P410 ‘Changing imbalance price calculations to comply with the Imbalance Settlement Harmonisation regulations’

Workgroup 2

9 October 2020

Agenda and meeting objectives

1. Welcome and Objectives
2. Update on actions
3. Update on analysis
4. Overview of amended solution
5. Discussion of solution
6. Other concerns for P410 to address
7. Initial view against objectives
8. Next steps

ACTION UPDATES

Actions

#	Action	Update
1	Circulate link to the approved Imbalance Settlement Harmonisation Regulation	This was done in the follow up email to meeting 1
2	Provide thoughts on how location of available energy can be used to prevent the GB price being set by other markets	It will be hard to develop a solution that satisfies this, as we won't always know the location of available energy
3	Investigate whether using the MIP to influence the combination of Bids and Offers in the VOAA calculation would be compliant with the ISHP	The Regulation specifies that the VOAA 'may only use' process derived from balancing products. This precludes using the MIP to influence the VOAA
4	Use Workgroup feedback to further develop the principles for how a VOAA should be calculated	We will go through our updated proposals in today's Workgroup

EBGL Article 52 ISH

Action	Update
Assess how the mix of products (including TERRE/MARI) will be used to balance the system post brexit.	This heavily depends on the Brexit outcome and derogations are with Ofgem to allow us to continue to use standard products, as of today we cannot give a definitive answer, however the general principle of standard vs specific is that the TSO has to use the standard products as a first attempt to balance the system and then they may use their specific products (if approved via the derogation) to balance any further shortfall.
Provide additional clarity on the future landscape of balancing products that will be used.	Everything I can share is all contained in the NGESO forward plan - https://www.nationalgrideso.com/document/166441/download
Provide thoughts on how location of available energy can be used to prevent the GB price being set by other markets	Interconnectors are only expected to provide around 10-20% of the energy in the UK, so we can't use it for everything, its unlikely that that energy from Europe will command the price, but yes it will have an impact. Without TERRE and MARI going live its difficult to project how big that impact will be
Confirm timescales of when the submissions for specific products will be made.	Specific products to TERRE – submitted June 19. We are still in discussions with Ofgem. CEP 6.4 pay as clear derogation, unfortunately there are no legal timelines attached to the CEP for a response, we are not able to provide a timeline, we are just working with Ofgem and hoping they give us some guidance soon, but the specific TERRE product submission (article 26) can't be approved until the CEP 6.4 one is approved. Specific products for MARI will not be submitted until about 6 months before the product going live which on current time frames would be around January 2022.
Provide guidance on the expected future of options fees, BM warm up and other costs reflected in the BPA.	We may need more discussion on this, CEP refers to Availability fees and utilization fees, my interpretations is these are the same as option fees? Availability = paying for an amount of capacity to be available and utilization is the fee paid when that energy is utilized.

CORRECTION – use of standard and specific products

At the last workgroup, I stated that the VOAA would need to be calculated from Standard or Specific RR/FRR products. This was incorrect

The article references only the RR/FRR process, and not Standard or Specific Products. Article 9(e) of the proposal makes it clear that products which are not Standard or Specific products can be used in the imbalance price

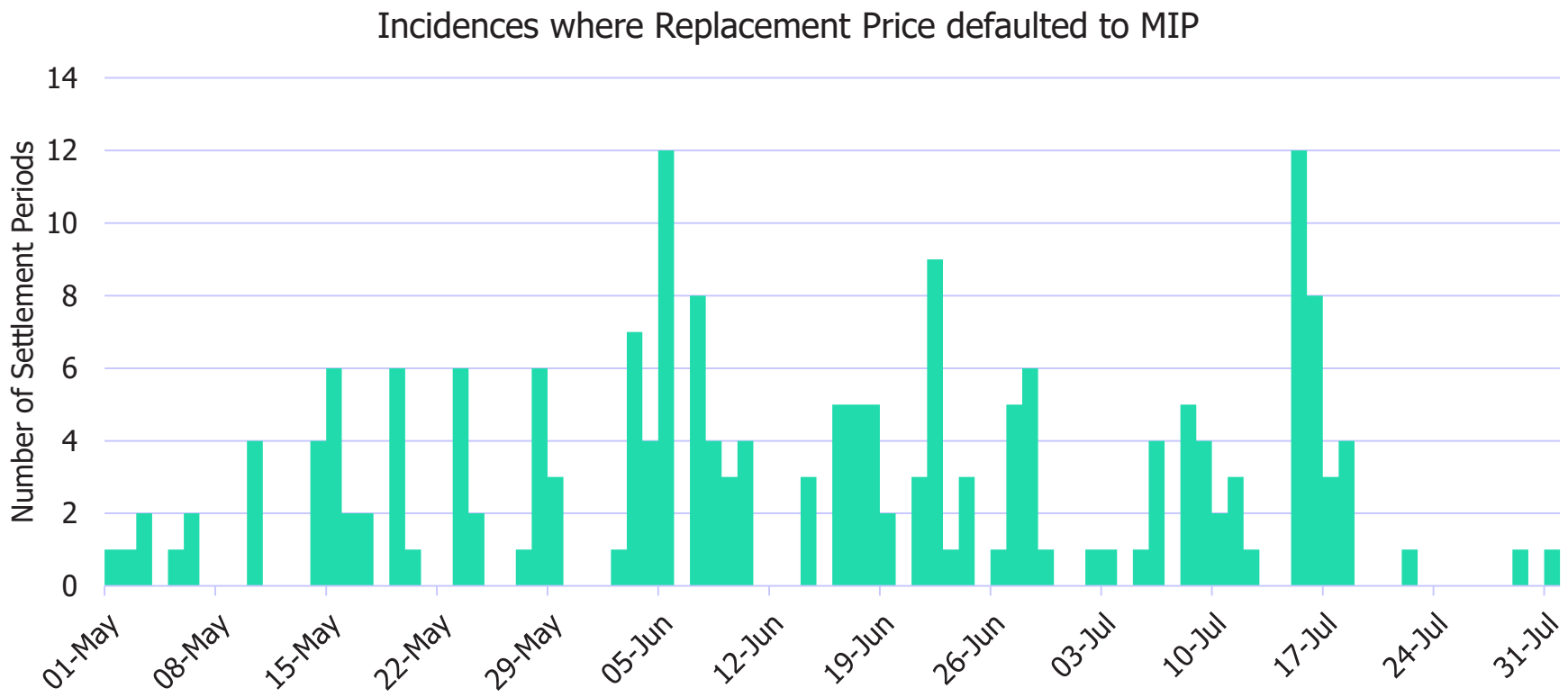
Therefore, I believe that Article 10 does not require the use of Standard or Specific product prices in calculating the VOAA. The product prices must be from the RR or FRR process. Therefore, we do not need Ofgem to have appointed Specific products prior to including them in the calculation of the VOAA (or of the imbalance price)

UPDATE ON ANALYSIS

Expected use of the Value of Avoided Activation of Energy

The graph below show how often the MIP set the System Price between 1 May 2020 and 31 July 2020 after the Replacement Price defaulted to the MIP. This indicates how often the VOAA might set the System Price.

- The MIP set the System Price in 194 (4%) Settlement Periods
- The MIP set the System Price at least once on 58% of days
- On 5 June 2020 and 15 July the MIP set the System Price in 12 Settlement Periods
- The highest number of consecutive Settlement Periods when the MIP set the System Price was four



4%

Settlement Periods where the VoAA might be used to set the System Price

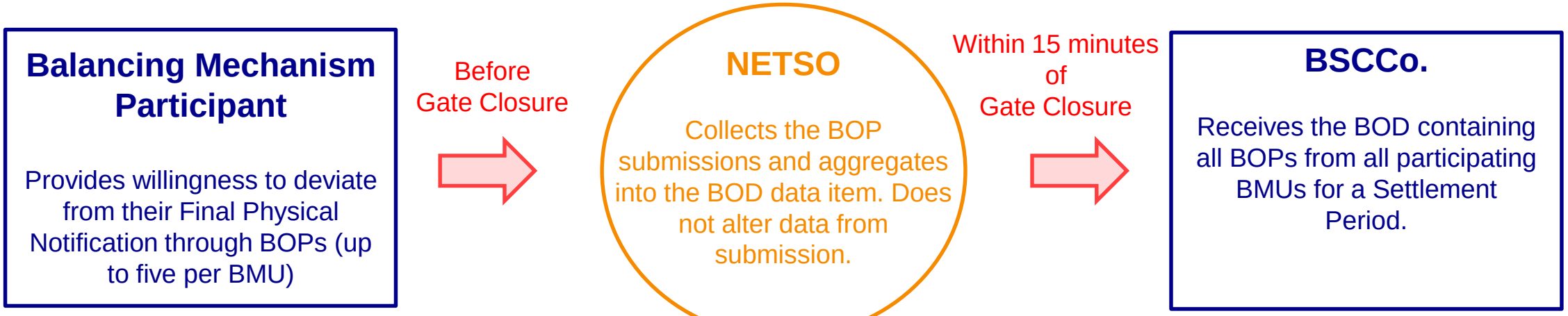
Data for Available Actions

Elexon receives Bid Offer Data (BOD) from National Grid for every Settlement Period. This data consists of all submitted Bid Offer Pairs (BOPs) submitted by BMUs. The data is unfiltered and provided as submitted for BMUs participating in balancing.

The raw dataset is extensive and features a significant proportion of submissions of Bid Offer Pairs that would not be accepted in the National Grid control room due to wider information on the BMU.

National Grid filters these Bids and Offers using other information such as Maximum Export Limit (MEL), Stable Export Limit (SEL), non-zero times etc. to identify viable balancing actions for a Settlement Period. (NG to provide further insight if needed).

The next slides display the challenges faced when deriving a VOAA from this dataset. We have used the midpoint methodology discussed in Workgroup 1.



The Scale of BOD

When anlaysing possible VOAA calculations for the Balancing Mechanism we have considered the Bid and Offer data we have available to calculate a VOAA. To model the midpoint methodology we looked at BOD from **1 May 2020 to 31 July 2020.**

During this period:

- 10 million BOPs were submitted; an average of 107k per day and 2,217 per Settlement Period

The data we have looked contains:

a) Settlement Date, Period and Run type

b) BOP number

c) Offer Price

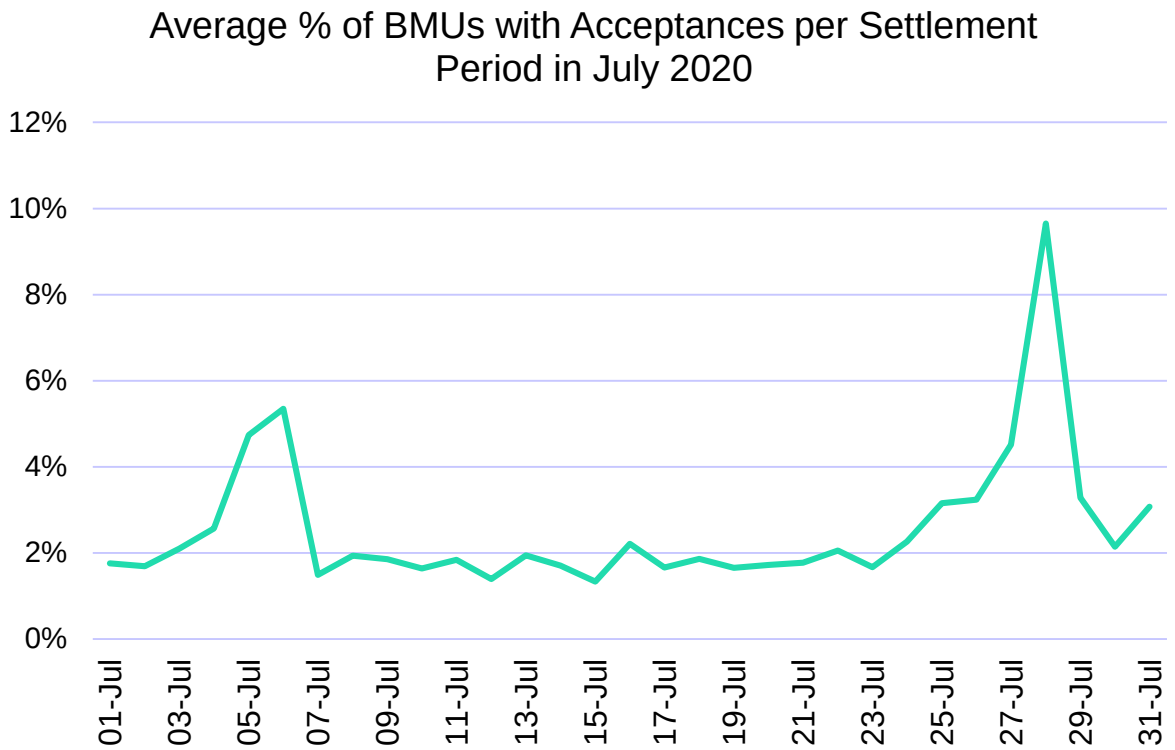
d) Bid Price

How do we define available BMUs?

The first challenge is finding a representative sample of BMUs with submitted Bid Offer Pairs (BOPs).

Between 1 May 2020 and 31 July 2020 there was a total of 1,068 BMUs with submitted Bid Offer Pairs, of these 282 BMUs had a Bid Offer Acceptance (26%).

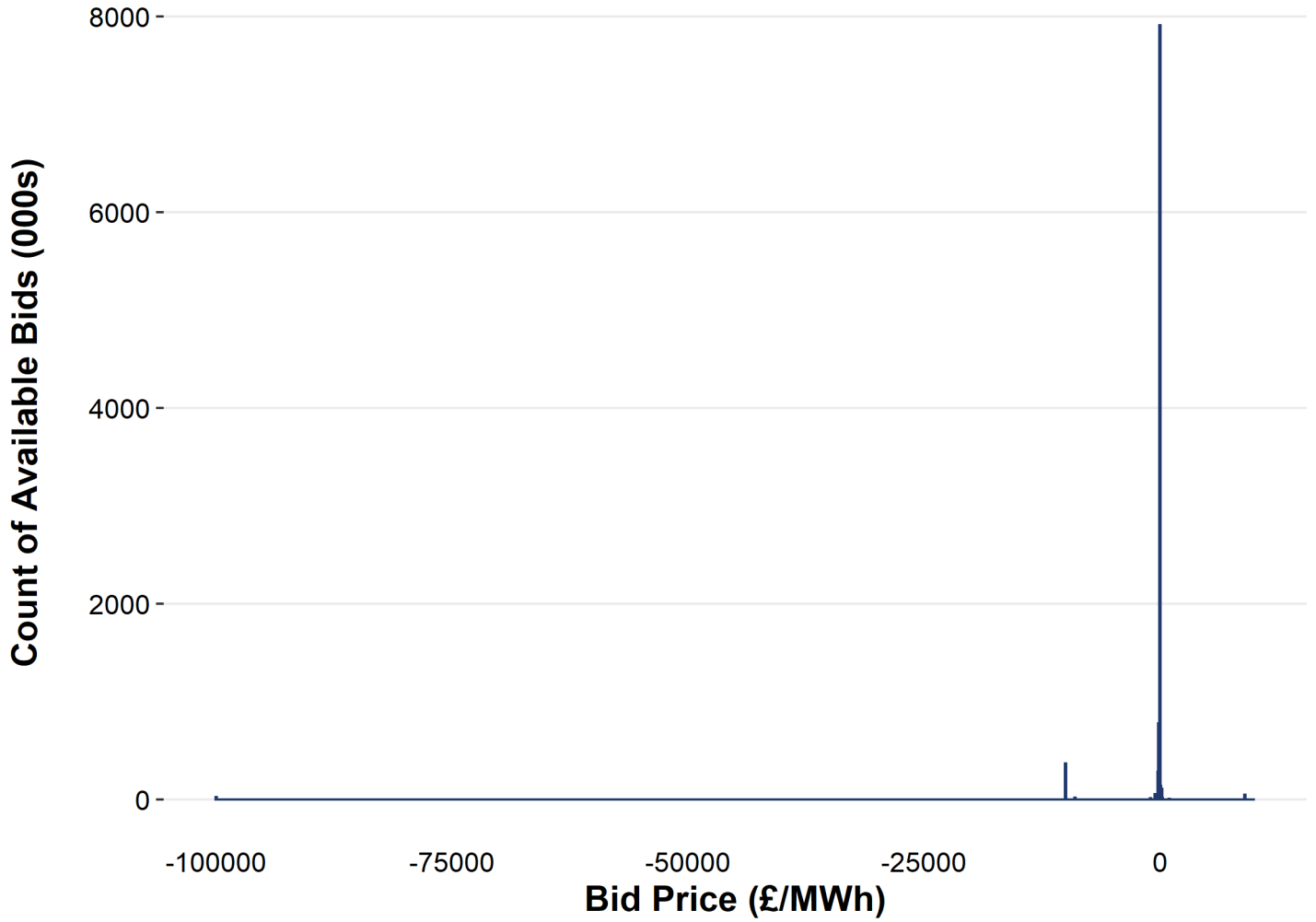
On a Settlement Period level, only an average of 2.6% of BMUs with BOPs were accepted.



Available Bid Prices

From 1 May 2020 to 31 July 2020:

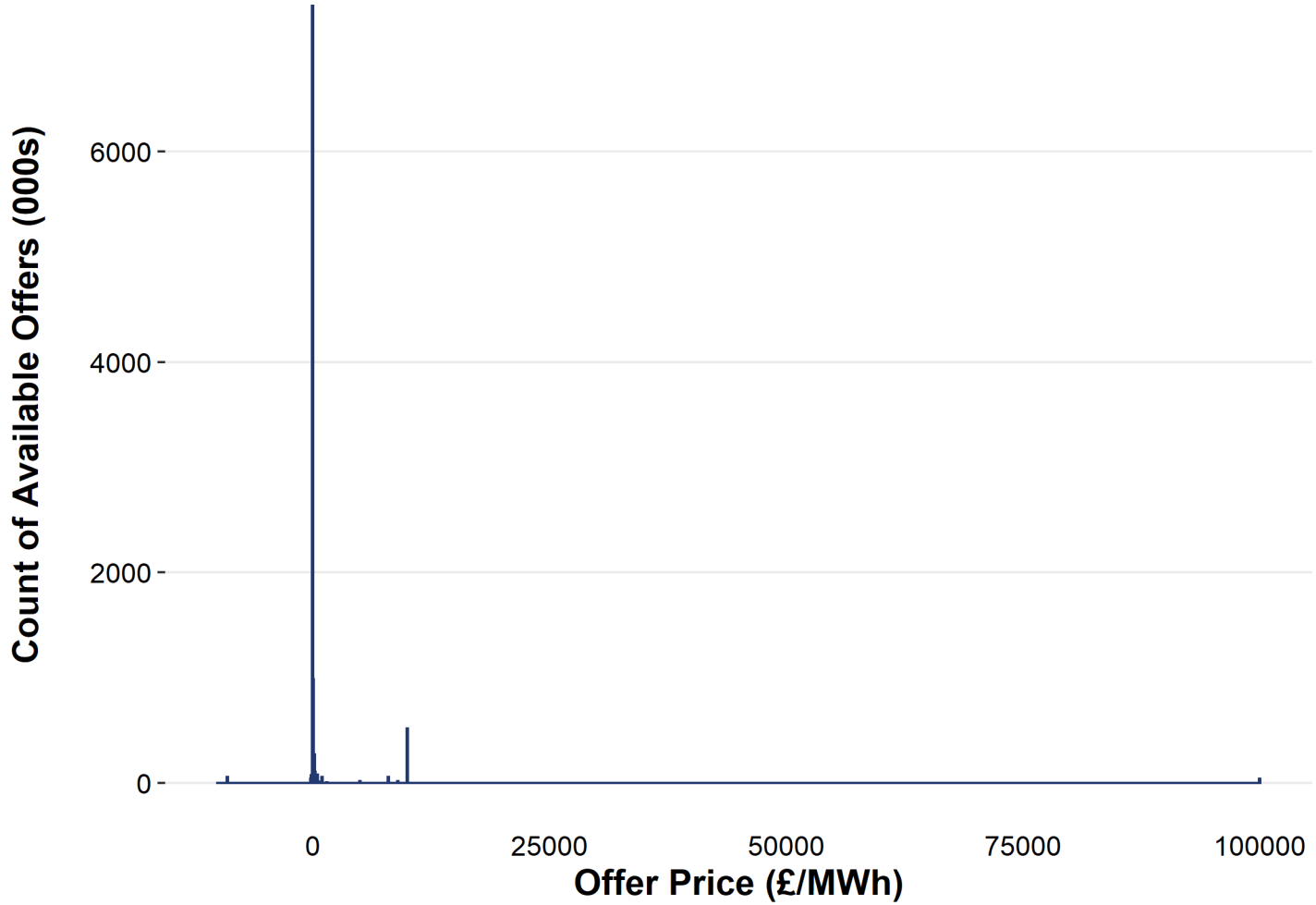
- 81% of submitted Bids were between -£50/MWh to £50/MWh
- 1% had a submitted Bid price between £150/MWh to £250/MWh
- The cheapest submitted Bid during this period was £9,999/MWh and occurred in 15% of Settlement Periods from two BMUs
- The cheapest accepted Bid during this period was £51/MWh (does not include BSAAs)



Available Offer Prices

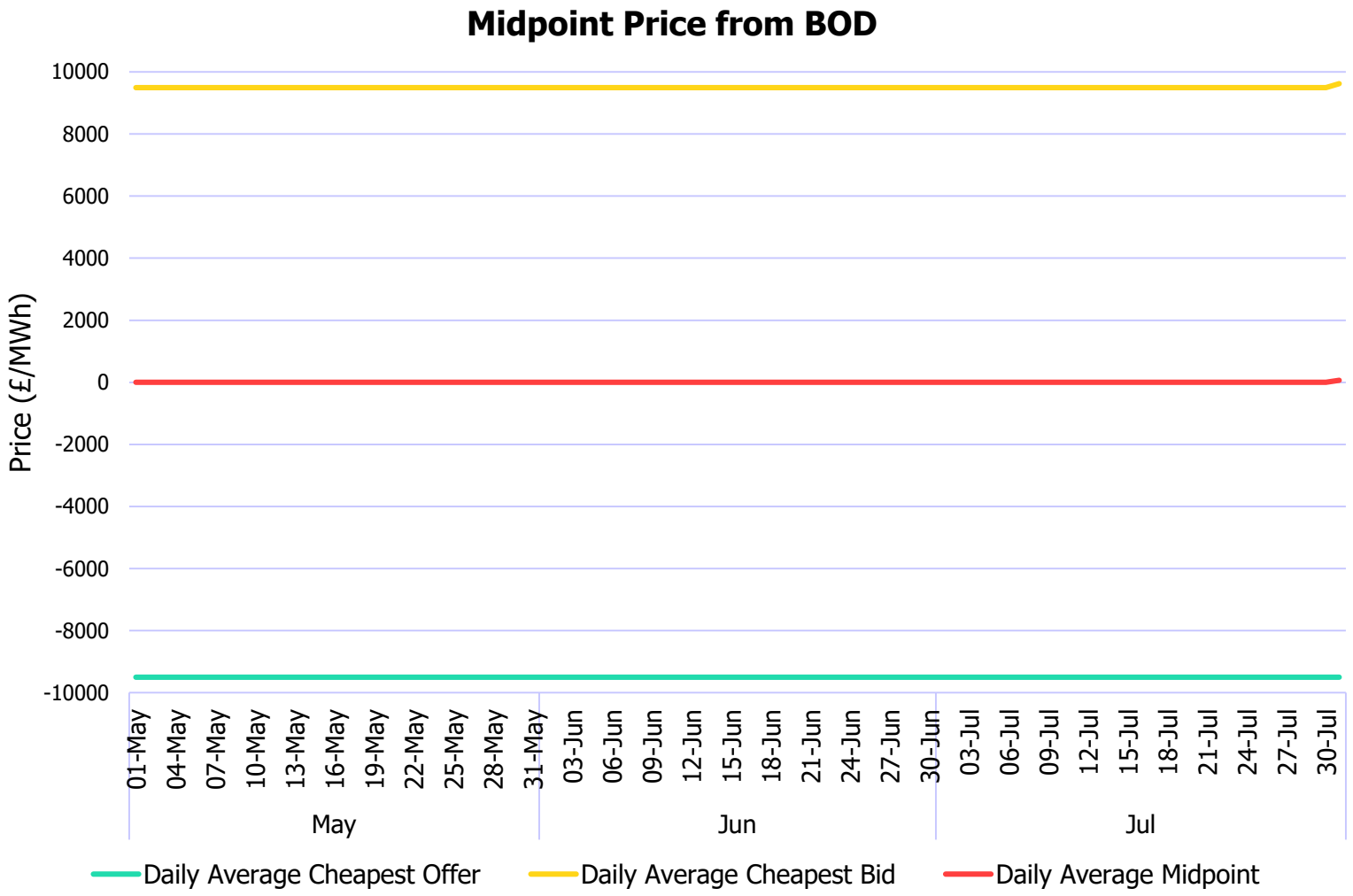
From 1 May 2020 to 31 July 2020:

- 75% of submitted Offers were priced between -£50/MWh to £50/MWh
- 2% had a submitted Offer price less than -£50/MWh
- The cheapest submitted Offer during this period was -£9,999/MWh submitted by one BMU
- The cheapest accepted Offer during this period was £0/MWh (does not include BSAAs)



Midpoints from Raw BOD

Using this unfiltered BOD the midpoint of the cheapest Bid and Offer is £0/MWh for 99.9% of Settlement Periods



Filtering the Data: BOPs

As using the raw data is unfeasible and provides no meaningful midpoint, we explored filters that could be applied to keep viable Bids and Offers.

As the VOAA is applied when no Bids and Offers are present, we can assume all BMUs are operating at their expected level without deviation (their FPN). The ‘available’ actions at this time will all be from their first band of deviation from this point. This is represented by BOP +1 for Offers and BOP-1 for Bids.

The first stage filter is to only derive a VOAA from BOP +/-1.

This reduced the submitted Bids and Offers by 500,000 (5%) but did not eradicate Bids priced at £9,999/MWh and Offers priced at -£9,999/MWh.

Filtering the Data: BMUs

After filtering by BOP +/-1 we looked at determining active BMUs that may contribute to the 2.5% of accepted BMUs in a Settlement Period.

As the Bids and Offers of £9,999 and -£9,999 were submitted by just two of over 1,000 BMUs, these BMUs were removed.

To identify BMUs with that may contribute to the 2.6% of accepted BMUs, we formed a list of all the accepted BMUs within the date range 1 May 2020 to 31 July 2020.

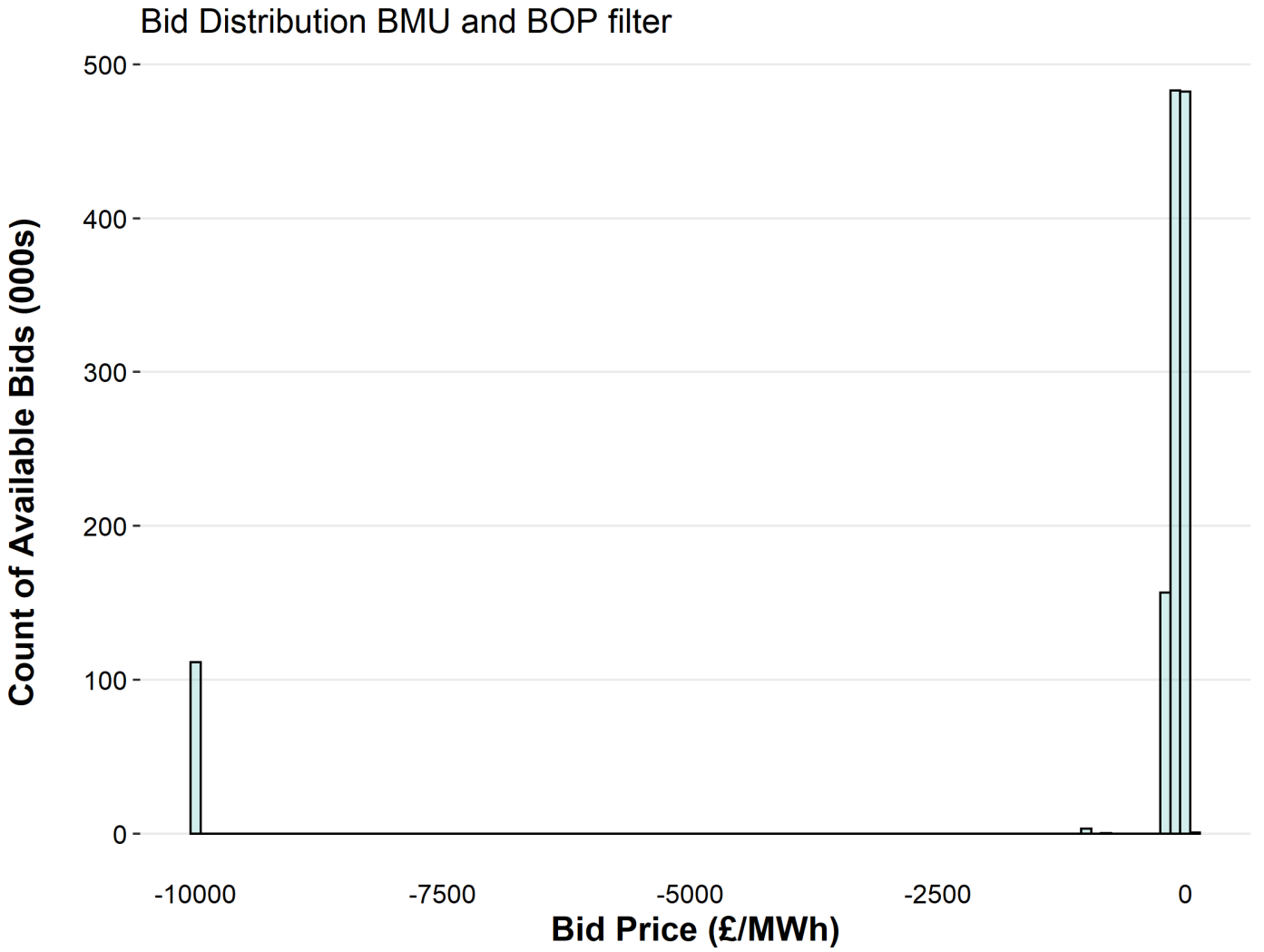
A list of 282 BMUs was created. The data was then filtered to only contain BOPs +/-1 from these 282 BMUs.

This reduced the number of BOPs to around 2.5million with a cheapest Bid price of **£70/MWh** and cheapest Offer price of **£0/MWh**.

Available Bid Prices from BMUs with Acceptances within BOP -1

From 1 May 2020 to 31 July 2020:

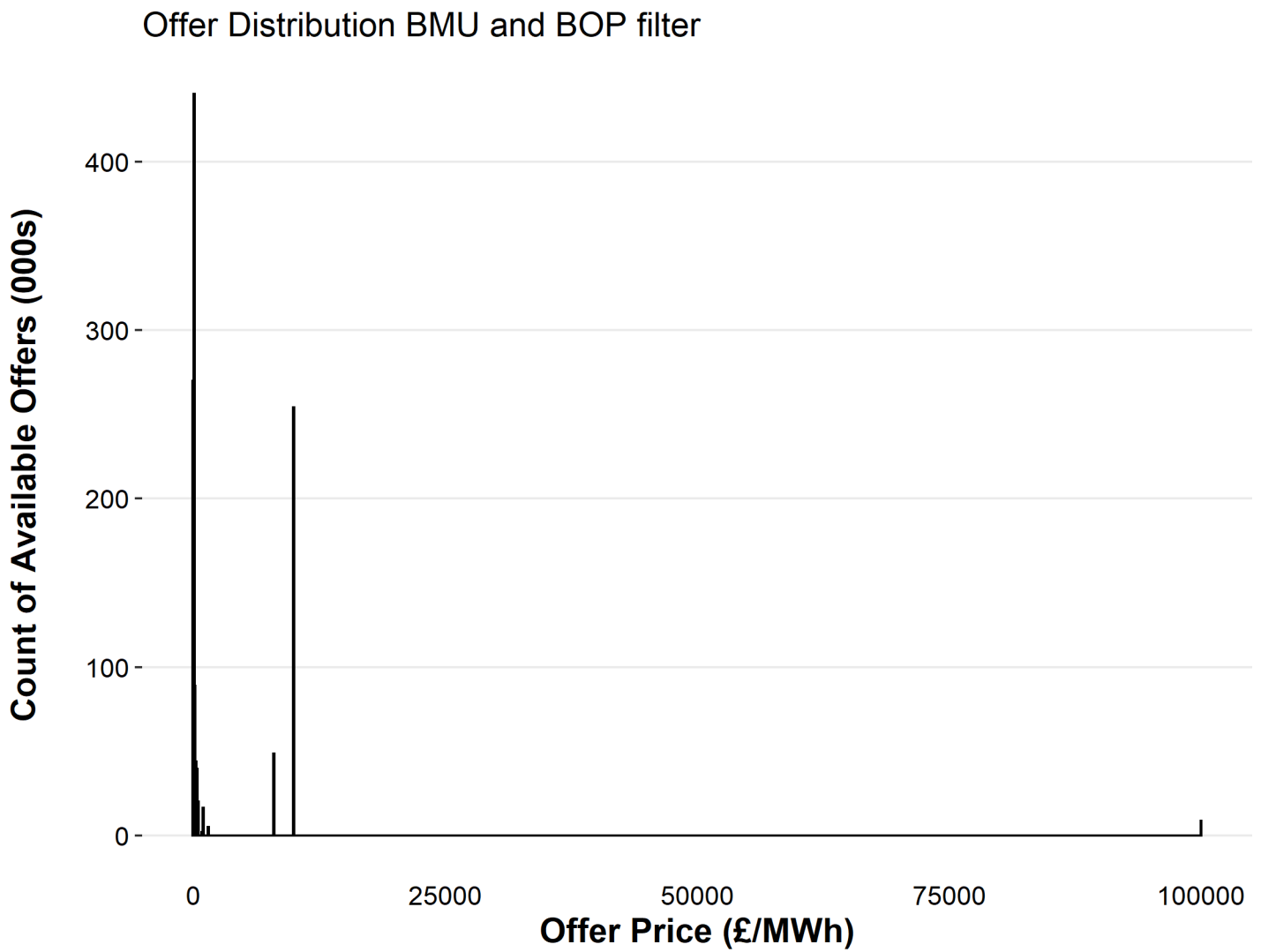
- 39% of submitted Bids were priced between -£50/MWh and £50/MWh
- 78% of submitted Bids were priced between -£150/MWh to £50/MWh
- 0.1% had a submitted Bid price greater than £50/MWh
- The cheapest submitted Bid during this period was £70/MWh
- The cheapest accepted Bid during this period was £51/MWh (does not include BSAAs)



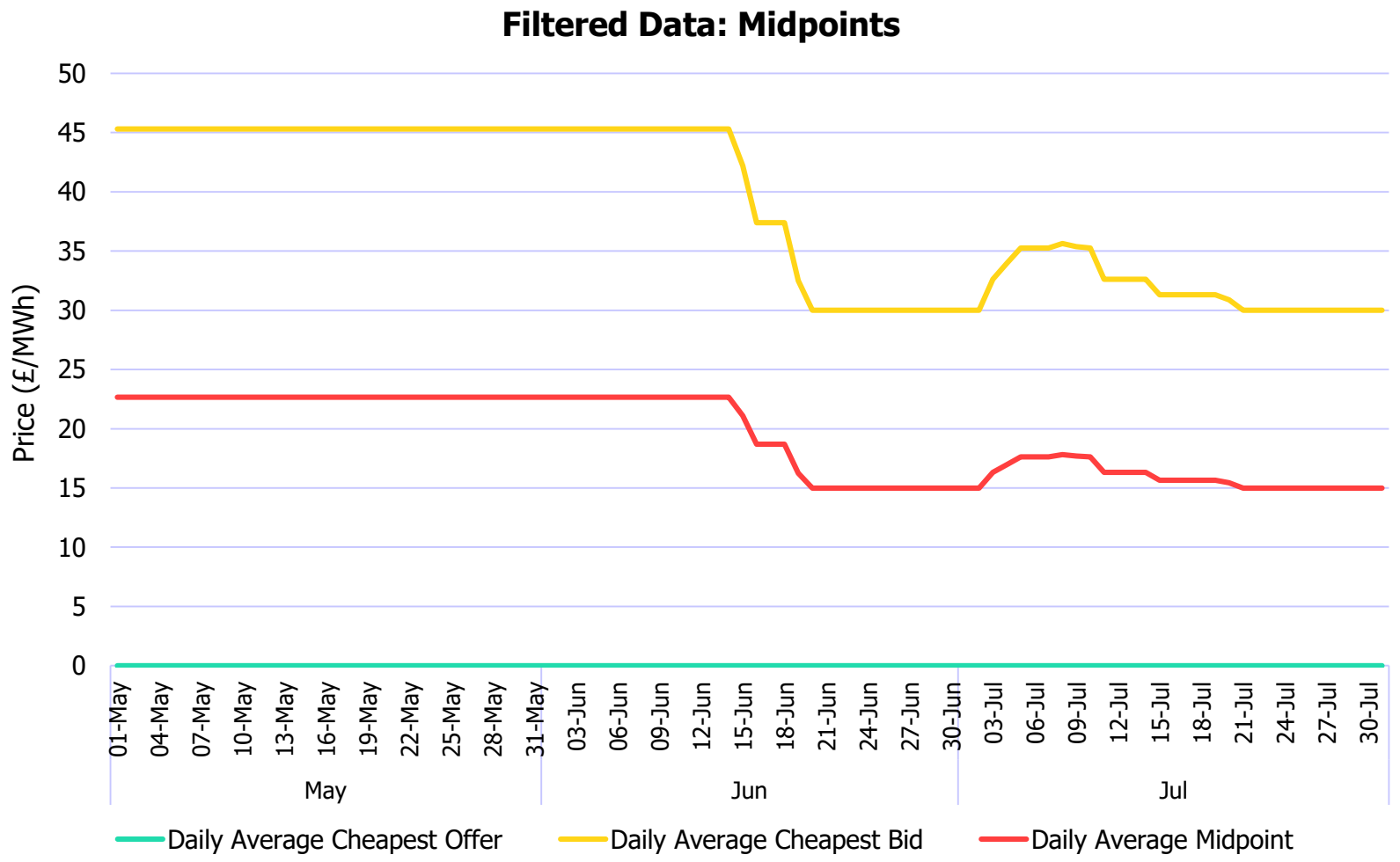
Available Offer Prices from BMUs with Acceptances within BOP +1

From 1 May 2020 to 31 July 2020:

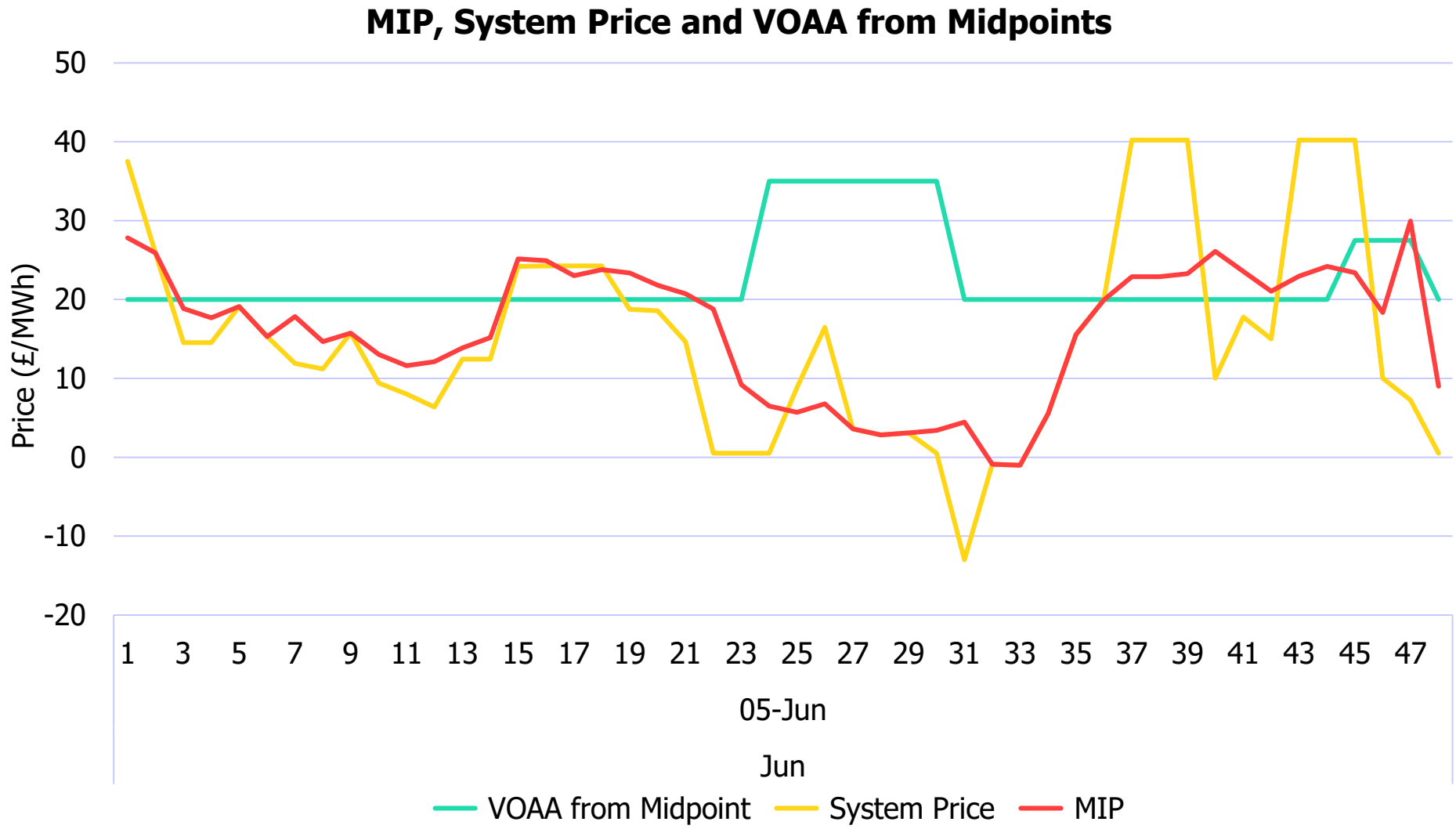
- 22% of submitted Offers were priced between -£50/MWh and £50/MWh
- 57% of submitted Offers were priced between £0/MWh to £150/MWh
- There were no Offers less than £0/MWh
- Therefore the cheapest submitted Offer during this period was £0/MWh
- The cheapest accepted Offer during this period was £0/MWh (does not include BSAAs)



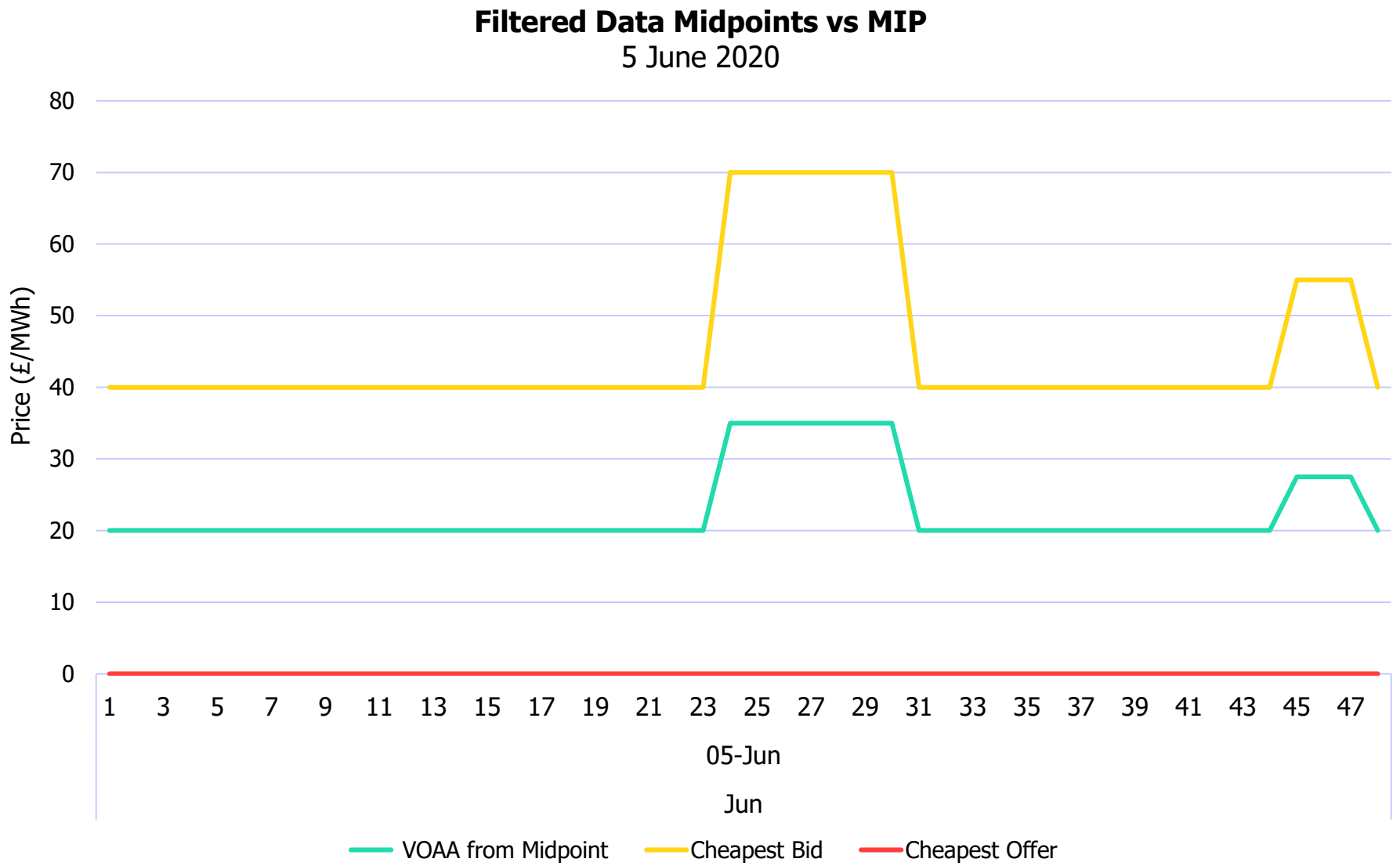
Midpoints from Data filtered by BMUs and BOP +/-1



Day example of filtered midpoints



Midpoints vs Market Index Price



Option For Operational methodology – Live BMUs are from the previous 24hr period

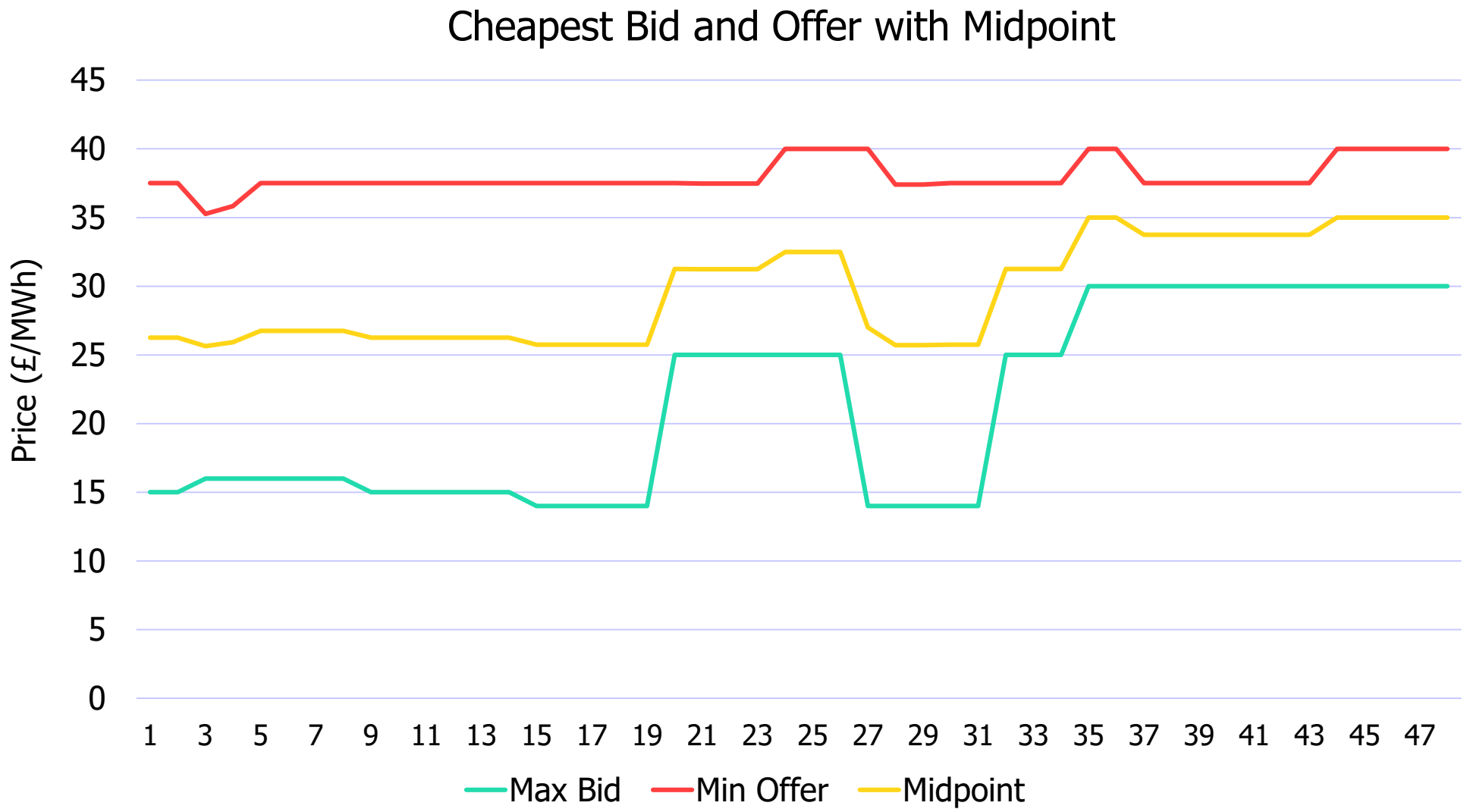
To apply filters in a live scenario, it is not efficient to use 10 million rows of data to determine viable Bids and Offers for each Settlement Period.

To represent an operational methodology we chose to look at:

- Bids from BOP -1
- Offers from BOP +1

From BMUs with acceptances in the last 24hr period to represent ‘available’ actions.

Specific Date Analysis: 5 June 2020



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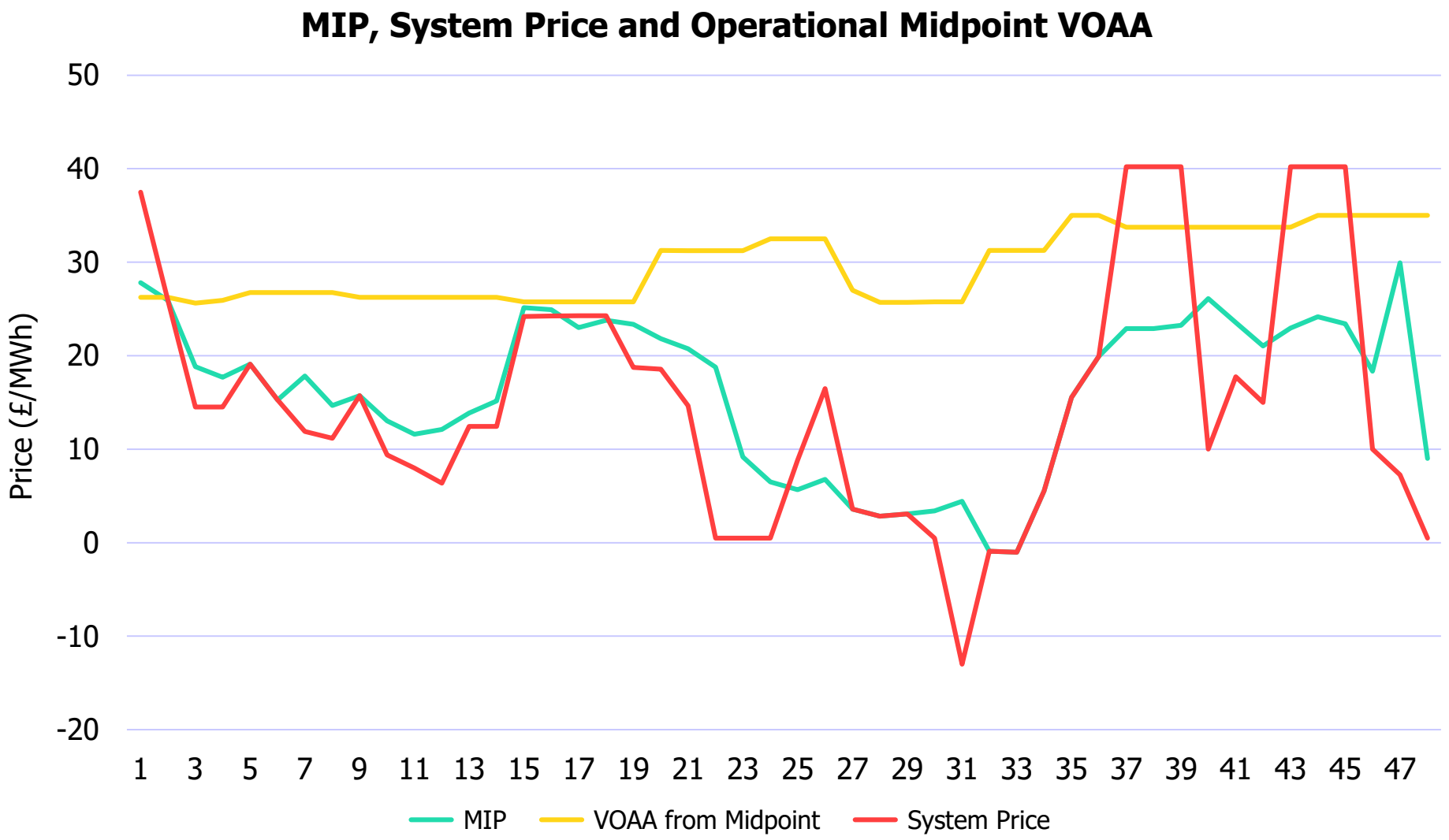

UPDATED SOLUTION

MIP as a comparator

We have considered whether the MIP can be used as a comparator against submitted RR/FRR Bids and the closest matching bid selected as a VOAA

The Regulation specifies that the calculation ‘may only’ use RR/FRR bid prices. Therefore, we believe using the MIP as a comparator would breach the regulations

The future of the MIP was discussed in Modification P305, which concluded that the MIP was a ‘best least effort’ ongoing solution, but may not be appropriate (or legal) in the long term

The P305 workgroup also discussed the use of alternative methodologies for calculating a price where NIV=0, but they were discounted because of the cost to change and lack of legal imperative to introduce them

The rational given for not further considering the MIP in the P305 workgroup was that the requirements for calculating would be affected by the EBGL and subsequent regulations, which were unknown at the time.

P305 & Issue 64 discussions of the MIP

The P305 Final Modification Report suggests that alternative methodologies for calculating the MIP were discussed at the time. Methodologies discussed were unlikely to be compliant with the regulation, and included;

- Pricing based on last activated BOA.
  - If during previous settlement period then non-compliant as price from different settlement period, otherwise compliant.
- Pricing based on average of highest bid and lowest offer price.
  - If no BOAs during SP then need alternative method, otherwise compliant.
- Pricing based on previous settlement period pricing.
  - Non-compliant as price from different settlement period.
- Setting the price to 0.
  - Non-compliant as not based on prices from a balancing product.

The Issue 64 Final Report suggests that an ‘ideal’ MIP methodology would take prices from submitted bids and offers.

Proposed solution

As a result of the above, the solution should have the following features;

- Flexible governance.
  - Products should be able to be added to/removed from the VOAA calculation without resorting to a Modification.
  - Criteria should be based on a regular assessment of product utilisation for balancing.
  - Alternatively, products for inclusion could be set in a CSD and then reviewed by CP on a regular basis.
- Based on traded balancing products.
  - Products should be included based on their normal contribution to the imbalance price, and weighted in proportion to their use.

Solution requirements - calculation

The VOAA must be calculated from RR and FRR bid prices.

The VOAA calculation must take as inputs the average of the least expensive bid/offer for a given product.

- This value must be represented as a clearing price for pay-as-clear products or a straight average of least expensive submitted prices for pay-as-bid products.

The VOAA calculation must use a ‘volume weighted’ average of the input prices to calculate the VOAA.

- This should not be a straight average, but rather take account of the effect on imbalance of the product based on assumed delivery time (e.g. 15 minutes for TERRE, 5 minutes for MARI, 30 minutes for BOA).

The VOAA calculation inputs must represent offers of volume above a specified threshold

- This will prevent very small volumes of very cheap bids/offers being able to skew the calculation of the VOAA.

Solution – Volume Weighting

There are two elements of volume weighting to consider, in different scenarios – within a product, and across products.

Within product volume weighting.

- Consider a settlement period where NIV=0 but the following volumes were satisfied via the MARI platform.

MARI Period	Volume	Clearing Price
1	-50	-20
2	0	20
3	0	22
4	0	20
5	0	20
6	50	40

Solution – within product volume weighting

In the example above, energy was activated in opposite directions during the first and last 5 minutes of the settlement period, but overall there was no activation of energy.

The regulation requires that we consider the prices of RR or FRR, but makes no explicit reference to volume. Therefore, we may be able to treat each of the 6 clearing prices equally, or to weight in preference of periods with volumes associated.

In the example on the previous slide, a straight average would give a value of £17/MWh while a VWAP would give a value of £10/MWh.

As there is no balancing energy demand across the settlement period in this example, arguably each clearing price is equally valid as the price available to NGESO for balancing energy.

Additionally, balancing energy demand is equally likely to have been needed for any one of the MARI periods.

Initial Elexon view is that there should not be volume weighting within products.

Solution – volume weighting

Across product volume weighting.

- Consider a settlement period where NIV=0 but NETSO has access to TERRE, MARI and BOAs for balancing energy. A hypothetical utilisation weighting has been applied to the products.

Product	Price	Historic utilisation by volume
TERRE	35	5%
MARI	40	5%
BOA	30	90%

- In this case, we could apply equal weighting to each product to give a price of £35/MWh, or apply weighting based on historic utilisation by volume to give a price of £30.75/MWh.

Solution – across product volume weighting

While each of the prices is an equally valid contributor to the cost of balancing, the same as within product pricing, the key difference is that NGESO is much more likely to have fulfilled a need using a BOA than with the TERRE or MARI platforms (in this hypothetical scenario).

Volume weighting means that a product which is more likely to be used based on historical data also makes a larger contribution to the imbalance price when the VOAA is used.

Volume weighting could be based on product activations, by untagged contribution to the price stacks, or by contribution to the NIV tagged stack. Only the NIV tagged stack is considered to be energy balancing actions in GB.

This will require a BSC function to calculate historic use of product by volume.

Initial Elexon view is that there should be volume weighting across products, and that this volume weighting should be based on contribution to the NIV tagged price stack.

Solution requirements - governance

The calculation must be provided for in the BSC (Section T ‘Settlement and Trading Charges’).

The specifics of the calculation must be provided for in a BSC Configurable Item.

- The Configurable Item must contain a list of inputs which is amendable based on threshold criteria for a product being included.
- The thresholds must be contained in the Configurable Item, and not be amendable without being subject to a specified process.

Proposed conditions for product inclusion

The solution will need to have an initial set of criteria for products which will used as inputs for the VOAA. As a starting point for discussion;

- The products must be RR or FRR products.
- The product has associated price(s) which contribute towards the GB imbalance settlement price.
- The product is responsible for contributing more than [X%] of the balancing energy by volume over a [X day] period.

Propose to use balancing energy by volume as the liquidity metric as the VOAA is concerned solely with establishing a price for imbalance energy.

- Products with fast response and short activations times are not usually reflective of products used to maintain balance across a settlement period. This is reflected in normal operation by the use of the Continuous Acceptance Duration Limit (CADL) which removes all Bid-Offer Activations (BOAs) less than ten minutes in continuous duration from the imbalance price calculation and the De-Minimis Acceptance Threshold, which removes all BOAs less than 0.1MWh in volume.
  - NB. CADL may be reduced to less than 5 minutes following the implementation of MARI, as MARI utilises 5 minute products.

Proposed calculations – high level

For each pay-as-bid product (P) contributing to the VOAA, propose to find the average price (AP) of the most expensive Offer ($SAP^{w}{}_{j-}$) and cheapest Bid ($SAP^{w}{}_{j+}$) where available volume is above a specified threshold in the settlement period (j).

$$AP_{Pj} = \frac{SAP^{w}{}_{j-} + SAPwj_{+}}{2}$$

For each pay-as-cleared product (P), propose to take all clearing prices (CP) for each activation period (λ) calculated during the settlement period and divide by the number of clearing price periods (nCP), to calculate the average clearing price (CPA) in the settlement period.

$$AP_{Pj} = \frac{\sum_{\lambda} CP_{P\lambda j}}{nCP_{P}}$$

Proposed calculations – high level

Each product (P) will have a historic volume of absolute balancing energy calculated for it, summing all post-NIV tagging energy activation volumes of that product over the previous '30 days', defined as 1440 settlement periods to negate the effect of clock change days (referred to as NIV_{Pj}). A Volume Weighting (VW) will be calculated for each eligible product as follows;

$$VW_{Pj} = \frac{NIV_{Pj}}{\sum_P NIV_{Pj}}$$

Where $\sum_P NIV_{Pj}$ is the sum of NIV_{Pj} over all eligible products, and an eligible product is as defined in the relevant Configurable Item.

- VOAA will then be calculated by multiplying each product's average price by its volume weighting.

$$VOAA_j = \sum_P (APPj \times WPj)$$

Considerations of proposed solution

This solution has the advantage of ensuring that the imbalance price is always based on the prices of balancing products.

It also ensures that prices are considered based on their normal impact on the imbalance price. Market participants should have confidence that their imbalances will be settled at a price representative of the cost of balancing the system.

While this solution means that when NIV=0 the imbalance price cannot rely on a traded price. However, the Market Index P\rice represents the cost of a market participant balancing their portfolio, not the cost of NGESO balancing the system. While the costs should converge as a settlement period approaches, they are not the same.

OTHER CONSIDERATIONS

Continued calculation of the MIP

Catalyst Commodities provides intelligent, independent, fact-based insight, regular reports and bespoke advice for UK Power. Our customer base of 40+ companies, includes 30+ BSC parties, consultants, consolidators and exemptible generators. The intimate relationship we have with our customers means we understand how a great proportion of the UK power market assess near term value in relation to market indices. We, and our customers, regard MIP as a well-integrated, well understood and well accepted market measure for near-time value assessment and value creation.

The benefits of the current MIP calculation arrangements are that the methodology is transparent, they are independently carried out, and the results are publicly available. This allows all parties to develop strategies and mark their performance against those strategies through an independent and transparent value measure.

The UK power market remains very liquid in the prompt, and we remain convinced that the publication of MIP works, alongside other measures, to improve the transparency and function of the prompt market – a key enabler of liquidity. This is especially important to small players, who might not be members of power exchanges but actively participate in the prompt market. They therefore rely on Elexon's MIP calculations to provide them with visibility of the level at which this increasingly important part of the market has traded.

We believe that stopping the independent calculation of MIP will require market participants to calculate their own versions, which will reduce the transparency of the market and reduce also the quality of the price signals which drive near-term plant optimisation decisions, in support of a functioning and efficient near-term market. If Elexon were to cease calculating MIP, then data provision would be left in the hands of market participants, and additional safeguards (incurring cost and complexity) would be required to ensure that consumers of the data were confident in its accuracy. Continuing the existing provision, through Elexon, a BSC-funded organisation, would appear to be a robust and efficient solution with benefits for all interested parties.

We therefore firmly support the continued calculation of MIP as an important, publicly available, independent, assured and transparent market index which supports the continued high liquidity and functioning of the prompt UK power market.

INITIAL WORKGROUP VIEWS

Terms of Reference

Areas to consider	
How can a VOAA be calculated in compliance with the ISHP?	
Is there any value to keeping references to the MIP in the BSC?	
Is the BPA permissible in its current form?	Yes
Is the use of PAR1 compliant with the ISHP and it optimal?	Yes
Do components of the BPA need to change, or should a new parameter be introduced to account for relevant costs?	This is not required to maintain compliance with the ISHP – Issue 83 can continue to assess the principles of the BPA
How will P410 impact the BSC Settlement Risks?	We do not believe P410 will impact on any Settlement Risks
assess the impacts of changing the Market Index Price for an Imbalance Settlement Harmonisation Regulation and compliant Value of Avoided Activation	This is ongoing.

Terms of Reference

Areas to consider	
What changes are needed to BSC documents, systems and processes to support P410 and what are the related costs and lead times? When will any required changes to subsidiary documents be developed and consulted on?	Will be assessed through a Service Provider Impact Assessment
Are there any Alternative Modifications?	
Should P410 be progressed as a Self-Governance Modification?	No
Does P410 better facilitate the Applicable BSC Objectives than the current baseline?	
Does P410 impact the EBGL provisions held within the BSC, and if so, what is the impact on the EBGL objectives?	Yes. It is consistent with the EBGL objectives

Applicable BSC Objectives – Proposer views

Obj	Impact	Rationale
(a)	Neutral	
(b)	Neutral	P410 also ensure efficient operation of the National Electricity Transmission System, we do not consider that it results in a more efficient outcome than the existing baseline. This is because we believe the MIP continues to be a reasonable proxy where it is used. We would not recommend any change to the existing calculations if the MIP continued to be compliant with the ISHP
(c)	Positive	P410 harmonises the imbalance settlement approach with other markets across the EU, improving competition and access to markets
(d)	Neutral	
(e)	Positive	P410 will ensure compliance with the ISHP, as per the EBGL
(f)	Neutral	
(g)	Neutral	

EBGL impact

P410 will require changes to BSC sections which constitute EBGL Article 18 Terms and Conditions. The impact of this will be determined during the Assessment Procedure.

Implementation of the ISHP into GB arrangements will:

- foster effective completion on balancing markets;
- Integrate balancing markets and promote possibility of for exchange of balancing services; and
- Ensure procurement of balancing services is fair and market based

We therefore believe that P410 is consistent with the EBGL objectives

Self-Governance

Not self-Governance

- will result in a change in the way the imbalance price is calculated in some scenarios
- will therefore impact competition
- Will also require changes to ENGL Article 18 Terms and Conditions

Implementation Date

The changes must be delivered by 15 January 2022 (18 months after the ISHP was approved.
We therefore recommend P410 is implemented in the previous scheduled BSC Release on:

- 4 November 2021

NEXT STEPS AND IMPACT ASSESSMENT

Next steps

- Draft Business requirements and circulate for Workgroup approval – 23 October
- Workgroup review of Business Requirements – 30 October
- Issue Service Provider Impact Assessment to identify system changes and costs – mid November
- Workgroup to consider system costs and analysis – likely late November
- Assessment Procedure Consultation – likely early December

A.O.B.

ELEXON

THANK YOU

BSC.change@elexon.co.uk