ISG209/03 – DE MINIMIS ACCEPTANCE THRESHOLD (DMAT) REVIEW

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Summary

The De Minimis Acceptance Threshold (DMAT) is a pricing parameter, used to identify and remove balancing actions with a volume smaller than a set value, from the Energy Imbalance Price calculation. DMAT is reviewed from time to time in accordance with the BSC, and has remained at 1MWh since it was introduction in 2001.

This initial review suggests that that DMAT needs to remain as a non-zero parameter, and that the current level of 1MWh may be too high. ELEXON will bring a recommended DMAT to the next ISG, along with questions for a joint consultation on DMAT and CADL, after further analysis of Settlement data.

The Imbalance Settlement Group (ISG) is invited to note the content of the analysis, and offer their views on a potential change to the DMAT value.

1. Background information

1.1 The De Minimis Acceptance Threshold (DMAT) removes balancing actions smaller than a set value, currently 1MWh, from the Energy Imbalance Price calculation. DMAT has been subject to seven parameter reviews since its implementation, with each review resulting in no change from 1MWh.

1.2 The parameter was introduced in 2001 following the implementation of BSC Modification P10 'Eliminating Imbalance Price Spikes Caused By Truncating Effects'. This was an urgent modification raised to deal with rounding errors between the Transmission Company and Settlement Administration Agent (SAA) systems, which were causing spurious Bid Offer Acceptances (BOAs) and had resulted in price spikes.

1.3 Data passed to settlement is specified to the nearest minute, and as a whole number of megawatts. Spurious BOAs can still occur when BOA instructions coincide with the ramping up or down of a BMU. **Figure 1** illustrates how this can occur for an example BOA. The figure shows the Bid Offer Pairs (BOP) above (BOP+1) and below (BOP-1) the Final Physical Notification (FPN).

1.4 In this example, the System Operator instructs the BMU to remain at 673MW at 08:08 by a BOA. Settlement Systems

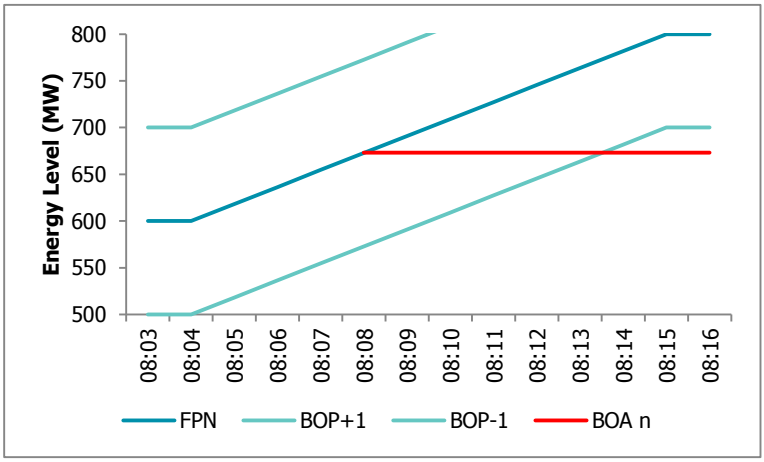

Figure 1: Example BOA instruction during a BMU ramping up

calculate the FPN at 08:08 as 672.72MW. This is calculated by linear interpolation between the two instructed levels at 08:04 and 08:15. There is a positive 0.27MW difference between the BOA and FPN at 08:08 this difference results in a spurious Offer of 0.005MWh.

1.5 Spurious BOAs produced because of the level of granularity of Settlement Systems will naturally have a small volume. A difference of 1MW between an FPN and a BOA for a minute would result in an erroneous volume of 0.017MWh.

1.6 As no rounding of acceptance volumes takes place during the price calculation, this suggests that a non-zero DMAT is a sensible precaution.

1.7 In November 2009, BSC Modification P217 'Revised Tagging Process and Calculation of Cash Out Prices' was implemented, which altered the application of DMAT. Prior to the Modification, DMAT was only applied to BOAs. P217A introduced disaggregated Balancing Services Adjustment Data (BSAD), known as Balancing Services Adjustment Actions (BSAAs) into the calculation of the Energy Imbalance Price. The modification detailed that BSAAs should be subjected to the same flagging and tagging rules as BOAs.

1.8 Modification P217 also changed the impact of small acceptance volumes. At classification, the price of First-Stage Flagged actions are compared to the most expensive unflagged action, and are unflagged if less expensive. As this calculation step occurs after DMAT Tagging, small potentially erroneous volumes cannot be the most expensive unflagged action. Without DMAT Tagging, a very small spurious acceptance volume could change the merit order of the pricing stack, and therefore the Replacement Price used to reprice flagged actions.

2. Future changes that may impact DMAT

2.1 BSC Modification P344 'Project TERRE' was approved in August 2018, and will mean that TERRE providers will be able to participate in the Balancing Mechanism (BM) with Secondary BMUs. This change will allow smaller BSC Parties to participate in the BM. This may lead to BOAs with smaller volumes being chosen for energy balancing.

2.2 In November 2018, the Price Average Reference (PAR) will reduce to 1MWh with the implementation of the second phase of BSC Modification P305 'Electricity Balancing Significant Code Review Developments'. The impact of a zero DMAT, and a non-zero DMAT less than 1MWh, is analysed in section four.

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3. Analysis of tagged actions

3.1 Analysis covers the period 1 August 2014 to 31 July 2018. For each year, the assessed period runs from August to July.

3.2 **Graph 1, 2** and **3** compare the historic volumes and numbers of BOAs and BSAAs.

3.3 **Graph 1** shows that the percentage of BSAA volume removed by DMAT Tagging has increased, from 0.0003% of volume in 2014/15 to 0.24% in 2017/18.

3.4 The highest percentage of BSAA removed occurred in 2017/18, when 9.92% of BSAA were removed. 13.06% of all BSAA were DMAT Tagged during February 2018.

3.5 The percentage of BOA volume removed has remained between 0.07% and 0.10% between 2014/15 and 2017/18. While the percentage of BOA actions removed has decreased from 7.27% in 2014/15 to 4.60% in 2017/18.

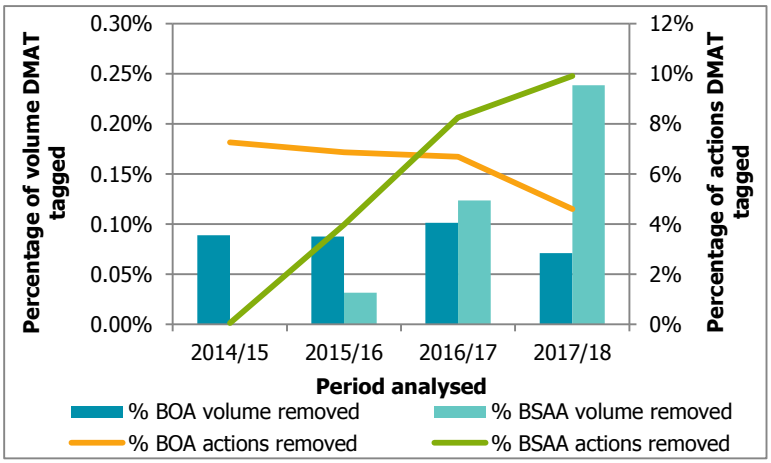
3.6 **Graph 2** shows the number and average absolute volume of DMAT tagged actions in each year.

3.7 The number of DMAT tagged BOAs has reduced year on year over the review period, and are 39.81% less in 2017/18 than in 2014/15.

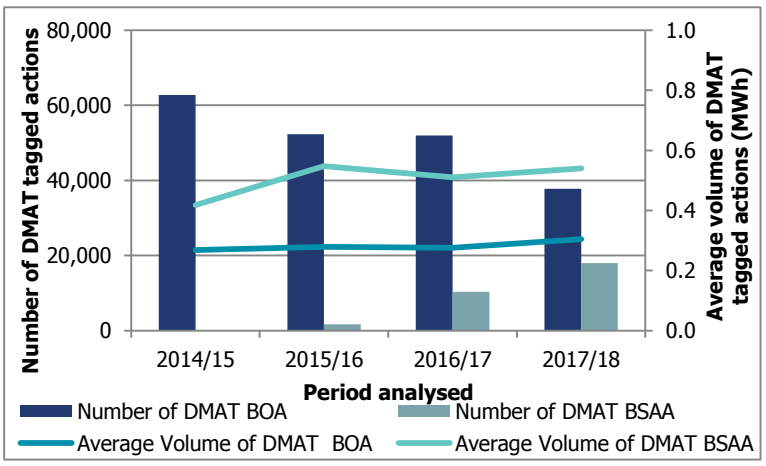
3.8 DMAT tagging removed 17,960 BSAA actions in 2017/18, compared to 23 BSAA in 2014/15.

3.9 **Graph 2** can be compared with **graph 3,** which shows that over the same period the number of BSAA utilised has increased from 40,702 in 2014/15 to 181,066 in 2017/18.

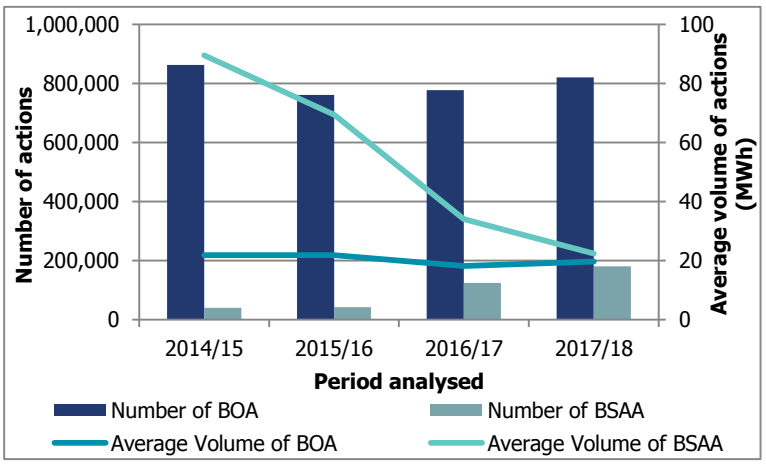
3.10 The average absolute volume of a BSAA has decreased from 90MWh to 22MWh. This shows a change in how BSAA has been utilised and aggregated since the last review.



Graph 1: Percentage of BOA and BSAA volumes and actions removed



Graph 2: Number and average volume of DMAT tagged BOA and BSAA



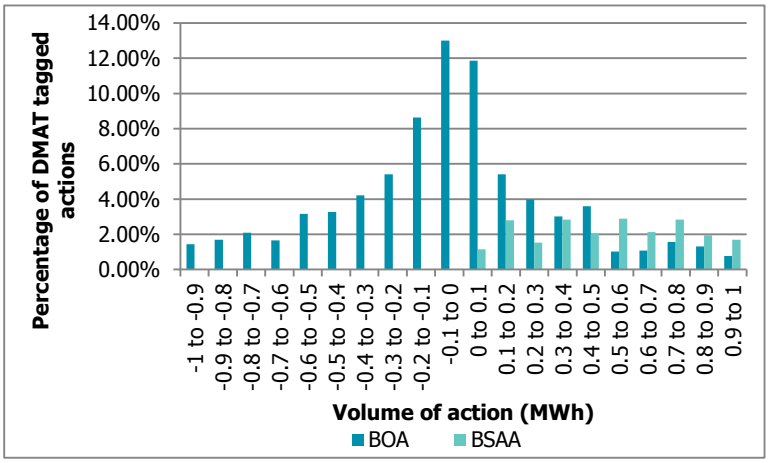
Graph 3: Number and average volume of BOA and BSAA

3.11 The number of BOAs utilised has decreased by 0.05%, and the average volume of a utilised BOA has reduced by 9.98% (from 22MWh in 2014/15 to 20MWh in 2017/18).

3.12 The average absolute volume of a DMAT tagged BOA over the entire period is 0.28MWh. The average of volume of a DMAT tagged BSAA for the same period was 0.53MWh.

3.13 **Graph 4** shows the distribution of volumes of DMAT tagged actions between August 2016 and July 2018. August 2014 to July 2016 has not been included in this graph due to the change in volumes of DMAT tagged BSAA shown in **graphs 2** and **3** above.

3.14 The graph shows that 26% of all DMAT tagged actions had a volume between -0.1MWh and 0.1MWh.



Graph 4: Percentage of DMAT tagged actions by volume of action between August 2016 and July 2018

3.15 Over the period, 78% of tagged actions were BOAs. The distribution of DMAT tagged BOAs has a degree of symetrey with 57% less than zero and 43% greater than zero. In contrast 99.9% of tagged BSAA are greater than 0MWh.

3.16 **Graph 4** also shows that, on average, 2.2% of all DMAT tagged actions are BSAAs in each category greater than 0MWh. The difference in distributions implies that the Settlement System issue that causes erroneous BOAs is different to any issue that might cause erroneous BSAA.

3.17 The analysis presented in these four graphs shows that over the period analysed, there are distinct differences in how BSAAs and BOAs have been utilised, and the volumes and number of these actions that have been DMAT tagged.

4. Impact on Imbalance Prices

4.1 Scenarios where DMAT is 0.5MWh and 0MWh have been compared against the live and November 2018 Imbalance Price calculations (for period August 2016 to July 2018). Neither 0MWh nor 0.5MWh are suggested values for DMAT; they have been assessed to show how a zero and a non-zero DMAT less than 1MWh changes the Imbalance Price calculation.

4.2 The Price Average Reference (PAR) is currently 50MWh and the Value of Lost Load (VoLL) is £3,000/MWh. The PAR will reduce to 1MWh, and the VoLL increase to £6,000/MWh, on 1 November 2018 when the second phase of BSC Modification P305 'Electricity Balancing Significant Code Review Developments' is implemented.

4.3 The Imbalance Price calculations have been run between August 2016 and July 2018 for the following scenarios:

Scenario 1 DMAT = 1MWh, PAR = 50MWh, VoLL = £3,000/MWh (Live)

Scenario 2 DMAT = 1MWh, PAR = 1MWh, VoLL = £6,000/MWh (post 1 November 2018)

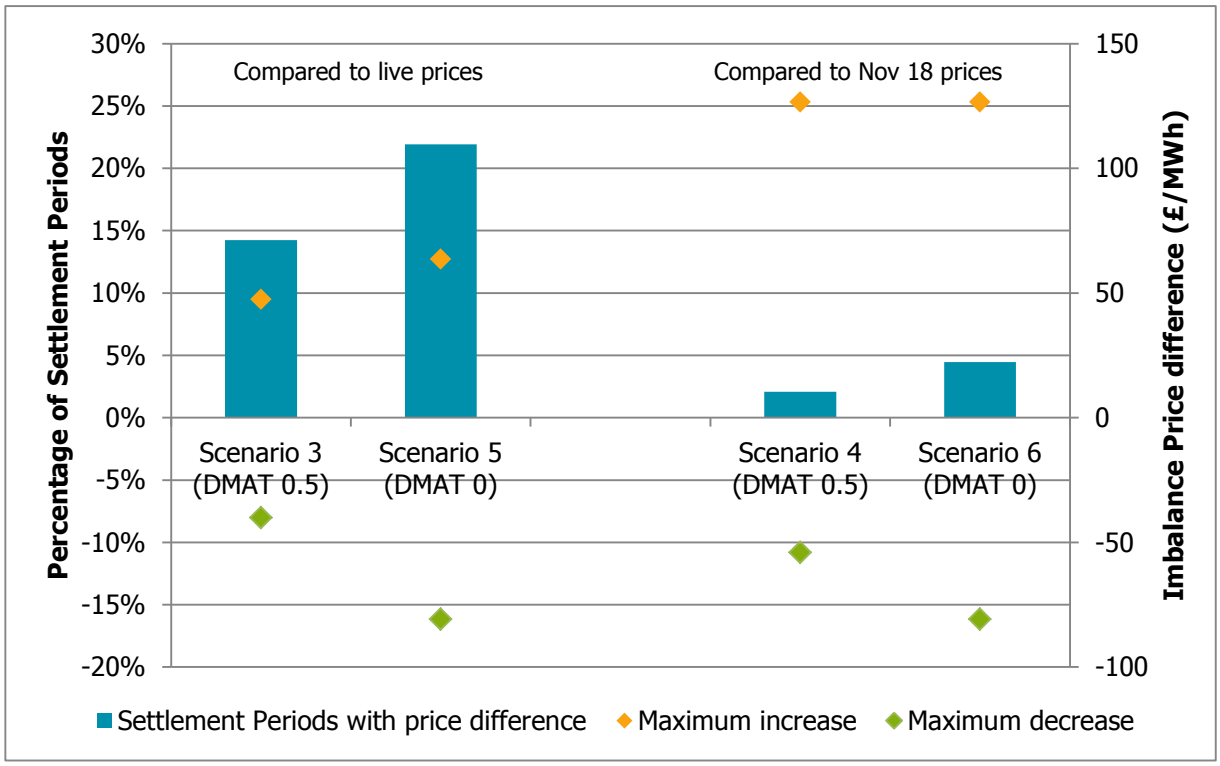
Scenario 3 DMAT = 0.5MWh, PAR = 50MWh, VoLL = £3,000/MWh (Live, with DMAT = 0.5MWh)

Scenario 4 DMAT = 0.5MWh, PAR = 1MWh, VoLL = £6,000/MWh (post 1 November 2018, with DMAT = 0.5MWh)

Scenario 5 DMAT = 0MWh, PAR = 50MWh, VoLL = £3,000/MWh (Live, with DMAT = 0MWh)

Scenario 6 DMAT = 0MWh, PAR = 1MWh, VoLL = £6,000/MWh (post 1 November 2018, with DMAT = 0MWh)

4.4 In **graph 5,** the prices from scenarios 3 and 5 have been compared to scenario 1 to show the effect of DMAT on the live PAR and VoLL scenario; scenarios 4 and 6 compare to scenario 2 to show the effect of DMAT on the November 2018 PAR and VoLL scenario.



Graph 5: Comparison of Imbalance Prices, by scenario

4.5 There are more Settlement Periods with price changes in scenarios 3 and 5 (live PAR and VoLL) than in scenario 4 and 5 (November 2018 PAR and VoLL).

4.6 The Imbalance Price would change in 22% of Settlement Periods if DMAT = 0MWh (scenario 5) compared to scenario 1. The maximum change in price would be a decrease of £80.76/MWh (17 August 2017, Settlement Period 30). This change occurred because of a 0.101MWh BOA becoming the most expensive unflagged action, and subsequently contributing to the Replacement Price. Under scenario 1 the price would have been £30.76/MWh and under scenario 5 the price was -£50/MWh.

4.7 Comparing scenario 6 to scenario 2, the price changed in 4% of Settlement Periods. The maximum change in price for both scenario 4 and 6 was £126.59 on 24 May 2018, Settlement Period 30. Under scenario 2, the Imbalance Price would have been £62/MWh; this increased under scenario 4 and 6 to £188.59/MWh. This change was due to a 0.917MWh BSAA priced at £199.92/MWh setting the PAR, where. Under a 50MWh PAR the inclusion of this action would have a smaller impact on prices.

4.8 A DMAT of 0.5MWh would cause the system length to change direction in 30 Settlement Periods (0.09%). Removing DMAT entirely would cause the system to change length in 46 Settlement Periods (0.13%).

4.9 In the November 2018 scenario, where scenarios 4 and 6 are compared to scenario 2, the Imbalance Price changes in a lower percentage of Settlement Periods. However, where a price change does occur, the average absolute change in price is greater (see **table 1**).

4.10 Where a price change occurs for both scenarios 3 and 5 the absolute difference is on average £0.49/MWh and £0.84/MWh. For scenarios 4 and 6 where a price change occurs the absolute difference is on average £4.16/MWh and £4.82/MWh.

	Average absolute price change (£/MWh)	
	Scenario 1 (PAR 50, DMAT 1)	Scenario 2 (PAR 1, DMAT 1)
Scenario 3 (PAR 50, DMAT 0.5)	0.49	
Scenario 4 (PAR 1, DMAT 0.5)		4.16
Scenario 5 (PAR 50, DMAT 0)	0.84	
Scenario 6 (PAR 1, DMAT 0)		4.82

Table 1: Average absolute difference in Imbalance Price between scenarios, where a price difference occurs.

4.11 This indicates that the Imbalance Price may not be indicative of the marginal price of balancing actions when small energy balancing volumes are excluded from the calculation.

5. Next steps

5.1 Our initial analysis suggests that a DMAT of 1MWh may no longer be appropriate. This is due to the value of PAR decreasing, changes in volume and number of DMAT Tagged BSAA, and the potential for smaller genuine balancing volumes in the BM.

5.2 We will conduct further analysis, assessing the impact of various non-zero DMAT values. We invite you to provide comments on the analysis included in this paper, and any industry changes that could impact the value of DMAT.

5.2.1 We will return to the ISG next month (October 2018) with further analysis, and will present a joint paper covering potential changes to both DMAT and CADL values. Any recommendations agreed by the ISG will be sent to the industry for consultation, and present the consultation questions to the ISG for review/comment.

6. Recommendations

6.1 We invite you to:

a) **NOTE** the analysis presented in this paper;

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