

MARKET INDEX DEFINITION STATEMENT REVIEW 2018

PAPER NAME	MIDS 2018 Consultation
Target Audience	BSC Parties
Purpose of paper	For consultation
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1. Executive Summary

- 1.1 ELEXON reviews the Market Index Definition Statement (MIDS)¹ annually on behalf of the BSC Panel, in accordance with BSC Section T1.5.4. In this review, the analysis covers the period 1 August 2017 to 31 July 2018. The review is undertaken to ensure that parameters used in the MIDS calculations (i.e. the Individual Liquidity Threshold (ILT), timeband weightings and product weightings) remain fit for purpose and through the parameters, checking the MIDS principles (BSC Section T1.5.3) are being met.
- 1.2 The 2018 MIDS review indicates that the description of the timebands in the MIDS should be amended, so they refer to the Submission Deadline (i.e. the beginning of a Settlement Period) rather than Gate Closure. This would allow trades between Gate Closure and the Submission Deadline to be included in the calculation of MIPs. The current ILT, product weightings and timeband 1-5 weightings remain suitable. Appendix 2 considers the removal of timeband 6 as a weighted product.
- 1.3 We use Market Index Base Data (MIBD) to review the performance of the parameters, in accordance with the principles defined in the MIDS. The data details individual trades on the two power exchanges² which act as Market Index Data Providers (MIDPs).
- 1.4 Our detailed analysis is provided in Appendix 1 of this paper. In summary, our key findings are:
 - **Volume:** The daily average Market Index Volume (the traded volume across weighted timebands and products³) was 687MWh during the review period, which has increased by 7MWh from the previous year (680MWh). By including trades taken after Gate Closure, the daily average Market Index Volume would increase to 852MWh. See Appendix 1, Section 3 for more information.
 - **Individual Liquidity Threshold (ILT):** Over this review period, the traded volume was below the ILT in 62 out of 17,520 Settlement Periods. This is an increase from 14 in the last review. By including trades taken after Gate Closure, only five Settlement Periods would have had traded volume below the ILT. The current 25MWh threshold remains suitable. See Appendix 1, Section 4 for more information.
 - **Weighting values:** The weightings are applied to determine which products and timebands are (and the extent to which they are) included in the Market Index Price calculation. Currently, the MIDS defines the use of either '1' or '0' weights, where '1' results in the data being fully included and '0' excluded.

¹ The MIDS can be found on the Imbalance Pricing page on the ELEXON website
<https://www.elexon.co.uk/operations-settlement/imbalance-pricing/>

² EPEX SPOT and N2EX

³ A qualifying product is a product which is traded on the spot market in the short term and which is eligible for inclusion in the Market Index Data calculation

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- **Timebands:** The current '1' weighting of timebands 1 to 6 includes all trades within 12 hours of Gate Closure. The analysis indicates that the current timeband descriptions in the MIDS are no longer suitable, as they do not take into consideration trades made post-Gate Closure. Appendix 2 looks at the removal of timeband 6 as a weighted product.
- **Products:** The weighted products are those of half hour, 1 hour, 2 hour and 4 hour duration. The analysis indicates that the current product weighting remain suitable in accordance with the MIDS principles.

1.5 The detail of our review is set out in Appendix 1 – Market Index Base Data Analysis.

2. Proposed changes to the MIDS

- 2.1 On 2 November 2017, Approved BSC Modification P342 'Change to Gate Closure for Energy Contract Volume Notifications', introduced a new deadline for the purpose of submitting Energy Contract Volume Notification (ECVNs) and Metered Volume Reallocation Notifications (MVRNs). This new contract notification deadline, the Submission Deadline, would be decoupled from Gate Closure, and was set at the start of the relevant Settlement Period. Market Index Base Data shows that on 2 November 2017 trades started to take place after Gate Closure and before the Submission Deadline.
- 2.2 The Workgroup for BSC Modification P342 discussed whether the deadline for the submission of Market Index Data should be moved to the Submission Deadline, or remain at Gate Closure. It was agreed that Gate Closure would remain as the deadline for qualifying trades for the provision of Market Index Data. The Workgroup noted that, once sufficient data was available on the volumes and prices of trades carried out between Gate Closure and the Submission Deadline, a determination of the most appropriate deadline could be included in the MIDS review in August 2018. The Workgroup believed that the number of trades made post-Gate Closure was likely to be small.
- 2.3 The analysis in Appendix 1 indicates that the current timebands should be amended to incorporate trades made past Gate Closure and up to the new Submission Deadline. This change would propose the following changes to the MIDS:
- References to Gate Closure to be altered to the Submission Deadline.
 - Weighting principle 4.2 (f) to refer to trades made as close as possible to the Submission Deadline, not Gate Closure.
- 2.4 A BSC Modification to change BSC Section T 1.5.3 (b)(iii) is also necessary. The modification is required to change the definition of 'short term' and no longer reference this to Gate Closure.
- 2.5 Appendix 2 contains analysis on the change of weighting for timeband 6 from '1' to '0'. Following proposed changes to include post-Gate Closure trade volume in Market Index Data, the impact of timeband 6 as a weighted product has been evaluated. As a proportion, timeband 6 has represented less than 2% of Market Index Volume in the last three MIDS Review periods.
- 2.6 Following this year's review, the proposed changes to the MIDS also identifies an opportunity for some housekeeping changes in the MIDS. The proposed changes are:
- MIDS 4.1 (d) refers to 'historic' rather than 'historical' data.
 - MIDS 4.2 (e) refers to an 'egg' rather than an 'example'.
 - Remove the duplicate header from the 'Longer-Dated Timebands' table in MIDS Appendix 1.
 - Make formatting changes to 'Price Formula' sections of MIDS Appendices 1 and 2 to correct a missing bracket and non-subscripted letters.

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3. Additional Information

- 3.1 Following the implementation of Approved BSC Modification P305 'Electricity Balancing Significant Code Review Developments' in November 2015, the calculation of Energy Imbalance Prices only uses the Market Index Price (MIP) in two defaulting scenarios. When the Net Imbalance Volume (NIV) is zero, then the Energy Imbalance Price will default to the MIP. Alternatively, if all of the actions in the price stack are unpriced, then the Replacement Price will be set by the MIP and the Energy Imbalance Price will consequently be set by the MIP. See Appendix 1, Section 2 for more detailed analysis on this.
- 3.2 The European Balancing Guideline (EBGL) requires all Transmission System Operators to develop a proposal for harmonising, including imbalance pricing. The proposal is currently being consulted on and is subject to change. The use of the MIP will be considered in making the BSC compliant with the EBGL. As the MIP is derived from wholesale markets and not balancing products, it would not be consistent with the EBGL obligation and therefore cannot be used as a default price. ELEXON expect the proposals to be finalised late 2018, and then submitted to the European regulators.

4. ISG Views

- 4.1 The ISG noted the analysis presented in the MIDS Review and agreed with the recommendations made by ELEXON. The ISG commented that the removal of timeband 6 would allow the Market Index Price to better reflect the short term market.
- 4.2 The ISG approved the consultation questions for the review following an amendment to question 2.

Appendices

Appendix 1 – Market Index Base Data Analysis

Appendix 2 - Removal of timeband 6 as a weighted timeband

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APPENDIX 1 - MARKET INDEX BASE DATA ANALYSIS

Section 1 - Background Information

- Definition of terms used in the review

Section 2 – Use of the Market Index Price (MIP)

- Analysis of the use of the MIP

Section 3 - Analysis of the Market Index Volume (MIV)

- An overview of average MIV by Settlement Date
- An overview of average MIV by timebands/products across Settlement Periods

Section 4 - Analysis of the Individual Liquidity Threshold (ILT)

- Principles to be applied to ILT
- Number of defaults in the review period
- Analysis of suitability for the current ILT

Section 5 - Analysis of the timeband and product Weightings

- Principles to be applied to timeband and product weightings
- Analysis of the current product and timeband weightings

Section 6 - Analysis All Products and timebands

- Analysis of all timebands and products for potential changes on the current weightings
- Analysis of the Day Ahead Auction Product

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1. Background Information

- 1.1 Each year, ELEXON reviews the Market Index Definition Statement (MIDS) on behalf of the BSC Panel, in accordance with BSC Section T1.5.4. In this review, the analysis covers the period 1 August 2017 to 31 July 2018. The review consists of checking that parameters used in the Market Index Price (MIP) calculation defined in the MIDS (i.e. the Individual Liquidity Threshold (ILT), timeband weightings and product weightings) remain fit for purpose and through the parameters, checking the MIDS principles are being met (BSC Section T1.5.3). The purpose of the MIP being to reflect the price of wholesale electricity in Great Britain for delivery in respect of that Settlement Period, in the short term market.
- 1.2 Parties trade wholesale energy on power exchanges where they can buy and sell power exchange products. The products vary by duration and start time. Approved [Modification Proposal P78](#) introduced the MIP to reflect the price of wholesale electricity in the short term market for Great Britain. In this context, Section T of the BSC defines Short term as 'no more than three Business Days prior to Gate Closure for the relevant Settlement Period'. This would require a Modification to the BSC to change.
- 1.3 A power exchange can provide data through its role as a Market Index Data Provider (MIDP). As a MIDP they calculate Market Index Data (MID), which consists of half hourly prices and volumes. The calculation process is defined in the MIDS. In particular, the Market Index Definition Statement defines:
- The overall price (Market Index Price) and volume (Market Index Volume) calculation process;
 - A volume threshold (Individual Liquidity Threshold), below which the default rules are applied;
 - A list of power exchange products that are included in the calculation;
 - A list of timebands, which group trades according to how long before Gate Closure they are made;
 - Weightings which reflect the importance of the products and timebands; and
 - Principles by which the weightings, products and thresholds are determined.
- 1.4 The Individual Liquidity Threshold (ILT) is a volume threshold that is set to apply default rules (see 1.5) when there is insufficient trading on the power exchange to provide a suitable price. The aim is to avoid the price being set by a single trade – i.e. not having the ILT too low – but also to minimise the number of Settlement Periods where the default rule is applied – not having the ILT too high.
- 1.5 The Market Index Volume (MIV) is calculated as the sum of the traded volume across the selected products and timebands, as defined in the MIDS. When the MIV traded in a half-hour is greater than the ILT, the Market Index Price (MIP) is the volume weighted average price of the trades. Where the MIV does not meet the ILT, the MIP and MIV default to zero.
- 1.6 The current MIDS sets the products to be included in each half-hourly price and volume calculation as the half-hour, 1 hour, 2 hour and 4 hour products traded within 12 hours of Gate Closure.
- 1.7 Weightings are applied to reflect the importance of each product and timeband and are set to '1' or '0', which either completely include or exclude particular trades. The weightings applied to the different products and timebands used in the calculations are shown in **Table 1.1**.

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Table 1.1 Product and Timeband Weightings

	Product	Timeband											
		1	2	3	4	5	6	7	8	9	10	11	12
Half-Hour	H	1	1	1	1	1	1	0	0	0	0	0	0
1 Hour Block	1	1	1	1	1	1	1	0	0	0	0	0	0
2 Hour Block	2	1	1	1	1	1	1	0	0	0	0	0	0
4 Hour Block	4	1	1	1	1	1	1	0	0	0	0	0	0
Overnight	O	0	0	0	0	0	0	0	0	0	0	0	0
Peak	P	0	0	0	0	0	0	0	0	0	0	0	0
Extended Peak	E	0	0	0	0	0	0	0	0	0	0	0	0
Day Ahead Auction	A	0	0	0	0	0	0	0	0	0	0	0	0

Proposed changes to timebands

- 1.8 Trades are classified by a number of timebands, which determine how long before Gate Closure the trade was made. These timebands cover a number of Settlement Periods. Timebands 1-6 are currently used to calculate the MIP. Timeband 6 begins 12 hours ahead of Gate Closure, and ends eight hours before Gate Closure. Timeband 1 is the final hour up to Gate Closure. These timebands are shown in **Diagram 1.1** below.



Diagram 1.1 Timebands 1 to 6. Each coloured block denotes a 30 minute period.

- 1.9 Following the implementation of BSC Modification P342, and the decoupling of the contract notification deadline from Gate Closure, our analysis looks at changing the MIDS Timebands. This change would allow trades made in the hour prior to the Settlement Period of delivery to be included in the Market Index Volume and Market Index Price calculation. This would alter the list of timebands which group trades according to how long before Gate Closure they are made, to a list of timebands which group trades according to how long before the Submission Deadline they are made. The proposed amended timebands to incorporate trades until the start of the Settlement Period are shown in Diagram 1.2 below.

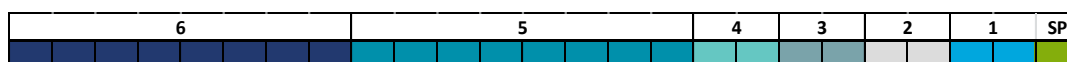


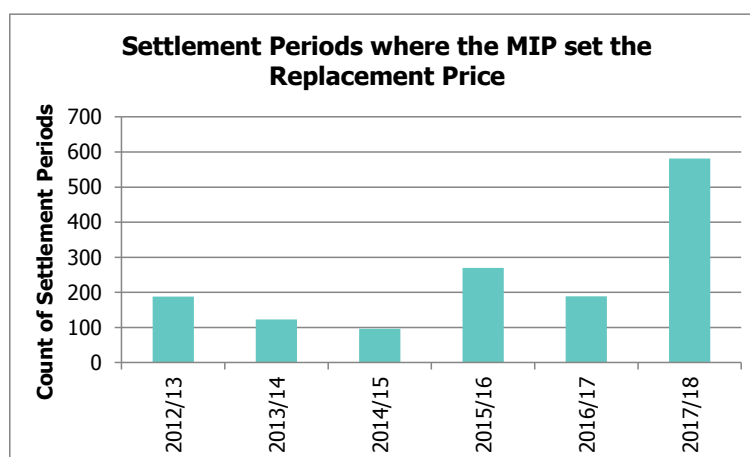
Diagram 1.2 Proposed timebands 1 to 6 in reference to the Submission Deadline, not Gate Closure. Each coloured block denotes a 30 minute period.

- 1.10 Through the Market Index Base Data analysis we will make reference to the proposal in **Diagram 1.2** as the 'Submission Deadline scenario'.

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2. Use of the Market Index Price (MIP)

- 2.1 BSC Modification P305 'Electricity Balancing Significant Code Review Developments', implemented on 5 November 2015, introduced a single price method, with a 'reverse' price no longer calculated by the MIP. The MIP is used to set the System Price in two scenarios:
- a) When the Net Imbalance Volume (NIV) is zero, then the System Price will default to the MIP; or
 - b) If all of the actions in the price stack are unpriced, then the Replacement Price will be set by the MIP and the System Price will consequently be set by the MIP.
- 2.2 Prior to the implementation of BSC Modification P305, the 'reverse' System Price was calculated for every Settlement Period and used for Energy Imbalance Settlement. The aim was for this 'reverse' price to reflect the price of wholesale electricity in the short term market for Great Britain. The MIP was used to set this 'reverse' price.
- 2.3 The System Price has not defaulted to the MIP due to a zero NIV since the implementation of BSC Modification P305. Since 2001, the NIV has equalled zero three times: 5 September 2007, Settlement Period 8; 22 September 2009, Settlement Period 10; and 10 May 2015, Settlement Period 7.
- 2.4 **Graph 2.1** below shows the incidences where the Replacement Price⁴ has defaulted to the MIP over the past six review periods. The MIP set the Replacement Price in 581 Settlement Periods between 1 August 2017 and 31 July 2018. The previous highest use of the MIP as a Replacement Price in a review period was 270 in 2015/2016.



Graph 2.1 Annual incidences where the Replacement Price has defaulted to the MIP. Annual periods are from 1 August to 31 July.

⁴ The Replacement Price is primarily determined based on the weighted average cost of the most expensive 1MWh of unflagged balancing actions. Where there are no unflagged balancing actions the Replacement Price is set equal to the MIP.

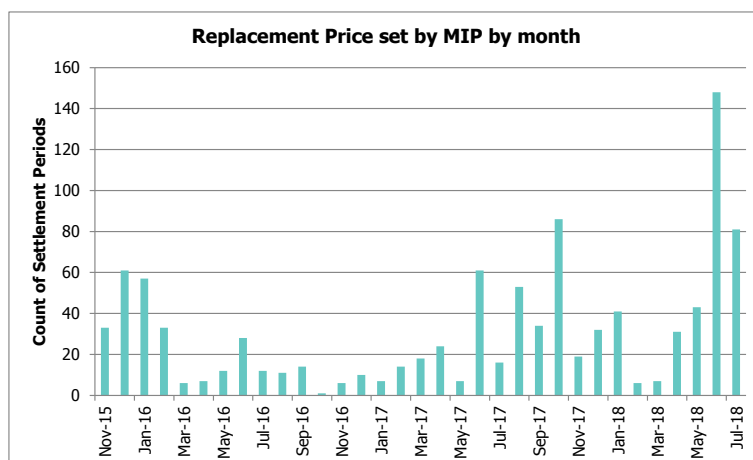
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2.5 The Replacement Price is used in 15% of Settlement Periods, regardless of market length. **Graph 2.2** shows the count of instances when the MIP was used to set the Replacement Price since November 2015. These instances are the only occasions of the MIP being used in the System Price calculation after the introduction of P305. In 1,019 Settlement Periods between November 2015 and July 2018, the Replacement Price was set by the MIP, this represents 2.1% (3.0% long and 0.6% of short Settlement Periods) of all Settlement Periods in this date range. This equates to approximately 1 Settlement Period a day. The highest number of incidents occurred in June 2018, when 148 Settlement Periods had the Replacement Price set by the MIP. ELEXON presented a paper to the Imbalance Settlement Group in response to this high occurrence.⁵

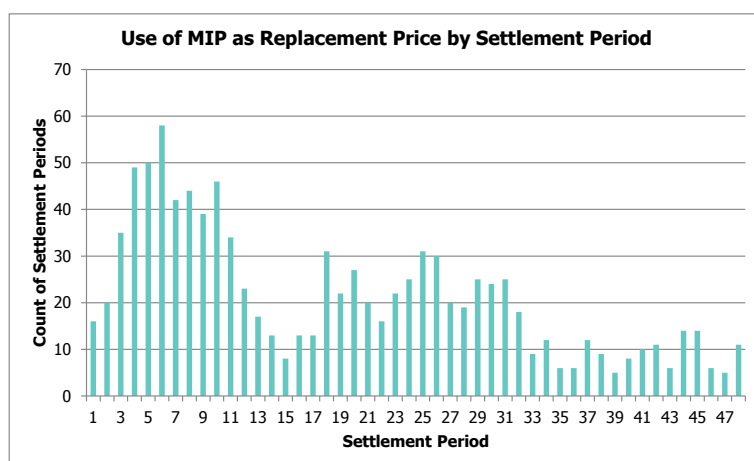
2.6 **Graph 2.3** shows the incidents where the Replacement Price has defaulted to the MIP by Settlement Period, between November 2015 and July 2018. The Replacement Price was set by the MIP on 58 days during Settlement Period 6, which represents 5.8% of days.

Future use of MIP

2.7 The European Balancing Guideline (EBGL) requires all Transmission System Operators to develop a proposal for harmonising, including imbalance pricing. The proposal is currently being consulted on, and is subject to change. The wording in the proposal contains requirements on calculation of a 'Value of Avoided Activation of Balancing Energy' (VOAA). This is the terminology that refers to a default price in situations where we would currently default to the MIP. As the MIP is derived from wholesale markets and not balancing products, it would not be consistent with this obligation, and therefore cannot be used as a default price. ELEXON expect the proposals to be finalised by end 2018, and then submitted to the European regulators. Any such requirement is also subject, in GB, to the outcome of Brexit for the energy sector.



Graph 2.2 Incidences where the Replacement Price has been set by the MIP.



⁵ <https://www.elxon.co.uk/documents/groups/isg/2018-meetings-isg/207-july/note-on-replacement-price/>

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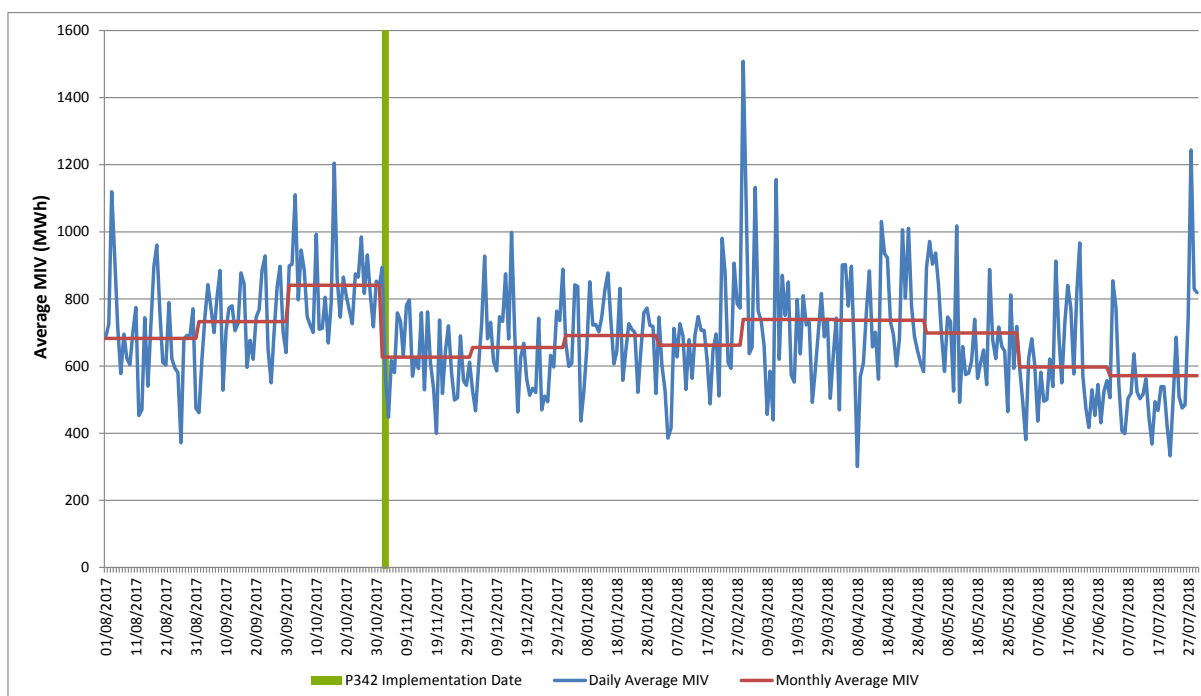
3. Analysis of the Market Index Volume (MIV)

- 3.1 Market Index Volume (MIV) is the total traded volume across the '1' weighted products and within '1' weighted timebands. The weightings are displayed in **Table 1.1**.
- 3.2 The daily average MIV was 687MWh over the review period, which has increased by 7MWh from the previous annual review, which had an average of 680MWh. Historical daily average MIV data can be found in **Table 3.1**.

Table 3.1 Daily Average MIV in MIDS Reviews since 2012

Review Period (Aug-Jul)	Daily Average MIV (MWh)
2012/13	603
2013/14	620
2014/15	693
2015/16	666
2016/17	680
2017/18	687

- 3.3 **Graph 3.1** displays the daily average MIV throughout the review period. The MIV reached a peak on 1 March 2018 at 1,508MWh, compared with last year's peak of 1,140MWh in March 2017. The October 2017 monthly average was 841MWh; this was the highest monthly average in this year's review period. The implementation date for BSC Modification P342, 2 November 2017, is displayed on Graph 3.1 with a green line. Daily average MIV can be seen to reduce after this date, due to the trades made between Gate Closure and the Submission Deadline not being included. Parties are no longer constrained to settling trades by gate closure. We have seen a shift in volumes of short term trades towards the submission deadline.



Graph 3.1 Daily and Monthly Average Market Index Volume by Settlement Date

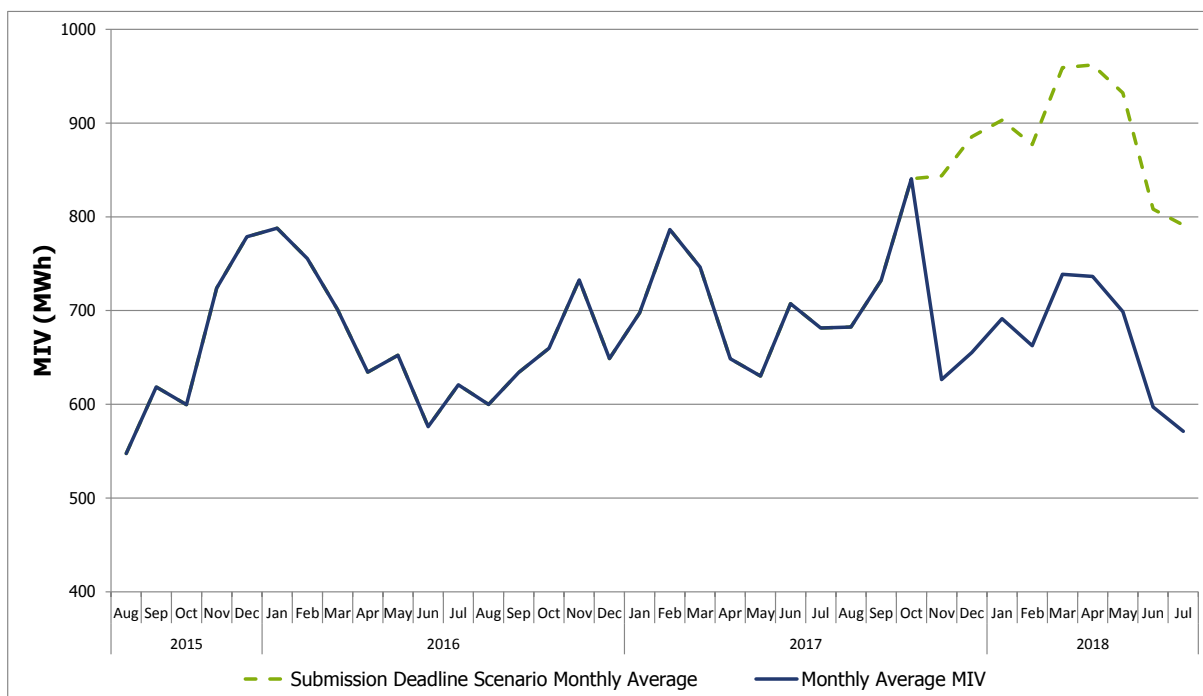
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3.4 **Table 3.2** provides a comparison of the calculated average Market Index Volume using the current timeband scenario, compared to the Submission Deadline scenario. By changing the MIDS to include trades under the Submission Deadline scenario, we could include the volumes of trades closer to the start of the Settlement Period in the calculation of Market Index Volume. The daily average MIV in each month since BSC Modification P342 would have been over 200MWh higher in this scenario. The highest daily average calculated MIV in the review period, 1 March 2018, would have increased to 1,829MWh under the Submission Deadline scenario. The daily average MIV is 24% higher under the Submission Deadline scenario.

3.5 **Graph 3.2** shows the monthly average MIV since August 2015. The monthly average MIV for the Submission Deadline has been plotted with a dashed green line. The difference between the current and Submission Deadline scenario is the additional MIV shown in **Table 3.2**.

Table 3.2 Daily average MIV compared to Submission Deadline scenario MIV

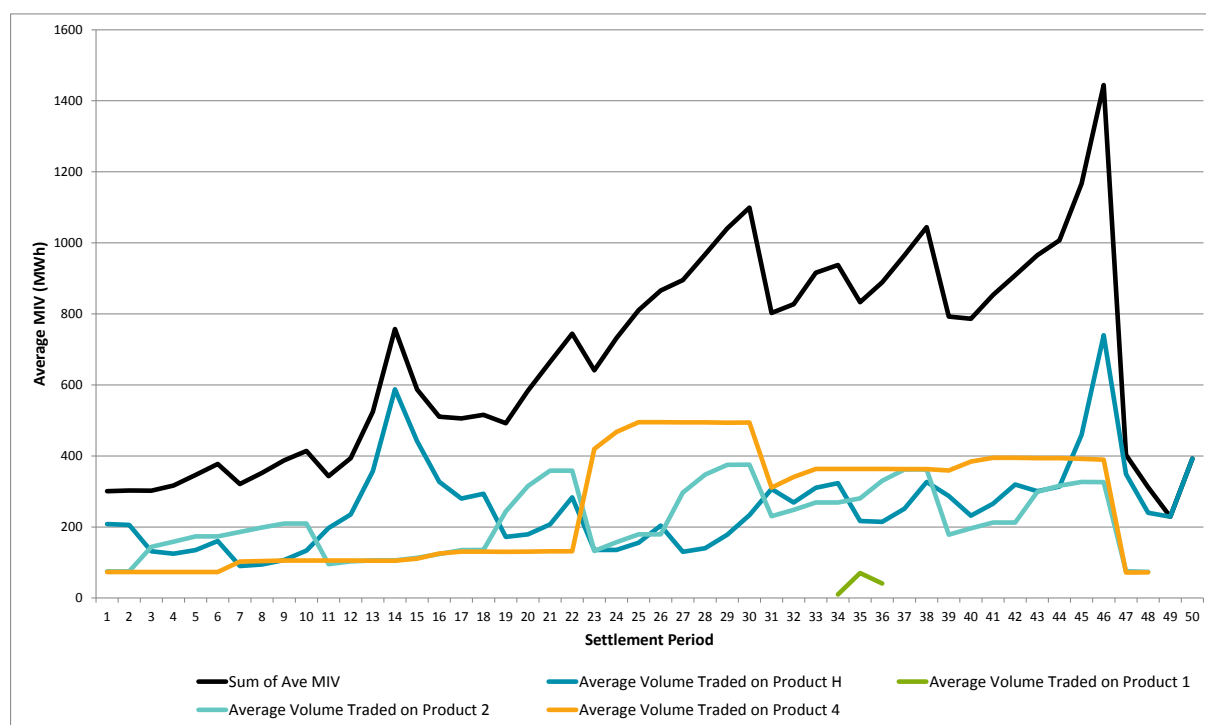
Month	Average Calculated MIV (MWh)	Average Submission Deadline scenario MIV (MWh)	Average additional MIV (MWh)
Aug-17	682		
Sep-17	732		
Oct-17	841		
Nov-17	626	844	217
Dec-17	655	885	230
Jan-18	691	903	212
Feb-18	663	877	215
Mar-18	739	959	220
Apr-18	736	962	226
May-18	699	932	233
Jun-18	597	808	211
Jul-18	571	791	220



Graph 3.2 Historical monthly average Market Index Volume, with the Submission Deadline scenario, plotted since November 2015.

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- 3.6 **Graph 3.3** shows the average MIV and average volume traded on each product weighted '1' by Settlement Period. Similar to the previous review, the Settlement Period average MIV increased through the day with product H peaking in Settlement Periods 14 and 46.
- 3.7 During review period, the 1-Hour Product was traded in Settlement Periods 18 and 34-36. In last year's review, the 1-Hour Product was traded during these Settlement Periods 35 and 40. **Graph 3.3** shows that the 1-hour Product had the least traded volume in comparison to the other products.



Graph 3.3 Average Market Index Volume by Settlement Period

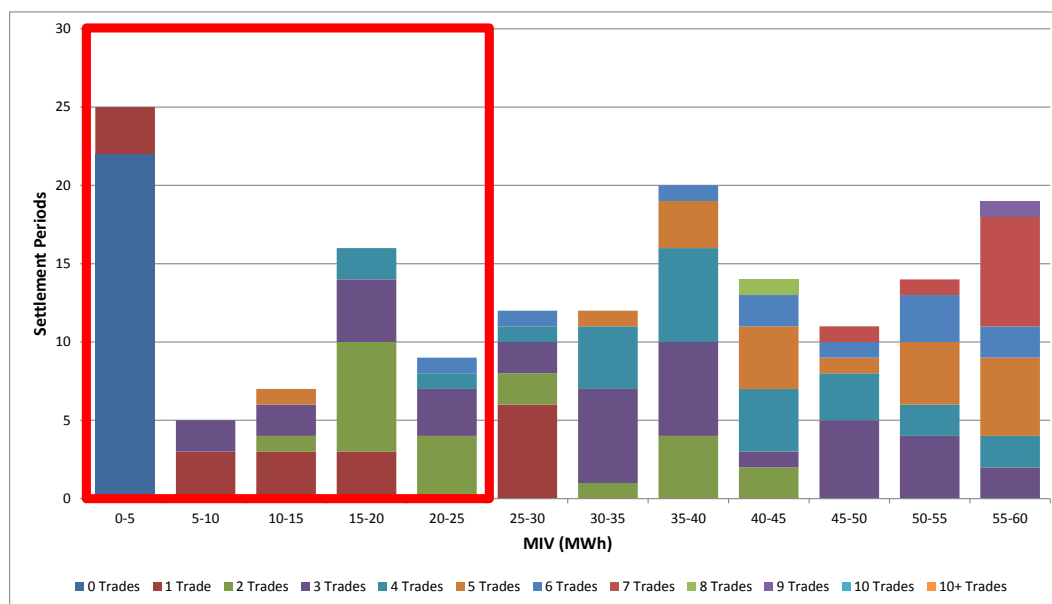
- 3.8 The analysis in Section 3 shows that the inclusion of trades up to the Submission Deadline would increase the Market Index Volume. Our recommendation would be for the volume of trades seen in the hour post-Gate Closure, and prior to the Submission Deadline, to be included in Market Index Data. This would enable the Market Index data to provide a better reasonable reflection of the price of wholesale electricity for a given Settlement Period of delivery. The proposed change would require a modification to BSC Section T 1.5.3(b)(iii), which defines 'short term'. The definition of short term in the MIDS 2.2 'List of Definitions' should be amended to align with the modification to BSC Section T.

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4. Analysis of the Individual Liquidity Threshold (ILT)

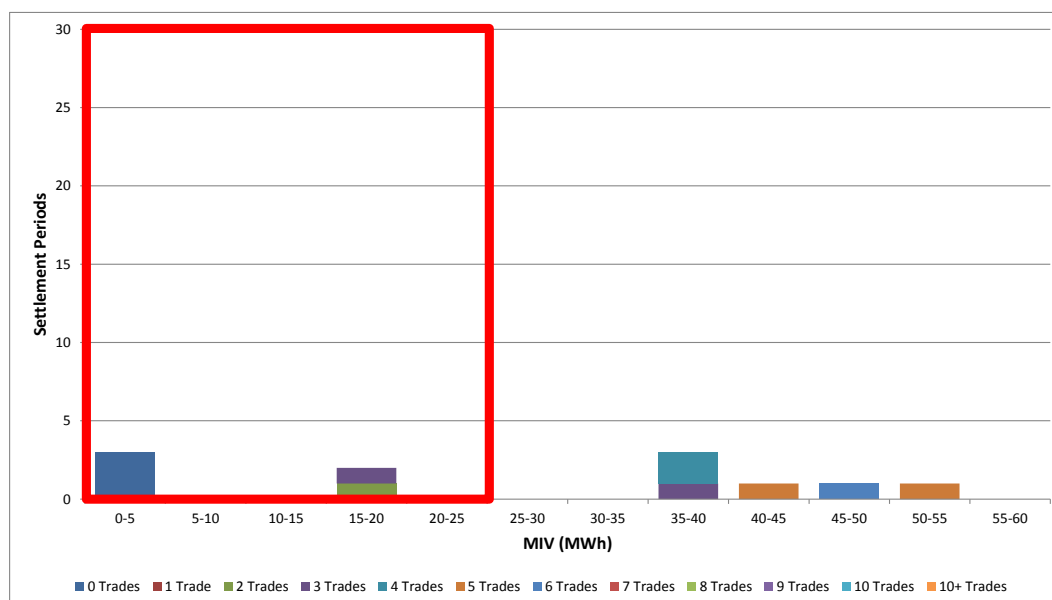
- 4.1 Analysis has been carried out using the live products and timeband weightings specified in **Table 1.1**.
- 4.2 The ILT is currently set to 25MWh, and triggers a default rule when there is a low liquidity of trades in a Settlement Period. When the MIV is not greater than the threshold, both the MIP and MIV are defaulted to zero.
- 4.3 The ILT must be set in accordance with the MIDS principles. We have analysed historical data to consider each of the principles. The principles that are applied in setting the ILT are:
- a)** Individual Liquidity Thresholds should be set to the same value(s) for every Market Index Data Provider (MIDP);
 - b)** Individual Liquidity Thresholds may be set to zero;
 - c)** Individual Liquidity Thresholds may be set to different values for different Settlement Periods in the day and may vary by Season or Day Type;
 - d)** Individual Liquidity Thresholds should be set based on the analysis of historical data;
 - e)** Individual Liquidity Thresholds should be set at a level that minimises the likelihood that the Market Index Price will be set by a single trade; and
 - f)** Individual Liquidity Thresholds should be set to ensure that the Market Index Price is defaulted in the minimum number of Settlement Periods, subject to the previous principle.
- 4.4 Currently the ILT for both MIDPs is 25MWh, so principle **a)** is met.
- 4.5 The analysis shows that the ILT could be set to zero as per principle **b)** which would also meet principle **f)**. 62 out of 17,520 (0.35%) Settlement Periods have defaulted throughout the year. Reducing the ILT to zero would ensure all qualifying trades are included in the calculation of MIPs, and so reduce the number of occasions when the MIP is defaulted to zero to when there were no qualifying trades at all. However reducing the ILT to zero would also increase the likelihood that the MIP is set on a single trade **e)**.
- 4.6 In the current review period, six Settlement Periods had set the MIP based on a single trade. Increasing the ILT increases the chances of the MIP defaulting to zero, which would be contrary to principle **f)**. Principle **c)** allows the ILT to change across different periods; however, as mentioned, this could result in principle **e)** and **f)** being compromised.
- 4.7 **Graph 4.1** shows the count of trades for Settlement Periods where the Traded Volume of qualifying products was below 60MWh; this occurred in 164 Settlement Periods. This is an increase from 45 Settlement Periods in the last review period. 18 Settlement Periods had one trade from qualifying contracts, and 12 of them defaulted to zero. The other six Settlement Periods had a MIV of 25MWh, and therefore met the liquidity threshold and did not default. Although the principles aim to avoid the price being set on a single trade, and six instances have occurred within the last year, these were on the ILT boundary. Hence, we believe there is no strong case to change away from 25MWh.

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Graph 4.1 Count of Trades that the MIP was set by and their respective volumes. The red outlined box highlights Settlement Periods below the ILT.

4.8 **Graph 4.2** shows the count of trades for Settlement Periods where the Traded Volume of qualifying products was below 60MWh under the Submission Deadline scenario. This was the case for 11 Settlement Periods compared to the current calculated MIV. Under the Submission Deadline scenario five Settlement Periods would have defaulted due to insufficient liquidity compared to 62 in the current scenario. A single trade would not have been used to set the MIP in this scenario.



Graph 4.2 Count of Trades that the MIP was set by and their respective volumes under the Submission Deadline scenario. The red outlined box highlights Settlement Periods below the ILT

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- 4.9 **Table 4.1** Displays the number of Settlement Periods where the MIV was below 60MWh in the last four MIDS Reviews, along with whether there was greater than one trade. Review periods are 1 August to 31 July. The number of defaulted Settlement Periods where the MIV is below the ILT is 62 in this review, compared to 14 last year. As highlighted in section 4.7, the six Settlement Periods in which one trade did not default the MIP in this review had a MIV of 25 MWh.
- 4.10 **Table 4.1** also includes the Submission Deadline scenario for the 2017/18 review period. The table shows that the ILT remains appropriate, due to the inclusion of the Submission Deadline scenario traded increasing the liquidity of the MIV.

Table 4.1 Breakdown of Settlement Periods with MIV <60MWh in the last four MIDS reviews

Count of Trades	No. of Defaulted Settlement Periods (MIV < 25 MWh)		No. of non-Defaulting Settlement Periods (MIV 25-60MWh)	
	0 or 1	Greater Than 1	1	Greater Than 1
2014/15	7	0	0	0
2015/16	3	4	1	1
2016/17	11	3	2	29
2017/18	34	28	6	96
2017/18 Submission Deadline	3	2	0	6

- 4.11 **Table 4.1** shows that the ILT remains appropriate, with the inclusion of the Submission Deadline scenario traded increasing the liquidity of the MIV. A change to include the Submission Deadline scenario trades, would aid ILT principle **f)**, by reducing the number of Settlement Periods the Market Index Price is defaulted from 62 to five. It would also benefit ILT principle **e)**, by reducing the Settlement Periods with the MIP set by a single trade from six to 0.

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5. Analysis of the Timeband and Product Weightings

- 5.1 The analysis was carried out using the '1' weighted products and timebands specified in the live version of the MIDS. This is shown in **Table 1.1**.
- 5.2 The timeband and product weightings determine which trades are included in the MIP and MIV calculation. Like the ILT, the timeband and product weightings are set in accordance with a set of principles detailed in the MIDS.
- 5.3 The principles are:
- a)** Weightings should be applied to the components that make up the Market Index Price;
 - b)** Weightings should not be applied to the Market Index Volume and should not be used in determining whether the traded volume meets the Liquidity Threshold for the half hour;
 - c)** Weightings may be applied to reflect how close to real time a trade was made (timeband weighting);
 - d)** Weightings may be applied to the product or contract types which qualify in the index calculation (i.e. those which are traded in the short term as defined in the BSC);
 - e)** The same weightings must be applied to equivalent qualifying products and timebands across all Market Index Data Providers;
 - f)** Weightings may be set to ensure that the Market Index Price is reflective of the price of trades as close as possible to Gate Closure;
 - g)** Weightings may be set to minimise the flattening effect on the Market Index Price of including traded products used in the methodology that have one price for a time period longer than one Settlement Period;
 - h)** Weightings may take values from '0' to '1'; and
 - i)** Where a weighting is set to '0', the weighting is effectively null, trades in the related product type and timeband will be excluded from the Market Index Volume (and Price) calculation.
- 5.4 A number of the principles - **a), b), c), d), e), h)** and **i)** - are already met under the current operation. The remaining principles **f)** and **g)** are considered below.
- 5.5 Weighting principle **f)** refers to trades used in the Market Index Price calculation using prices of trades as close as possible to Gate Closure. This principle could be changed in the MIDS refer to as close as possible to the Submission Deadline, if the proposed recommendation to include trades up the Submission Deadline in Market Index Data is agreed.
- 5.6 The MIDP calculates the MIP using the weighted products and timebands when the MIV is above the 25MWh ILT. The '1' weighting is currently applied to products H, 1, 2 and 4 in timebands 1 to 6 which results in trades relating to these product and timeband combinations being used to calculate the MIP and MIV.

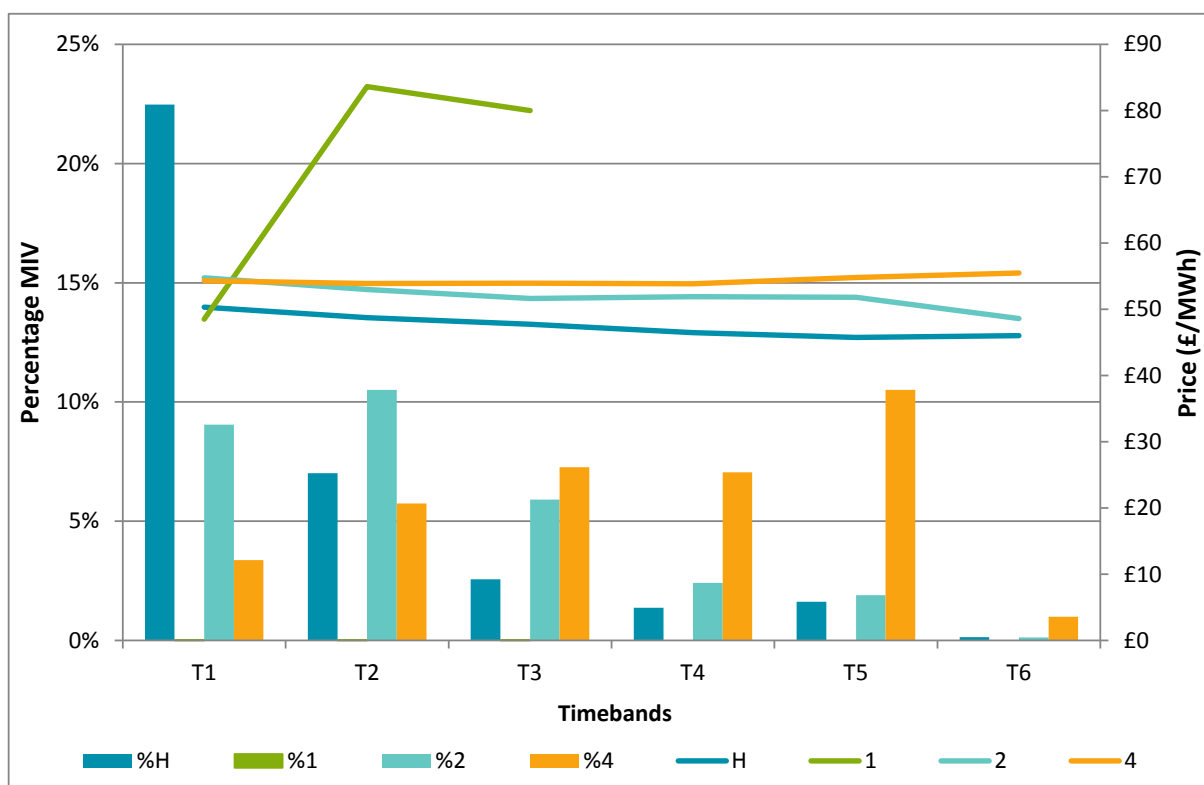
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5.7 **Graph 5.1** shows the percentage of traded volume on the '1' weighted products captured in the '1' weighted timebands. As expected, due to the nature of the products:

- The volume traded on the Half-Hour Product was highest in timebands 1 and 2;
- The volume traded on the 2-Hour Product was mainly captured in timebands 1, 2 and 3; and
- Traded volume on the 4-Hour Product was mainly dominating in timebands 4 and 5.

It is worth noting that timebands 5 and 6 are of four hours duration compared to 1 to 4 which are only one hour as highlighted in **Diagram 1.1**. The volume traded on the 1-Hour Product is typically low, this trend continued this year.

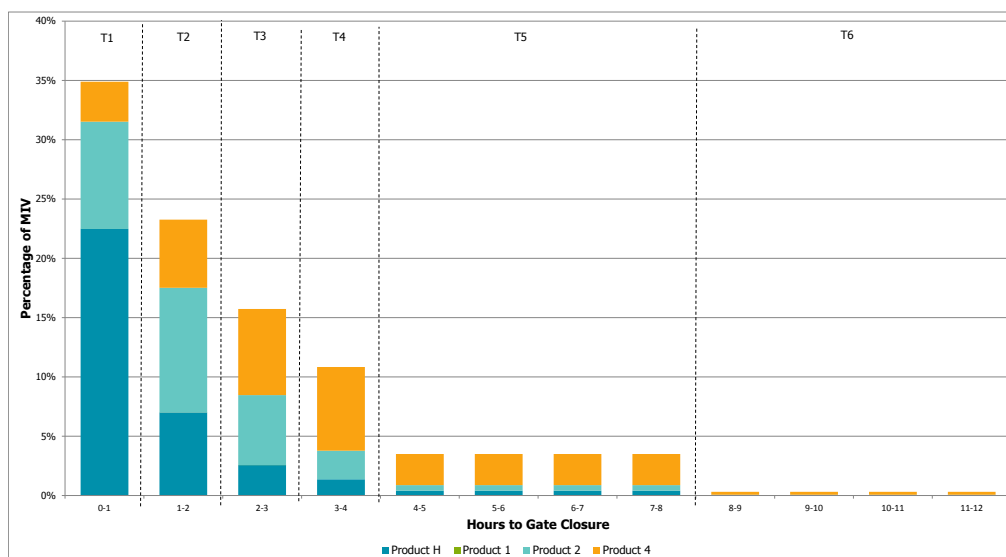
5.8 **Graph 5.1** also shows the price curve for the '1' weighted products in each timeband. The average price was flat from timeband 6 towards Gate Closure (from right to left) for Product H, 2 and 4. Average prices for Product H in each timeband ranged between £45.74/MWh and £50.33/MWh. Average timeband prices for Product 2 ranged by £6.14/MWh and for Product 4 by £1.66/MWh. The average price for Product 1 varies due to a lower number of trades on this product (less than 0.01% of all volume traded over the six timebands).



Graph 5.1 Average Price and Percentage of Market Index Volume by timeband

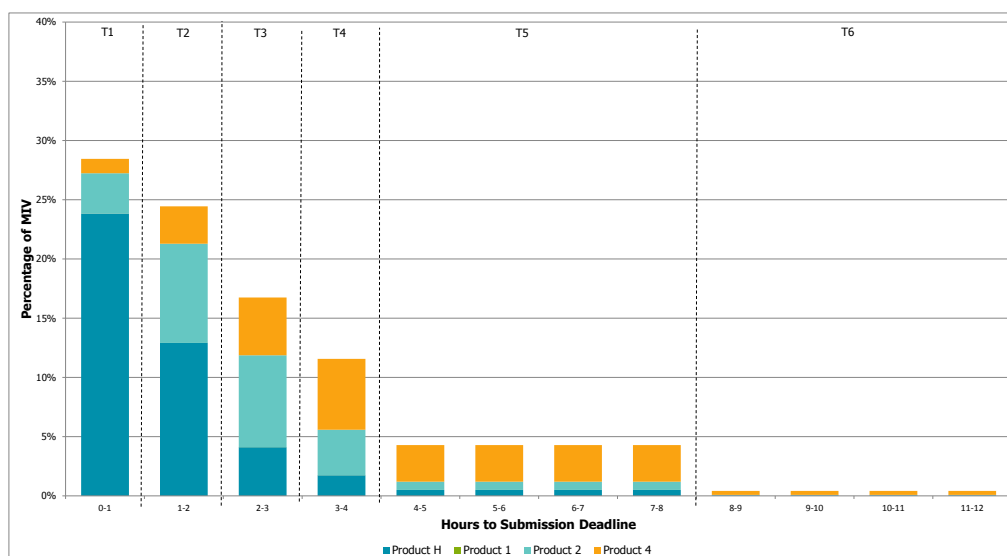
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- 5.9 **Graph 5.2** displays the same information as **Graph 5.1**, but with the x-axis to hourly scale. The volumes for the longer timebands (5 and 6) are averaged out across each of the four hours. As seen in the previous graph, the respective products percentage of MIV peaks when they are closest to Gate Closure. With the H-Hour Product peaking in the hour before Gate Closure, the 2-Hour Product peaking two hours before Gate Closure and so forth. Timeband 1 has a lower percentage of MIV compared with last year, decreasing by 3%; timeband 1 now represents 35% of the MIV.



Graph 5.2 Percentage of Market Index Volume by Time (hours) to Gate Closure

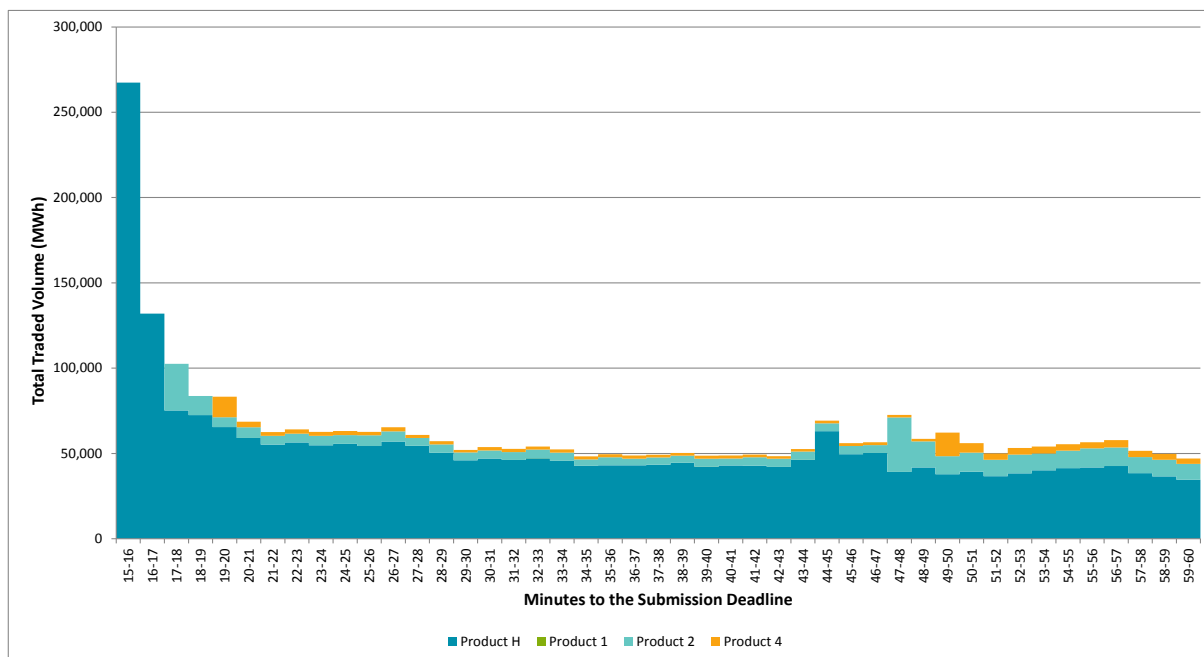
- 5.10 **Graph 5.3** uses the proposed Submission Deadline scenario to display the percentage of Market Index Volume by Time (hours) to the Submission Deadline, as opposed to Gate Closure in **Graph 5.2**. The same pattern can be seen as in **Graph 5.2**, the Submission Deadline scenario highlights that the hour prior to a Settlement Period would be contain the highest proportion of volume in the MIV. The new proposed timeband 1 would represent 28.5% of MIV. The hour prior to Gate Closure (Timeband 1 under the current scenario and timeband 2 under the Submission Deadline scenario) would represent 24.5% of the MIV.



Graph 5.3 Percentage of Market Index Volume by Time (hours) to the Submission Deadline.

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- 5.11 **Graph 5.4** displays a breakdown by minute, and by product, of the traded volume post-Gate Closure and before the Submission Deadline from 2 November 2017 to 31 July 2018. No volume is traded within 15 minutes of the Submission Deadline due to the closure of trading times of the power exchange markets operated by the MIDPs⁶. The highest volumes of Product H are traded between 15-17 minutes prior to the Submission Deadline, representing 14% of the total volume post-Gate Closure. **Graph 5.4** shows that trading is happening up to the market closure all weighted products, at their closest possible point for delivery. The proposal to amend timeband references to the Submission Deadline, as opposed to Gate Closure, would incorporate this volume in calculating the Market Index Price and hence make the Market Index Price more reflective of the wholesale market at its closest point to delivery.



Graph 5.4 Traded volume by Product post-Gate Closure and before the Submission Deadline.

⁶ EPEX Spot Closure of Trading times vary by product. Product H is 15 minutes before delivery, Product 1 is 16 minutes, Product 2 is 17 minutes and Product 4 is 19 minutes before delivery.
<https://www.epexspot.com/en/product-info/intradaycontinuous/uk>

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6. Analysis of all Products and Timebands

6.1 Analysis of all timebands and products for potential changes on current weightings

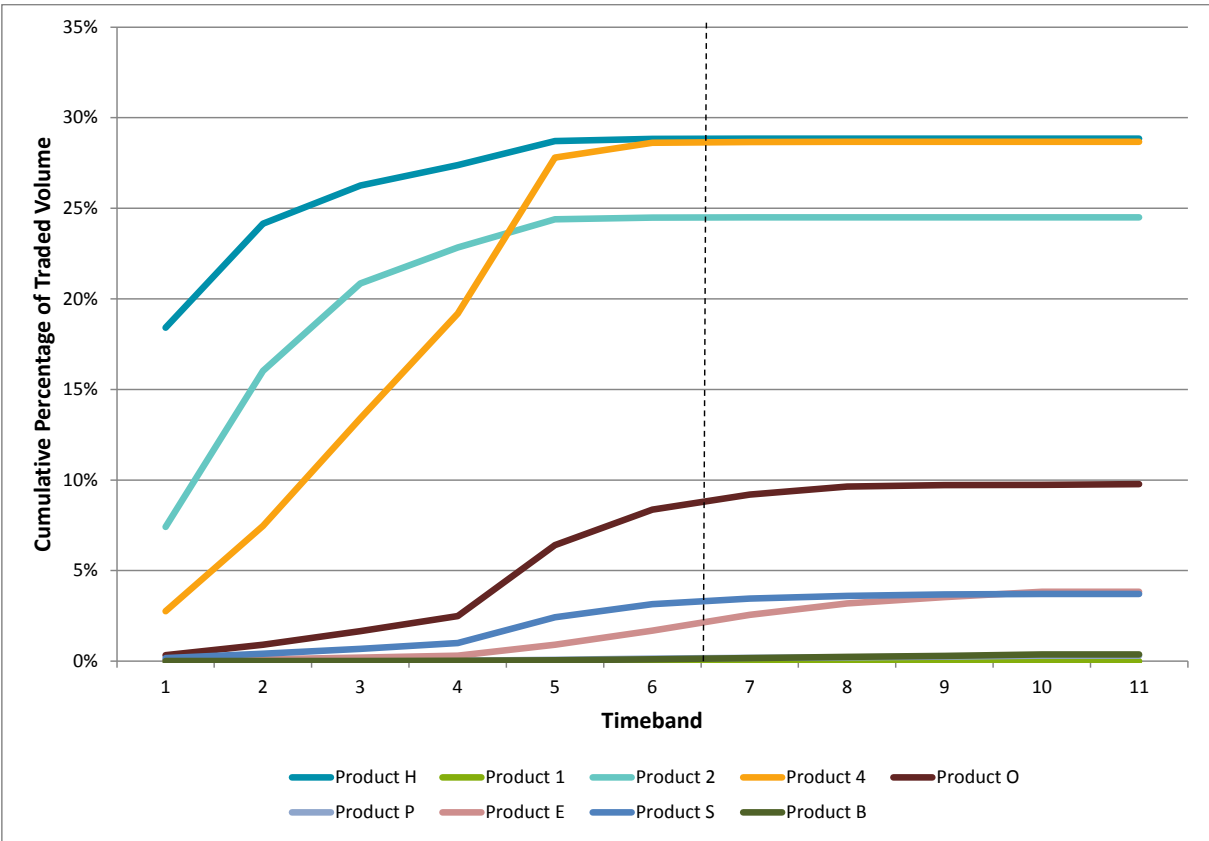
- 6.1.1 All of the MIDS Products are detailed in **Table 6.1.1**. The analysis considers all of the products listed below **except for the Day Ahead Auction Product** (Product A), which is considered separately as the volume traded on this product is significantly larger than the other products.

Table 6.1.1. Available Products

Product	Identifier	Duration (hours)
Half-Hour	H	0.5
1 Hour Block	1	1
2 Hour Block	2	2
4 Hour Block	4	4
Overnight	O	8
Peak	P	12
Extended Peak	E	16
Block 3 and 4	S	8
Off Peak	N	8
Base Day	B	24
Day Ahead Auction	A	1

- 6.1.2 We have reviewed data for the two Market Index Data Providers' trades up to three Calendar Days ahead of Gate Closure and this period is broken down into 12 timebands. Timebands 1-6 which cover trades made up to 12 hours ahead of Gate Closure. We will now consider timebands 1-12 to confirm the relevance of the current weightings. Note that zero trades were made on timeband 12 during this review period of 1 August 2017 to 31 July 2018.
- 6.1.3 **Graph 6.1.1** shows the cumulative percentage of volume traded on all products in all timebands for the review period. In the earlier timebands, a much higher percentage of volume is traded on products H, 2 and 4 than any other products. This suggests that the current products remain suitable as they are traded close to Gate Closure (principle **f**) and represent a significant percentage of the total volume.
- 6.1.4 The volume traded on the Overnight Product is visible from timebands 5 onwards, which is similar to that noted in the previous reviews. Previous consultations with industry on including this product have not resulted in any change to its weighting due to the flattening or 'smoothing' effect.

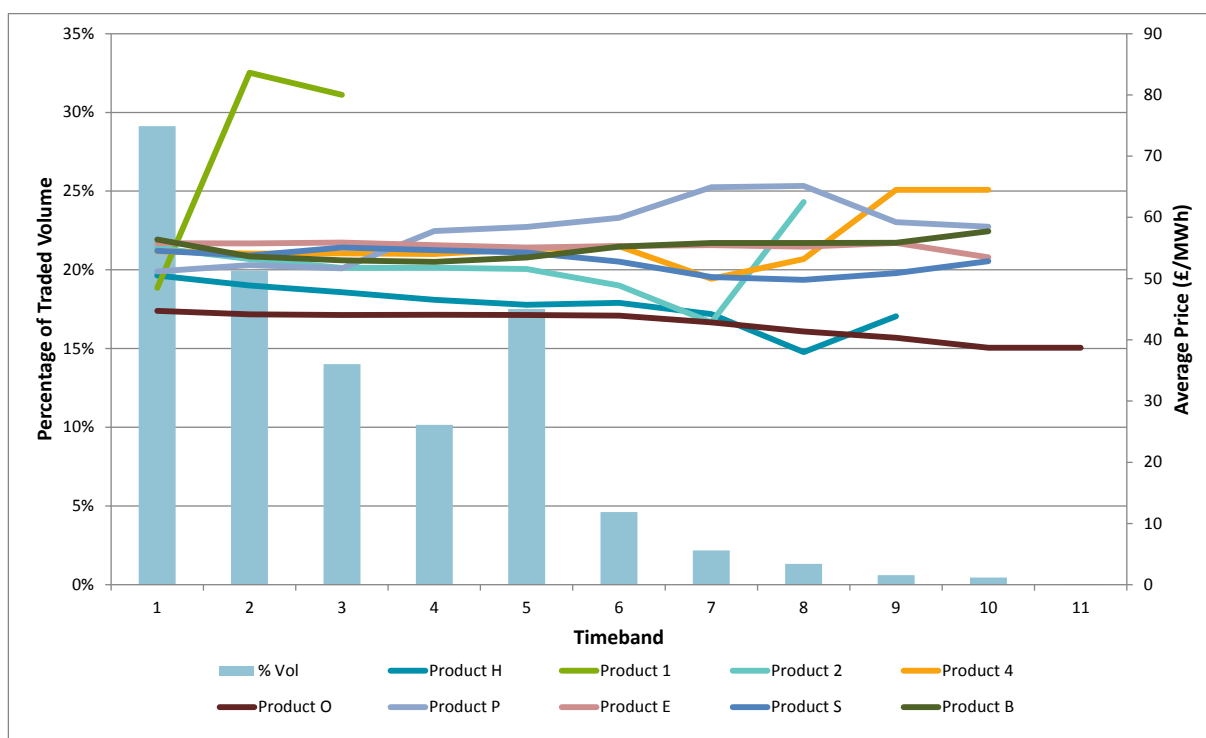
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Graph 6.1.1. Cumulative Percentage of Total Trade Volume on all Products (excluding Product A) across all timebands.

6.1.5 **Graph 6.1.2** shows the average price of each traded product and the cumulative percentage of total volume traded in each timeband. The largest volumes were traded at timeband 1 (accounting for 29.13% of the total trade), representing a 4% decrease from the previous review. Except for timeband 1, the total volume traded on the other timebands has not significantly changed since the last review.

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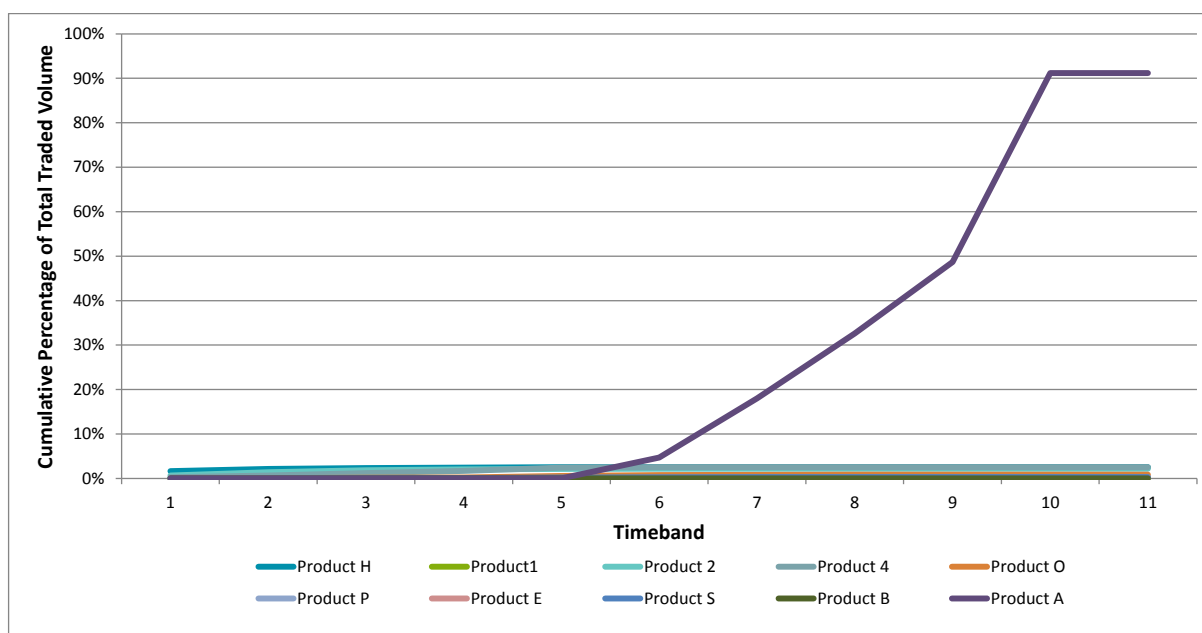


Graph 6.1.2. Percentage of total volume traded (excluding Product A) in each timeband

6.2 Day Ahead Auction Product

- 6.2.1 The Day Ahead Auction Product (Product A) is a blind auction where buyers and sellers enter anonymous orders for each hourly period from 23:00 to 23:00. The auction market closes at 11:00, after which the orders are matched for each hourly period. The time that the orders are matched gives the trade time used in calculating the timeband for the trade.
- 6.2.2 **Graph 6.2.1** shows that the Auction Product accounted for 91.16% of total traded volume during the review period. The product only applies from timeband 6. Unlike the other products this product is not traded in timebands 1 to 5 that are closer to Gate Closure. During the last review period, the Auction Product accounted for 91.87% of total traded volume.
- 6.2.3 The Auction Product has been given '0' weighting and the ISG recommended that this product should be monitored considering its large traded volume on the market.
- 6.2.4 Considering the current market liquidity and weighting principle **f)**, the current '0' weighting on the Auction Product remains suitable.

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Graph 6.2.1. Cumulative Percentage of total traded volume on all Products (including A) across all timebands.

6.2.5 **Table 6.2.1** shows the total traded volume on all products across all timebands. As displayed in **Graph 6.2.1**, Product A accounts for most of the traded products, and a large proportion of all trades (42.50%) is made during timeband 10 driven by Product A (accounting for 42.46% of all trades at timeband 10). The percentage of volume for Product A and for timeband 10 have increased by 2% from the last review.

Table 6.2.1 Percentage of Total Traded Volume on all Products across all timebands

Products	Timeband											Total
	1	2	3	4	5	6	7	8	9	10	11	
H	1.63%	0.51%	0.19%	0.10%	0.12%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	2.55%
1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	0.66%	0.76%	0.43%	0.17%	0.14%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	2.17%
4	0.24%	0.42%	0.53%	0.51%	0.76%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	2.54%
O	0.03%	0.05%	0.07%	0.07%	0.35%	0.17%	0.07%	0.04%	0.01%	0.00%	0.00%	0.86%
P	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%
E	0.00%	0.01%	0.01%	0.01%	0.05%	0.07%	0.08%	0.06%	0.03%	0.03%	0.00%	0.34%
S	0.01%	0.02%	0.02%	0.03%	0.13%	0.06%	0.03%	0.01%	0.01%	0.00%	0.00%	0.33%
B	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.00%	0.03%
A	0.00%	0.00%	0.00%	0.00%	0.00%	4.70%	13.32%	14.56%	16.11%	42.46%	0.00%	91.16%
Total	2.58%	1.76%	1.24%	0.90%	1.55%	5.11%	13.51%	14.68%	16.16%	42.50%	0.00%	100.00%

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APPENDIX 2 - REMOVAL OF TIMEBAND 6 AS A WEIGHTED TIMEBAND

1. Rationale behind the proposal

- 1.1 Timeband 6 represents 1.26% of the MIV, compared to 1.18% in the previous review period. The potential removal of timeband 6 as a weighted product was raised and analysed in the 2014 MIDS Review⁷. The ISG recommended that no change should be made to the MIDS. The rationale behind the ISG's decision was the potential internal cost for Parties in making changes to their system to adapt and, having considered the small effect on prices, the benefits around changing the MIDS could be outweighed by the implementation costs. The 2018 MIDS Review is proposing changes to the MIDS due to contract notifications being accepted up to the Submission Deadline at the start of a Settlement Period as opposed to Gate Closure. The potential to remove timeband 6 has therefore been re-evaluated.
- 1.2 According to Principle **f)** from the *Principles to be applied in setting product and time weighting values*, 'Weighting may be set to ensure the Market Index Price is reflective of the price of trades as close as possible to Gate Closure'. Analysis on the Submission Deadline scenario in Appendix 1, would look to amend this principle to refer to the Submission Deadline as opposed to Gate Closure. By removing Timeband 6, the calculation of MIP will be more reflective of trades taken closer to the Submission Deadline.

2. Current timeband scenario:

- 2.1 The current weighted timebands are 1-6 which represent 0 to 12 hours prior to Gate Closure, or 1-13 hours before the start of the Settlement Period.

6						5						4	3	2	1	GC	SP

- 2.2 The proposed Submission deadline scenario in the 2018 MIDS review would change the description of the timebands in the MIDS to refer to the hours from the Submission Deadline as opposed to Gate Closure. This would represent 0-12 hours prior to the Settlement Period of delivery.

6						5						4	3	2	1	SP

- 2.3 The removal of timeband 6 as well as the proposed Submission Deadline scenario would represent 0-8 hours prior to the start of a Settlement Period.

5						4	3	2	1	SP

3. Impact on MIDS

- 3.1 Regarding the weightings, the removal of timeband 6 from the MIP calculation process would be done by changing its current weightings from '1' to '0' as described below on **Table 1**.

⁷ https://www.elexon.co.uk/wp-content/uploads/2013/10/03_ISG160_04_MIDS_Review_2014.pdf

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Table 1: Proposed Live Product and Timeband Weightings

	Product	Timeband											
		1	2	3	4	5	6	7	8	9	10	11	12
Half-Hour	H	1	1	1	1	1	0	0	0	0	0	0	0
1 Hour Block	1	1	1	1	1	1	0	0	0	0	0	0	0
2 Hour Block	2	1	1	1	1	1	0	0	0	0	0	0	0
4 Hour Block	4	1	1	1	1	1	0	0	0	0	0	0	0
Overnight	O	0	0	0	0	0	0	0	0	0	0	0	0
Peak	P	0	0	0	0	0	0	0	0	0	0	0	0
Extended Peak	E	0	0	0	0	0	0	0	0	0	0	0	0
Day Ahead Auction	A	0	0	0	0	0	0	0	0	0	0	0	0

- 3.2 Under the Submission Deadline scenario, timeband 6 represented 247,776 MWh (1.67%) of Market Index Volume. Table A2 displays the total MIV volume of each weighted product under the Submission Deadline scenario from 1 August 2017 to 31 July 2018.

Table 2. Total MIV by Product in the 2017/18 review period under the Submission Deadline scenario

Timeband	Total Volume (MWh)
1	4,232,017
2	3,636,041
3	2,491,010
4	1,720,133
5	2,549,870
6	247,776

- 3.3 **Table 3** shows the proportion of Market Index Volume made up by timeband 6 in the last four years. 2017/18 data contains the proposed Submission Deadline scenario. Under current rules the 2017/18 proportion would be 1.18%. In the last 3 years the proportion of the MIV by timeband 6 has been less than 2%.

Table 3. Proportion of total MIV contributed by Timeband 6

MIDS Review Year	Timeband 6 Volume as a proportion of MIV
2014/15	2.65%
2015/16	1.16%
2016/17	1.18%
2017/18 Submission Deadline	1.67%

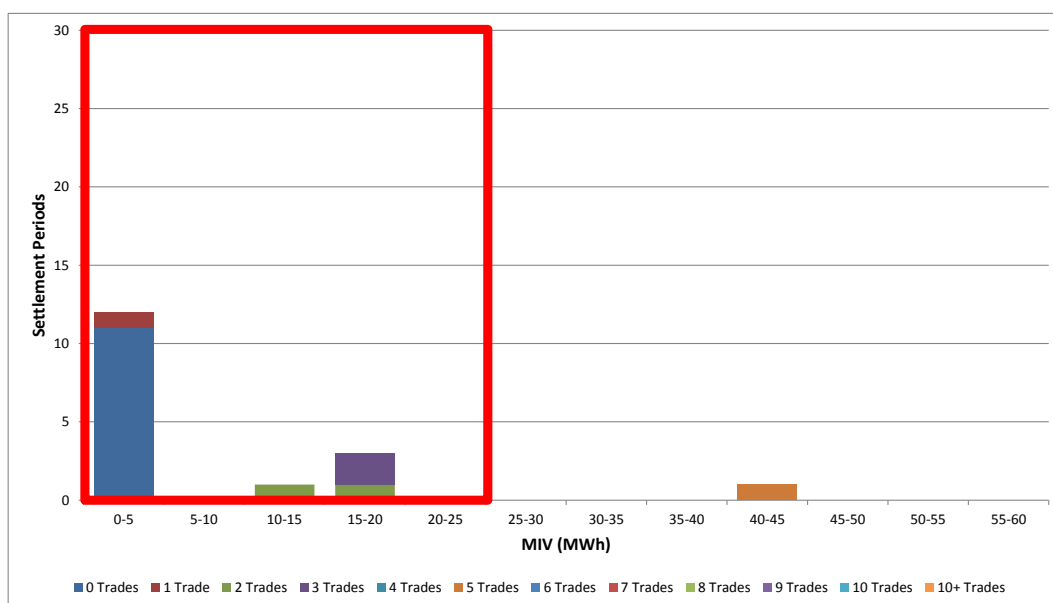
- 3.4 **Table 4** recalculates the daily average MIV with timeband 6 removed. The table works out the difference between the current scenario up to November 2018 and from the Submission Deadline scenario after November 2018. The highest daily average MIV change in April was -25MWh. The daily average MIV differences by month varied between -6MWh and -25MWh.

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Table 4. Daily average MIV for existing MIDS, Submission Deadline scenario and removal of timeband 6. The difference by removing Timeband 6 is calculated from the Average Calculated MIV for August to October and from Submission Deadline scenario from November 2017.

Month	Average Calculated MIV (MWh)	Average Submission Deadline scenario MIV (MWh)	MIV with removal of timeband 6	Difference in MIV (MWh)
Aug-17	682		671	-11
Sep-17	732		724	-8
Oct-17	841		834	-6
Nov-17	626	844	836	-8
Dec-17	655	885	871	-14
Jan-18	691	903	881	-22
Feb-18	663	877	857	-20
Mar-18	739	959	943	-16
Apr-18	736	962	937	-25
May-18	699	932	916	-16
Jun-18	597	808	799	-9
Jul-18	571	791	780	-12

3.5 **Graph 1** displays the number of defaulting Settlement Periods with liquidity below 60MWh in a Submission Deadline scenario, but where only products in Timebands 1-5 have been included. 17 Settlement Periods with MIV under 60MWh compared to 11 under the Submission Deadline scenario. All Settlement Periods under 25MWh were on 28 June 2018. 28 June 2018 had 12 hours downtime on BSC Central Systems due to a technology upgrade.



Graph 1. Count of Trades that the MIP was set by and their respective volumes. The red outlined box highlights Settlement Periods below the ILT.

3.6 With the proposed recommendation to include trades made post-Gate Closure and prior to the Submission Deadline in Market Index Data, weighting principle **f)** would indicate weightings should be allocated as close

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as possible to the Submission Deadline. Timeband 6, in the Submission Deadline scenario, would represent trades made 8-12 hours prior to the start of a Settlement Period. There has been historically low volume, as a proportion of total MIV, in timeband 6 (8-12 hours prior to the close of market trading) as seen in Table 3. The removal of timeband 6 would further aid weighting principle **f**), whilst not compromising ILT principles **e**) (minimising MIP set by a single trade) or **f**) (MIP defaulted in minimum number of Settlement Periods).