# System Prices Analysis Report: July 2022

**Bookmark** Glossary

The System Prices Analysis Report (SPAR) provides a monthly update on price calculations. It is published by the ELEXON Market Operations on the Elexon Website and issued to the Imbalance Settlement Group (ISG) at their monthly meeting. This report provides data and analysis specific to System Prices and the Balancing Mechanism. It demonstrates the data used to derive the prices. The data is a combination of II and SF Settlement Runs.

### Highlights from the July 2022 report

- ➤ The DRM dropped below 0GW on 18 July in Settlement Periods 37 to 40. National Grid ESO issued a Capacity Market Notice on this day which signals to market there may not be enough generation to meet demand. For more information, read the BSC Insight: Using the Insights Solution to predict Capacity Market Notices (https://www.elexon.co.uk/article/bsc-insight-using-the-insights-solution-to-predict-capacity-market-notices/)
- ► £885,308 was spent on Short Term Operating Reserve (STOR) in July 2022, the highest monthly total for July since 2018.
- July 2022 had a monthly average System Price of £325.77/MWh in short Settlement Periods, the highest on record.

## On this page

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## **System Prices and length**

This report covers the month of July. 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 the two scenarios.

When the market is long, System Prices are based predominantly on the System Operator's 'sell' actions such as accepted Bids. When the market is short, System Prices are based predominantly on the System Operator's 'buy' actions.

# COOKIES SETTINGS ummary by month (£/MWh)

This table gives a summary of System Prices for July, with values shown in £/MWh.

# **System Length**

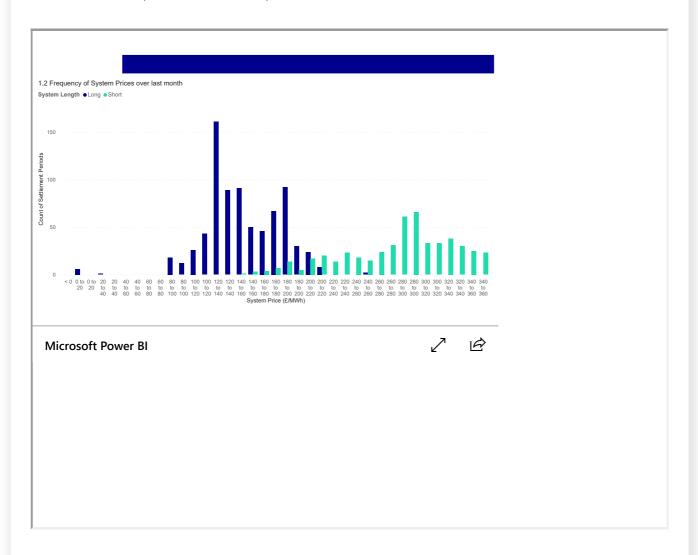
Long	
Min	0
Мах	250
Median	142.32
Mean	146.36
Std.Dev	33.2
Short	
Min	149
Мах	774
Median	314
Mean	326.09
Std.Dev	90.29

System Length	Min	Max	Median	Mean	Std.Dev
Long	0	250	142.32	146.36	33.2
Short	149	774	314	326.09	90.29

Source: Elexon

### Frequency of System Prices over last month

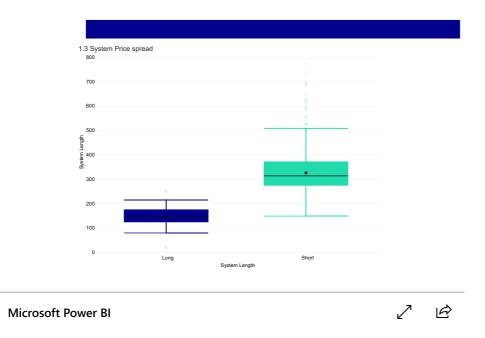
This graph shows the distribution of System Prices across Settlement Periods in July 2022 when the market was long and short. 80% of System Prices were between £121.93/MWh and £387.84/MWh regardless of system length. When the system was long, 80% of prices were between £115.00/MWh and £187.43/MWh. When the system was short, 80% of prices were between £220.74/MWh and £424.99/MWh.



System Prices were £100.00/MWh or more on 1,451 occasions but did not exceed £1,000.00/MWh in July 2022. In the previous month there were 1,095 System Prices on or over £100.00/MWh and no System Prices over £1,000.00/MWh. The highest System Price of the month, £774.00/MWh, occurred in Settlement Period 38 on 19 July. This was set by a Balancing Services Adjustment Action (BSAA) priced at £774.00/MWh.

There were no Settlement Periods where the System Price was less than £0.00/MWh in July, with the lowest System Price of £0.00/MWh occurring in five Settlement Periods in July.

**System Price spread** The graph below displays the spread of System Prices in July 2022 as a box plot diagram, split between a short and long system.

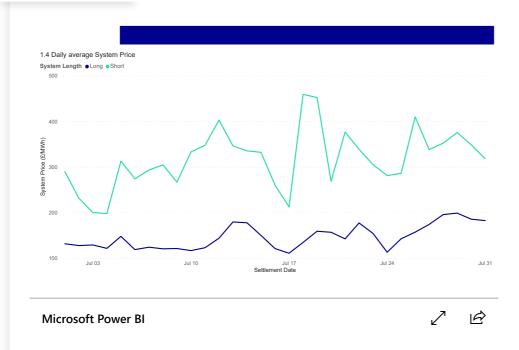


The middle line in each box represents the median System Price of the month, which is £314.00/MWh for short Settlement Periods and £142.32/MWh for long Settlement Periods. Each box edge represents the lower and upper quartiles (25th and 75th percentile respectively), with the Interquartile Range (difference between the Upper and Lower quartiles) being £96.30/MWh for short System Prices and £49.60/MWh for long System Prices.

Outliers are shown on the graph as circles, and have been defined as being greater than 1.5 times the Interquartile Range (IQR) away from the Upper and Lower quartiles. Under this definition, nine long and 24 short System Prices in July were outliers. Of the nine long outliers, seven were less than the lower outlier boundary. The prices of Long outliers ranged from  $\pm 0.00$ /MWh (the lowest System Price of the month) to  $\pm 250.00$ /MWh. The highest System Price of the month,  $\pm 774.00$ /MWh, was 2.46 times the median short System Price for the month.

### **Daily average System Price**

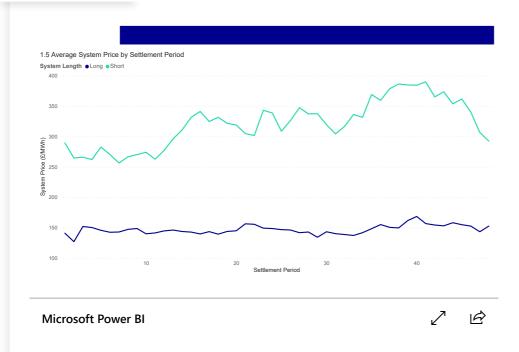
The graph below shows daily average System Prices over the last month.



In July, the average System Price was £146.36/MWh when the system was long and £326.09/MWh when the system was short. The highest daily average price when the system was short was £459.36/MWh, and occurred on 18 July; the system was short for 22 Settlement Periods on this day. The lowest daily average price when the system was long was £110.64/MWh on 17 July. The system was long for 40 Settlement Periods on this day.

### **Average System Price by Settlement Period**

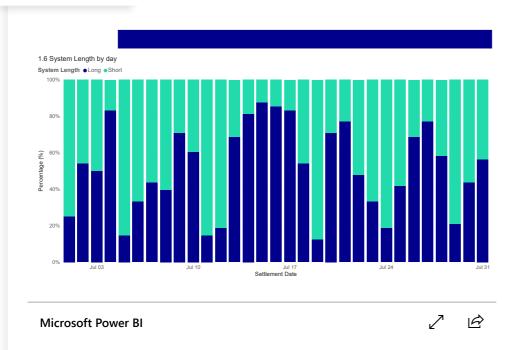
The graph below shows the variation of average System Prices across the day.



Short prices were highest in Settlement Period 41, with long prices lowest in Settlement Period 2. The lowest average System Price, regardless of market length, occurred during Settlement Period 7, when the System Price was £179.56/MWh. The daily average long Settlement Period System Prices ranged between £127.03/MWh and £168.53/MWh. Average short Settlement Period prices varied from £256.49/MWh to £390.12/MWh.

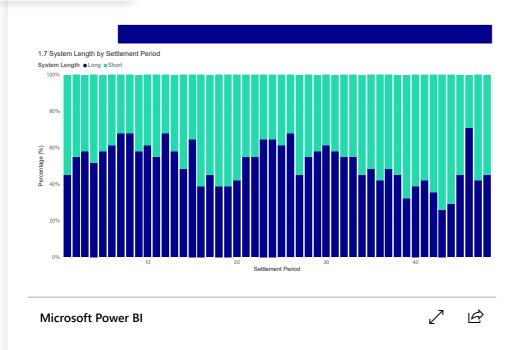
### **Daily System Length**

This graph shows system length by day.



# System Length by Settlement Period

This graph shows system length by Settlement Period for July.



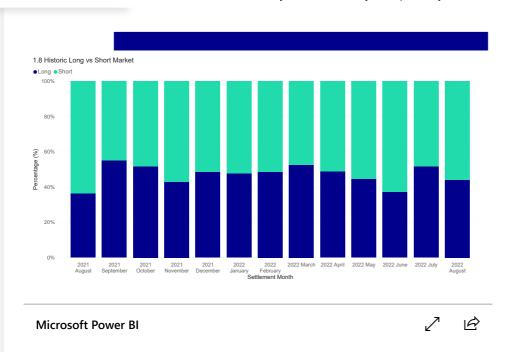
The system was long for 51% of Settlement Periods in July.

On 19 July, the system was short for 42 of 48 Settlement Periods. The long Settlement Periods on this day had an average NIV of -222MWh. The daily average NIV on this day was 416MWh.

Settlement Period 46 had the highest number of long Settlement Periods, with 71% of them being long this month.

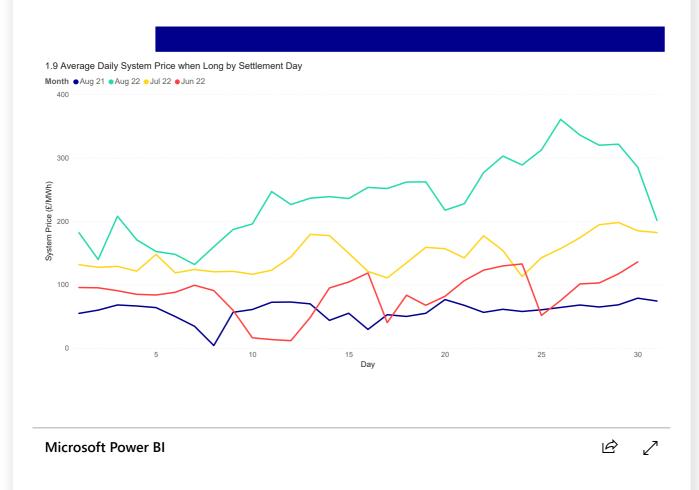
### Historic long vs short market

This graph shows the percentage of long and short Settlement Periods over the past year. July 2022 had 51% of long Settlement Periods, compared to 46% per month over the previous 12 months.



## Average Daily System Price when Long by Settlement Day

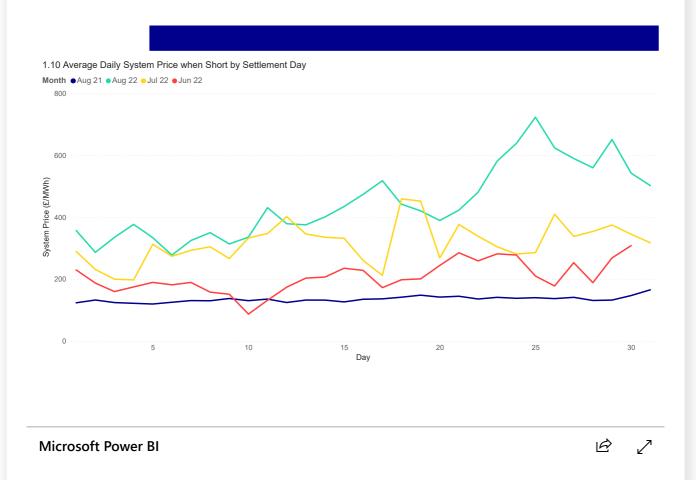
The graph below displays the daily average System Prices in July 2022 when the system was long compared to the two previous months and the same month last year.



Daily average long System Prices were £84.00/MWh higher in July 2022 than the same month in 2021.

### **Average Daily System Price when Short by Settlement Day**

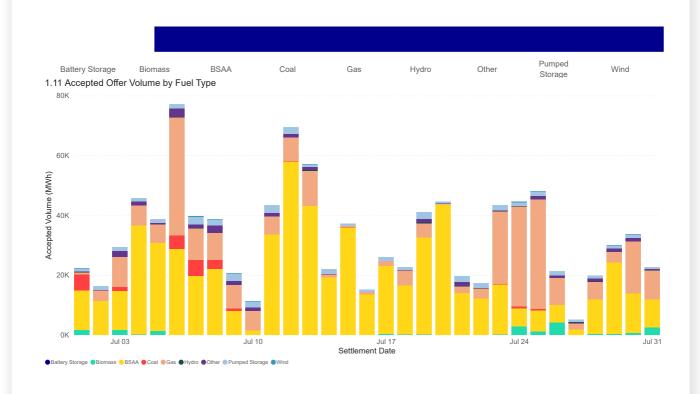
This graph looks at System Prices from the same months as the previous graph, but when the System was short.



Short daily average System Prices were £199.67/MWh higher in July 2022 than the same month last year.

## **Accepted Volumes Accepted Offer Volume by Fuel Type**

This graph displays the Offer volumes of fuel types that participated in the Balancing Mechanism during July 2022. Offers are balancing actions taken to increase the level of energy on the System. This report also contains balancing volumes from Balancing Services Adjustment Actions (BSAAs). BSAAs include, but are not limited to, balancing actions such as system-to-system services, Short Term Operating Reserve actions taken outside the Balancing mechanism and forward contracted energy products.



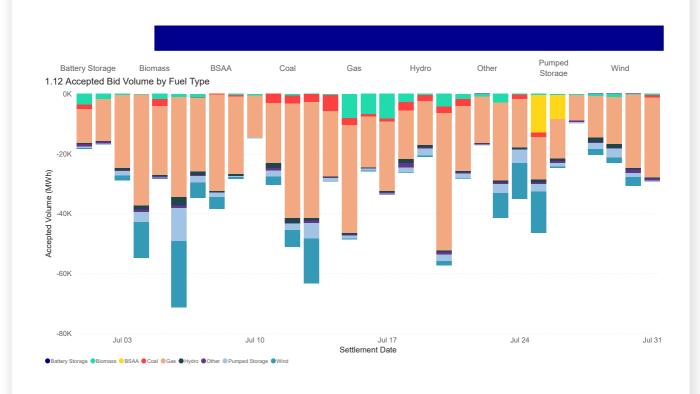
Microsoft Power BI





## **Accepted Bid Volume by Fuel Type**

This graph displays the Bid volumes of fuel types that participated in the Balancing Mechanism during July 2022. Bids are balancing actions taken to decrease the level of energy on the System.



Microsoft Power BI





During July, 61% of Offer volume came from BSAA BMUs with a further 28% from Gas and 4% from Pumped Storage BMUs.

69% of Bid volume came from Gas BMUs with a further 11% from Wind and 6% from Pumped Storage BMUs.

### **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 the Replacement Price;
- The impact of NIV Tagging;
- The impact of PAR Tagging;
- The impact of DMAT and Arbitrage Tagging; and

How these mechanisms affect which balancing actions feed into the price.

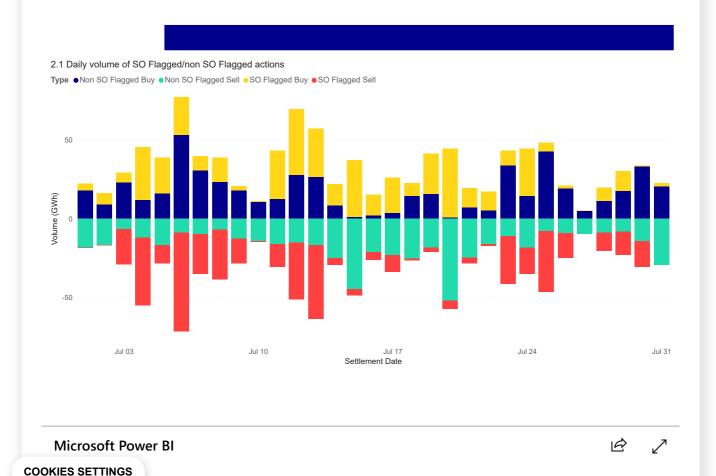
## **Flagging**

The Imbalance Price calculation aims to distinguish between 'energy' and 'system' balancing actions. Energy balancing actions are those 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 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). The System Operator (SO) flags actions when they are taken to resolve a locational constraint on the transmission network (SO-Flagging), or to correct short-term increases or decreases in generation/demand (Continuous Acceptance Duration Limit (CADL) Flagging).

### Daily volume of SO-Flagged/non-Flagged actions

This graph shows the volumes of Buy and Sell actions in July 2022 that have been Flagged by the SO as being constraint related. On 20 July, 98% of Buy volume was SO-Flagged.



48% of Sell balancing action volume taken in July had an SO-Flag, compared with 62% the previous month. 59% of SO-Flagged Sell actions came from CCGT BMUs, 5% came from Balancing Service Adjustment Actions (BSAAs) and 23% from Wind BMUs. The average initial price (i.e. before any re-pricing) of a SO-Flagged Sell action was £20.76/MWh.

47% of Buy balancing action volume taken in July had an SO-Flag, compared to 46% in June. 8% of SO-Flagged Buy actions came from CCGT BMUs and 91% from BSAAs. The average initial price of a SO-Flagged Buy action was £537.42/MWh.

Any actions with a total duration of less than the CADL are flagged. The CADL is currently set at 10 minutes.

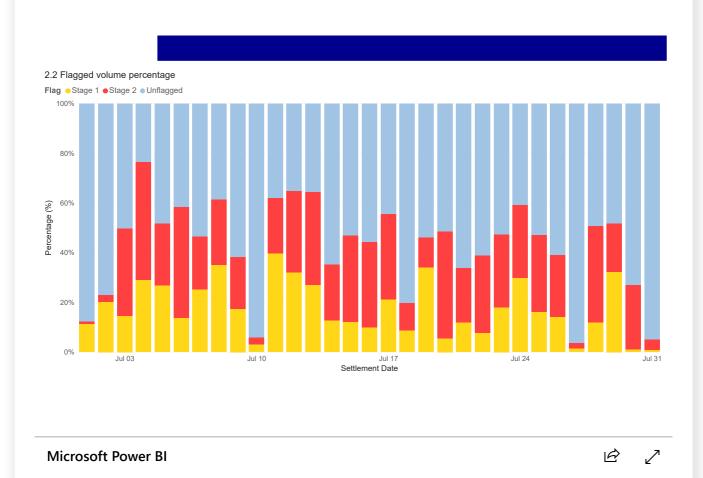
0.7% of Buy action volume and 0.3% of Sell action volume were CADL Flagged in July. The majority of CADL Flagged Buy actions (98%), and CADL Flagged Sell actions (84%) came from Pumped Storage BMUs, with CCGT BMUs accounting for a further 15% of CADL Flagged Sell Actions.

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-Staged Unflagged balancing action, it becomes Second-Stage Flagged. This means it is considered a system balancing action and becomes unpriced.

### **Flagged Balancing Volumes**

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

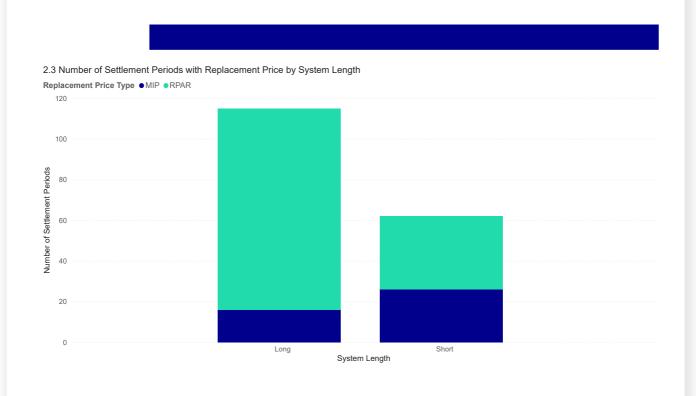
In July, 42% of balancing volume received a First-Stage Flag with 58% of this volume going on to receive a Second-Stage Flag. On the 4 July, 77% of balancing volume was flagged; with 62% of this volume receiving a Second Stage Flag.



## The Replacement Price

Any Second-Stage Flagged action volumes left in the NIV will be repriced using the Replacement Price. The Replacement Price is either based on the Replacement Price Average Reference (RPAR currently based on the most expensive 1MWh of Unflagged actions), or if no Unflagged actions remain after NIV Tagging, the Market Index Price (MIP). In July, 135 (9%) Settlement Periods had a Replacement Price based on the RPAR and 42 (3%) Settlement Periods had a Replacement Price based on the MIP. However, the majority of Settlement Periods (88%) did not have a Replacement Price.

**Number of Settlement Periods with Replacement Price by System Length** displays the count of Settlement Periods which had a Replacement Price applied, split by the system length and if the Replacement Price was based on RPAR or the MIP.



Microsoft Power BI





## **Average Price and Replacement Price by System Length**

This table displays the average original and Replacement Price of Second-Stage Flagged actions

# **System Length**

L	0	n	g
_	_		0

Long	
Original Price (£/MWh)	115.31
Replacement Price (£/MWh)	152.48
Short	
Original Price (£/MWh)	479.66

COOKIES SETTINGS Price (£/MWh)

315.11

System Length	Original Price (£/MWh)	Replacement Price (£/MWh)
Long	115.31	152.48
Short	479.66	315.11

Source: Elexon

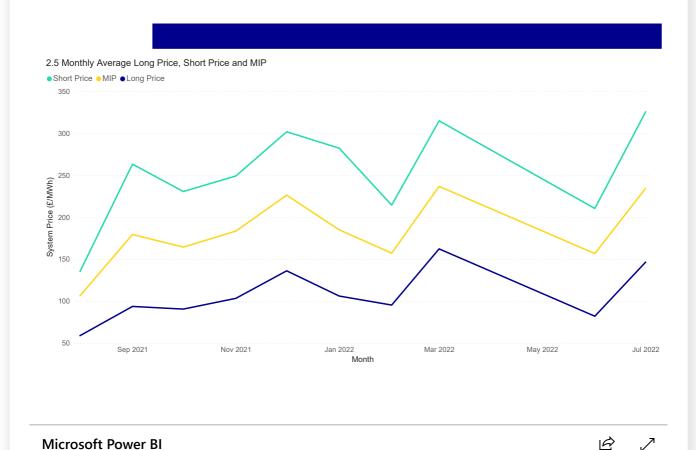
Sell actions will typically have their prices revised upwards by the Replacement Price for the purposes of calculating the System Price. In total, 48% of Sell volume in July was Flagged. Of this Flagged Sell volume, 9% was assigned a Replacement Price. The average original price of a Second-Stage Flagged repriced Sell action was £115.31/MWh and the average Replacement Price for Sell actions (when the System was long) was £152.48/MWh.

48% of Buy volume were Flagged; 2.9% of this volume had the Replacement Price applied. The average original price of a Second-Stage Flagged repriced Buy action was £479.66/MWh and the average Replacement Price for Buy actions (when the System was long) was £315.11/MWh.

If there are no Unflagged actions remaining in the NIV, the Replacement Price will default to the MIP. This occurred in 16 long and 26 short Settlement Periods in July, compared to 19 long and 41 short Settlement Periods the previous month.

### Monthly Average Long Price, Short Price and MIP

This graph compares the monthly average MIP to the monthly average long and short System Prices for the past 13 months. The monthly average long price increased by £64.38/MWh to £146.36/MWh, the short price increased by £115.60/MWh to £326.09/MWh and the MIP increased by £77.90/MWh to £234.60/MWh in July 2022 compared to the previous month.



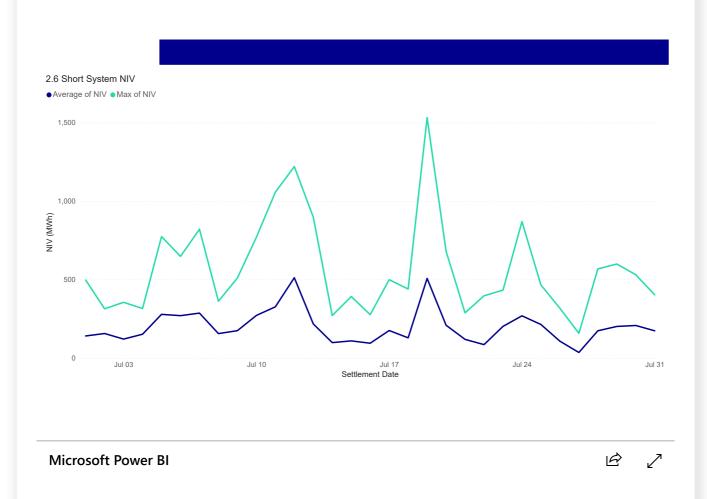
July 2022 had a monthly average System Price of £325.77/MWh in short Settlement Periods, the highest on record.

## **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.

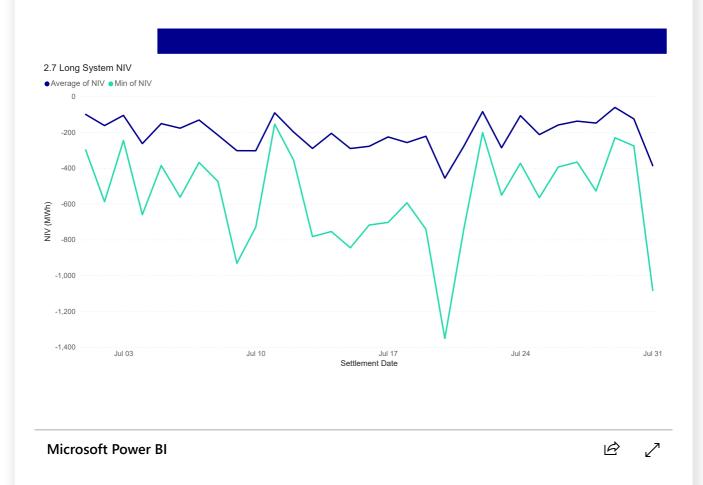
### **Short system NIV**

This graph shows the greatest and average NIV when the system was short.



## **Long system NIV**

This graph shows the minimum 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 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. The price is then derived from these remaining actions.

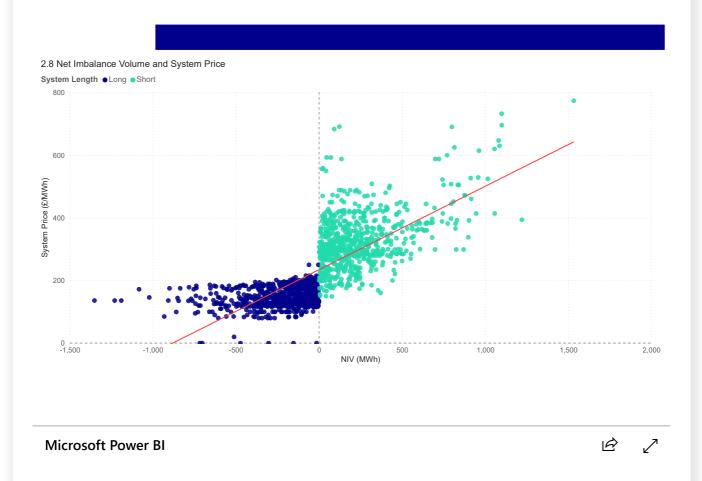
NIV Tagging has a significant impact in determining which actions feed through to prices. In July, 83% of volume was removed due to NIV tagging. The most expensive actions are NIV Tagged first; hence NIV Tagging has a dampening effect on prices when there are balancing actions in both directions.

The maximum short system NIV of the month (1,532MWh) was seen in Settlement Period 38 on 19 July, where the System Price was £774.00/MWh.

The minimum long system NIV of the month was -1,352MWh, in Settlement Period 14 on 20 July, where the System Price was £136.00/MWh.

### **Net Imbalance Volume and System Price**

This graph displays a scatter graph of Net Imbalance Volume and System Prices. The dashed lines display a 0MWh NIV and a £0.00/MWh System Price, the red line is a trendline with the expected System Price from a particular NIV based on the month's data.



There were 766 long Settlement Periods in July, 42 of which occurred on 15 July. The average NIV on this day was -241MWh, with the lowest NIV (-845MWh) occurring in Settlement Period 32. The highest System Price of the month (£774.00/MWh) also had the highest (shortest) NIV of the month (1,532MWh).

### **PAR Tagging**

PAR Tagging is the final step of the Imbalance Price calculation. It takes a volume-weighted average of the most expensive 1MWh of actions left in the stack. The value of PAR is set at 1MWh.

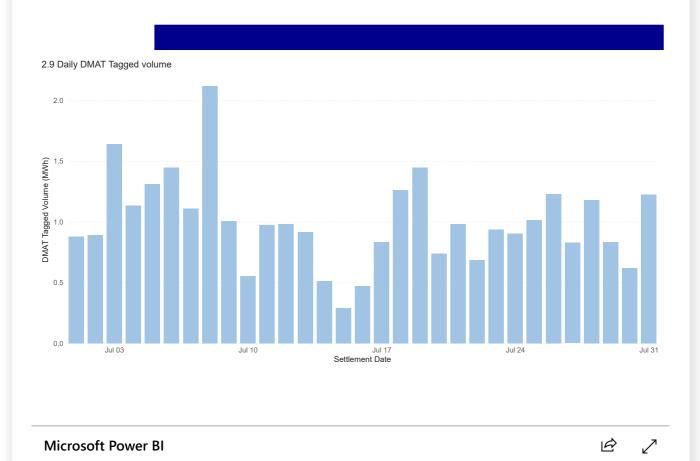
PAR Tagging is active in almost all Settlement Periods, the only periods not affected by the parameter have a NIV of less than 1MWh.

During July, there were 4 Settlement Periods where PAR Tagging was inactive. The average NIV in these Settlement Periods was 0.3MWh. Settlement Period 11 on 31 July had the lowest **COOKIES SETTINGS** 03MWh), and therefore was the most balanced Settlement Period of the month.

### **DMAT and Arbitrage Tagged Volumes**

Some actions are always removed from the price calculation (before NIV Tagging). These are actions which are less than the 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). The DMAT is set at 0.1MWh.

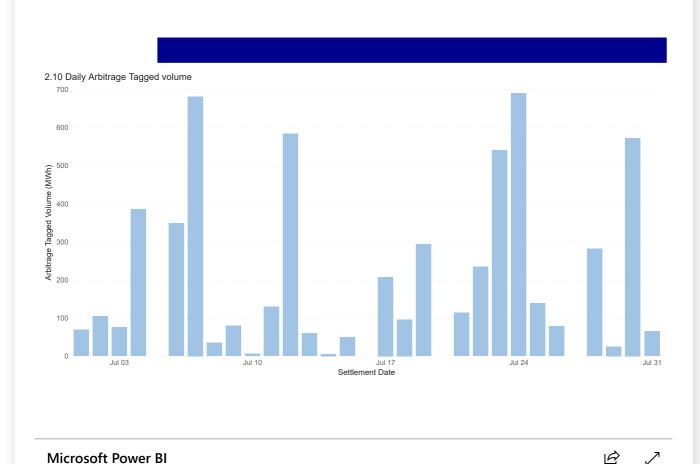
**Daily Volume of DMAT Tagged volume** This graph shows the volumes of actions removed due to DMAT Tagging.



31MWh of total Buy and Sell volume was removed by DMAT Tagging in July, compared to 28MWh the previous month. 45% of the DMAT Tagged volume came from CCGT BMUs, 25% from other BMUs and 11% from Gas BMUs.

### **Daily volume of Arbitrage Tagged volume**

This graph shows the volumes of actions that were removed due to Arbitrage Tagging.



5,951MWh of total Buy and Sell volume was removed by Arbitrage Tagging in July. 53% of the Arbitrage Tagged came from CCGT BMUs, 18% from Wind BMUs and 10% from other BMUs.

In July, the average initial price of an Arbitrage Tagged Buy action was £107.30/MWh, and for a Sell action was £167.65/MWh. The maximum initial price of an Arbitrage Tagged Sell action was £400.00/MWh, and the lowest priced Arbitrage Tagged Buy action was -£81.78/MWh.

On 24 July, 690MWh of actions were Arbitrage Tagged, representing 0.9% of the daily volume of balancing actions. The average price of an Arbitrage Tagged Buy action was £162.80/MWh, and for a Sell action was £270.89/MWh on this day. 58% of the Abitrage Tagged Volume came from CCGT BMUs, 20% from Gas BMUs and 14% from Wind BMUs.

## **Balancing Services**

### **Short Term Operating Reserve (STOR) costs and volumes**

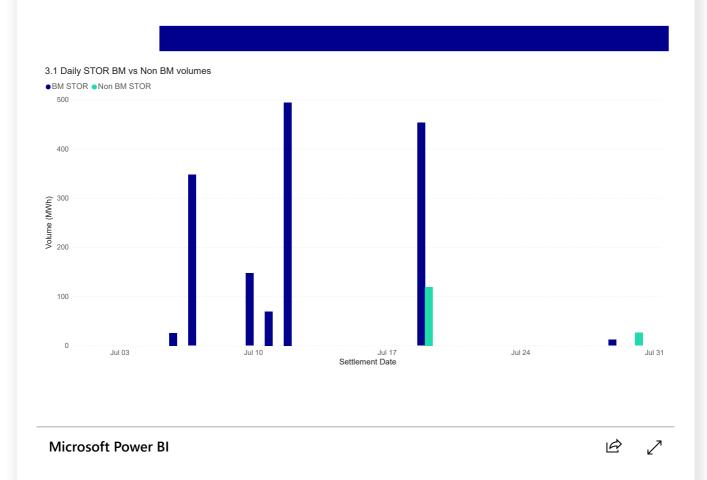
This section covers the balancing services that the System Operator (SO) takes outside the Balancing Mechanism that can affect the price.

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).

### **Daily STOR vs Non-BM STOR volume**

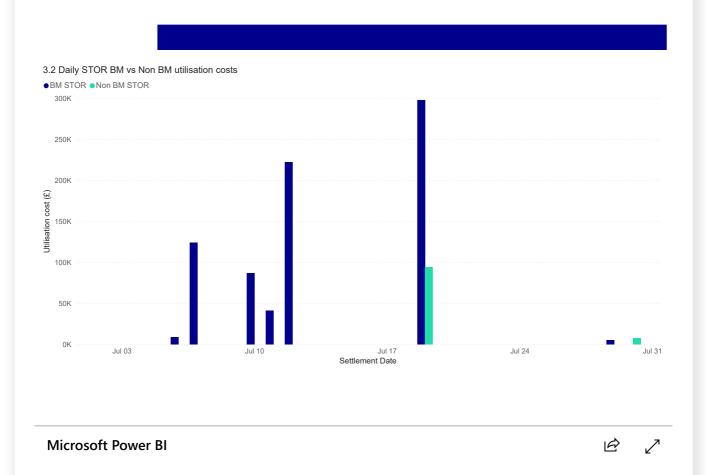
This graph gives STOR volumes that were called upon during the month split into BM STOR and non-BM STOR. 9% of the total STOR volume utilised in July came from outside of the Balancing Mechanism.



### **Daily STOR vs Non-BM STOR utilisation costs**

This graph shows the utilisation costs of this capacity. The average Utilisation Price for STOR capacity in July was £524.82/MWh; £508.10/MWh for BM STOR and £703.84/MWh for non-BM STOR.

£885,308 was spent on Short Term Operating Reserve (STOR) in July 2022, the highest monthly total for July since 2018.

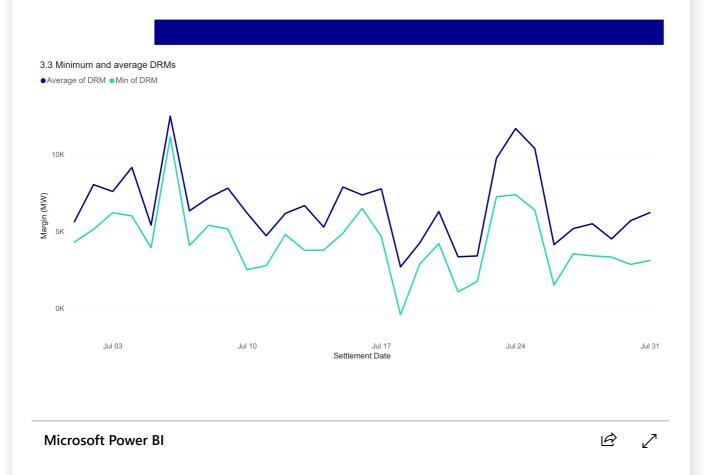


On 19 July the largest amount was spent on STOR volume for the month (£391,923), of which 76% of the cost was BM STOR and 24% was non-BM STOR. The utilised BM STOR volume on this day was 453MWh, compared to the average of 50MWh across the month.

### 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 (RSVP)** in order to calculate System Prices. The RSVP 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, set at £6,000/MWh from 1 November 2018).

**Minimum and average DRMs** This graph shows the daily minimum and average Gate Closure DRMs for July 2022.



The System Operator has determined a dynamic relationship between each DRM and the LoLP, which will determine the RSVP.

The minimum DRM in July was -0.400GW on 18 July in Settlement Period 40 (compared to 1.824GW in June). This DRM corresponded to a LoLP of 0.6952 and a RSVP of £4,171.43/MWh (see **Top 5 LoLPs and RSVPs**). This is the lowest DRM and highest RSVP on record.

The DRM dropped below 0GW on 18 July in Settlement Periods 37 to 40. National Grid ESO issued a Capacity Market Notice on this day which signals to market there may not be enough generation to meet demand. For more information, read the BSC Insight: Using the Insights Solution to predict Capacity Market Notices

(https://www.elexon.co.uk/article/bsc-insight-using-the-insights-solution-to-predict-capacity-market-notices/)

The only other date with a negative DRM was 14 January 2022, where the DRM was -0.262GW.

The RSVP re-prices STOR actions in the Imbalance Price calculation if it is higher than the original Utilisation Price. No STOR actions were repriced with the RSVP during July.

## **Top 5 LoLPs and RSVPs**

# **Settlement Date**

18/07/2022		
Settlement Period	40	
DRM (MW)	-400	
LoLP	0.6952	
RSVP (£/MWh)	4171.4	
RSVP Used	No	
System Price (£/MWh)	180	
System Length	Long	
18/07/2022		
Settlement Period	38	
DRM (MW)	-314	
LoLP	0.6587	
RSVP (£/MWh)	3952.2	
RSVP Used	No	
System Price (£/MWh) OKIES SETTINGS	683.3	

System Length	Short	
18/07/2022		
Settlement Period	39	
DRM (MW)	-139	
LoLP	0.5757	
RSVP (£/MWh)	3454.1	
RSVP Used	No	
System Price (£/MWh)	691.15	
System Length	Short	
18/07/2022		
Settlement Period	37	
DRM (MW)	-84	
LoLP	0.5454	
RSVP (£/MWh)	3272.3	
RSVP Used	No	
System Price (£/MWh)	200	

Settlement Period	41
DRM (MW)	132
LoLP	0.442
RSVP (£/MWh)	2651.7
RSVP Used	No
System Price (£/MWh)	180
System Length	Long

Source: Elexon

## **Contact information**

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## **PDF** versions

Download PDFs of previous reports from the SPAR archive (https://www.elexon.co.uk/about/key-data-reports/system-prices-analysis-report/spar-archive/)

## **BSC Insights**

**System Prices** 

•	The electricity market (https://www.elexon.co.uk/about/elexon-insights/bsc-insights-the-electricity-market/)	>
•	Code Governance and reforms (https://www.elexon.co.uk/about/elexon-insights/bsc-insights-code-governance-and-reforms/)	>
•	Imbalance and Settlement (https://www.elexon.co.uk/about/elexon-insights/bsc-insights-imbalance-and-settlement/)	>

(https://www.elexon.co.uk/about/elexon-insights/bsc-insights-system-prices/)
 Supporting changes in the energy system
 (https://www.elexon.co.uk/about/elexon-insights/bsc-insights-supporting-changes-in-the-energy-system/)

Managing the BSC (https://www.elexon.co.uk/about/elexon-insights/bsc-insights-managing-the-bsc/)

## **Accessibility**

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