



Scenario - MDVO/B & SoC without DFR [1]

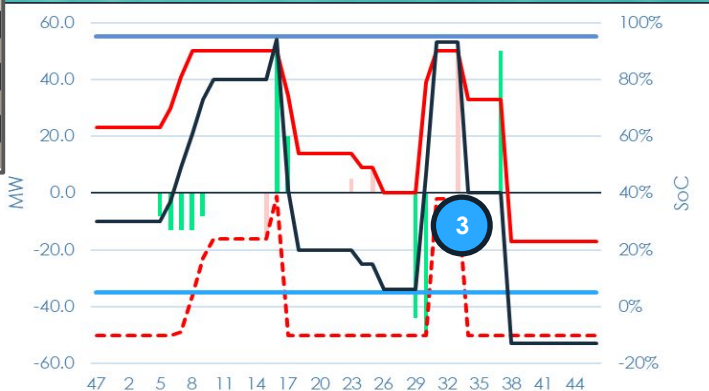
Non-Time Varying



Time	SoC (%)	MIL (MW)	MEL (MW)	MDVB (MWh)	MDVO (MWh)
15:00	93%	-2	50		
15:30	93%	-2	50		
16:00	93%	-2	50	-1.08	41.80
16:30	93%	-2	50		
17:00	93%	-2	50		
17:30	93%	-2	50		
18:00	93%	-2	50		
18:30	40%	-50	33		
19:00	40%	-50	33		
19:30	40%	-50	33		
20:00	40%	-50	33		
20:30	40%	-50	33		
21:00	40%	-50	33		

- [1] Example 50MW, 50MWh storage facility, with warranted limits on operation at the SoC extremes, & 88% round trip efficiency. Assumed power curve to be linear across full SoC range.
- Determination of useable/tradeable energy from SoC alone, therefore requires assumptions to be made on all of the above.

Site:	AG-GC0166 BESS
MW	MWh
50	50
Min SoC	Max SoC
5%	95%
Imp_eff	Exp_eff
93%	95%



Time	SoC (%)	MIL (MW)	MEL (MW)	MDVB (MWh)	MDVO (MWh)
15:00	93%	-2	50		
15:30	93%	-2	50		
16:00	93%	-2	50	-1.08	41.80
16:30	40%	-50	33		
17:00	40%	-50	33		
17:30	40%	-50	33		
18:00	40%	-50	33		
18:30	-13%	-50	-17		
19:00	-13%	-50	-17		
19:30	-13%	-50	-17		
20:00	-13%	-50	-17		
20:30	-13%	-50	-17		
21:00	-13%	-50	-17		

Scenario

- Time now: 16:00
- [2] SCADA reporting 93% full
 - MDVO: 41.8MWh
 - MDVB: -1.08MWh
- Planned 50MW export at 18:00
- [3] Receive 50MW 30min offerside acceptance (16:00-16:30)
- Modelled SoC at 16:30: 40%
- MDVO unchanged until it is redeclared post instruction
- [4] MEL here based on 30min rule. Only indication that there is a future SoC violation



Scenario - MDVO/B & SoC without DFR [2]

Time Varying



Time	SoC (%)	MIL (MW)	MEL (MW)	MDVB (MWh)	MDVO (MWh)
15:30	93%	-2	50		
16:00	93%	-2	50	-1.08	41.80
16:30	93%	-2	50	-1.08	41.80
17:00	93%	-2	50	-1.08	41.80
17:30	93%	-2	50	-1.08	41.80
18:00	93%	-2	50	-1.08	41.80
18:30	40%	-50	33	-29.73	16.63
19:00	40%	-50	33	-29.73	16.63
19:30	40%	-50	33	-29.73	16.63
20:00	40%	-50	33	-29.73	16.63
20:30	40%	-50	33	-29.73	16.63
21:00	40%	-50	33	-29.73	16.63

Scenario - as per [1]

- [1] Receipt of 50MW 30min offside acceptance (15:30-16:00) updates future MDVO/B values
- In the absence of any further instructions MDVO/B stays static until next scheduled action (50MW export at 18:00) & shows to NGENO there is a future SoC violation
- Implies export PN will need to be adjusted down [or benefit from bidders acceptance in the BM]
- Needs acceptance that only the most recent MDVO/B value is seen to be firm (and representative of the storage facility's actual usable export/import capacity) and any subsequent value indicative
 - As otherwise at Gate Closure, site could be interpreted as showing 75MWh of export availability [when in reality it has 41.8MWh]

Site:	AG-GC0166 BESS
MW	MWh
50	50
Min SoC	Max SoC
5%	95%
Imp_eff	Exp_eff
93%	95%



Time	SoC (%)	MIL (MW)	MEL (MW)	MDVB (MWh)	MDVO (MWh)
15:00	93%	-2	50		
15:30	93%	-2	50		
16:00	93%	-2	50	-1.08	41.80
16:30	40%	-50	33	-29.73	16.63
17:00	40%	-50	33	-29.73	16.63
17:30	40%	-50	33	-29.73	16.63
18:00	40%	-50	33	-29.73	16.63
18:30	-13%	-50	-17	-58.38	-8.55
19:00	-13%	-50	-17	-58.38	-8.55
19:30	-13%	-50	-17	-58.38	-8.55
20:00	-13%	-50	-17	-58.38	-8.55
20:30	-13%	-50	-17	-58.38	-8.55
21:00	-13%	-50	-17	-58.38	-8.55



Scenario - MDVO/B & SoC with Partial Outage

Time Varying



Time	SoC (%)	MIL (MW)	MEL (MW)	MDVB (MWh)	MDVO (MWh)
15:30	93%	-2	50		
16:00	93%	-2	50	-1.08	41.80
16:30	93%	-2	50	-1.08	41.80
17:00	93%	-2	50	-1.08	41.80
17:30	93%	-2	50	-1.08	41.80
18:00	93%	-2	50	-1.08	41.80
18:30	40%	-50	33	-29.73	16.63
19:00	40%	-50	33	-29.73	16.63
19:30	40%	-50	33	-29.73	16.63
20:00	40%	-50	33	-29.73	16.63
20:30	40%	-50	33	-29.73	16.63
21:00	40%	-50	33	-29.73	16.63

Scenario

- Time now: 16:00
- Planned 50MW export at 18:00 as before
- [1] Half the available power & capacity is made unavailable [Forced outage]
- SCADA stays reporting 93% full [assumes for BESS that all subunits are well balanced]
- [2] MEL/MIL & MDVO/B all change though in response to the drop in availability
 - MDVO: 41.8 → 20.9MWh
 - MDVB: -1.08 → -0.54MWh
- [3] Future position can no longer be physically met. Depending on nature of issue & time to delivery. Position would be retraded / PN adjusted down.
- NGESO only gains an awareness of impact of planned outages though a time varying signal.



Time	SoC (%)	MIL (MW)	MEL (MW)	MDVB (MWh)	MDVO (MWh)
15:30	93%	-2	50	-1.08	41.80
16:00	93%	-1	25	-0.54	20.90
16:30	93%	-1	25	-0.54	20.90
17:00	93%	-1	25	-0.54	20.90
17:30	93%	-1	25	-0.54	20.90
18:00	93%	-1	25	-0.54	20.90
18:30	12%	-25	-8	-28.92	-4.04
19:00	12%	-25	-8	-28.92	-4.04
19:30	12%	-25	-8	-28.92	-4.04
20:00	12%	-25	-8	-28.92	-4.04
20:30	12%	-25	-8	-28.92	-4.04
21:00	12%	-25	-8	-28.92	-4.04