# Issue Report

# Issue 64 'Defining default price when NIV equals zero and when there is no priced action left after NIV tagging'

## Contents



## About This Document

This document is the Issue 64 Group's Report to the Balancing Settlement Code (BSC) Panel. It provides details of the Issue Group's discussions and proposed solutions to the highlighted issue and contains details of the Workgroup's membership. ELEXON will table this report at the Panel meeting on 19 January 2017.


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# 1 Summary

## Background

Following the annual Market Index Definition Statement (MIDS) review in 2015, the Imbalance Settlement Group (ISG) and the BSC Panel recommended forming an Issue Group to review the use of the Market Index Price (MIP) in its current form in defaulting situations.

Therefore, ELEXON raised Issue 64 'Defining default price when NIV equals zero and when there is no priced action left after NIV tagging' on 21 July 2016.

## Conclusions

The Issue Group concluded that using the MIP as a default price in System Price calculations remains fit for purpose and should not be changed. The Issue Group suggested that the analysis conducted by ELEXON on the use of the MIP, be included in the next annual MIDS review.

# 2 Background

## What is the imbalance price?

Trading Parties can trade electricity for each half hour of a day (Settlement Period) up to one hour ahead of actual consumption/generation (Gate Closure). At Gate Closure all physical and contract notifications become final. In a given Settlement Period, Parties may be unable to balance their position (i.e. between what they contract to consume/generate and what they consume/generate), resulting in a position of imbalance. After Gate Closure, the System Operator will assess the amount of planned generation and expected demand for the Settlement Period, and may take actions to balance the system. This can be done through the Balancing Mechanism (BM); accepting Bids and Offers submitted by Parties. Bids are proposals to reduce generation or increase consumption, while Offers are proposals to increase generation or reduce consumption. The System Operator can also use Short Term Operating Reserve (STOR) contracts to either increase system supply or reduce system demand in the form of generation or demand reduction during certain periods of the day.

After the end of the Settlement Period, ELEXON compares the amount of energy that each Party contracted with its metered volumes for that Settlement Period, accounting for any balancing actions. If there is an imbalance volume, which may be a deficit or surplus, the Party must pay (or is paid) the volume at the relevant imbalance price. This price is calculated by ELEXON's system for every Settlement Period of the day and is applied to all imbalance volumes. If the Party is short, it means that it consumed more energy than it bought or generated less than it sold. In this case the Party pays for its deficit at the System Buy Price (SBP). If the Party is long it means that it consumed less than it bought or generated more than it sold. In this case the Party is paid for its surplus at the System Sell Price (SSP). Since 5 November 2015 and the implementation of P305 'Electricity Balancing Significant Code Review Developments', both the SBP and SSP are equal to each other and are calculated using balancing cost data provided by the System Operator for the relevant Settlement Period.

## What is the Market Index Price?

The Market Index Data (MID) that is used to derive the MIP is defined in BSC Section T1.5.3:

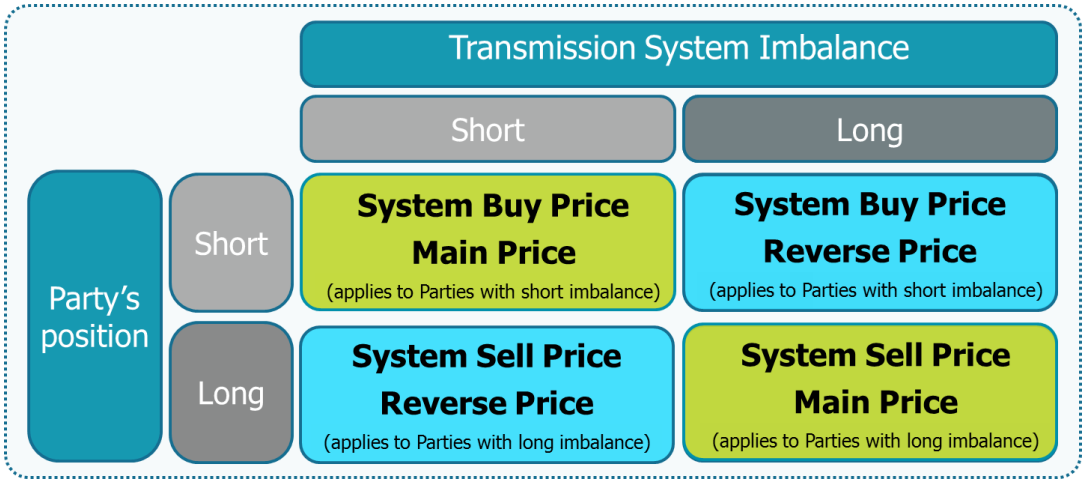
> "The Market Index Data is to be used in Settlement to calculate a price (expressed in £/MWh) in respect of each Settlement Period (in accordance with paragraphs 4.4.2(b) and 4.4.3(b)) which reflects the price of wholesale electricity in Great Britain for delivery in respect of that Settlement Period in the short term market, in circumstances where the levels of liquidity in the market during that period and in respect thereof are not exceptionally low."

P305 introduced a single imbalance price using the existing Main Price calculation based on the actions taken by the System Operator to balance the System, as well as including demand control actions.

Before P305 the imbalance price was calculated using a dual price calculation method. That is by calculating and settling based on a SBP and SSP which could either be the Main Price (based on the price of Bids and Offers accepted by the System Operator for that Settlement Period) and the Reverse Price (based on the market price of electricity for that Settlement Period).

Whether the SBP or SSP were set equal to the Main or Reverse Price was determined by whether the System as a whole was long (the Net Imbalance Volume (NIV) was zero or negative) or short (the NIV was positive) in that Settlement Period. If the System was long, the SSP would have been the Main Price and the SBP the Reverse Price. Conversely, if the System was short, the SBP would have been the Main Price and the SSP the Reverse Price.

The following diagram explains the pre-P305 arrangements:




Before the implementation of P305, the MIP was used every Settlement Period as the Reverse Price. Since the implementation of P305, the Reverse Price is no longer used and so the MIP is not used as frequently as it used to be.

## What is the Issue?

Currently, the MIP is used when NIV equals zero or when there are no priced actions left in the stack to set the Replacement Price. The MID used to calculate the MIP is provided by two Market Index Data Providers (MIDPs), namely EPEX and N2EX.

As part of the annual MIDS review in 2015, the ISG and the BSC Panel recommended forming an Issue Group to review the use of the MIP in its current form in defaulting situations described above.

The rationale for reviewing this default option was that, following the implementation of P305, the imbalance price calculation has changed from a dual imbalance prices calculation to a single imbalance price. Other parts of the price calculation have also changed. For example, the imbalance price is now based on a smaller volume of System Balancing Actions taken by the System Operator, making the price more marginal. Additionally, the inclusion of demand control actions taken by the System Operator can now have an impact on the imbalance price calculation. All these changes in the price calculation have reduced the frequency of use of the MIP and could have also increased the difference between the imbalance price and the MIP.

This raises the question of whether the MIP is still an appropriate value to use for default situations such as those described above, should the MID continue to be procured and the MIP calculated, as is currently defined in the MIDS.

In addition to reviewing the relevance of the MIP, the Issue Group also considered the cost incurred with procuring data for and calculating the MIP, in light of the reduced use of the MIP.

When considering the purpose and use of the MIP, ELEXON is aware that it is used for a variety of non-BSC purposes. For example, it is used as a reference price in other industry codes and bilateral contracts between market participants. Therefore any change to the calculation of the MIP would likely have an effect on other non-BSC aspects of market participation.

# 3 Issue Group's Discussions

## Is the use of the MIP as a default price fit for purpose?

At the two meetings, the Issue Group discussed the purpose of the default price. ELEXON explained that there are two situations where the imbalance price cannot be calculated. These situations being:

- When the NIV equals zero, because no actions are taken to balance the system or if the volume of accepted bids is equal to the volume of accepted offers.
- If all actions left in the stack are 'Second Stage Flagged' and therefore unpriced, then there is not price to reprice them.

ELEXON added that according to the imbalance price calculation included in BSC Section T Annex T-1, actions can be First-Stage Flagged due to their duration or because the System Operator considers them as system balancing. If they are more expensive than the most expensive Unflagged action in the stack, the action is repriced using a 'Replacement Price', based on the 1MWh of the most expensive Unflagged action. Any First-Stage Unflagged balancing actions are automatically classified as Second-Stage Unflagged balancing actions. One member of the Issue Group asked for clarification on this part of the process. ELEXON confirmed that, if a First-Stage Flagged action is cheaper than an 'Unflagged' action, it retains its price. If there are no First-Stage Unflagged balancing actions in the stack, all balancing actions are classified as Second-Stage Flagged balancing actions. This is when the Replacement Price cannot be calculated and it defaults to the MIP.

### What should the chosen default price reflect?

ELEXON asked the Issue Group to define a set of criteria which could be used to describe what the default price should reflect. These criteria could then be used to assess the relevancy of the MIP as the current default option.

One member of the Issue Group suggested that the imbalance price should reflect the price Parties that are out of balance would be able to access, if they were able to go to the power exchange in real time. However, ELEXON indicated that that price could not be accessed because all Physical Notifications and Bids Offers data for a relevant Settlement Period have to be notified by Gate Closure (one hour before the beginning of the relevant Settlement Period). Therefore, Parties pay an estimated price that could be the one we could have had in real time.

The Issue Group added that the imbalance price should reflect the price of the last action taken by the System Operator to balance the System. The default price is just a proxy and there are circumstances when an imbalance price cannot be derive.

An Issue Group member noted that in an ideal world the feasible Bids and Offers could be looked at and attempted to be matched up.

One member of the Issue Group indicated that the main question is whether it is fair that Parties are charged based on the MIP when it is used as default price. The member believed that this is the case.

ELEXON highlighted that Article 57 of the draft European Network Codes, which defines the imbalance price, required that, in the event that no action is taken in either direction, the imbalance price should reflect the value of avoided activation of balancing energy for 'frequency restoration reserves' or 'replacement reserves'. Depending how these are

translated in Great Britain (GB) terms, this could rule out the option of using the MIP as default price for NIV equals zero occasions. An Issue Group member responded that the MIP could be seen as the value of avoided activation of balancing actions in their view so there would not be a need to change the default option.

## Analysis provided to the Issue Group

ELEXON presented its analysis on the MIP before and after the implementation of P305. The analysis showed that, since the implementation of P305, there has been greater difference between the imbalance price and the MIP. In addition, over time there was an increasing frequency of the MIP used to set the price (see more details in Appendix 1).

An Issue member noted that it would be useful to analyse the NIV when National Grid takes actions to balance the system in each direction. The Member advised that the majority of the instances where the MIP was used as a default option were when the system was long rather than short. In these cases the MIP is a good proxy because the network is long, fairly balanced and the NIV quite small. When the system is seriously imbalanced, it will be harder to get a situation where all actions in the stack are flagged and a default price needed. The Issue Group considered that the market price should be based on data taken and calculated as close as possible to real time in order to be a good proxy. ELEXON performed the required analysis and invited the Issue Group to discuss the results at its second meeting. The analysis is included in Appendix 1.

One Issue member queried what the lines represent in the analysis provided in Graph 6 (Appendix 1). ELEXON noted that the blue line is the average System Price while the red dots represent the MIP when it is used as a default price. One Member noted that it is extremely unlikely that the average System Price is spread smoothly across the MIP values. ELEXON later confirmed that the MIP values were averaged by NIV values for the purpose of the analysis.

## Further defaulting options considered

The Issue Group also discussed the option of using the cheapest action taken instead of all the actions that National Grid actually employs. However, this option was considered too complicated because some actions cannot be captured. Therefore, they agreed that the MIP was a better option.

The Issue Group members advised that the market is volatile and some improvements can be made to make the default price more reflective. Another Issue member queried if it is worth ELEXON paying the same price for the MID given it is used infrequently.

ELEXON advised that the cost of procuring the MID had been recently re-procured and the ISG discussed how to reduce these costs. For instance, there are costs involved in getting the data. The Issue Group considered that, if we decide to stop using the MIP as default option, other options might be even more expensive. The Issue Group noted that if individual Parties were to procure the data from the Power Exchanges themselves, this would likely be more expensive than if ELEXON procured it and provided the data to the industry. In addition, the industry is using the MIP for other purposes outside of the BSC.

ELEXON noted that P342 'Change to Gate Closure for Energy Contract Volume Notifications' is proposing to decouple the contract notifications submission deadline from Gate Closure. If this Modification is approved, trading can happen later and the MIP may need to be reconsidered.

ELEXON noted that the possibility of changing the MIP had been assessed by industry consultation as part of the last annual MIDS review (ISG184/07). This consultation only received one response, which suggested that the MIP should not be changed. The number of respondents also demonstrates that industry does not consider the MIDS a priority at this moment in time.

ELEXON also noted that removing timebands from the calculation to base the MIP on trades closer to Gate Closure (as suggested at the first Issue Group meeting) would not change the MIP significantly. Additionally, this could cause volume liquidity issues and increase the number of occurrences the MIP defaults to zero to unacceptable levels for a default option. Indeed, in order to be used, the MIP should be calculated using at least 25MWh of traded volumes. By reducing the number of timebands in the calculation, there would be an increase in the number of instances where the volume of trades available is lower than 25MWh, leading to a value of MIP of zero. Detailed analysis is included in Appendix 1.

ELEXON asked the Issue Group if they believed there could be a point when the MIP diverges too much from the average System Price under similar imbalance conditions. One Issue Group member noted that the market price is reflective only up to the Gate Closure and after that, conditions can change. The MIP is always diverging from the imbalance price because the liquidity changes.

One Issue Group member noted that the MIP diverges more when the System is short. However, the Issue Group agreed that this does not raise any concern.

## Issue Group conclusion

The Issue Group unanimously agreed that the current usage of the MIP as default price is the most cost effective option. Further analysis can be performed in the annual MIDS review for the ISG to consider if a change to the MIDS parameters would enhance the calculation.

## Next Step

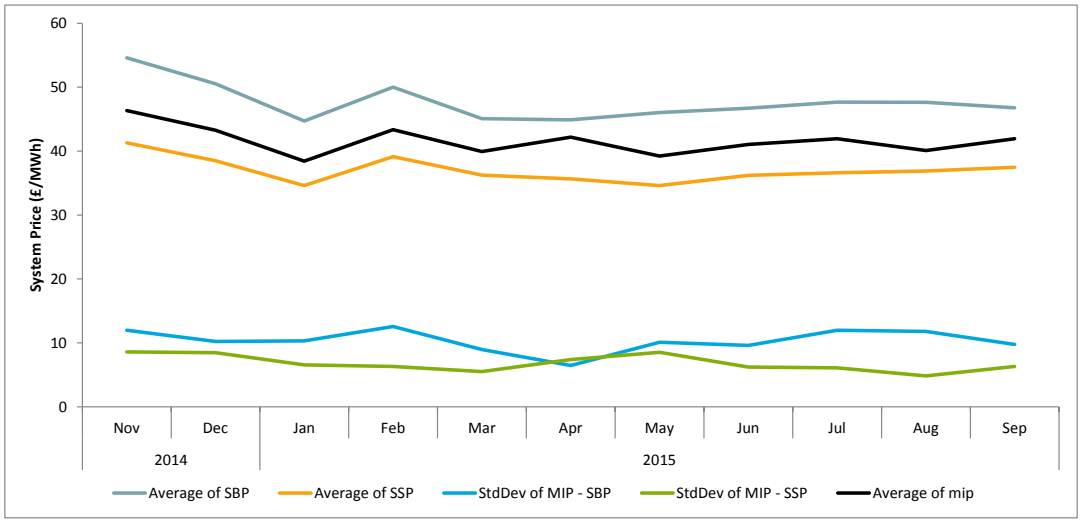
The Issue Group recommendations will be included in the Issue 64 Final Report which will be tabled to the BSC Panel at its meeting on 19 January 2017.

# Appendix 1: Analysis

## Chapter 1 Analysis presented to the Issue Group

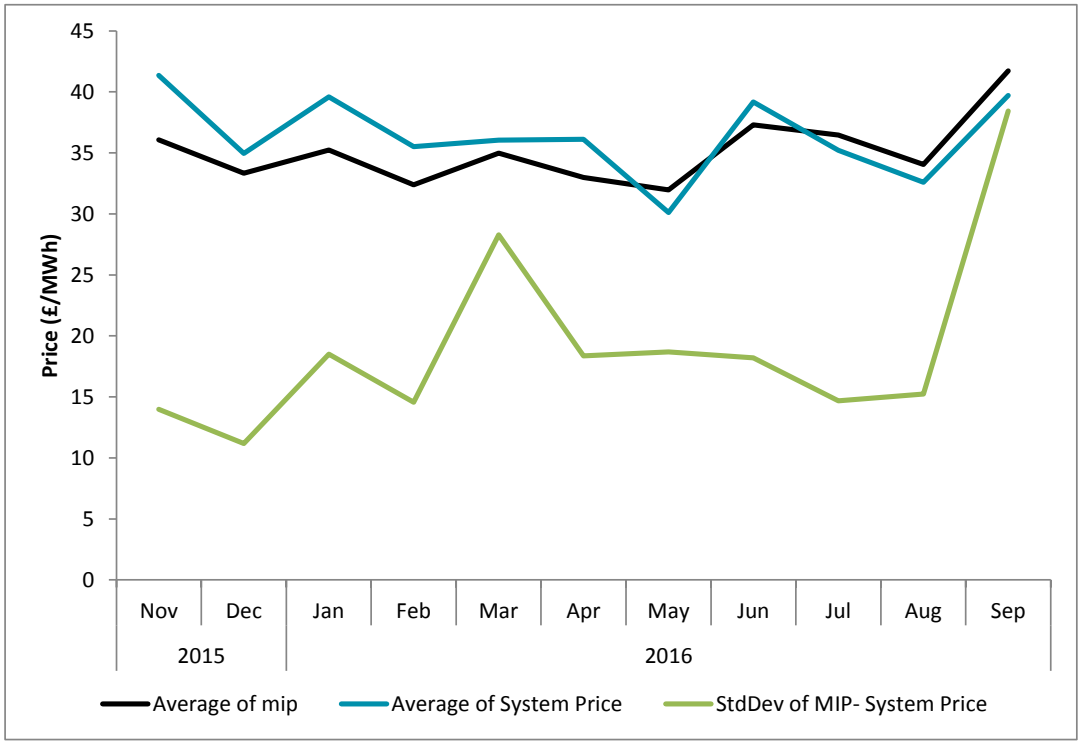
The use of the MIP has changed significantly since the introduction of P305. Currently there is a single imbalance price per Settlement Period. Previous to P305, there were two imbalance prices per Settlement Period, a SBP and a SSP. The calculations for both prices differed. The Reverse Price was calculated using the MIP. The main price was calculated based on the price of actions the System Operator accepted.

**Graph 1** - Average SBP, SSP and MIP over time (before P305). The standard deviation of the difference between the SBP/SSP and the MIP is also shown.




**Graph 1** above shows the MIP, on average, being between the SBP and SSP. In addition, the average standard deviation of the difference tends to around £10/MWh.

**Graph 2** - Average imbalance price and the MIP over time (post P305). The standard deviation of the difference between the imbalance price and the MIP is also shown.

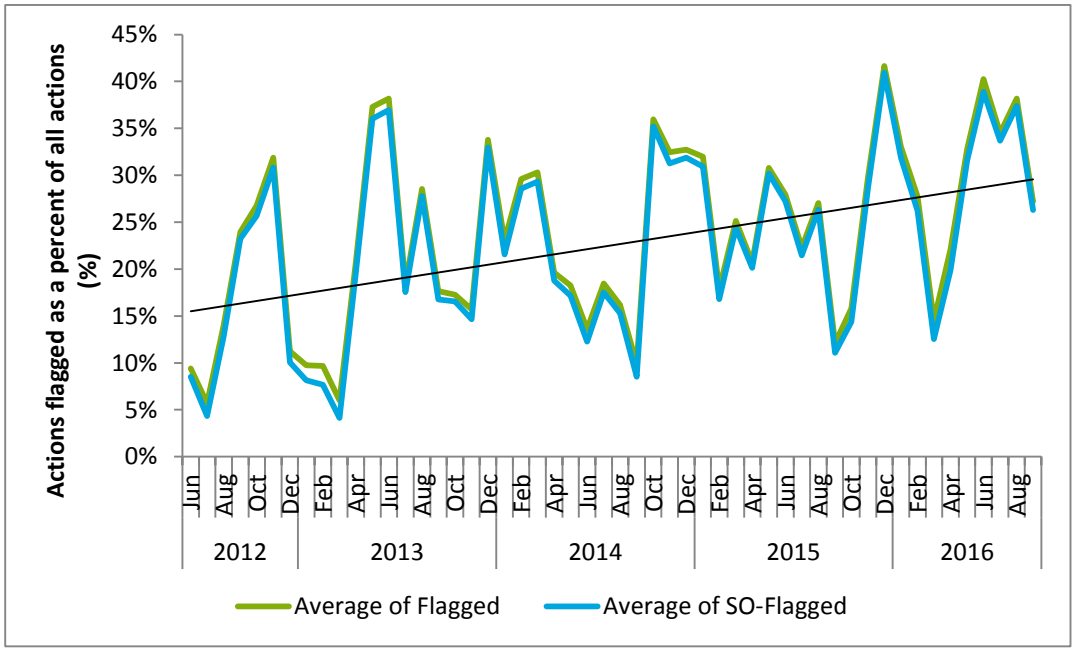



**Graph 2** above shows that the average MIP appears to be a good proxy for the imbalance price. When looking at the standard deviation it can be seen that the average difference

between the MIP and the imbalance price is greater, than prior to P305 (Graph 1), tending to around £20/MWh.

There have been 267 instances of defaulting prices, and hence the MIP setting the imbalance price, since 5 November 2015. The frequency of defaulting prices is growing due to increased flagging actions from the System Operator, see Graph 3 below.

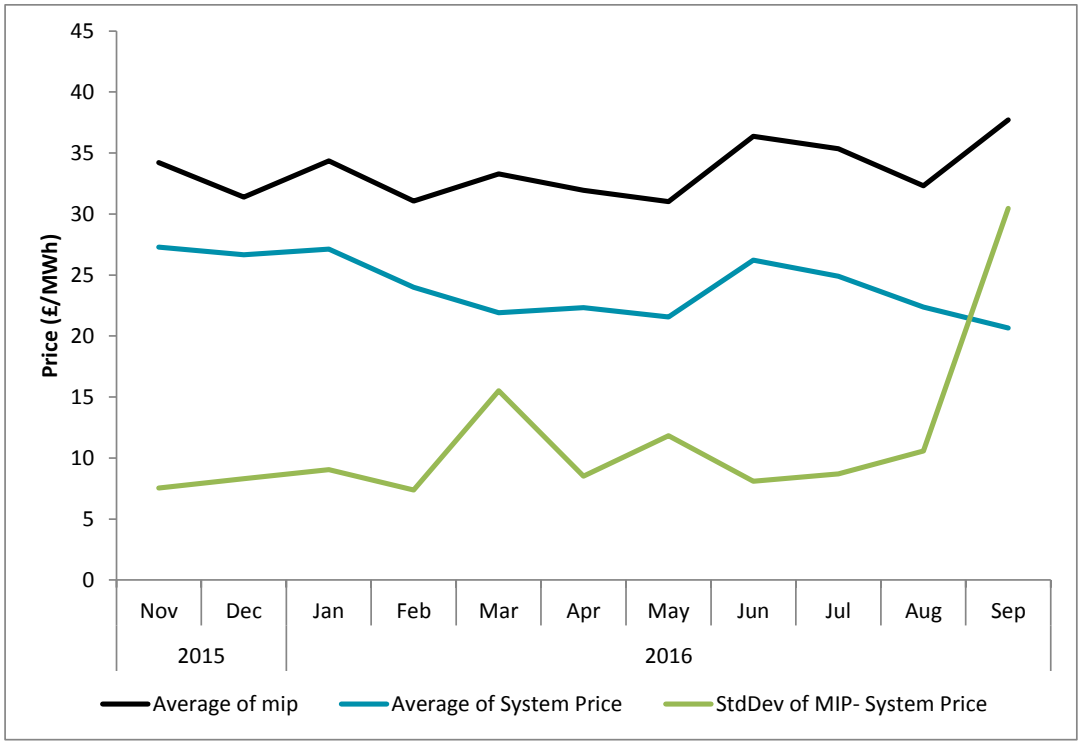
**Graph 3** - Total flagged actions over time.



## Chapter 2 Analysis requested by the Issue Group

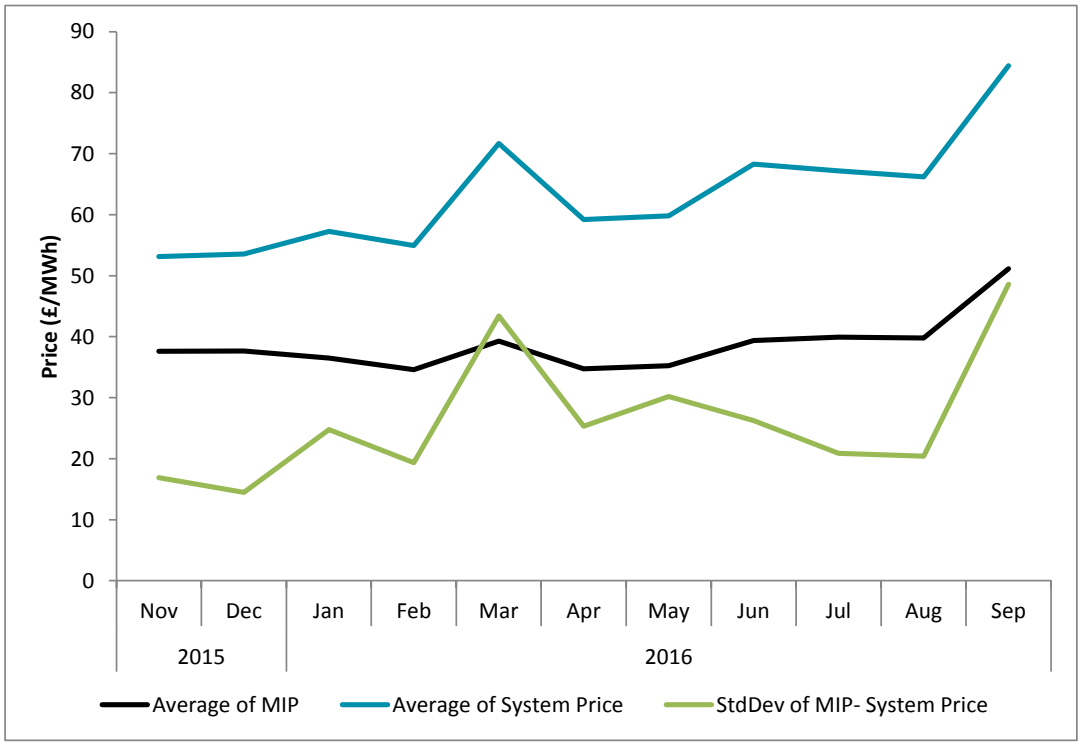
The Issue Group requested that **Graph 2** was split by system length.

**Graph 4 –** Average System Price and the MIP over time when the System was long. The standard deviation of the difference between the system price and the MIP is also shown.




When the System is long, the MIP is typically higher than the system price. September 2016 had a number of system price spikes with a peak of £801 pushing up the average System Price and standard deviation.

**Graph 5 –** Average system price and the MIP over time when the System was short. The standard deviation of the difference between the imbalance price and the MIP is also shown.

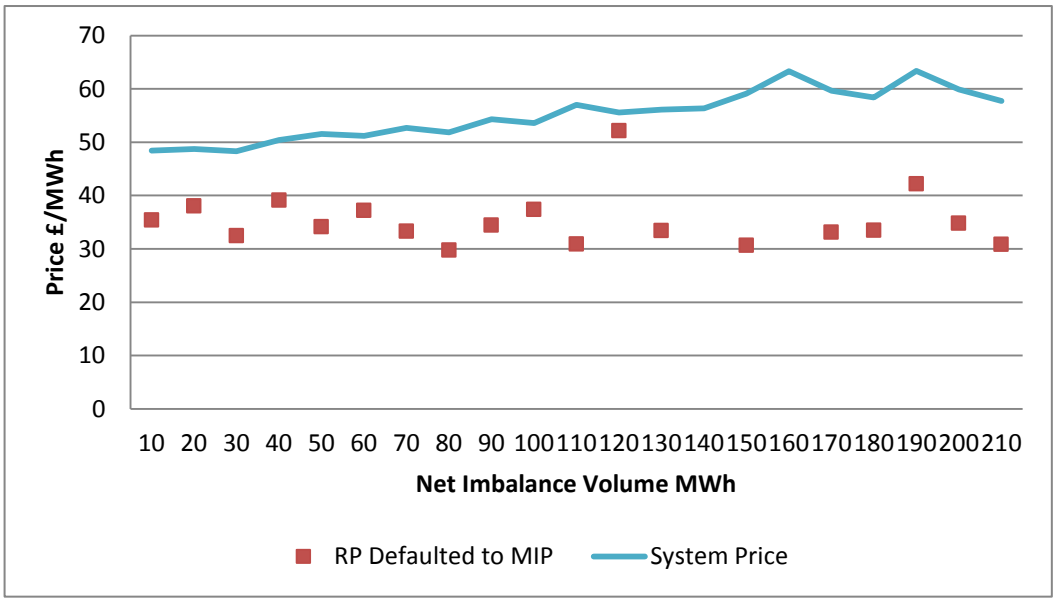



When the System is short, the MIP is typically lower than the system price, as seen above. The standard deviation of the difference between the MIP and the system price is greatest

when the System is short, generally £25/MWh compared with £10/MWh for a long System. This reflects a more volatile imbalance price when the System is short.

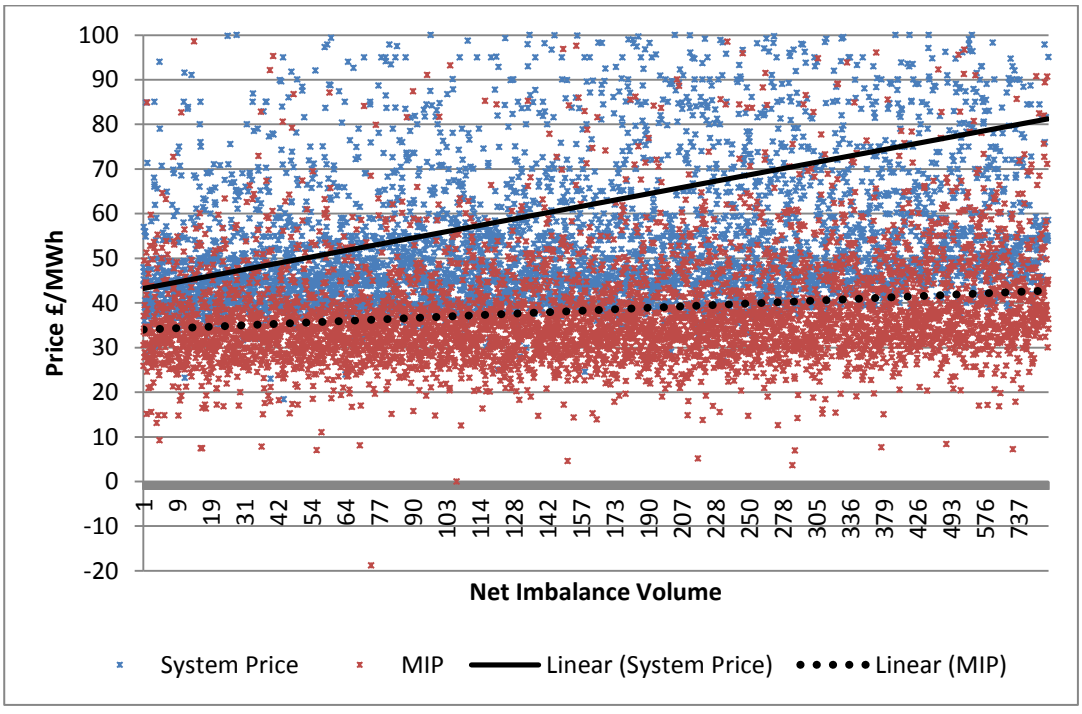
With the long and short market conditions split out, it is clear that the MIP underestimates in the short market and overestimates on the long market.

**Graph 6 –** Average Replacement Price when defaulted to MIP and System Price under short market conditions.



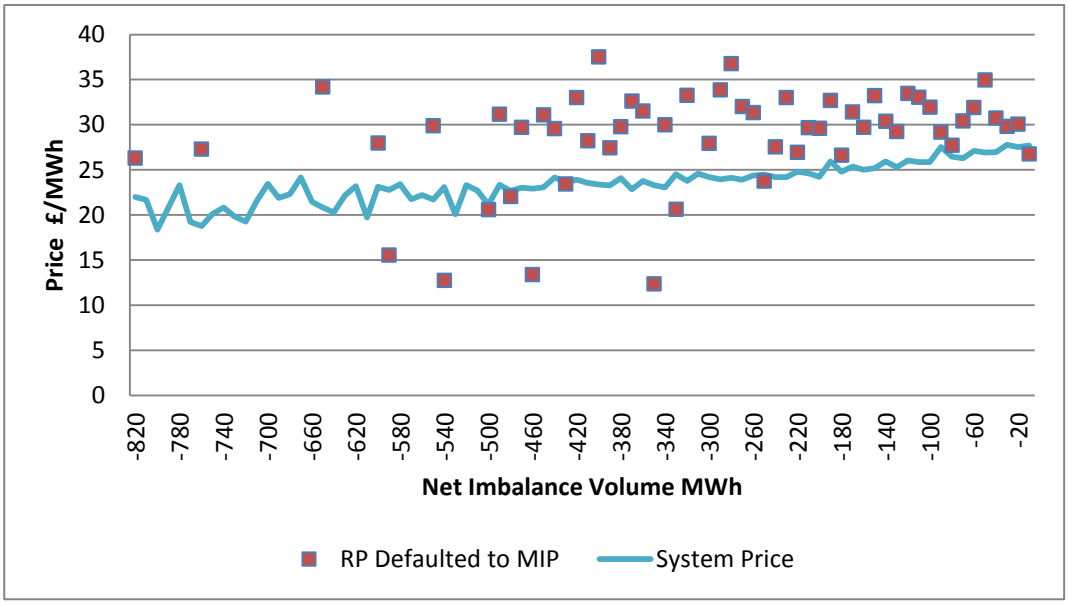

In this graph the live System Price is grouped into 10MWh NIV bands and then averaged to give a proxy for what the MIP is trying to reflect. The MIP is also average in NIV bands when appropriate to display a single entry per NIV band. Although the volume of data is limited, it suggests that under equivalent market length the MIP is below the average System Prices in defaulting Settlement Periods. However, the number of Settlement Periods for which Replacement Price has defaulted to MIP is limited with only 41 instances when the market is short. It is also worth noting that the instances of default have a small range of NIV from 0MWh to 210MWh. This suggests that the System is generally more balanced when using the default under short condition.

**Graph 7 -** System Price and NIV for short market condition



The above graph is limited to display prices up to £100/MWh only however the linear (System Price) trend is calculated on all data points. As with Graph 6 the trend for the MIP is to fluctuate below the average System Price in the short market condition. As discussed the defaulting scenario has occurred in up to 210MWh of NIV. The divergence in the linear trend occurs more significantly in the large NIV condition.

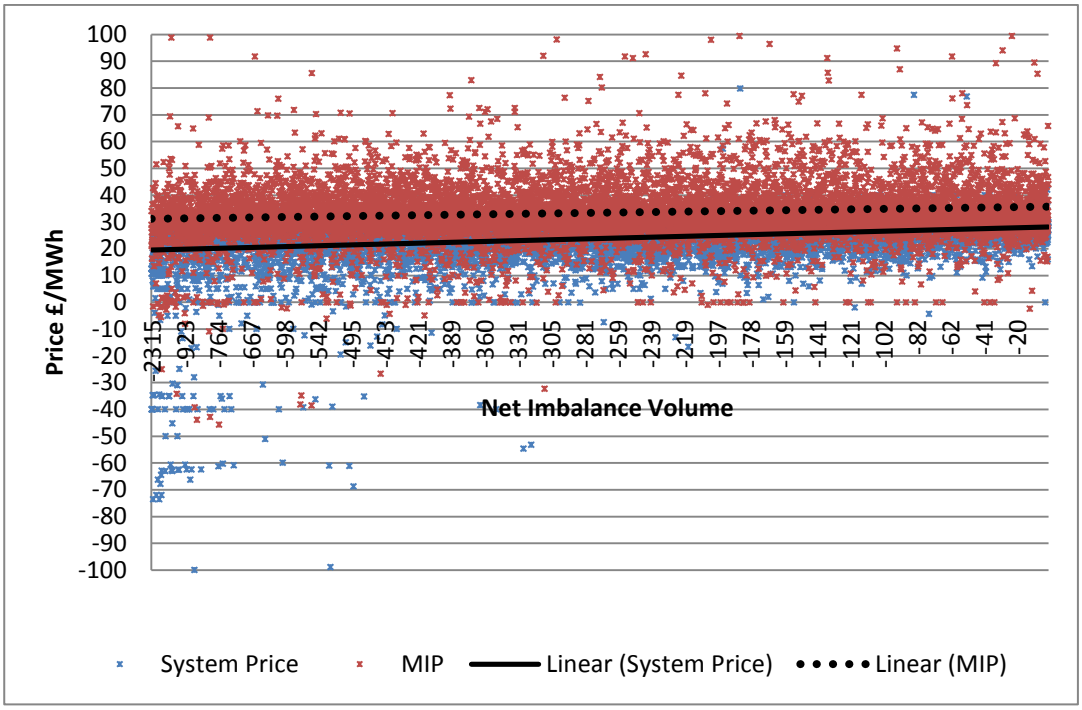
**Graph 8 –** Average Replacement Price when defaulted to MIP and System Price under long market conditions.




In this graph the live System Price is grouped into 10MWh NIV bands and then averaged to give a proxy for what the MIP is trying to reflect. When used, the MIP is also averaged in NIV bands when appropriate to display a single entry per NIV band. There are more instances of the Replacement Price defaulting to MIP in long market conditions than short. 67% defaults under the long market condition occurred when NIV was between 0MWh and -210MWh and 80% of defaults between 0MWh and -300MWh.

It suggests that under equivalent market length the MIP tend to fluctuate above the average System Price in defaulting Settlement Periods. However, the number of Settlement Periods for which Replacement Price has defaulted to MIP is limited with only 229 instances when the market is long.

**Graph 9 -** System Price and NIV for long market condition




The graph is limited to display prices up to £100/MWh only however the linear (System Price) trend is calculated on all data points. As with Graph 8 there is a tendency for the MIP to fluctuate above of the System Price in the short market condition.

When considering different parameters to use in the MIP calculation, we studied the effect of removing timebands 5 and 6 (trades made between 12 and 4 hours before Gate Closure) as well as only including trades made on the Half Hourly product in timeband 1 (1 prior to Gate Closure).

Removing timebands 5 and 6 would have the following effect over the past year:

- Reduce daily average MIV by 97MWh
- Increase the number of defaulting Settlement Periods from 5 to 7
- No impact on daily average MIP (increases netting off decreases)
- At Settlement Period level, the biggest decrease in average MIP occurs at SP 38 whilst the biggest increase occurs at Settlement Period 47
- Very minimal impact on Settlement Period average MIP (£0.06/MWh)
- At product level, the 4-hour product is the most impacted, mostly from removing timeband 5

Overall, there would be a very little impact from removing timebands 5 and 6. Removing additional timebands could reduce liquidity to critical level.

Only including trades made on the Half Hourly product in timeband 1 would increase the number of instances when the volume of trades in a Settlement Period is below the Individual Liquidity Threshold (ILT) – 25MWh – to 390 over the past year, which would reduce the effectiveness of the MIP as a default price option.

## Conclusion

As highlighted by the above analysis, the MIP and the average System Price can behave differently depending on the overall System length. Additionally, there is a growing divergence between the MIP and the System Price as NIV increases. This is visible on Graphs 7 and 9 when the System is respectively short and long. The divergence is particularly increased when the System is short which can be a concern.
Considering the parameters available in the MIDS, the MIP calculation could be amended to push the price up or down. However this would not benefit the System price calculation as it does not reflect the long and short market conditions of a single System Price calculation. Additionally, analysis performed on the effect of amending the MIP parameters highlighted little effect and increased risk of the MIP defaulting to zero. Therefore changes to the MIDS parameters are unlikely to provide an improvement to the accuracy of a default price but rather put at risk the availability of the data when needed.

# Appendix 2: Issue Group Membership

## Issue Group membership and attendance

| Issue 64 Group Attendance | | | |
|---|---|---|---|
| Name | Organisation | 10 October 16 | 1 December 16 |
| Jemma Williams | ELEXON *(Chair)* | ✓ | ✓ |
| Giulia Barranu | ELEXON *(Lead Analyst)* | ✓ | ✓ |
| Elliott Hall | ELEXON *(Design Authority)* | ✓ | × |
| Nicholas Rubin | ELEXON *(Design Authority)* | × | ✓ |
| Thomas Routier | ELEXON *(Proposer)* | × | ✓ |
| Matthew Fitt | ELEXON *(Proposer Alternate)* | ✓ | × |
| Roger Harris | ELEXON *(Market Analysis)* | ✓ | × |
| Allan McCall | RWE Retail Energy Management | ✓ | ☎ |
| Bill Reed | RWE Supply and Trading GmbH | × | ☎ |
| Lisa Waters | Waters Wye Associates | ✓ | ☎ |
| Martin Mate | EDF Energy | ☎ | ☎ |
| Olaf Islei | EPEX SPOT | × | ☎ |

# Appendix 3: Glossary & References

## Acronyms

Acronyms used in this document are listed in the table below.

| Acronyms | |
|---|---|
| Acronym | Definition |
| BM | Balancing Mechanism |
| BSC | Balancing Settlement Code *(industry Code)* |
| GB | Great Britain |
| HH | Half Hourly |
| ILT | Individual Liquidity Threshold |
| ISG | Imbalance Settlement Group |
| MID | Market Index Data |
| MIP | Market Index Price |
| MIDP | Market Index Data Provider |
| MIDS | Market Index Definition Statement |
| NHH | Non-Half Hourly |
| NIV | Net Imbalance Volume |
| SBP | System Buy Price |
| SSP | System Sell Price |
| STOR | Short Term Operating Reserve |

## External links

A summary of all hyperlinks used in this document are listed in the table below.

All external documents and URL links listed are correct as of the date of this document.

| External Links | | |
|---|---|---|
| Page(s) | Description | URL |
| 2 | Issue 64 page on the ELEXON website | https://www.elexon.co.uk/smg-issue/issue-64/ |
| 3 | P305 page on the ELEXON website | https://www.elexon.co.uk/mod-proposal/p305/ |
| 3 | BSC Section page on the ELEXON website | https://www.elexon.co.uk/bsc-related-documents/balancing-settlement-code/bsc-sections/ |
| 4 | P342 page on the ELEXON website | https://www.elexon.co.uk/mod-proposal/p342/ |
| 5 | MIDS review 2016 on the ELEXON website | https://www.elexon.co.uk/meeting/isg-184/?from_url=https://www.elexon.co.uk/events-calendar-item/isg-184/ |