramping up/down and maintained response.

Alongside this, further work is required to align and articulate enduring requirements for small scale assets operating within an aggregated unit, these need to satisfy:

1. The fundamental operational requirements of the BM for system balancing.
2. Realisable standards for aggregated units and domestic hardware. This is being addressed through the Independent Operational Metering Review being conducted by DNV.
3. Registration processes for SAA BMUs, including details of the individual assets, how to update that list and assessing the deliverable capacity of BMUs comprising SAA.

This trial and the ongoing operation of Relaxed Metering Capacity SAA BMUs are helping to remove a barrier to accessing the BM. In turn, this supports increasing market flexibility and the drive for net zero.

For any queries please email: power.responsive@nationalenergyso.com

Glossary

MEL – Maximum Export Limit

MIL – Maximum Import Limit

SEL – Stable Export Limit

SIL – Stable Import Limit

[3] ESO to make change allowing up to 300MW of flexible assets into the Balancing Mechanism | National Energy System Operator (neso.energy)