Volume Capped: I-SEM Interactions for Battery Energy Storage Systems

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Background

The DS3 Volume Capped arrangements are being put in place to ensure the provision of high availability reserve services to the system. While the procurement process is technology neutral, the service requirements are expected to attract Battery Energy Storage Systems (BESS). However, the nature of this service provision means that interactions with the existing I-SEM arrangements may not be straight forward.

In particular, one feature of the arrangements is that the TSO is limited to dispatching the Providing Unit to 10 times per year. This limit excludes dispatches in response to or within 20 minutes of a frequency event. This limit was put in place following consultation with industry, who expressed concerns that regular cycling of BESS would have a detrimental impact on the lifetime of their asset.

Industry has requested additional information regarding how the limitation would operate in reality. This information note aims to give some clarity in that area, and looks at how batteries would be expected to behave in the ex-ante energy markets and Balancing Market under relevant scenarios.

Typical Operation

It is our expectation that, under typical operation, a contracted battery would not be active in the Day-ahead (DAM) or Intraday Markets (IDM). They would be expected therefore to have a Physical Notification (PN) position of 0 MW as they enter the Balancing Market.

The Providing Unit would be expected to bid into the Balancing Market in line with their TSC obligations. However a "Follow PN" rule would be put in place in the scheduling software to ensure that they are not scheduled to generate or consume differently to their PNs, and their scheduled generation would therefore be equal their PNs – i.e. it would be 0 MW if the Providing Unit submits a PN of 0 MW. This would be irrespective of their submitted bids. This should mean that the Providing Unit would be available to provide its full suite of contracted services. Any decisions taken to dispatch the Providing Unit differently to their PN would only be triggered manually by the system controllers, rather than economically through the schedule.

The use of this rule would need to be reflected in the TSO Balancing Market Principles Statement, rather than being under Trading and Settlement Code.

Responding to a Frequency Event

When an event occurs that leads to the system frequency going beyond the trigger frequency for that Providing Unit, the Providing Unit will automatically respond as per its defined response characteristic defined in Schedule 9 of its contract. The battery will be treated as per any other unit in the market. That is, for an automated response, they would be settled at the Imbalance Settlement Price only for energy generated (or consumed). There is the potential for Uninstructed Imbalance Charges in this case where the Providing Unit Metered Quantity is different to their Dispatch Quantity of 0 MW, however

the tolerance bands beyond which these charges apply are increased in line with frequency deviating from the nominal which would reduce the potential for these charges.

If the response is reflected through a Dispatch Instruction (DI), they would be settled at the better of their Bid Offer Price or the Imbalance Settlement Price for energy generated (or consumed) by the Providing Unit.

Responding to a Dispatch Instruction (not recharging)

When a Providing Unit generates or consumes energy at the request of the TSO, and this leads to its output diverging from its PN, this will be treated as a TSO action. The Providing Unit will have a Bid Offer Acceptance calculated for it in the normal way using the Providing Unit's Bid Offer Data. A manual process will be used to track how many of these dispatches away from the Providing Unit's PN fall outside of the 20 mins allowed for frequency events. Once the limit of 10 is breached, the controllers will be instructed not to deviate from the PN for this Providing Unit except within 20 mins of a frequency event, unless some arrangement is agreed between the TSO and Providing Unit.

Recharging following an under-frequency event

If a Providing Unit recharges by completion of the first trading period ending 8 hours after a frequency event, it will not see a reduction in its Availability Performance Scalar for its unavailability during that 8-hour period. In order to recharge, we would expect Providing Units to purchase energy through the normal market mechanisms, i.e. by bidding to purchase power in the ex-ante energy markets and reflecting this as a PN to the TSO. If the Providing Unit does not intend to participate in the ex-ante markets, it would not be able to rely on its Bid Offer Data being accepted in the Balancing Market due to the "Follow PN" rule.

Once a Providing Unit has a PN for a negative volume of energy (i.e. for recharging), the TSO will then typically issue a DI to reflect this due to the "Follow PN" rule in the schedule. If for some reason the TSO does not issue this DI (e.g. system security) then the Availability Performance Scalar calculation for the Providing Unit will reflect this.

Draining following an over-frequency event

We do not anticipate that responding to over-frequency events will have a major impact on a Providing Unit's ability to provide system services due to the small volumes of energy involved. Also, as under-frequency events are anticipated to be more common than over-frequency, it is likely that the battery will be drained by responding to such an event in between over-frequency events. However, we expect the approach described above for recharging would also work for draining after the battery has consumed energy in response to an over-frequency event.

Capacity Market Obligations

We note that battery units have the ability to use a DECTOL parameter value to derate themselves to zero in the Capacity Market auction, effectively removing their obligations. Should a unit wish to take on obligations, they have the option to remove the 10 dispatch limit from their contract. If they do this, they will be treated like any other normal Balancing Market unit and the "Follow PN" rule will not be implemented for the unit in the schedule. Apart from this, we do not intend on creating specific arrangements for units with Capacity Market Obligations – these obligations are taken solely at the unit's risk

Uninstructed Imbalances

We note that some Providing Units may choose to recharge without having traded the energy in the ex-ante market, or without having a dispatch instruction from the TSOs to do so. This would lead to imbalances against their traded position and/or uninstructed imbalances against their dispatch position. Providing Units do so at their own risk, and should such behaviours prove to be problematic from a system security perspective, the TSO reserves the right to remedy this.

Review of Implementation

If for some reason the approach above leads to unforeseen and undesirable effects on the Providing Unit, the market, or the system, or leads to situation where the Providing Unit cannot meet its contractual obligations or otherwise goes against the decision and principles set by the SEMC for these arrangements, the TSOs will engage with the contracted parties in order to come up with an alternative approach.