DATA REVIEW FOR THE MARKET INDEX DEFINITION STATEMENT 2015

PAPER NAME	MIDS Consultation
Target Audience	BSC Trading Parties
Purpose of paper	For consultation
Deadline for responses	14:00 - 9 September 2015
Summary	The Market Index Definition Statement (MIDS) defines the way the Market Index Price – used to determine the 'reverse' Energy Imbalance Price – is calculated. We review the MIDS annually, as required by the Balancing Settlement Code (BSC). Our analysis shows that the current Individual Liquidity Threshold (ILT), timeband weightings and product weightings remain suitable for 2015/16. We also noted an opportunity to seek views on whether the MIDS will remain fit for purpose following implementation of a Single Imbalance Price in November 2015.
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1. Executive Summary

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. Amongst other things, ELEXON completes the review in order to check that parameters used in the calculations defined in the MIDS (i.e. the Individual Liquidity Threshold (ILT), timeband weightings and product weightings) remain fit for purpose. The current review period covers 1 August 2014 to 31 July 2015.

1.2 The 2015 MIDS review indicates that the current Individual Liquidity Threshold (ILT), timeband weightings and product weightings are suitable. We expect the calculation of Imbalance Prices will rarely use the Market Index Price (MIP) following the implementation of Approved Modification P305 'Electricity Balancing Significant Code Review Developments' in November 2015. We believe the industry should consider alternative data and price calculation methods.

1.3 We use Market Index Base Data (MIBD) which details individual trades on the two power exchanges[1] to review the performance of the parameters in accordance with the principles defined in the MIDS. Our detailed analysis is in Appendix 1 to this paper. In summary, our key findings are:

- **Volume**: The average Settlement Period Market Index Volume (the traded volume across weighted timebands and products[2]) was 693MWh during the review period which has increased by 73MWh from the previous year (620MWh). See Appendix 1, Chapter 2 for more information.

[1] APX and N2EX
[2] 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

- **Individual Liquidity Threshold (ILT)**: Over this review period, the traded volume was below the ILT in three out of 17520 Settlement Periods. This small number of defaulting periods demonstrates that the current 25MWh threshold remains suitable. See Appendix 1, Chapter 3 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 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.
    - **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 weighting is suitable.
    - **Products**: The weighted products are those of half hour, 1 hour, 2 hour and 4 hour duration. The analysis indicates that the current timeband weighting remain suitable in accordance with the MIDS principles.

2. Opportunity to change the MIDS

2.1 Currently the Market Index Data (MID) is used to calculate the Market Price, i.e. the reverse Energy Imbalance Price. This applies to almost every Settlement Period. Currently, two Market Index Data Providers (MIDPs) provide the MIDS data (Market Index Data (MID)).

2.2 We expect that the Market Price will rarely be used after Approved Modification P305 'Electricity Balancing Significant Code Review Developments' is implemented in November 2015. It will only apply when the Net Imbalance Volume (NIV) equals zero. NIV has been zero in three Settlement Periods since January 2001. These occurred on:

- 5 September 2007, Settlement Period 8. There were no Bid or Offer Acceptances;
- 22 September 2009, Settlement Period 10. There were no Bid or Offer Acceptances; and
- 10 May 2015, Settlement Period 7. Eight Balancing Services Adjustment Actions and 31 Bid/Offer Acceptances were all 'tagged' leaving zero volume in the price calculation.

2.3 Delivery of the MID has an annual cost of circa £330,000 (plus additional operational costs). Considering the expected infrequent use post November 2015, we believe this area warrants review.

2.4 However, the publishing of MID, in particular Market Index Prices, is believed to be useful for industry as a whole. For example, participants use the data as a reference within commercial contracts. Also, the BSC and BMRS provide a convenient independent location for Parties and other consumers to view and verify market data.

2.5 The ISG approved ELEXON's plan to consult BSC Parties and other interested market participants about the future of the MIDS and their use of MID, and recommended that an Issue Group would be the most suitable way of monitoring and reviewing the need for change. In any case, the MIDS is reviewed at least every 12 months as required by the BSC.

2.6 If the Issue Group findings are that the current MIDS are not fit for purpose, it could decide to change weightings on products and timebands used to calculate the Market Index Price.

3. ISG Views

3.1 The ISG has reviewed the analysis as presented at the August ISG meeting and noted the relevance of the current parameters used to calculate the Market Index Price.

3.2 The ISG noted that the future of the MIDS had been discussed and consulted on during Modification P305 Working Group meetings and it was agreed to leave the MID untouched by Modification P305 and to instead investigate this separately.

3.3 The ISG noted that there was a significant cost incurred by BSC Parties around providing the MIDS data. Considering that, the possibility to change or remove the MIDS should be reviewed as part of an Issue Group to determine the way forward after Modification P305 implementation in November 2015.

3.4 The ISG requested for the cost associated with providing the MIDS to be added in the Consultation Proforma to be considered by Parties when answering the questions on the future use of the MIDS. Additionally, the ISG asked for Parties to indicate potential alternative sources of data for market prices if the MIDS were to change or be removed.

DATA REVIEW FOR THE MARKET INDEX DEFINITION STATEMENT 2015

Appendix 1 – Market Index Base Data Analysis

Chapter 1 - Background Information

- Definitions of the terminologies used in the review

Chapter 2 - 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 Period

Chapter 3 - Analysis of the Individual Liquidity Threshold (ILT)

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

Chapter 4 - Analysis of the timeband and Product Weightings

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

Chapter 5 - Analysis All Products and timebands

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

DATA REVIEW FOR THE MARKET INDEX DEFINITION STATEMENT 2015

1. Background Information

1.1 We calculate a 'reverse' Energy Imbalance Price for every Settlement Period and use this for Energy Imbalance Settlement. The aim is for this 'reverse' price to reflect the price of wholesale electricity in the short term market for Great Britain.

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. A power exchange can provide data to us by becoming a Market Index Data Provider (MIDP). As a MIDP they calculate Market Index Data (MID), which consists of a half hourly price and volume. The calculation process is defined in the Market Index Definition Statement (MIDS).

1.3 The Market Index Definition Statement defines:

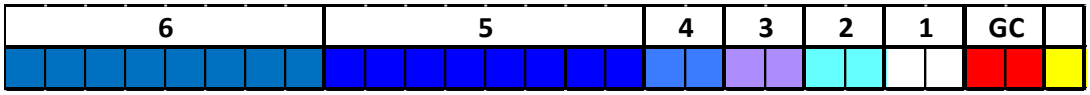
- The overall price (Market Index Price) and volume (Market Index Volume) calculation process
- A volume threshold (Individual Liquidity Threshold), below which the default rules are applied
- A list of power exchange products that are included in the calculation
- A list of timebands which group trades according to how long before Gate Closure they are made
- Weightings which reflect the importance of the products and timebands
- 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 when there is insufficient trading on the power exchange to provide a suitable price. The aim is to avoid the price being set on 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 When the volume traded in a half-hour is greater than the ILT, 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. The Market Index Price (MIP) is the volume weighted average price of the trades. Where the volume does not meet the ILT, the MIP and MIV default to zero.

1.6 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 is four hours in duration. Timeband 1 is the final hour up to Gate Closure. These timebands are shown in **Diagram 1** below.

Diagram 1: Timeband 1 to 6.



1.7 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.

1.8 **Weightings** are applied to reflect the importance of each product and timeband and are currently 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**.

Table 1: Live Product and timeband Weightings

		Timeband											
	Product	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

2. Analysis of the Market Index Volume (MIV)

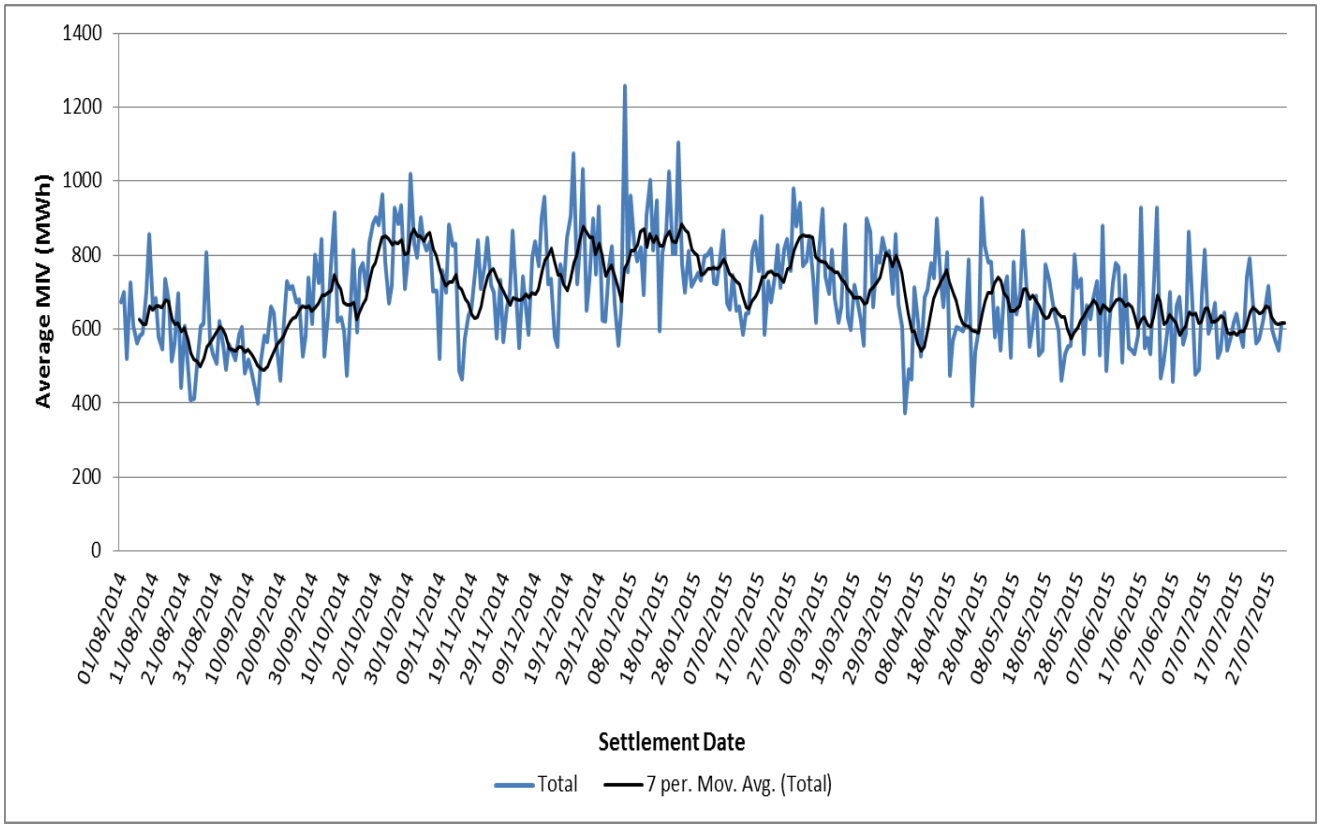
2.1 Market Index Volume (MIV) is the traded volume across the '1' weighted products and within '1' weighted timebands. The weightings are displayed in **Table 1**.

2.2 The daily average MIV was 693MWh over the review period, which has increased by 73MWh from the previous annual review which had an average of 620MWh.

2.3 **Graph 1** displays the daily average MIV throughout the review period. We witness a comparable overall shape to the previous review, although flatter and with higher volumes over the whole year. The MIV reached a peak in January at 1,258MWh, compared to the usual October peak. Last year's analysis is available on the ELEXON website here:

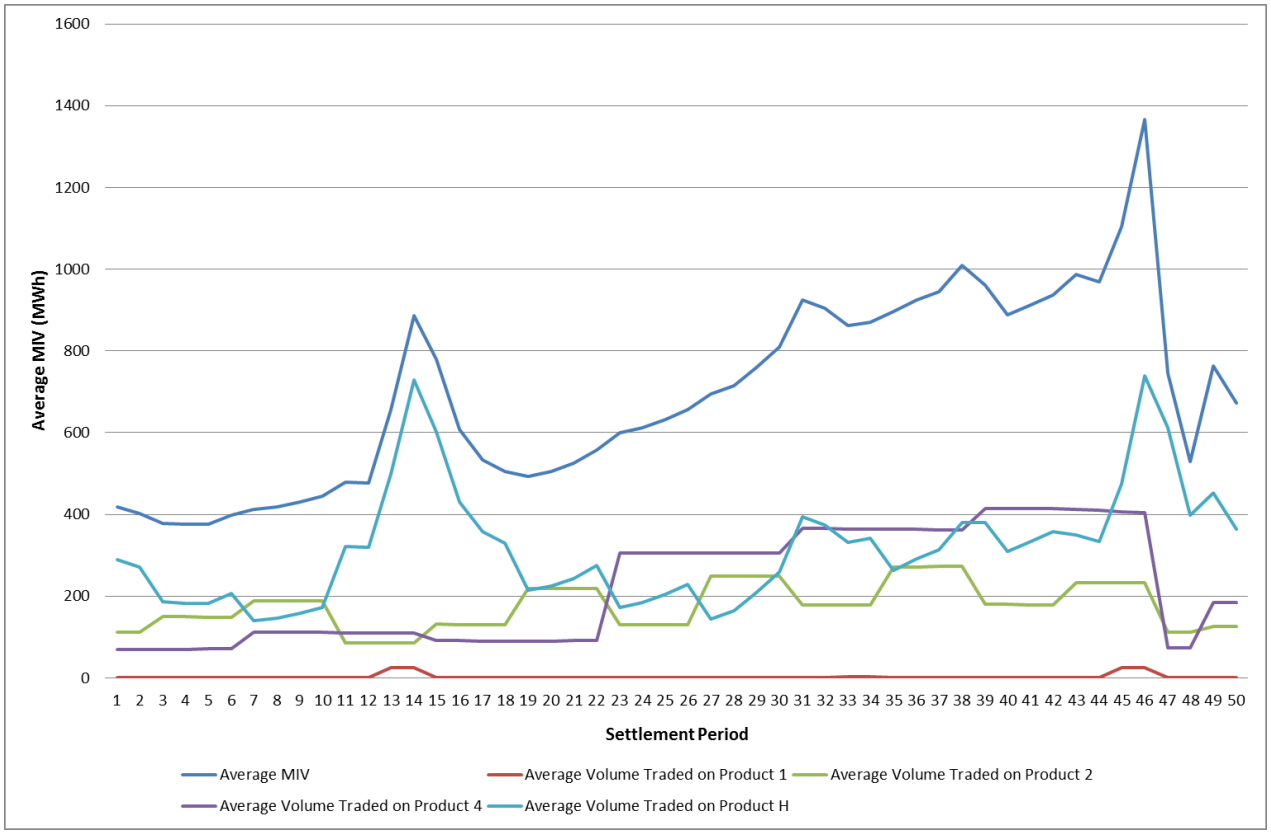
https://www.elexon.co.uk/wp-content/uploads/2013/10/03_ISG160_04_MIDS_Review_2014.pdf

Graph 1: Daily Average Market Index Volume by Settlement Date



2.4 **Graph 2** shows the average MIV and average volume traded on each weighted product '1' by Settlement Period. Similar to the previous review, the Settlement Period average MIV increased through the day and peaked in Settlement Periods 14 and 46, where the volume traded on the Half Hour Product (H) peaks. Graph 2 shows that the One Hour Product had the least traded volume in comparison to the other products.

Graph 2: Average Market Index Volume by Settlement Period



3. Analysis of the Individual Liquidity Threshold (ILT)

3.1 We carried out the analysis using the live products and timeband weightings specified in **Table 1**.

3.2 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.

3.3 The ILT must be set in accordance with the MIDS principles. We have analysed historic data to consider each of the principles and the results confirm that 25MWh is a suitable value. 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 historic 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.

3.4 Currently both MIDPs have the value of 25MWh set, so principle **a)** is met.

3.5 The analysis shows that the ILT could be set to zero as per principle **b)** which would also meet principle **f)**. However, since no Settlement Period have defaulted throughout the year, reducing the ILT to zero would not improve any of the 17,520 Settlement Periods of that review period and this would also increase the likelihood that the MIP to be set on a single trade **e)**. In the current review period, no Settlement Periods – defaulted or otherwise - had the MIP based on a single trade. Principle **c)** allows the ILT to change across different periods, however, this would not impact any Settlement Periods and, as mentioned, could result in principle **e)** being compromised.

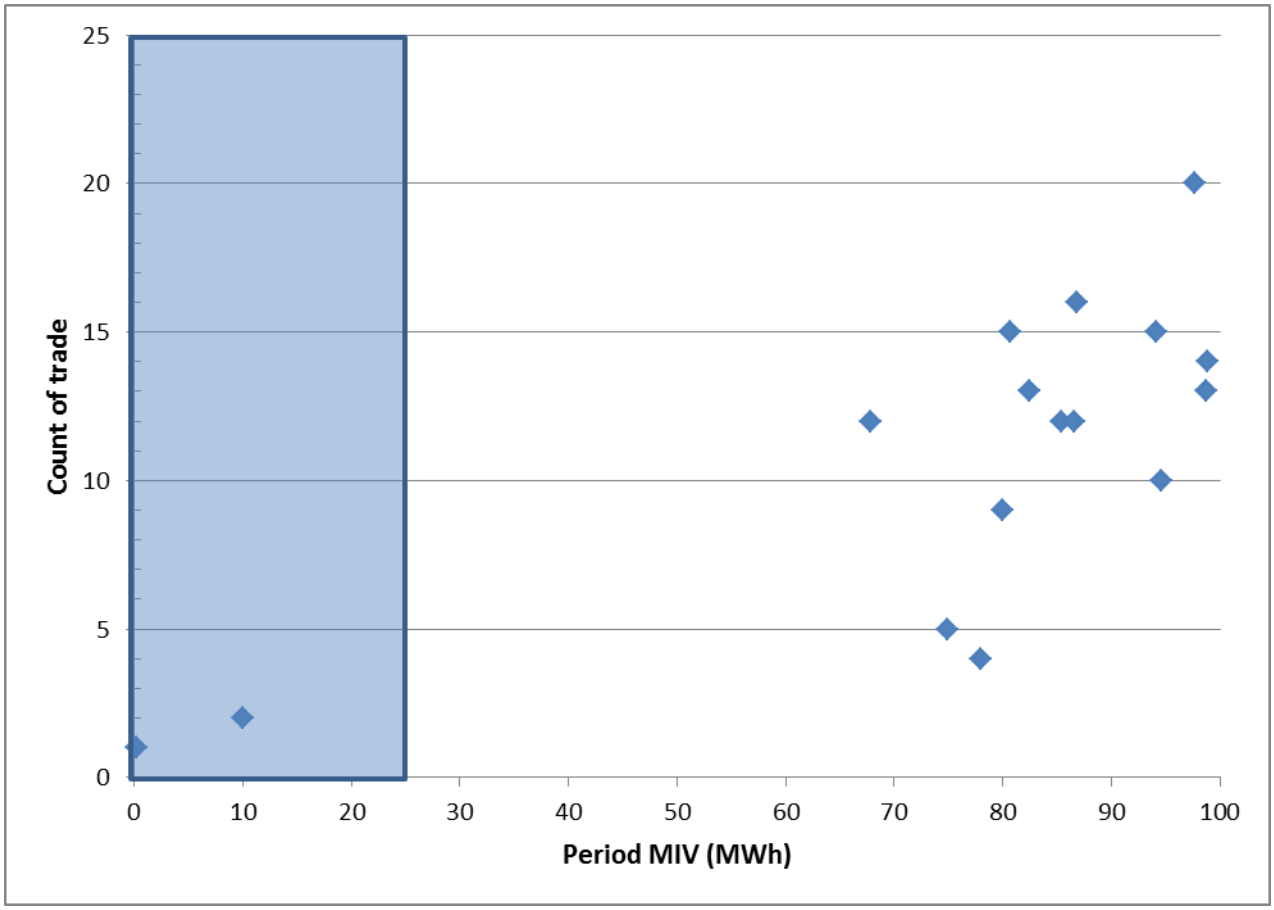
3.6 **Table 2** shows the number of defaults in the recent MIDS Reviews. Over the 2014 review period, no Settlement Periods were defaulted to the Main Price.

Table 2: Defaulted Settlement Periods

Review Periods	No. of Defaulted Settlement Periods
2006	38
2007	52
2008	5
2009	2
2010	6
2011	11
2012	6
2013	2
2014	0
2015	3

3.7 **Graph 3** shows the count of trades for Settlement Periods where the volume of trades was below 100MWh and that the MIP was not set by a single trade. Note that two of the defaulting Settlement Periods had a MIV of 10MWh which explains that only two instances are visible on **Graph 3**.

Graph 3: Count of Trades that MIP is set by under current parameters



3.8 As explained above, the historical data shows that three Settlement Periods have defaulted in the current review period, and also the MIP was not set by a single trade, therefore the current ILT of 25 MWh meets the principles and should remain unchanged. The data analysis of **Table 2** indicates that principle **d)** is met as an annual review of the defaulted Settlement Periods is made to ensure it is still relevant.

4. Analysis of the Timeband and Product Weightings

4.1 The analysis was carried out using the '1' weighted products and timebands specified in the live version of the MIDS. This is also shown in **Table 1**.

4.2 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.

4.3 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.

4.4 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.

4.5 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.

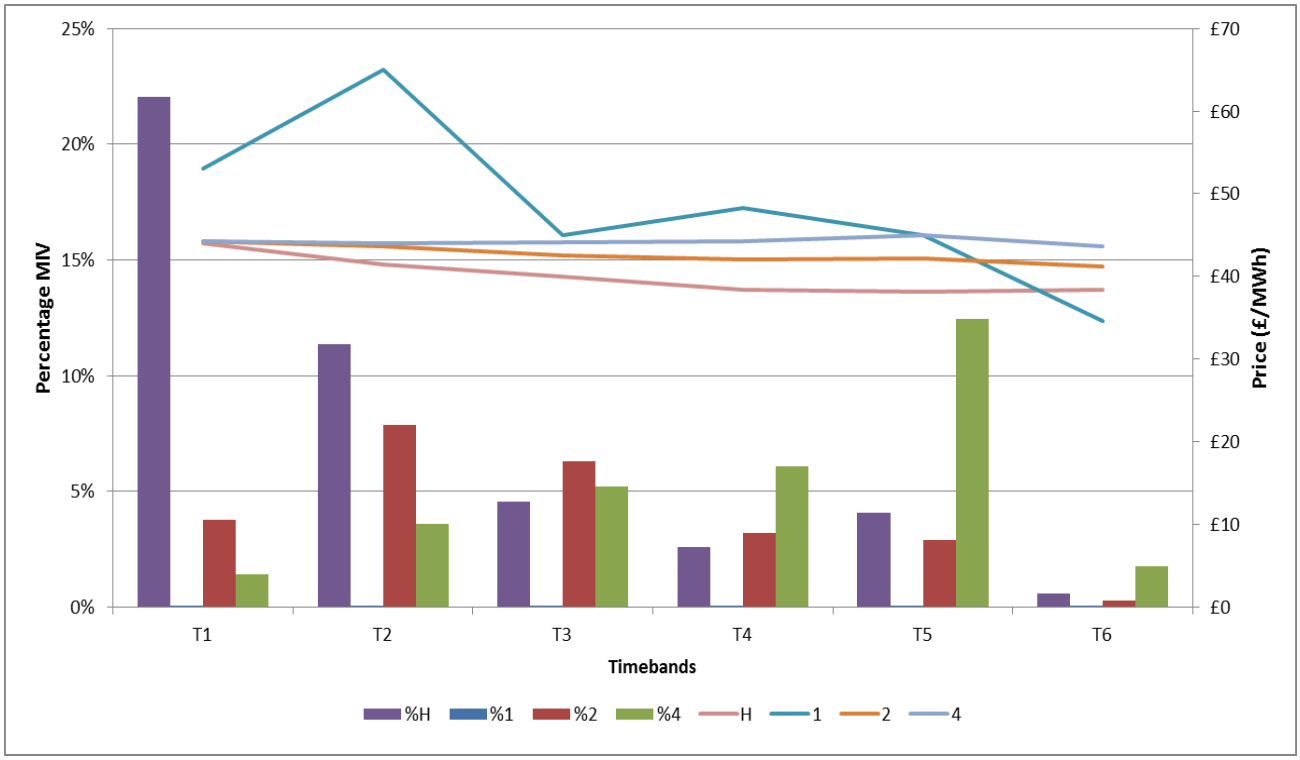
4.6 **Graph 4** shows the price curve for the '1' weighted products in each timeband. It can be seen that the average price was flat from timeband 6 towards Gate Closure (from right to left) for Product H, 2 and 4. The average price for Product 1 varies due to a lower number of trades on this product (0.001% of all volume traded over the six timebands). Product 1's average price has increased toward Gate Closure which is the opposite situation as the one observed during the last review.

4.7 **Graph 4** also 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 dominated in timebands 1 and 2;
- The volume traded on the 2-Hour Product was mainly captured in timebands 2 and 3; and
- Traded volume on the 4-Hour Product was mainly dominating in timebands 4 and 5.

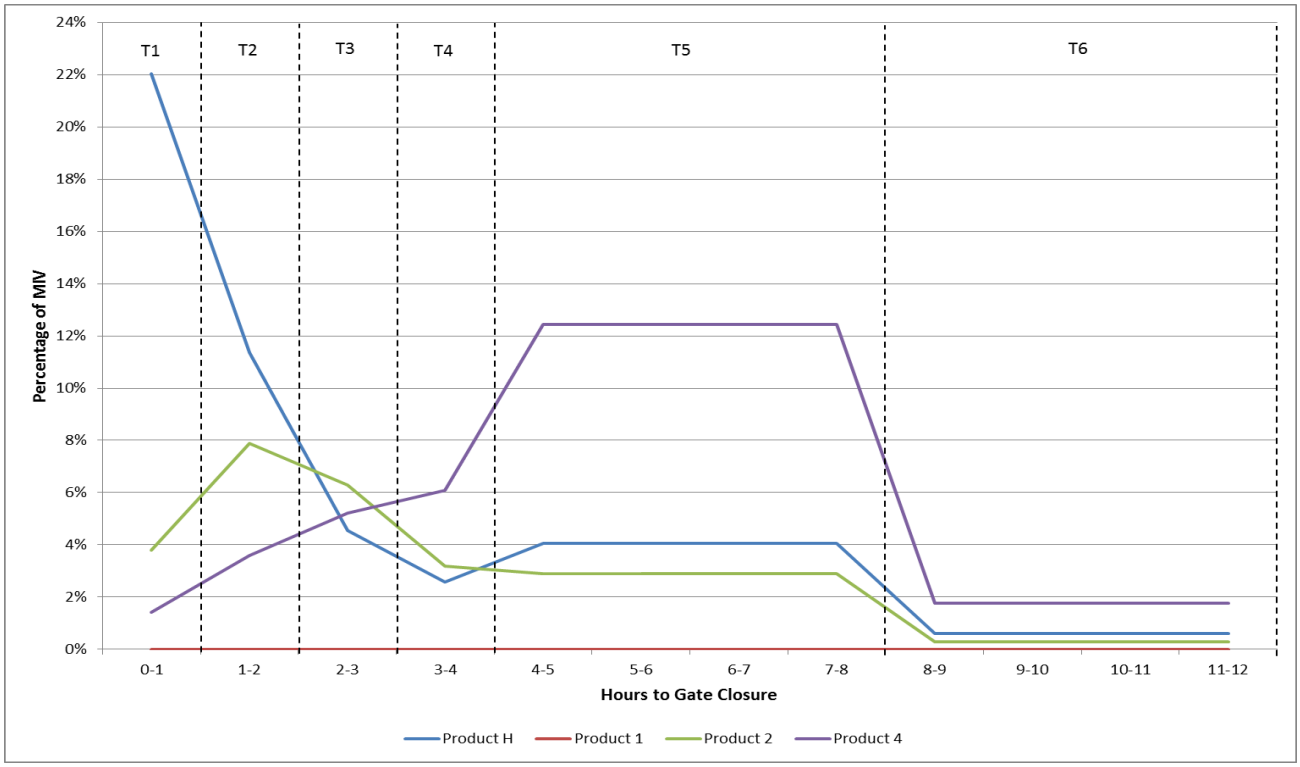
It is worth noting that timebands 5 and 6 are of four hours duration compared to 1 to 4 which are only one hour as highlighted in **Diagram 1**.

Graph 4: Average Price and Percentage of Market Index Volume by timeband



4.8 **Graph 5** shows the same information as **Graph 4**, 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. The pattern shown in **Graph 5** remains the same as the one noted during the previous review for all Products with a small increase in Products H (+0.6%) being traded during timeband 5 compared to last year's review.

Graph 5: Percentage of Market Index Volume by Time (hours) to Gate Closure



5. Analysis of All Products and Timebands

5.1 All of the MIDS products are detailed in **Table 3** below and, so far, we have looked at 4 of the 9 products, as the weight of the others remains '0'. The analysis considers all of the products listed below except for the Auction Product (which is considered separately as the volume traded on this product is significantly larger than the other products).

Table 3: Products referenced in the MIDS

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
Base Day	**B**	24
Day Ahead Auction	**A**	1

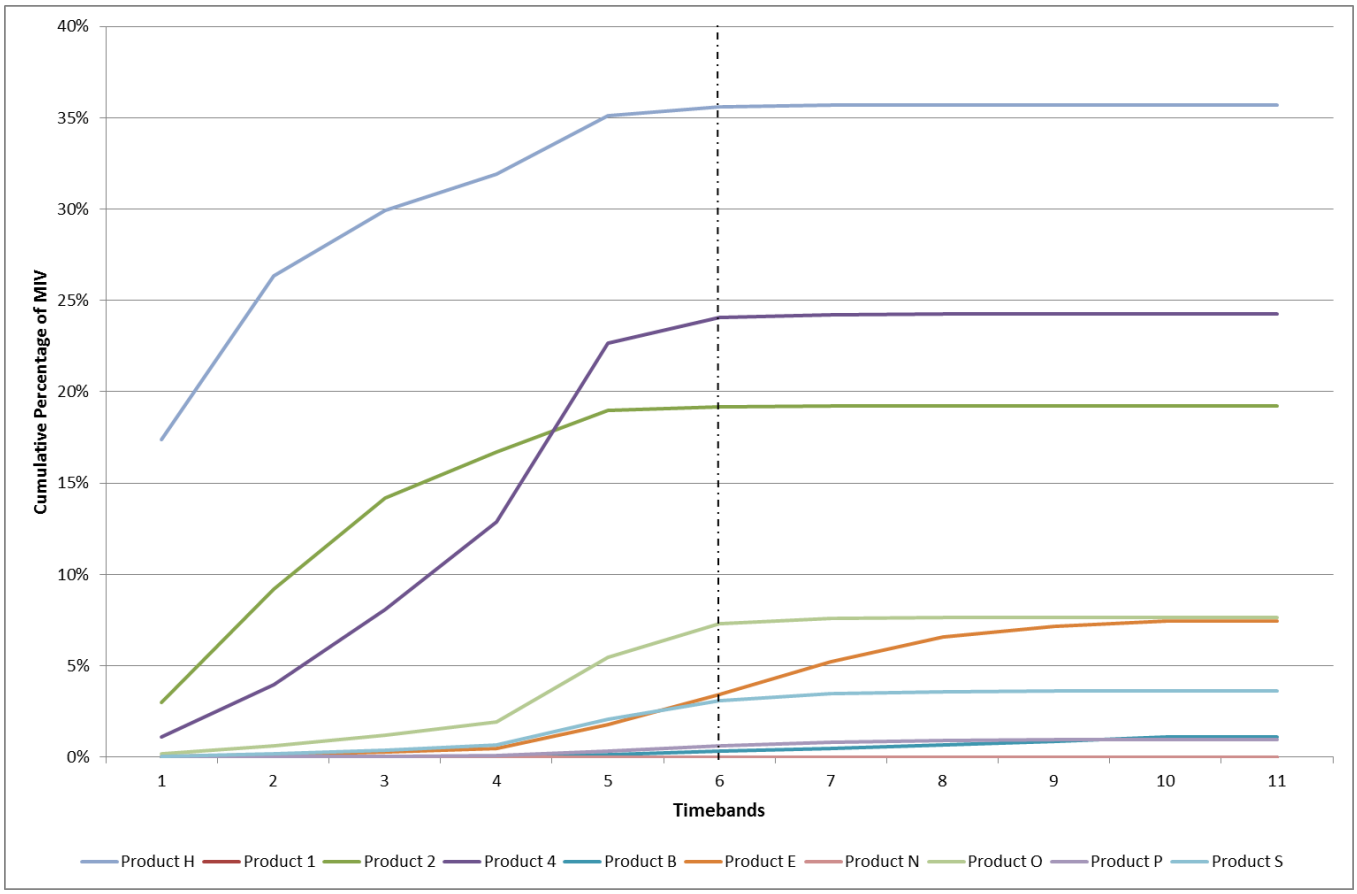
5.2 We have reviewed data for trades up to three Calendar Days ahead of Gate Closure and this period is broken down into 12 timebands. We have already discussed timebands 1-6 which cover trades made up to 12 hours ahead of Gate Closure. We will now consider timebands 1-12 to confirm the relevance of the current weightings. Note that no trades were made on timeband 12 during this review period.

5.3 **Graph 6** 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.

5.4 The volume traded on the Overnight Product is visible from timebands 5 onwards, which is similar to that noted in the previous review. Previous consultations with industry on including this product have not resulted in any change to its weighting due to the risk of flattening or 'smoothing' effect.

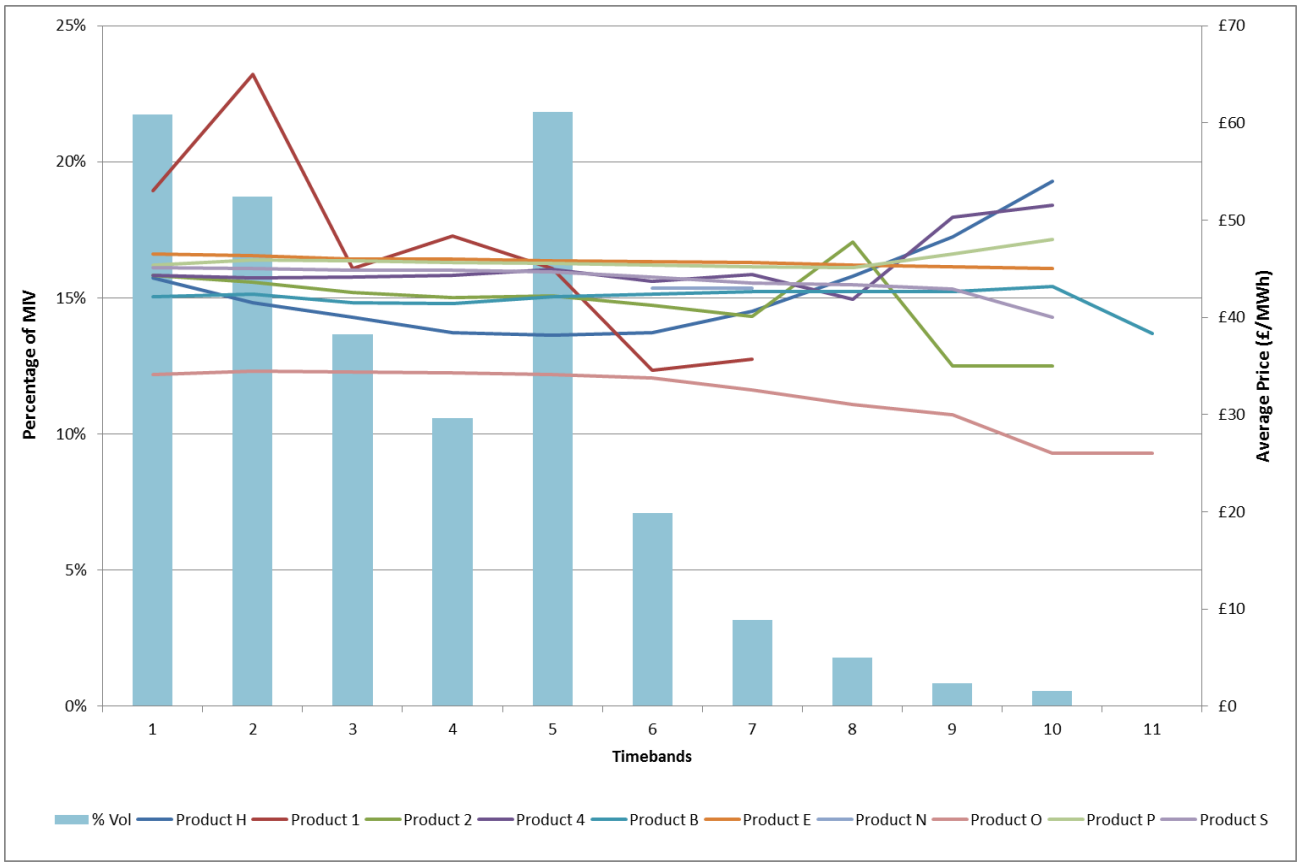
5.5 Trades on Product 4 have significantly increased on timeband 5 with a 3.5% increase compared to last year's review, accounting for 24.7% of all volumes traded over all products and timebands.

Graph 6: Cumulative Percentage of Total Trade Volume on all Products across all timebands



5.6 **Graph 7** 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 5 (accounting for 21.82% of the total trade) followed by timeband 1 (21.75% of all trades). This is largely due to the volume traded on the Base Day Product as shown in the previous graph. The Base Day Product is 24 hours in duration. The Total volume traded at timeband 11 has dropped since last review and there wasn't any volume traded in timeband 12 during this review period.

Graph 7: Percentage of total volume traded in each timeband



6. Day Ahead Auction Product

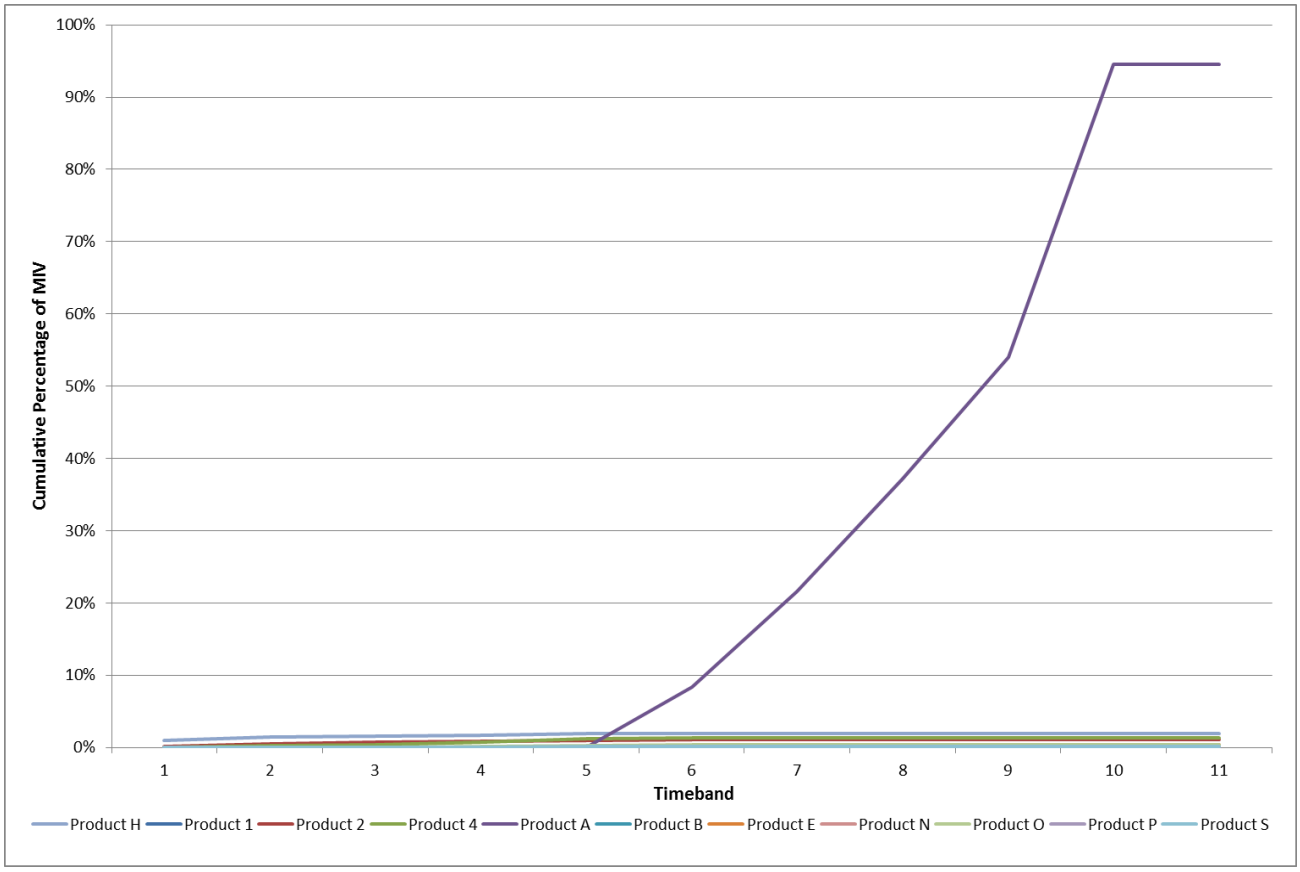
6.1 The Day Ahead Auction Product is a blind auction where buyers and sellers enter anonymous orders for each hourly period from 23:00 to 23:00. The auction market closes at 10:30, after which the orders are matched for each hourly period. The time that the orders are matched gives the trade time used in calculating the timeband for the trade.

6.2 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.

6.3 **Graph 8** shows that the Auction Product accounted for 94.55% of total traded volume during the review period. The product only applies to one weighted timeband, timeband 6. Unlike the other products this product is not traded in timebands 1 to 5 that are closer to Gate Closure.

6.4 Considering the current market liquidity and weighting principle **f)**, the current '0' weighting on the Auction Product remains suitable.

Graph 8: Cumulative Percentage of total traded volume on all Products (including A) across all timebands



6.5 **Table 4** shows the total traded volume on all products across all timebands. As outlined in the above **Graph 8**, Product A accounts for most of the traded products and, overall, a large proportion or all trades (40.52%) is made during timeband 10 driven by Product A (accounting for 40.49% of all trades at timeband 10).

Table 4: Percentage of Total Traded Volume on all Products across all timebands

Products	Timebands											
	1	2	3	4	5	6	7	8	9	10	11	12
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	0.16%	0.34%	0.27%	0.14%	0.12%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4	0.06%	0.15%	0.22%	0.26%	0.53%	0.08%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
A	0.00%	0.00%	0.00%	0.00%	0.00%	8.40%	13.22%	15.60%	16.84%	40.49%	0.00%	0.00%
B	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.00%	0.00%
E	0.00%	0.01%	0.01%	0.01%	0.07%	0.09%	0.10%	0.07%	0.03%	0.02%	0.00%	0.00%
H	0.95%	0.49%	0.20%	0.11%	0.17%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
N	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
O	0.01%	0.02%	0.03%	0.04%	0.19%	0.10%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%
P	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%
S	0.00%	0.01%	0.01%	0.01%	0.08%	0.06%	0.02%	0.01%	0.00%	0.00%	0.00%	0.00%
Grand Total	**1.19%**	**1.02%**	**0.75%**	**0.58%**	**1.19%**	**8.79%**	**13.39%**	**15.70%**	**16.89%**	**40.52%**	**0.00%**	**0.00%**