

Review of the Market Index Definition Statement

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Overview or Purpose of Document:

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 BSC.

The MIDS defines a set of principles to which threshold and weighting parameters are applied to determine the data that is included in the price calculation. In this paper we present analysis on the performance of these parameters in meeting the principles.

Our analysis shows that the Individual Liquidity Threshold and product/timeband weightings specified in the current MIDS remain suitable.

The Imbalance Settlement Group (ISG) has recommended that no change should be made to the MIDS.

Your responses to this consultation will be presented to the ISG in September when they will be invited to make a final recommendation on the MIDS to the BSC Panel. The consultation responses need to be submitted by **17:00 on Thursday, 9 September 2010**.

Target Audience:

All Parties and other interested parties in connection with the MIDS.

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Summary

We have carried out the annual MIDS Review and the analysis indicates that the current parameters are suitable, and therefore should remain unchanged. To perform the analysis, we used Market Index Base Data (MIBD), which details individual trades made on the power exchange. Our key findings were:

- **Volume** – The average Market Index Volume (the Traded Volume across weighted timebands and products) has increased by 14MWh to 539MWh per Settlement Period. See Appendix 1 Section 2 for more information.
- **Individual Liquidity Threshold** – There were 6 Settlement Periods where the Traded Volume was below the ILT. This represents 0.03% of all Settlement Periods in the review period. The current value of the ILT – 25MWh – remains suitable.
- **Weighting values** – The weightings are currently either '1' or '0', where '1' results in the data being included and '0' excluded.
- **Timebands** – The '1' weighting of timebands 1 to 8 include all trades within 20 hours of Gate Closure. The current timebands remain suitable as 98.5% of the total volume is traded within timebands 1 to 8. See appendix 1 sections 4 to 6 for more information.
- **Products** – The weighted products are those of half hour, 2 hour and 4 hour duration. These remain suitable as they meet the key criteria within the MIDS, and account for 78% of the volume in the weighted timebands. See appendix 1 sections 4 to 6 for more information.
- **New MIDP** – From September a second MIDP will be providing Market Index Data. See section 7 for more information.

We have found that the current Individual Liquidity Threshold, timeband and product weightings are appropriate in determining the Market Index Data Price and Volume in accordance with the principles of the MIDS.

The ISG has reviewed our analysis and has recommended for consultation, that no change is made to the MIDS. A summary of the ISG discussions is provided on the next page.

ISG Views

The ISG has reviewed the MIDS analysis set out in this document, and recommended that no changes be made.

A minority view within the ISG was that the Overnight product should also have a '1' weighting. This product accounts for 10% of the total volume traded and in the overnight period (23:00 – 07:00), product O makes up 33% of the volume traded. This is a significant proportion and trades on this product are taken into consideration by Parties in their planning. Therefore the minority view was that this product should be included in the calculation of the Market Index Price. Also, including this product would increase liquidity in the overnight period.

The majority view of the ISG was that the current weighted products – H, 2 and 4 – provide sufficient liquidity at the moment and represent short term trading of electricity on the power exchange.

The ISG recommended for industry consultation that no change should be made to the MIDS.

Market Index Base Data Analysis

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, 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 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 selected 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 1-8 are used to calculate the MIP. Timeband 8 begins 20 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: Timebands 1 to 8.



1.7 The current MIDS sets the **products** to be included in each half hourly price and volume calculation as the half hour, 2 hour and 4 hour products traded within 20 hours of Gate Closure (timeband 8).

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.

1.9 **Table 1: Current Product and Timeband Weightings**

		Weightings												
		Timeband												
	Product	1	2	3	4	5	6	7	8	9	10	11	12	13
Half-Hour	H	1	1	1	1	1	1	1	1	0	0	0	0	0
2 Hour Block	2	1	1	1	1	1	1	1	1	0	0	0	0	0
4 Hour Block	4	1	1	1	1	1	1	1	1	0	0	0	0	0
Overnight	O	0	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	0
Extended Peak	E	0	0	0	0	0	0	0	0	0	0	0	0	0

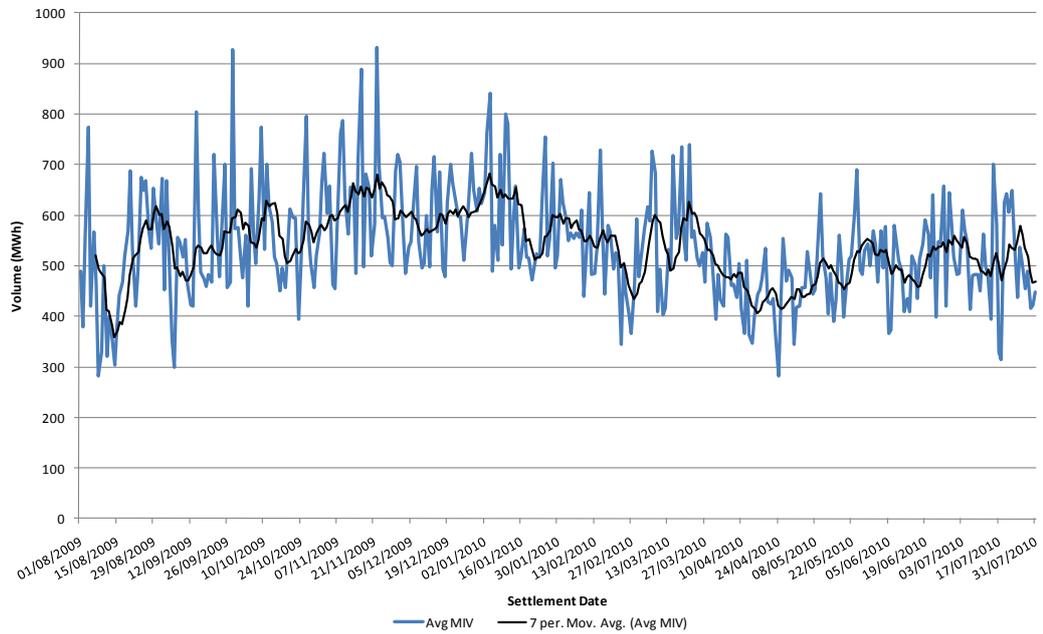
1.10 The MIDS parameters must be set according to historic data. In this review we have used base data for the period 1 August 2009 to 31 July 2010. If the historic data shows that a change to the MIDS is required, the change will need approval by the Panel and ultimately the Authority.

2 Market Index Volume

2.1 Market Index Volume is the Traded Volume across the '1' weighted products and timebands. Hence products H, 2 and 4 up to timeband 8 (20 hours before Gate Closure).

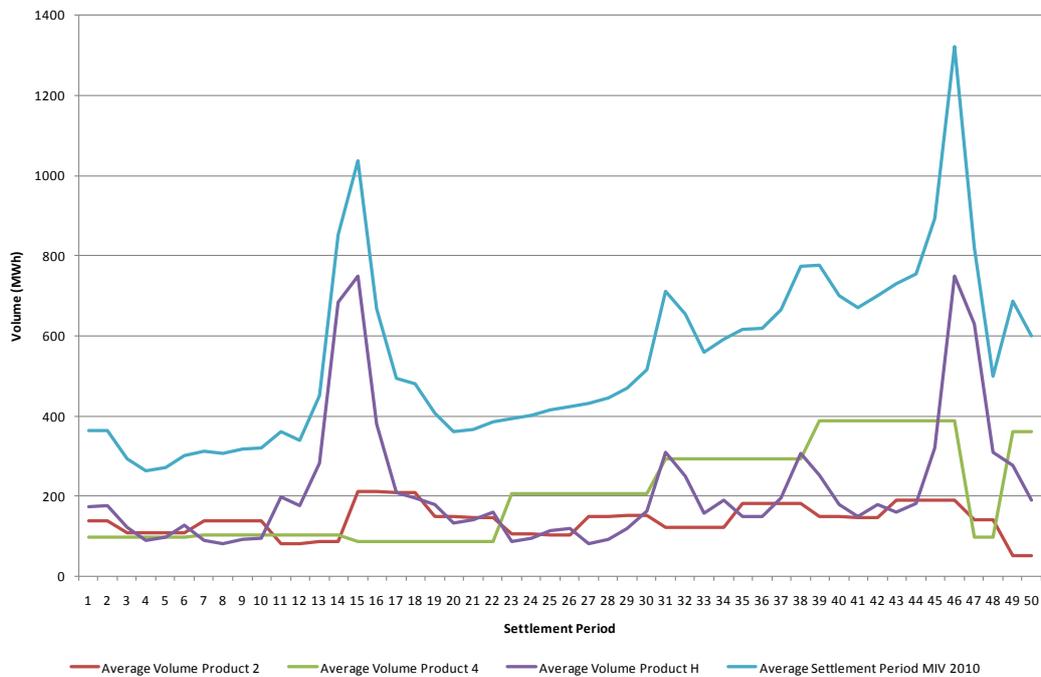
2.2 The overall average of the Market Index Volume (MIV) has risen in this review period. Previously it was 525MWh, and this has increased to 539MWh. Graph 1 shows the daily average MIV throughout the review period. This has been between 500MWh and 600MWh for the majority of the period. This is similar to the previous review.

2.3 **Graph 1: Average Settlement Period MIV by Settlement Date**



2.4 Graph 2 displays the average MIV and volume for products H, 2 and 4 in timebands 1-8 by Settlement Period. The half hour product dominates the MIV in the morning peak and also around Settlement Period 47. The trends are very similar to those evidenced in the last review – with the least volume across Settlement Periods 1 to 12.

2.5 **Graph 2: Average MIV by Settlement Period**



3 Individual Liquidity Threshold

- 3.1 The Individual Liquidity Threshold (ILT) is 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.
- 3.2 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.
- 3.3 Currently, we have a single MIDP, APX Commodities Limited; therefore principle (a) above is met. See section 7 for more information about MIDPs.
- 3.4 The analysis shows that the ILT could be set to zero as per principle (b) which would also meet principle (f). However if we reduce the ILT to zero it would only improve six Settlement Periods out of 17520 in the review period whilst increasing the likelihood that the MIP could be set on a single trade (e), as two of the defaulted Periods only had single trades take place. Principle (c) allows the ILT to change across different periods. However, this would only impact 6 periods, and as mentioned could result in principle (e) being compromised.

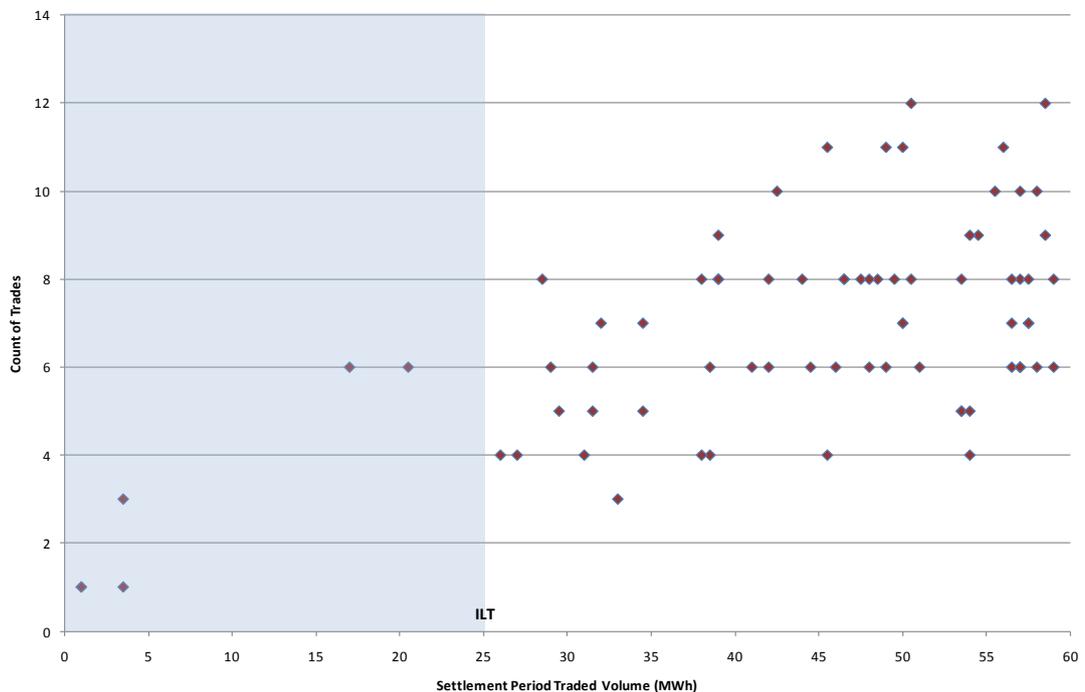
Table 2: Defaulted Settlement Periods

Review	No. of Settlement Periods below ILT
2006	38
2007	52
2008	5
2009	2
2010	6

- 3.5 Over the review period, where MIV has been above the ILT, the MIP has not been set on a single trade. Graph 3 shows that there is a risk of this happening, as in one period,

it was set on 3 trades. However, this is not a significant risk as it represents 1 in 17520 Settlement Periods.

3.6 **Graph 3:** Count of trades that MIP is set by



3.7 We analysed the average count of trades to look for periods of low liquidity and the data exhibits the same pattern as per the previous review. We found that there was an average of 20 trades across Settlement Periods 1-12 compared to the remainder of the day which averaged 37 trades.

3.8 The historic data (d) shows that the current ILT of 25 MWh meets the principles to be applied in setting the ILT.

4 Timeband and Product Weightings

4.1 The timeband and product weightings determine which trades are included in the MIP and MIV calculation. The weightings were introduced in section 1 where table 1 displays the current product and timeband weightings. Like the ILT, the timeband and product weightings are set in accordance with a set of principles detailed in the MIDS. We have considered each principle in this review and the results show that the current weightings remain suitable.

4.2 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 (e.g. 4 Hour blocks, Half Hour blocks);
- 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';
- 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.

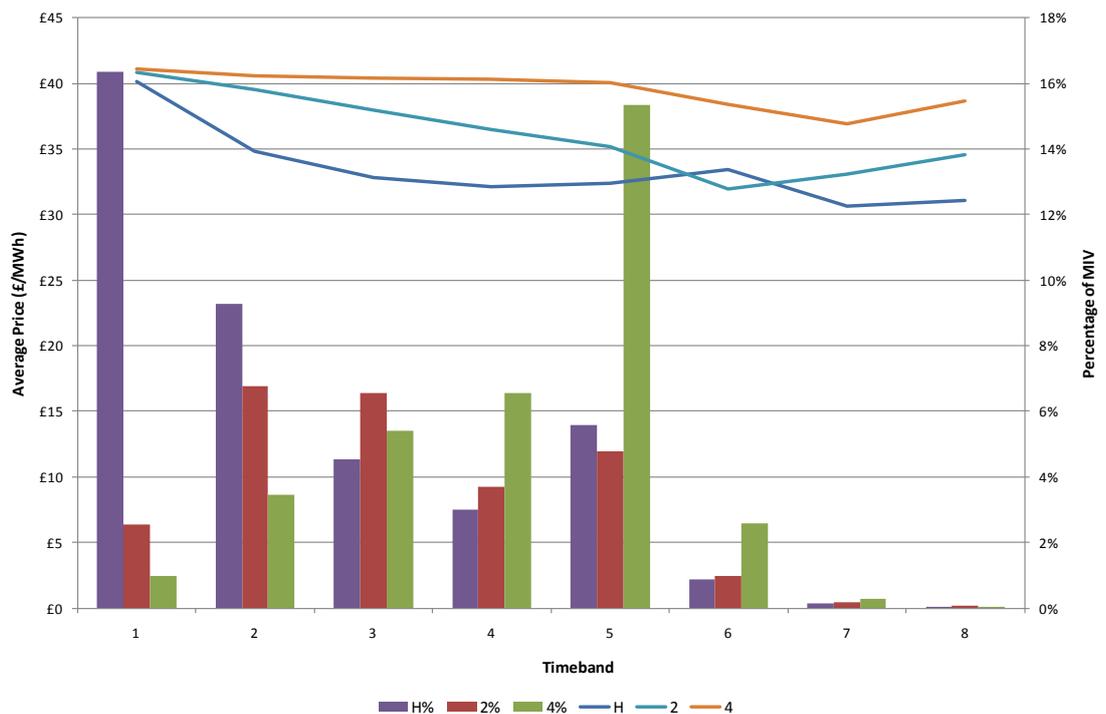
4.3 A number of the principles - **(a), (b), (c), (d), (e), (h)** and **(i)** - are already met under the current operation. The remaining principles **(f)** and **(g)** are considered below.

5 '1' Weighted Products and Timebands

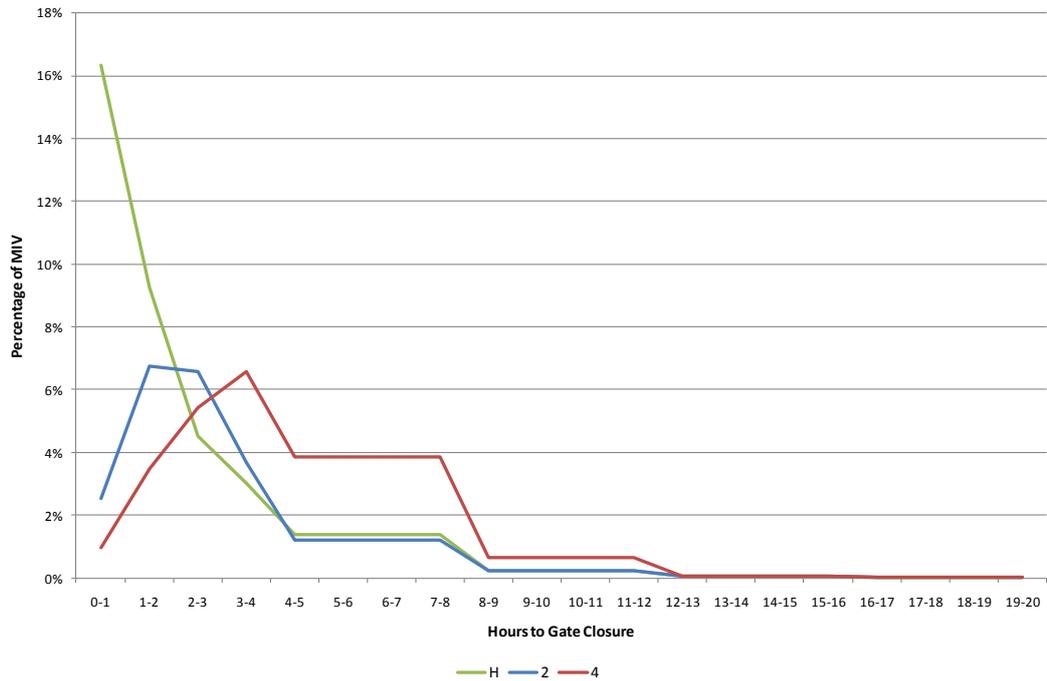
- 5.1 The MIDP calculates a Market Index Price and Volume using the weighted products and timebands when the Market Index Volume is above the 25 MWh ILT. The '1' weighting is applied to products H, 2 and 4 in timebands 1 to 8 which results in trades relating to these product and timeband combinations being used to calculate the MIP and MIV.
- 5.2 Graph 4 shows the price curves for the '1' weighted products and the volume traded in each timeband. Note that the x-axis is not completely to scale as timebands vary in duration (see diagram 1 in section 1). The curves display similar characteristics to previous reviews, increasing in price from timeband 5 towards Gate Closure (from right to left). There is a noticeable reduction in prices year on year reflecting market conditions.
- 5.3 In theory, we may consider the optimum price signal to be provided by product H traded in the Settlement Period before Gate Closure. This would give the wholesale price of 'short term' energy as close to real time as possible for a particular Settlement Period. However, this would not provide sufficient liquidity. Graph 4 shows that only 16% of the MIV comes from the half hour product 1 hour ahead of Gate Closure. This is why additional timebands further away from Gate Closure and other products are included.
- 5.4 Product H displays the expected characteristics of 'Short Term' energy trading. The price and volume of trades increases towards Gate Closure. This is caused by supply and demand factors with a diminishing number of trades likely to be available closer to Gate Closure.

- 5.5 Principle (f) states that the weightings may be set to ensure that the MIP is reflective of the price of trades as close as possible to Gate Closure. Graph 4 displays a very low traded volume across timebands 7 and 8. It could be argued that these should be weighted at '0', and the data shows that removing the weightings from these timebands would not have impacted the number of Settlement Periods that were below the ILT.
- 5.6 Considering the MIP calculation, and noting that the MIP is a weighted average price, these timebands have less impact on the MIP due to the lower volumes. Therefore we do not see any significant benefit in removing the weighting of '1' from timebands 7 and 8.
- 5.7 Graph 5 is similar to graph 4, but with the x-axis to scale. The volumes for the longer timebands are averaged out across each of the 4 hours and therefore not representative of the true traded volumes. However, breaking down the timebands into these hourly periods shows that the spike in timeband 5 for product 4 is as a result of the extended length of the timeband as opposed to an increase in volume. Product H shows an increasing volume towards Gate Closure; this is expected in a 'short term' market as more short duration trades are made to avoid exposure to imbalance charges.

5.8 **Graph 4: Average Price and Percentage of Market Index Volume by Timeband**



5.9 **Graph 5: Average Price and Percentage of Market Index Volume by Time to Gate Closure**



5.10 After timeband 5 longer duration products become more popular and power exchange trades switch away from the short duration products H, 2 and 4. The longer duration products are discussed in the next section of this paper.

5.11 Overall, the data shows that the current '1' weighted products and timebands are suitable in reflecting the 'short term' price of energy in accordance with the MIDS principles.

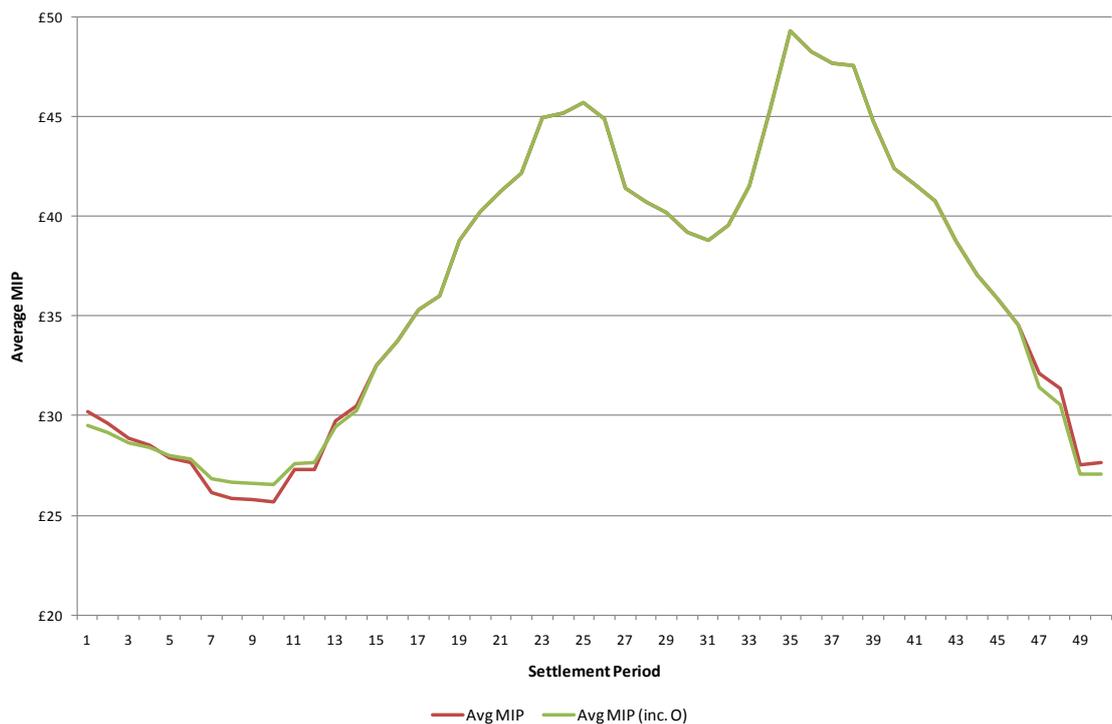
6 All Products and Timebands

6.1 We have looked at 3 of the 6 products listed in the MIDS, so far the remaining products are O, P and E which are for 8, 12 and 16 hour periods. We have also included a further 3 products in this review B, S and A, which are included in the data from the power exchange.

Table 3: Products Traded on the Power Exchange

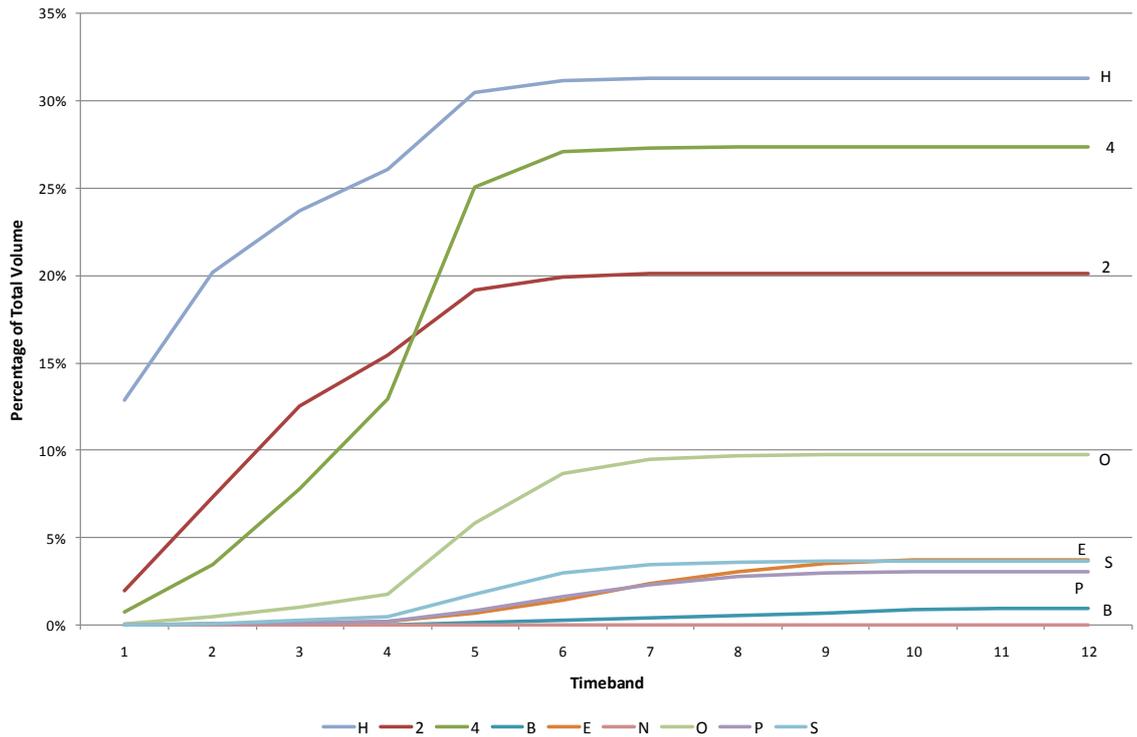
Product	Identifier	Duration (hours)
Half Hour	H	0.5
2 Hour Block	2	2
4 Hour Block	4	4
Overnight	O	8
Peak	P	12
Extended Peak	E	16
Base Day	B	24
Blocks 3 & 4	S	8
Day Ahead Auction	A	1

- 6.2 We receive data for trades up to 3 Business days ahead of Gate Closure and this period is broken down into 13 timebands. We have already discussed timebands 1-8 which cover trades made up to 20 hours ahead of Gate Closure. We will now consider timebands 1-12 (no trades were made on any of the products in timeband 13).
- 6.3 The MIP is a half hourly price and would ideally represent the half hour product traded as close to Gate Closure as possible. Longer duration products span multiple half hours (Settlement Periods) with a single price and therefore cause a flattening effect **(g)** on the price. Principle (g) allows weightings to be set to avoid such effect. For example, the Overnight product is 8 hours in duration, and is currently weighted so that is not included. A trade on this product will have the same price across 16 Settlement Periods. Graph 6 shows the Average MIP per Settlement Period, both with and without the Overnight product included. This shows that there would be a smoothing effect of the price during the overnight period if this product were to be included.
- 6.4 At present we believe there is no need to include the Overnight product in the calculations, as there is no issue with liquidity in the impacted Settlement Periods. If the level of liquidity were to decrease in the overnight period, then product O should be considered.
- 6.5 **Graph 6: Average MIP by Settlement Period including O product.**



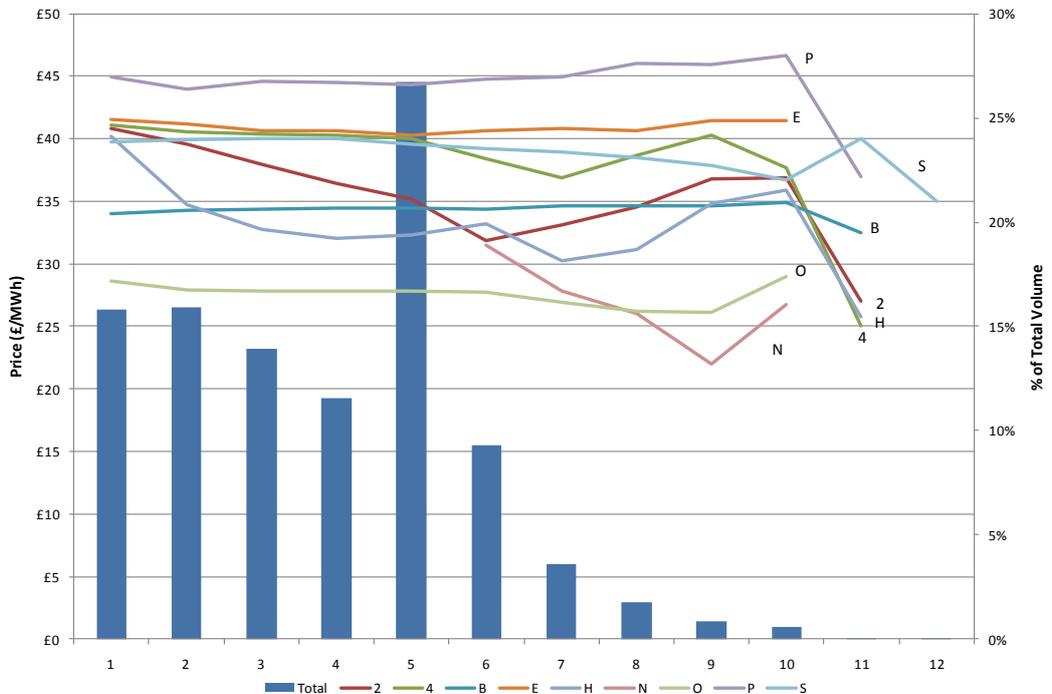
- 6.6 Graph 7 shows the cumulative percentage of total volume, a much higher percentage of total volume is traded on products H, 2 and 4 than any other products in timebands 1 to 4. The graph shows that products H, 2 and 4 are the right products to be used in calculating the MIP as they are traded close to Gate Closure **(f)** and represent a significant percentage of the total volume.

6.7 **Graph 7: Cumulative Percentage of Total Volume¹**



6.8 Graph 8 shows the average price of each traded product and the percentage of total volume traded in each timeband.

6.9 **Graph 8: Average Price of Product by Timeband and Percentage of Total Volume by Timeband**



¹ We have not included the auction product in Graph 7 as the data is not available for the complete review period.

- 6.10 The day ahead auction product has not been included in this analysis. It 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.
- 6.11 The product was first introduced in February 2009. However, it has not been traded since September 2009 and therefore we did not consider it to be suitable for this analysis.

7 New MIDP

- 7.1 We have prepared changes to the MIDS that will allow N2EX to become a MIDP. The MIDS is currently with the Authority for approval, pending confirmation of the go-live date from N2EX. N2EX is the name of the UK power market operated by NASDAQ OMX Commodities and Nord Pool Spot. N2EX spot market will be released on the 15 September 2010.
- 7.2 The spot market will open for trading when a sufficient number of market participants are ready to trade and clear the spot contracts. Once products are being traded the MIDP will submit Market Index Data for use in the reverse System Price.
- 7.3 We previously raised an issue with the ISG ([ISG101/02](#)) regarding the impact of fractional weightings. If a set of trades was split across more than one MIDP, and fractional weightings were applied, the MIP can be different to one calculated based on the same trades made on just one MIDP.
- 7.4 At present this does not have an impact as all the weightings are set to '0' or '1'. But with a new MIDP entering the market this issue will need careful consideration if, in future, it is proposed that the weightings should be changed.