ISG199-SPAR

REPORTING ON SEPTEMBER 2017

ISSUE 24 – PUBLISHED 24 OCTOBER 2017

SYSTEM PRICE ANALYSIS REPORT

The System Prices Analysis Report (SPAR) provides a monthly update on price calculations. It is published by the ELEXON Market Analysis Team to the Imbalance Settlement Group (ISG) and on the ELEXON Website ahead of the monthly ISG meeting.

This report provides data and analysis specific to System Prices and the Balancing Mechanism[1]. It demonstrates out-turn prices and the data used to derive the prices. The data is a combination of II and SF Settlement Runs.

This month's SPAR also contains an Appendix giving a calculation example of how the lowest System Price of the month was calculated.

1 SYSTEM PRICES AND LENGTH

This report covers the month of September. Where available, data uses the latest Settlement Run (in most cases 'II' or 'SF').

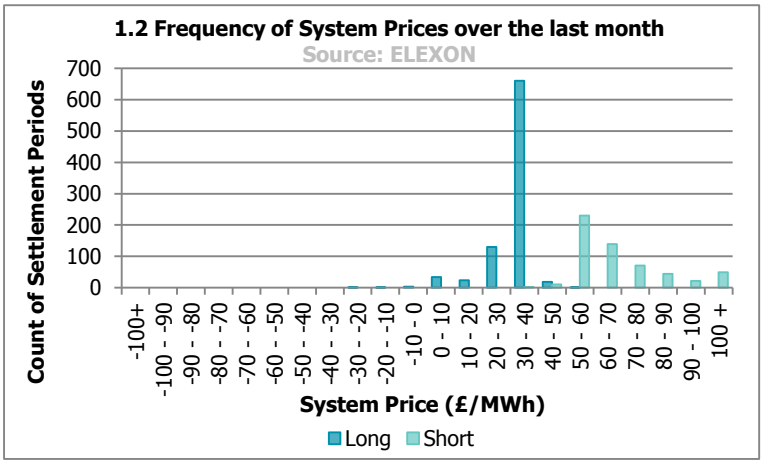
In this report we distinguish between a 'long' and a 'short' market when analysing System Prices because the price calculation differs between two scenarios. When the market is long, System Prices will be based predominantly on the System Operator's 'sell' actions such as accepted Bids. When the market is short, System Prices will instead be based predominantly on the System Operator's 'buy' actions. **Table 1.1** gives a summary of System Prices for September 2017.

	System Price (Long)				
Month	**Min**	**Max**	**Median**	**Mean**	**Std Dev**
September 2017	-25.00	58.79	34.50	31.84	8.45

	System Price (Short)				
Month	**Min**	**Max**	**Median**	**Mean**	**Std Dev**
September 2017	33.97	176.69	62.69	68.89	18.96

1.1 System Price summary by month (£/MWh)

Graph 1.2 shows the distribution of System Prices across Settlement Periods in the last month when the market was long and short.



In September 2017 73% of System Prices were between £20/MWh and £60/MWh regardless of system length. When the System was long, 90% of prices were between £20/MWh and £40/MWh. When the System was short, 65% of prices were between £50/MWh and £70/MWh and 9% of prices were over £100/MWh. 2% of System Prices regardless of length were between £40/MWh and £50/MWh.

[1] For further detail of the Imbalance Price calculation, see our imbalance pricing guidance: https://www.elexon.co.uk/reference/credit-pricing/imbalance-pricing/

SYSTEM PRICE ANALYSIS REPORT

System Prices exceeded £100/MWh 47 times in September 2017 (compared to 39 times in August). The 47 System Prices which exceeded £100/MWh occurred across 15 different days. Settlement Period 39 was the most frequent of those exceeding £100/MWh, with six occurrences in the month. System Prices in Settlement Periods 38 and 40 each exceeded £100/MWh on five occasions.

The highest System Price for September 2017 was £176.69/MWh, occurring in Settlement Period 16 on 18 September. The System Price for this Settlement Period was set by an Offer from a Coal BMU priced at £179/MWh and an Offer from a Pumped Storage BMU priced at £115/MWh.

There were five negative System Prices in September. The lowest System Price was -£25/MWh, on 3 September in Settlement Period 12, set by a Bid from a Biomass BMU. The calculation for the System Price for this Settlement Period is detailed in the Appendix.

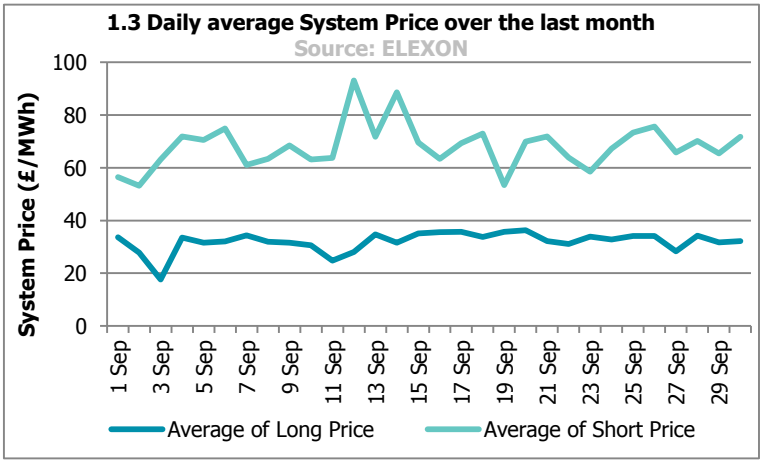
For five Settlement Periods in September the System Price was £0/MWh.

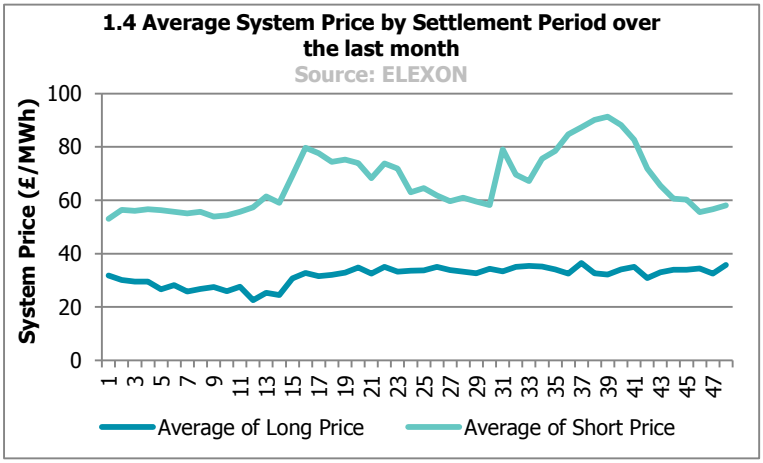
Graph 1.3 shows daily average System Prices over the last month. In September, the average System Price when the system was long was £31.84/MWh and short was £68.89/MWh.

The highest daily average price when the system was short was £93.14/MWh and occurred on 12 September. The System was short for 19 Settlement Periods on this day.

Graph 1.4 shows the variation of System Prices across the day. Short prices were highest in Settlement Period 39 and long prices lowest in Settlement Period 12. The lowest average System Prices regardless of market length was seen during Settlement Period 10 when the System Price was on average £31.59/MWh.

Long prices show little variance over Settlement Periods, with the prices between £22.57/MWh and £36.43/MWh. Average short Settlement Period prices vary from £53.06/MWh to £91.32/MWh.

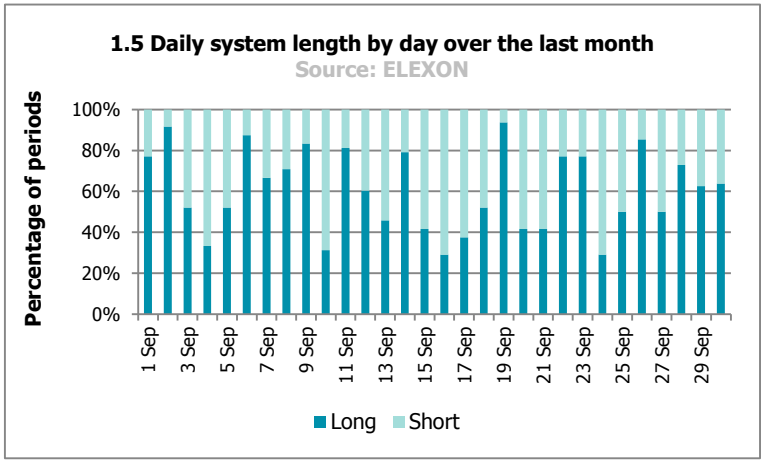


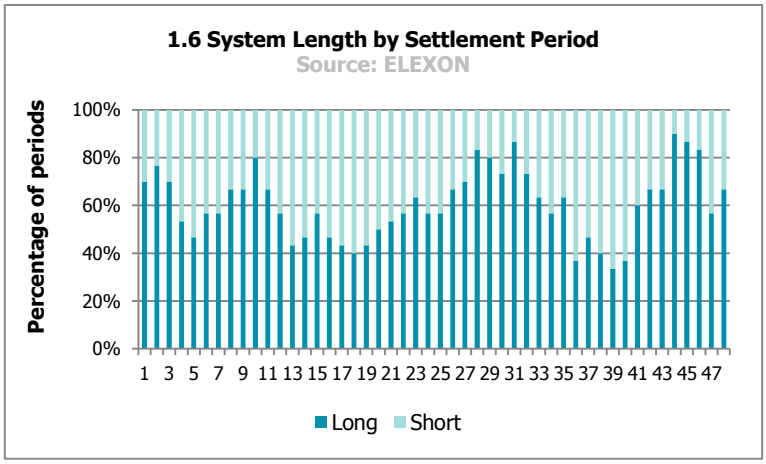


Graph 1.5 shows system length by day, and **Graph 1.6** shows system length by Settlement Period for September. The system was long for 61% of Settlement Periods in September, compared to 65% in August.

On 19 September the system was long for 92% of Settlement Periods. The average NIV while the system was long on this day was -256MWh. The average System Price on this day regardless of length was £36.77/MWh.

Settlement Period 39 was short for 67% of the month, making it the shortest Settlement Period in September 2017.





2 PARAMETERS

In this section we consider a number of different parameters on the price. We consider:

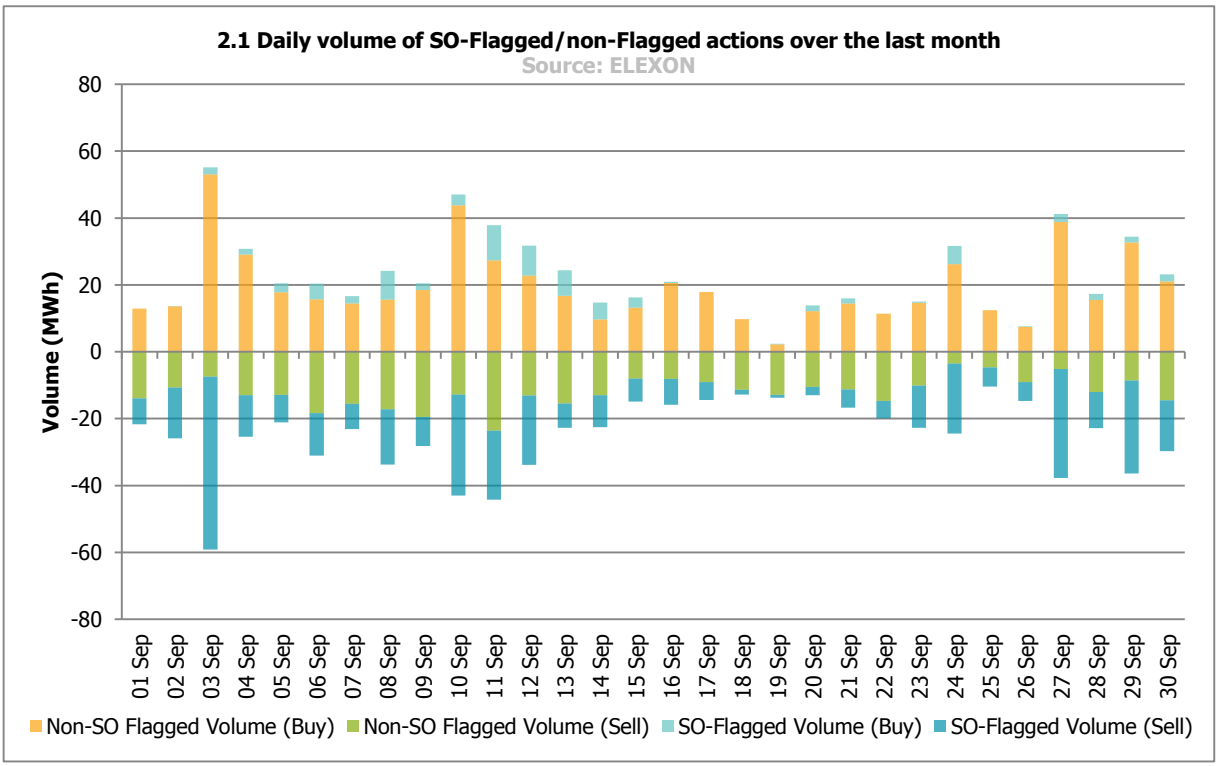
- The impact of Flagging balancing actions;
- The impact of NIV Tagging;
- The impact of PAR Tagging;
- The impact of the Replacement Price; and
- How these mechanisms affect which balancing actions feed into the price.

Flagging

The Imbalance Price calculation aims to distinguish between 'energy' and 'system' balancing actions. Energy balancing actions are those which are related to the overall energy imbalance on the system (the 'Net Imbalance Volume'). It is these 'energy' balancing actions which the Imbalance Price should reflect. System balancing actions are actions which relate to non-energy, system management actions (e.g. locational constraints).

Some actions are 'Flagged'. This means that they have been identified as potentially being 'system related', but rather than removing them completely from the price calculation (i.e. Tagging them) they may be re-priced, depending on their position in relation to the rest of the stack (a process called Classification). Actions are Flagged by the System Operator when they are taken to resolve a locational constraint on the transmission network (SO-Flagging), or when they are taken to correct short-term increases or decreases in generation/demand (CADL Flagging).

Graph 2.1 shows the volumes of buy and sell actions that have been Flagged by the SO in September 2017 as being constraint related. On 3 September, 87% of sell volume was SO-Flagged.



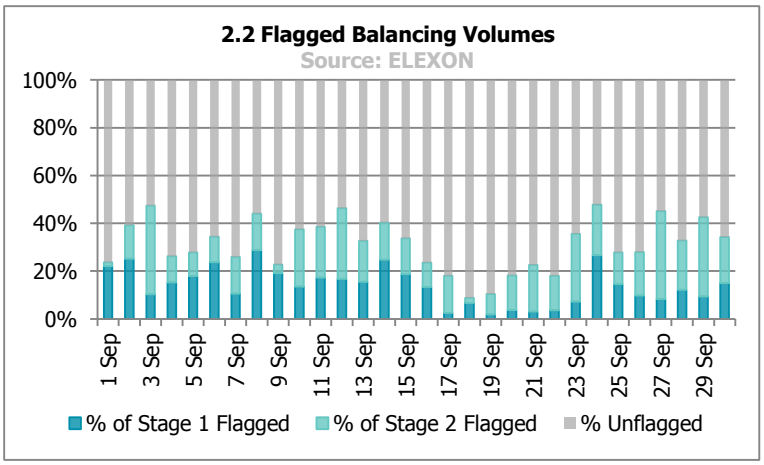
52% of sell balancing actions taken in September had an SO-Flag compared with 58% in August. 49% of SO-Flagged sell actions came from Balancing Services Adjustment Actions (BSAAs), 23% from Wind BMUs and 15% from CCGT BMUs. The average initial price (i.e. before any re-pricing) of a SO-flagged sell action was -£30.05/MWh.

12% of buy balancing actions taken in September had an SO-Flag, compared to 25% in August. 49% of SO-Flagged buy actions came from CCGT BMUs, and 43% from BSAAs. The average initial price of a SO-Flagged buy action was £73.73/MWh.

Any actions which are less than 15 minutes total duration are CADL Flagged. 1.7% of buy actions and 1% of sell actions were CADL Flagged in September. The majority of CADL Flagged buy (94%) came from Pumped Storage BMUs. 56% of CADL Flagged sell actions were by Pumped Storage BMUs, whilst 42% were from CCGT BMUs.

SO-Flagged and CADL-Flagged actions are known as 'First-Stage Flagged'. First-Stage Flagged actions may become 'Second-Stage Flagged' depending on their price in relation to other Unflagged actions. If a First-Stage Flagged balancing action has a more expensive price than the most expensive First Stage Unflagged balancing action it becomes Second-Stage Flagged. This means that it is considered a system balancing action and becomes unpriced.

Graph 2.2 shows First and Second-Stage Flagged action volumes as a proportion of all actions taken on the system. Note these are all balancing actions that were accepted – only a proportion of these will feed through to the final price calculation.



The Replacement Price

If there are Second-Stage Flagged action volumes left in the NIV, these will be repriced by the Replacement Price. In total 53% of sell actions in September were flagged. Of these 6% were assigned a Replacement Price, currently based on the most expensive 1MWh of Unflagged actions.

Sell actions will typically have their prices revised upwards by the Replacement Price for the purposes of calculating the System Price. In September, the average original price of a Second-Stage Flagged repriced sell action was -£4.22/MWh and the average Replacement Price for sell actions (when the System was long) was £32.79/MWh.

14% of buy actions were Flagged; of these 0.1% had the Replacement Price applied. The average original price of a buy action with the Replacement Price applied was £130.91/MWh, and the average Replacement Price was £127.00/MWh.

If there are no Unflagged actions remaining in the NIV, the Replacement Price will default to the Market Index Price. This occurred in 31 long Settlement Periods (compared to 53 long Settlement Periods last month).

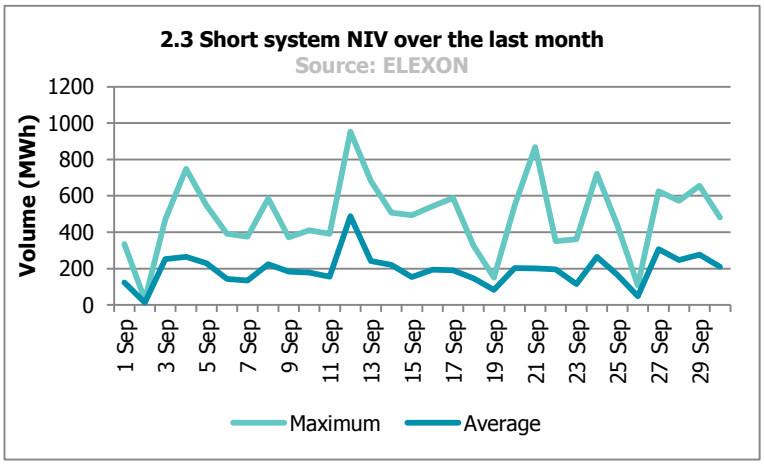
NIV and NIV Tagging

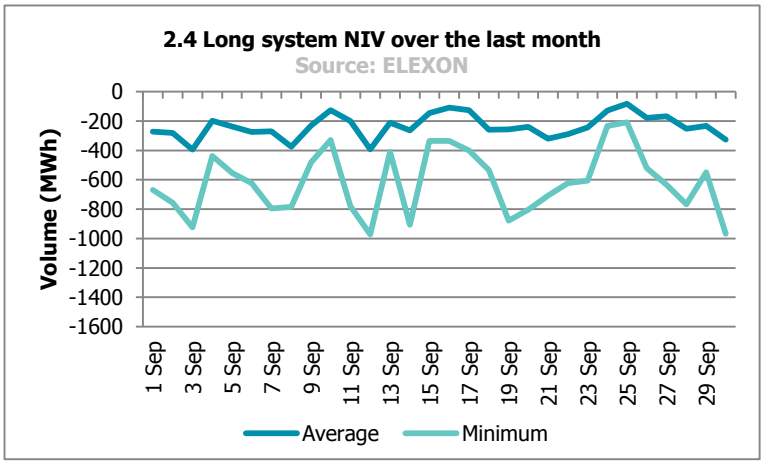
The Net Imbalance Volume (NIV) represents the direction of imbalance of the System – i.e. whether the system is long or short overall. **Graph 2.3** shows the greatest and average NIV when the system was short and **Graph 2.4** shows greatest and average NIVs when the system was long. Note short NIVs are depicted as positive volumes and long NIVs are depicted as negative volumes.

In almost all Settlement Periods the System Operator will need to take balancing actions in both directions (buys and sells) to balance the system. However, for the purposes of calculating an Imbalance Price there can only be one imbalance in one direction (the Net Imbalance). 'NIV Tagging' is the process which subtracts the smaller stack of balancing actions from the larger one to determine the Net Imbalance. It is from these remaining actions that the price is derived.

NIV Tagging has a significant impact in determining which actions feed through to prices. 76% of volume was removed due to NIV tagging in September. The most expensive actions are NIV Tagged first; hence NIV Tagging has a dampening effect on prices when there are balancing actions in both directions.

The maximum long system NIV of the month was -971MWh, on 12 Spetember 2017 during Settlement Period 20. All the actions for this Settlement Period were sell actions. The System Price for this Settlement Period was £34.50/MWh. The maximum short system NIV of the month (953MWh) was also see on 12 September in Settlement Period 48.



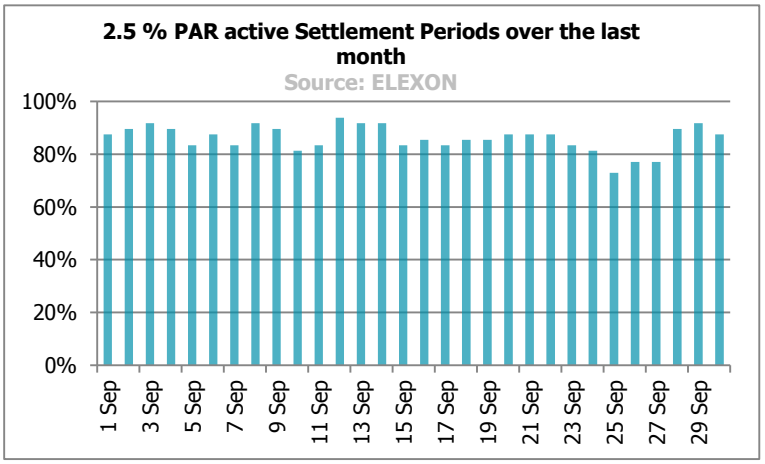


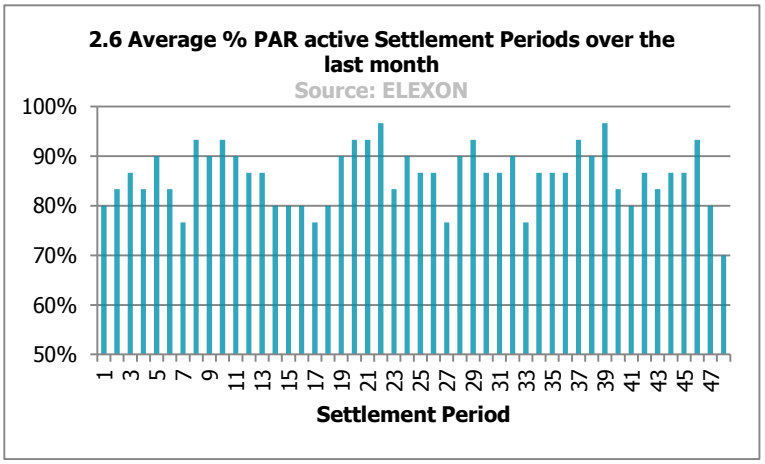
PAR Tagging

PAR is the final step of the Imbalance Price calculation. It takes a volume weighted average of the most expensive 50MWh of actions left in the stack. PAR is currently set to 50MWh, but is due to decrease to 1MWh on 1 November 2018.

The impact of PAR Tagging across the month can be seen in **Graph 2.5**. PAR Tagging is active when there are more than 50MWh of actions left in the NIV following the previous steps of Imbalance Price calculation. Only the most expensive 50MWh are used in the calculation, so any volumes greater than 50MWh are 'PAR Tagged' and removed from the Imbalance Price calculation stack. PAR was active for 86% of Settlement Periods in September.

Graph 2.6 shows the proportion of Settlement Periods over the last month when PAR Tagging was active. Settlement Period 48 had the lowest active PAR Tagging in September 2017 with 70%, representing the NIV being smaller in this period or the system being more balanced as a whole prior to System Operator balancing activity.





DMAT and Arbitrage Tagged Volumes

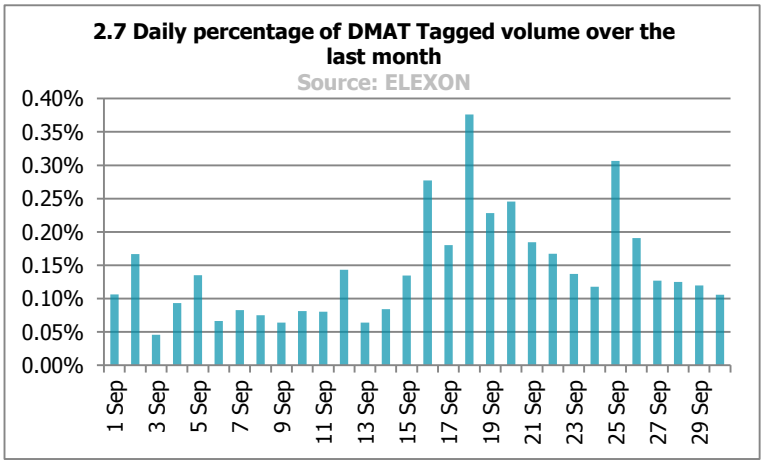
Some actions are always removed from the price calculation (before NIV Tagging). These are actions which are less than 1MWh (De Minimis Acceptance Threshold (DMAT) Tagging) or buy actions which are either the same price or lower than the price of sell actions (Arbitrage Tagging).

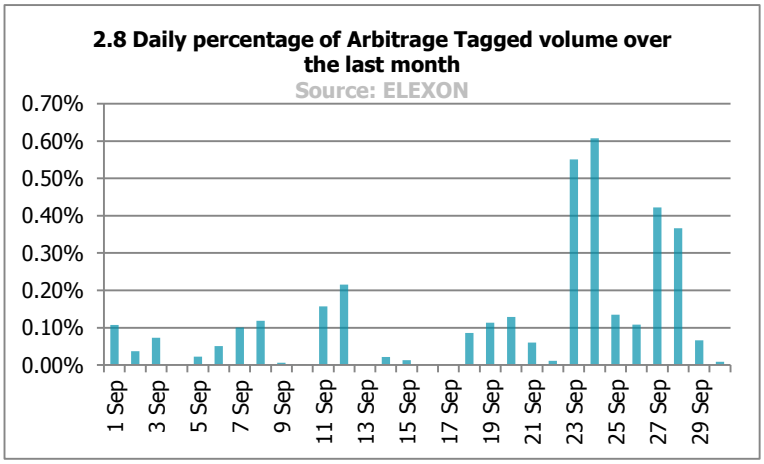
Graph 2.7 shows the volumes of actions which were removed due to DMAT Tagging. 0.12% of buy and sell volume was removed by DMAT Tagging. 43% of DMAT Tagged volume came from CCGT BMUs and 40% from Balancing Services Adjustment Actions (BSAAs).

Graph 2.8 shows the volumes of actions that were removed due to Arbitrage Tagging. 56% of Arbitrage Tagged volume was from CCGT BMUs, 19% from Wind BMUs and 15% from BSAAs.

In September the average initial price of an Arbitrage Tagged buy action was £44.10/MWh, and for a sell action was £47.28/MWh. The maximum price of an Arbitrage Tagged sell action was £253.89/MWh, and the lowest priced Arbitrage Tagged buy action was -£52.88/MWh.

On 24 September 2017 341MWh of actions were Arbitrage Tagged. The average price of an Arbitrage Tagged buy action was £31.42/MWh and for a sell action was £44.86/MWh.





3 BALANCING SERVICES

Short Term Operating Reserve (STOR) costs and volumes

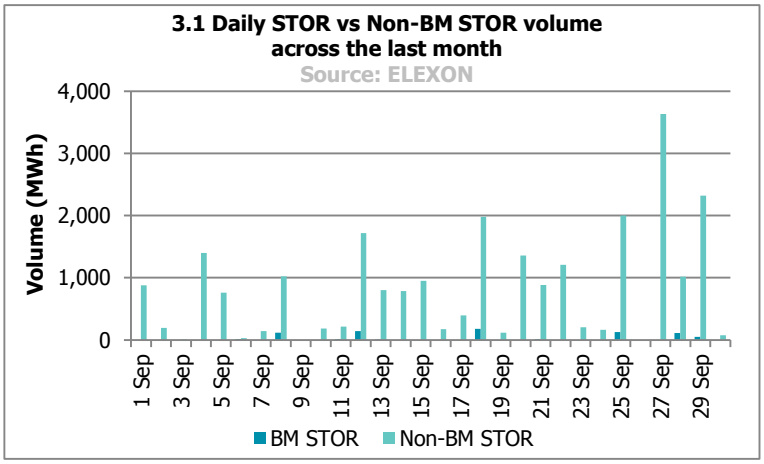
This section covers the balancing services that the System Operator (SO) takes outside the Balancing Mechanism that can have an impact on the price.

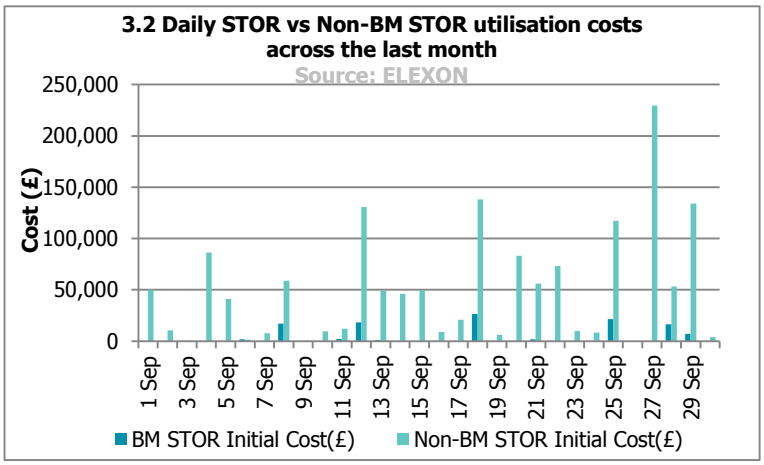
In addition to Bids and Offers available in the Balancing Mechanism, the SO can enter into contracts with providers of balancing capacity to deliver when called upon. These additional sources of power are referred to as reserve, and most of the reserve that the SO procures is called Short Term Operating Reserve (STOR).

Under STOR contracts, availability payments are made to the balancing service provider in return for capacity being made available to the SO during specific times (STOR Availability Windows). When STOR is called upon, the SO pays for it at a pre-agreed price (its Utilisation Price). Some STOR is dispatched in the Balancing Mechanism (BM STOR) while some is dispatched separately (Non-BM STOR).

Graph 3.1 gives STOR volumes that were called upon during the month – split into BM STOR and non-BM STOR. **Graph 3.2** shows the utilisation costs of this capacity. 97% of the total STOR utilised in September came from outside of the Balancing Mechanism.

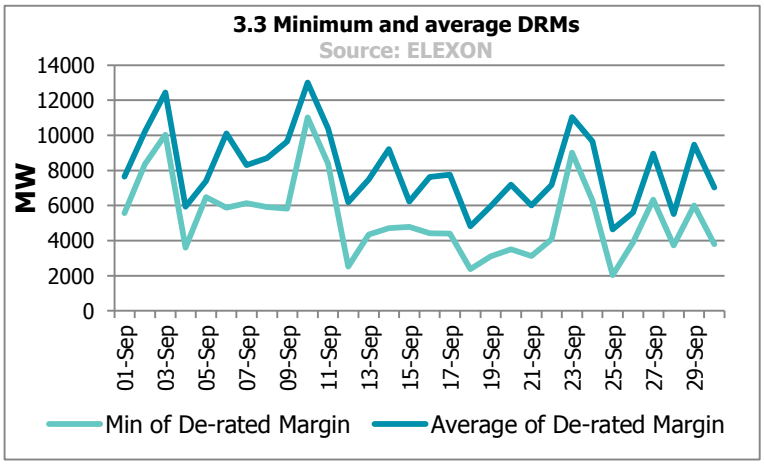
The average Utilisation Price for STOR capacity in September was £146.19/MWh (£146.81/MWh for BM STOR and £60.77/MWh for non-BM STOR).





De-Rated Margin, Loss of Load Probability and the Reserve Scarcity Price

There are times when the Utilisation Prices of STOR plants are uplifted using the **Reserve Scarcity Price (RSP)** in order to calculate System Prices. The RSP is designed to respond to capacity margins, so rises as the system gets tighter (the gap between available and required generation narrows). It is a function of **De-Rated Margin (DRM)** at Gate Closure, the likelihood that this will be insufficient to meet demand (the **Loss of Load Probability**, LoLP) and the **Value of Lost Load** (VoLL, currently set at £3,000/MWh).



Graph 3.3 shows the daily minimum and average Gate Closure DRMs for September 2017.

The System Operator has determined a relationship between each DRM and the LoLP, which will determine the RSP[2]. The minimum DRM in September was 2,033MW (August minimum 2,408MW) on 25 September in Settlement Period 40.

The RSP is used to re-price STOR actions in the Imbalance Price calculation if it is higher than the original Utilisation Price. There were no STOR actions that were re-priced using the RSP in September (see **Table 3.4**).

3.4 Top 5 LoLPs and RSPs

Date	SP	DRM	LoLP	RSP	RSP Used	System Length	System Price
25/09/2017	40	2,032.68	0.0018	**5.52**	No	Short	89.31
25/09/2017	39	2,122.57	0.0012	**3.63**	No	Short	109.95
18/09/2017	41	2,374.19	0.0003	**1.04**	No	Long	37.70
25/09/2017	41	2,474.04	0.0002	**0.61**	No	Long	40.19
12/09/2017	40	2,522.36	0.0002	**0.47**	No	Short	139.00

[2] The System Operators methodology for LoLP is set out in the LoLP Methodology statement: https://www.elexon.co.uk/wp-content/uploads/2015/10/Loss_of_Load_Probability_Calculation_Statement_v1.0.pdf

4 P305 - SPECIFIC ANALYSIS

This section compares live prices with two different pricing scenarios. First we consider what prices would look like with the **pre-P305 price calculation** to highlight the impact of P305. Before the implementation of P305, the price calculation had:

- A PAR of 500MWh, and an RPAR of 100MWh;
- No non-BM STOR volumes or prices included in the price stack;
- No RSP, and instead a Buy Price Adjuster (BPA) that recovers STOR availability fees; and
- No Demand Control, Demand Side Balancing Reserve (DSBR), or Supplementary Balancing Reserve (SBR) actions priced at VoLL.

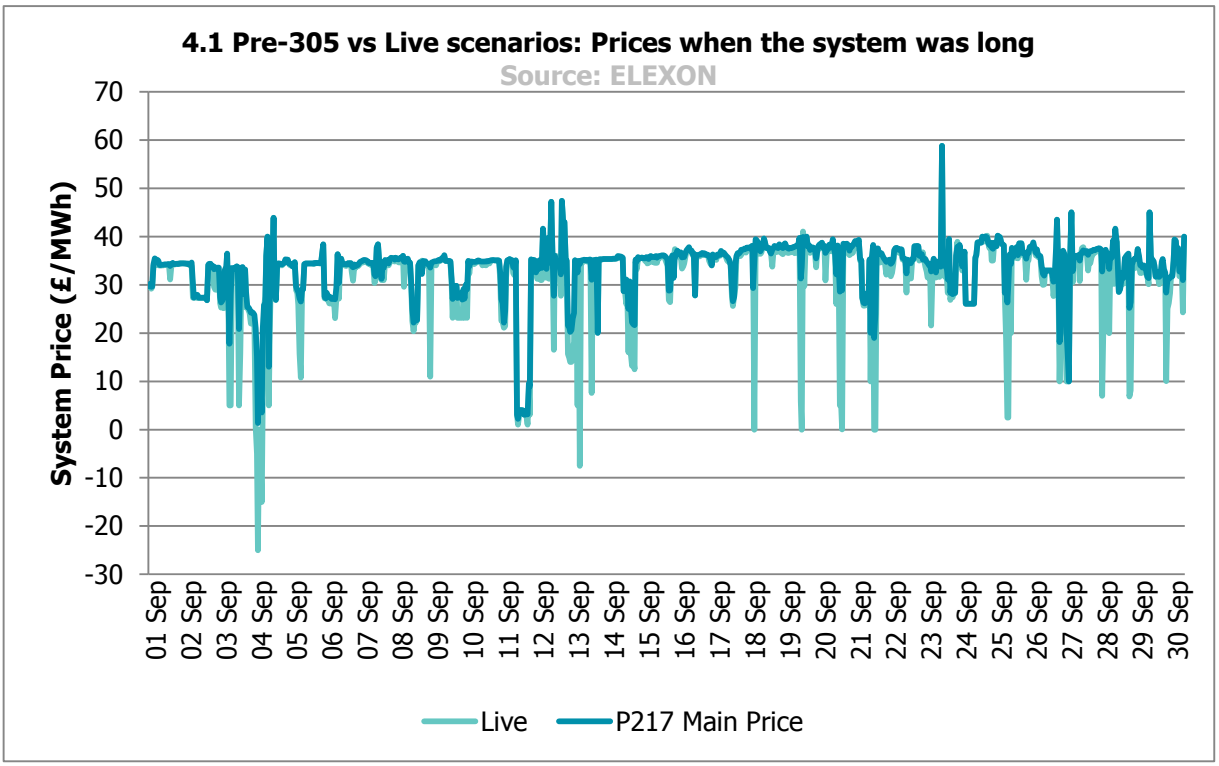
We also consider the **November 2018 Scenario**, which captures the effect of changes to the Imbalance Price parameters that are due to come in on 1 November 2018. These are:

- A reduction in the PAR value to 1MWh (RPAR will remain at 1MWh);
- The introduction of a 'dynamic' LoLP function; and
- An increase in the VoLL to £6,000MWh, which will apply to all instances of VoLL in arrangements, including the RSP function.

Pre-P305 Price Calculation

Graph 4.1 compares live System Prices when the system was long with prices re-calculated using the pre-P305 pricing scenario 'P217' (for comparison we use the Main Price calculation). On average, live prices were £1.73/MWh lower when the system was long compared to the pre-P305 calculation. This is expected, in particular because of the reduction of PAR from 500MWh to 50MWh to make prices 'more marginal'. This change reduces the dampening effect of a large PAR.

When the system was long, prices were different in 84% of Settlement Periods; in 83% of these periods the change was less than £1/MWh. The biggest price change occurred on the 12 September 2017 in Settlement Period 21, where the live price was £41.82/MWh lower than the System Price would have been under the P217 Scenario. This price change is due to the reduction in PAR.

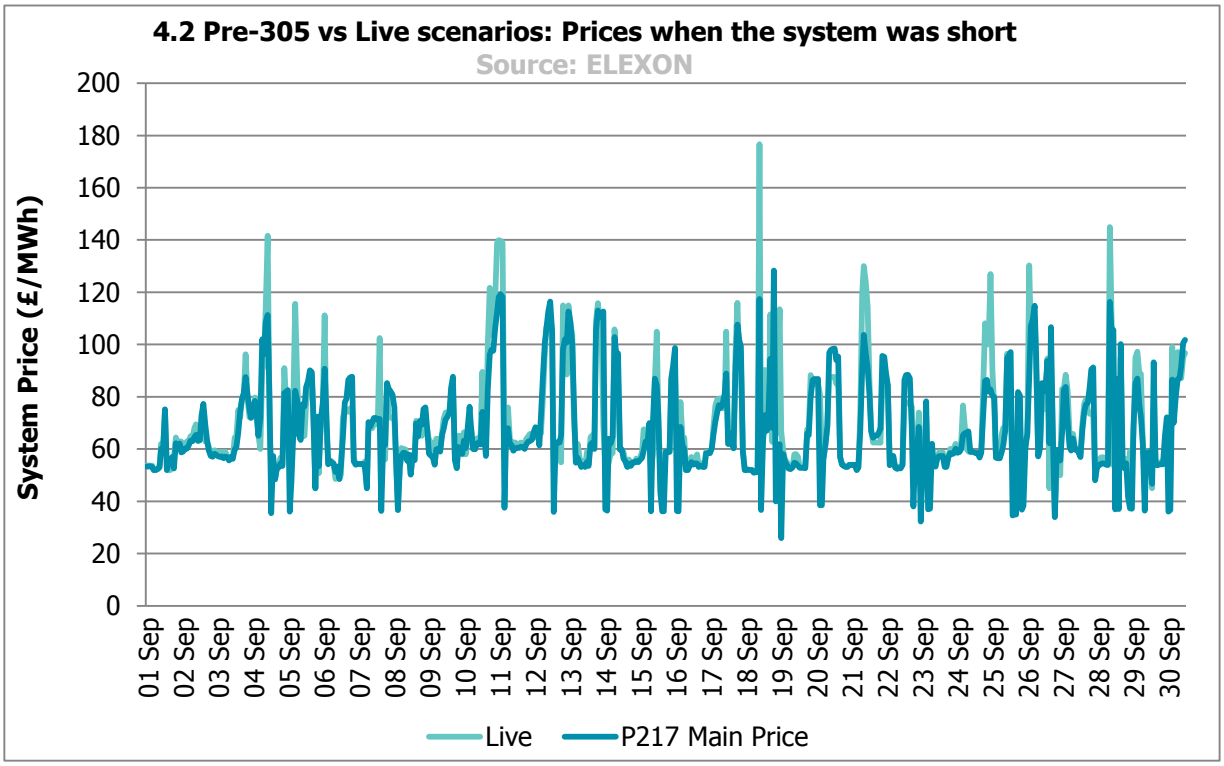


Graph 4.2 compares live System Prices when the system was short with prices re-calculated using the pre-P305 pricing scenario 'P217' (using the Main Price calculation).

Live prices were on average £1.93/MWh higher when the system was short, and 19% of short Settlement Periods had price changes greater than £10/MWh.

The biggest difference in prices when the system was short was £59.25/MWh, which happened on 18 September 2017 during Settlement Period 16 as a result of the reduction in PAR. In the P217 scenario the Main Price would have been £117.44/MWh whereas in the live scenario the System Price was £176.69/MWh.

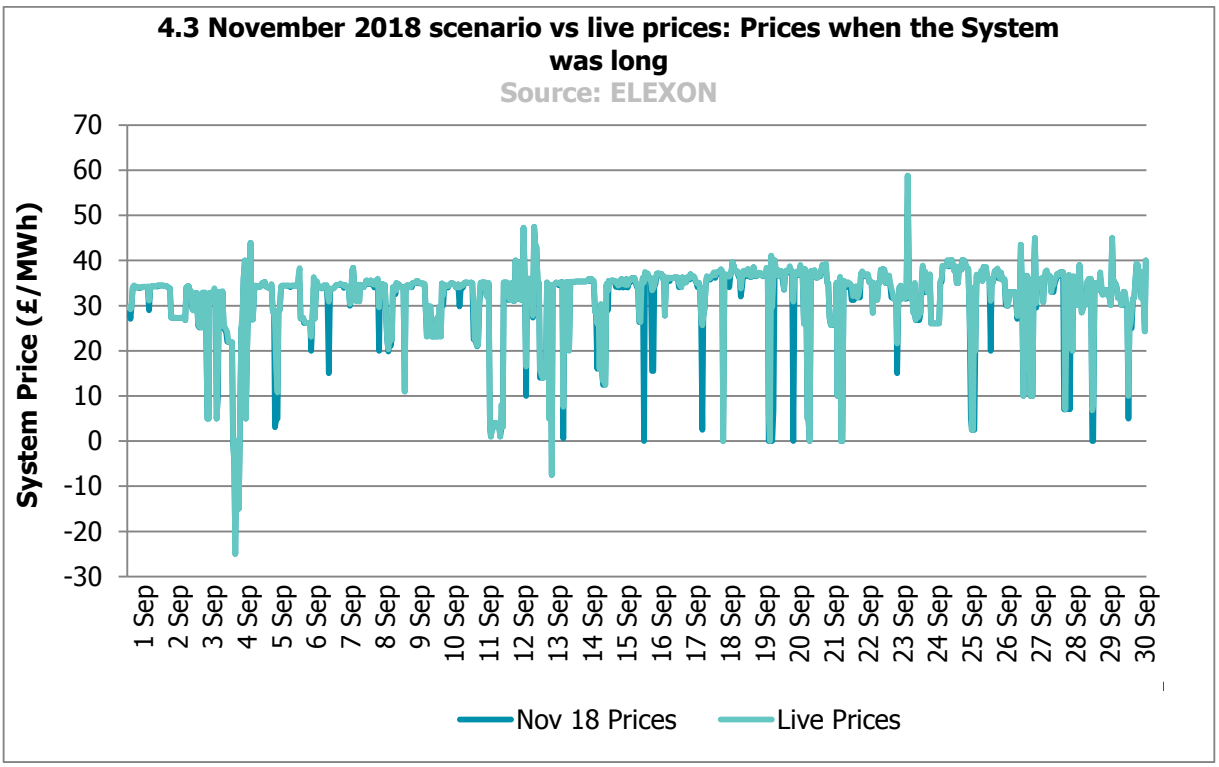
The inclusion of non-BM STOR volumes in the pricing stack changed the system length from long to short in 38 Settlement Periods.



November 2018 Price Calculation

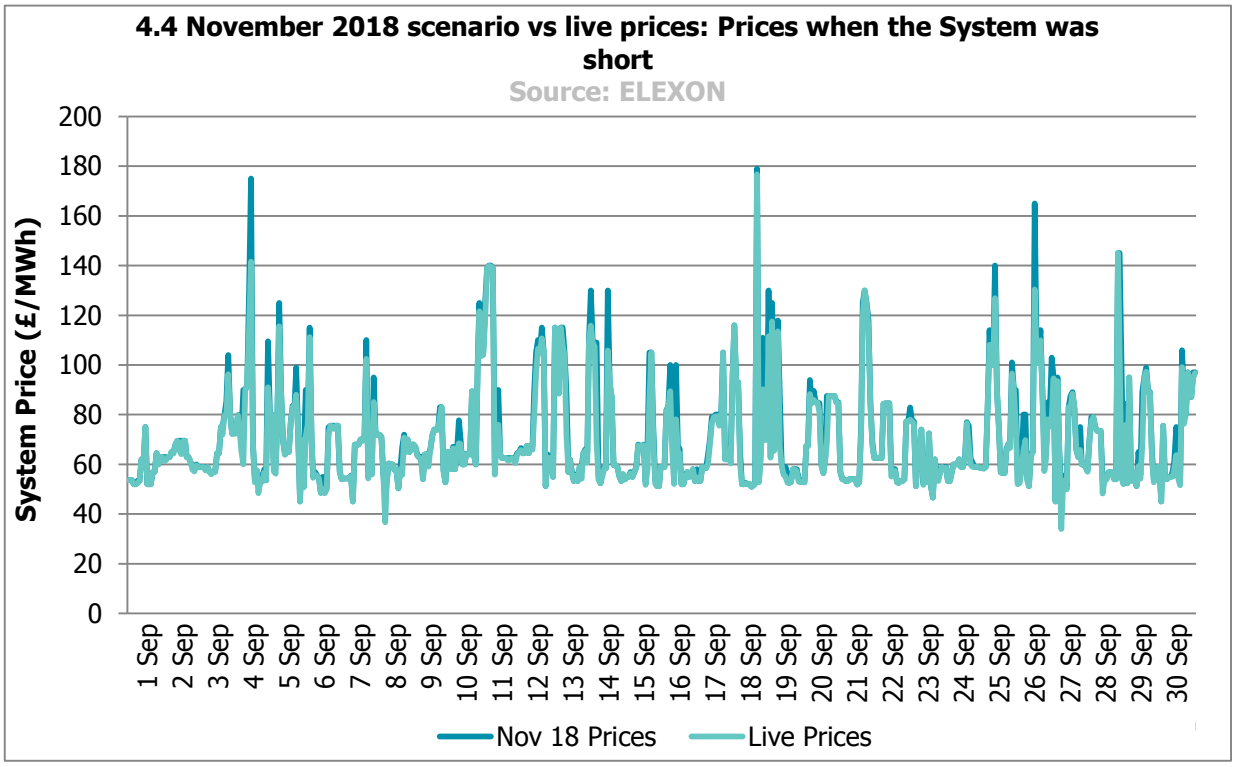
Under the November 2018 scenario, when the system is long prices would be the same or lower, and when the system is short prices would be the same or higher. The average price differences across the month are relatively small under the November 2018 scenario. System Prices would be £0.75/MWh lower when the system was long and £2.11/MWh higher when the system was short. There was no change in prices in 46% of Settlement Periods

Graph 4.3 compares live System Prices with prices re-calculated using the November 2018 scenario when the system was long. When the system was long, price changes were less than £1/MWh in 81% of Settlement Periods and greater than £5/MWh in 7% of Settlement Periods. The biggest shift in price was £35.13/MWh (Settlement Period 21 on 15 September 2017) when the price would have been £0/MWh under the November 2018 scenario, compared to the current live System Price of £35.13/MWh.



Graph 4.4 compares live System Prices with prices re-calculated using the November 2018 scenario when the system was short. Prices would be higher in 48% of short Settlement Periods under the November 2018 scenario. Of those, 25% changed by more than £5/MWh and 13% by more than £10/MWh. The biggest difference in price was £45.52/MWh (Settlement Period 19 on 28 September 2017) when the price would have been £100/MWh under the November 2018 scenario, compared to the current live System Price of £54.48/MWh.

Under the November 2018 scenario, there would be 61 Settlement Periods in September 2017 with prices greater than £100/MWh, compared to 49 periods under the current live scenario.



There were no Demand Control actions taken during September 2017. Under the November 2018 scenario, these action types would be priced at a VoLL of £6,000/MWh rather than the current £3,000/MWh. Although this scenario does not capture the impact that a move to a dynamic LoLP methodology will have, the impact of the change in VoLL on the RSPs can be seen in **Table 4.5.** The RSP would have re-priced no STOR actions in September.

4.5 Reserve Scarcity Prices with VoLL of £6,000

Date	SP	DRM	LoLP	RSP	RSP Used	System Length	System Price
25/09/2017	40	2,032.68	0.0018	**11.04**	No	Short	89.31
25/09/2017	39	2,122.57	0.0012	**7.27**	No	Short	109.95
18/09/2017	41	2,374.19	0.0003	**2.09**	No	Long	37.70
25/09/2017	41	2,474.04	0.0002	**1.23**	No	Long	40.19
12/09/2017	40	2,522.36	0.0002	**0.94**	No	Short	139.00

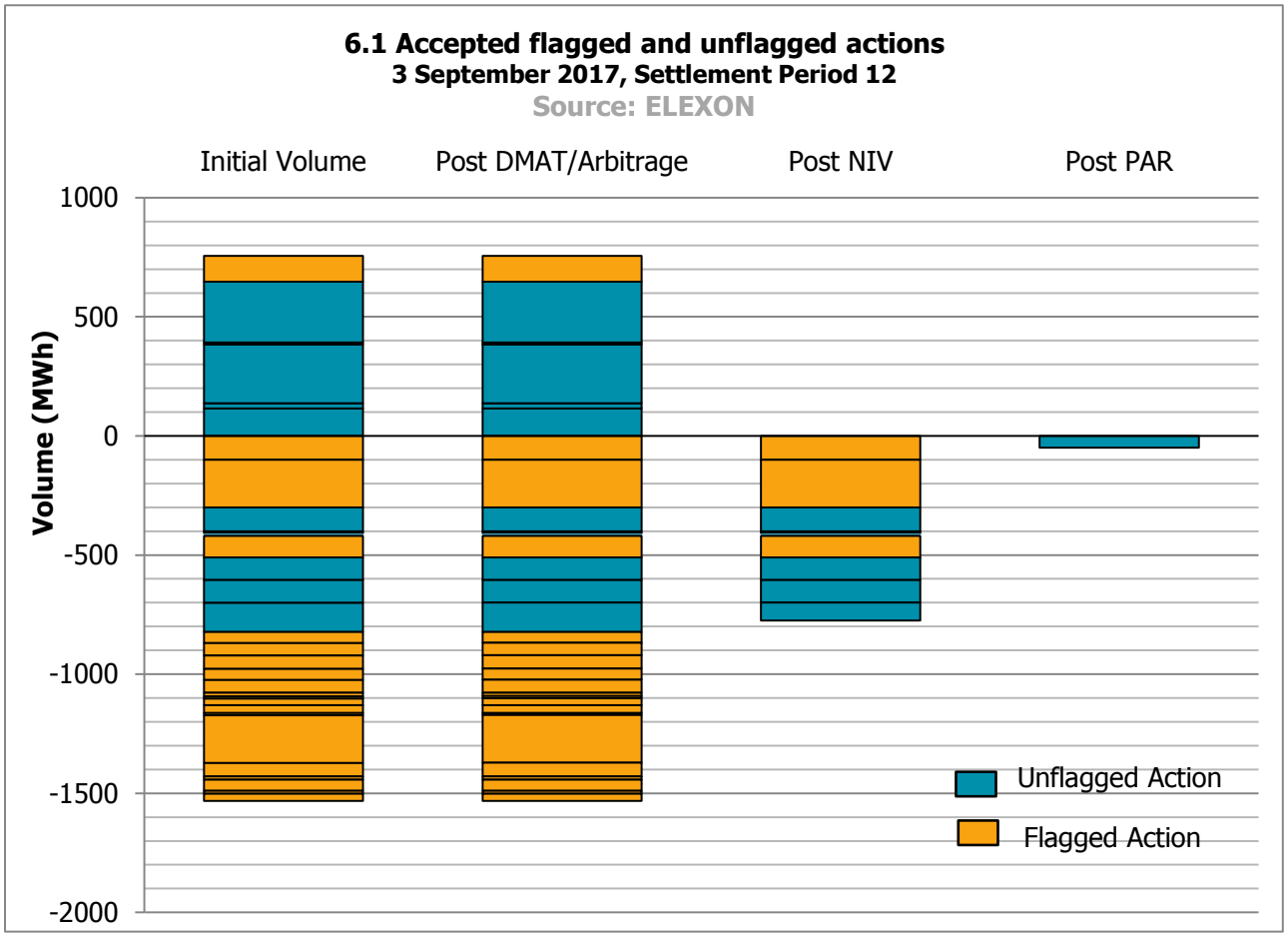
5 GLOSSARY

Term	Abbrev.	Definition
Bid		A proposed volume band and price within which the registrant of a BM Unit is willing to reduce generation or increase consumption (i.e. a rate below their FPN).
Bid/Offer Acceptance	**BOA**	A Bid or Offer within a given Settlement Period that was Accepted by the SO. BOAs are used in the Imbalance Price calculation process e.g. to calculate NIV or the System Price.
Offer		A proposed volume band and price within which the registrant of a BM Unit is willing to increase generation or reduce consumption (i.e. a rate above their FPN).
System Price		A price (in £/MWh) calculated by BSC Central Systems that is applied to imbalance volumes of BSC Parties. It is a core component of the balancing and settlement of electricity in GB and is calculated for every Settlement Period. It is subject to change via Standard Settlement Runs.
Replacement Price		A price (in £/MWh) calculated by BSC Central Systems that is applied to volumes that are not priced during the imbalance pricing process (detailed in BSC Section T) It is calculated for every Settlement Period, and is subject to change via Standard Settlement Runs.
Utilisation Price		The price (in £/MWh) sent by the SO in respect of the utilisation of a STOR Action which: (i) in relation to a BM STOR Action shall be the Offer Price; and (ii) in relation to a Non-BM STOR Action shall be the Balancing Services Adjustment Cost.
Market Index Price	**MIP**	The Market Index Price reflects the price of wholesale electricity in the short-term market (in £/MWh). You can find an explanation of how it is calculated and used in the Market Index Definition Statement (MIDS).
Reserve Scarcity Price	**RSP**	Both accepted BM and non-BM STOR Actions are included in the calculation of System Prices as individual actions, with a price which is the greater of the Utilisation Price for that action or the RSP. The RSP function is based on the prevailing system scarcity, and is calculated as the product of two following values: · the Loss of Load Probability (LoLP), which will be calculated by the SO at Gate Closure for each Settlement Period; and · the Value of Lost Load (VoLL), a defined parameter currently set to £3,000/MWh.
Replacement Price Average Reference	**RPAR**	The RPAR volume is a set volume of the most expensive priced actions remaining at the end of the System Price calculation, and is currently 1MWh. The volume-weighted average of these actions, known as the Replacement Price, is used to provide a price for any remaining unpriced actions prior to PAR Tagging.
Long		In reference to market length, this means that the volume of Accepted Bids exceeds that of Accepted Offers.
Short		In reference to market length, this means that the volume of Accepted Offers exceeds that of Accepted Bid.
Net Imbalance Volume	**NIV**	The imbalance volume (in MWh) of the total system for a given Settlement Period. It is derived by netting buy and sell Actions in the Balancing Mechanism. Where NIV is positive, this means that the system is short and would normally result in the SO accepting Offers to increase generation/decrease consumption. Where NIV is negative, the system is long and the SO would normally accept Bids to reduce generation/ increase consumption. It is subject to change between Standard Settlement Runs.

6 APPENDIX 1 – A CALCULATION EXAMPLE, SETTLEMENT PERIOD 12, 3 SEPTEMBER 2017

In this section one of our Market Analysts, Elona Bucaj, takes a step by step look at how the System Price was calculated for Settlement Period 12 on Sunday 3 September 2017. The System Price was -£25/MWh, the lowest System Price of the month.

In this particular Settlement Period the system was long as National Grid accepted more Bids than Offers, with a total of 52 balancing actions taken. This was made up of 49 Bid-Offer Acceptances (BOAs), with seven Offers and 42 Bids, and three Balancing Services Adjustment Actions (BSAAs). These were separated into their respective Buy and Sell stacks, and ranked from most to least expensive actions (as shown in **graph 6.1**). The most expensive Offer in the Offer stack was £99/MWh, with the cheapest at £55/MWh. The most expensive Bid in the Bid stack was -£88/MWh, with the cheapest at £25.26/MWh.



The next stage removes balancing actions under the De Minimis Acceptance Threshold (DMAT), which is set at 1MWh. DMAT aims to remove small volume actions that could be the result of rounding errors. Only one action was DMAT Tagged in this Settlement Period.

First-Stage Flagging is a process which looks to identify if an action is 'system' related and needs to be repriced. All First-Stage Flagged actions in this Settlement Period were SO-Flagged, this represented 1,220MWh energy balancing

volume. The majority of Flagged actions related to Wind BMUs (82%), with 10% related to Pumped storage BMUs and 3% related to Gas BMUs.

In this Settlement Period 38 balancing actions were First-Staged Flagged, 37 sell actions and one buy action. The average price of these Flagged sell actions was -£55.19/MWh, the most expensive Unflagged sell action in this Settlement Period was priced at -£25/MWh.

Classification determines if the balancing actions will become 'Second-Stage Flagged' or 'Second-Stage Unflagged' actions, and also whether they keep their price. First-Stage Flagged actions become Second-Stage Flagged actions if the action has a more expensive price than the most expensive Unflagged action. Classification occurs independently for the Buy Ranked Set and the Sell Ranked Set. In this case 31 actions were Second-Stage Flagged.

The Net Imbalance Volume (NIV) Tagging occurs after Classification. NIV is calculated by netting off the Buy and Sell Ranked Sets to give the net system length, starting with the most expensive actions first. If the Transmission System is short, NIV will be positive and if long, NIV will be negative. In this example, the NIV is -776MWh so the Transmission System is long, which means the SO accepted a greater volume of sell than buy actions to balance the system. It also means that our System Price will be calculated based purely on Bids.

None of the Flagged actions had their price replaced by the Replacement Price. This is due to 31 Second Stage Flagged actions being removed from the calculation by Net Imbalance Volume (NIV) tagging, this can be seen in the post NIV column of **Graph 6.1**. In the System Price calculation NIV tagging occurs before the replacement price is applied.

PAR Tagging then takes the most expensive 50MWh of actions (due to be 1MWh from 1 November 2017) to calculate the final Energy Imbalance Price as a volume weighted average. There are two actions in the PAR of -29.44MWh and -20.56MWh, both these actions are priced at -£25/MWh. The volume weighted average price of these two actions is -£25/MWh. The Energy Imbalance Price calculation is given below:

$$\frac{((-29.44MWh \times -£25/MWh) + (-20.56MWh \times -£25/MWh))}{(-29.44MWh - 20.56MWh)} = -£25/MWh$$

In this example, both of the actions are for the same price and therefore reducing the PAR volume, for example to 1MWh would make no difference to the System Price.