

NETA Change Form		ELEXON Reference
		MP137
Title		Version No.
Revised Calculation of System Buy Price and System Sell Price		Version 0.1
		LogicaCMG Reference
		ICR545
Type of Assessment	Date CP Received	Date IA Issued
DLIA	06-Oct-2003	22-Oct-2003
Brief Summary of Change		
<p>The modification would set the main imbalance cash out price equal to the highest-priced untagged energy offer acceptance when the system is short and the lowest-priced untagged energy bid acceptance when the system is long. For these purposes, no distinction would be made between offers and bids accepted in the balancing mechanism and individual balancing services actions taken before gate closure by NGC. There would be no changes to the operation of the Balancing Mechanism and, in particular, balancing actions would continue to be paid at the respective offer or bid prices. The current P78 mechanism would also be retained with the main price being calculated on a marginal basis and the reverse price calculated – as now – from market index data. The existing tagging methodology would also be retained, but with the addition of tagging for offsetting bid and offer acceptances on individual BMUs and for forward energy trades which offset the net system imbalance. Attachment 1 to this proposal outlines the envisaged method for calculating SBP and SSP.</p> <p>Attachment 2 places the proposed BSC modifications in the context of a wider discussion on security and efficiency in the England and Wales electricity market and inter alia contains a detailed discussion of the proposed modification to the BSC and the analysis and justification underlying these modification proposals. However, for the avoidance of doubt, the scope of Attachment 2 means that it also includes analysis and proposals which fall outside the immediate scope of the proposed modifications to the BSC.</p>		
LogicaCMG's Proposed Solution		
<p><u>Option 0: BMU Undo Tagging, BSAD Offset Tagging, Disaggregated BSAD, EUC</u> Modify Settlement Calculation process to incorporate BMU Undo Tagging and BSAD Offset Tagging. Modify Settlement Calculation process to include new data (EUC and Disaggregated BSAD) in NIV tagging process.</p> <p><u>Option 1: Marginal Price, BMU Undo Tagging, BSAD Offset Tagging, Disaggregated BSAD, EUC</u> Modify Settlement Calculation process to incorporate BMU Undo Tagging and BSAD Offset Tagging. Modify Settlement Calculation process to include new data (EUC and Disaggregated BSAD) in</p>		

NIV tagging process.

Modify Settlement Calculation process to take the Marginal Price.

Option 2: Marginal Price, BMU Undo Tagging, BSAD Offset Tagging, Disaggregated BSAD

Modify Settlement Calculation process to incorporate BMU Undo Tagging and BSAD Offset Tagging.

Modify Settlement Calculation process to include new data (Disaggregated BSAD) in NIV tagging.

Modify Settlement Calculation process to take the Marginal Price.

Option 3: Load new BSAD

Modify BSAD loader to handle new format BSAD.

Modify BSAD form to handle new format data.

Create new loader to handle Expected Utilisation Cost data.

Option 4: Publish new system and energy BSAD data

Modify existing BSAD web page / tibco to publish System and non-BMU Energy BSAD.

New web page (tibco & csv) to publish BMU Energy BSAD against System and non-BMU Energy BSAD. The new page's query will be consistent with existing web page queries (the criteria fields are Settlement Date, Settlement Period, and BM Unit ID. Settlement Period or BM Unit ID can be wild card. Queries that cause more than 50 BM Units worth of data to be returned will not be displayed).

Option 5: Publish Energy Imbalance Price Calculation Details

Modify Settlement Calculation process to store details of calculation.

New web page (tibco & csv) to show this detail pictorially, as per Figure 3 in requirements document.

Update existing Derived Data page to show EUC impact on Acceptances.

Option 6: Re-Run Indicative Calc

The relevant data screens and loaders will be updated to trigger a re-calculation on receipt of updates.

Modify Indicative Settlement Calculation process such that it can be re-run without impacting on calculating each periods initial indicative results.

Modify Indicative Settlement Calculation process so that it stores derived data and tags the data used to calculate it.

Allow a web view of the history of changes by modifying all pages relating to the indicative calculation such that they allow the queries and reporting to specify which version of the run the data displayed will relate to.

Option 7: Publish EUC

New web page to show EUC in a tabular format. The new page's query will be consistent with existing web page queries (the criteria fields are Settlement Date, Settlement Period, and BM Unit ID. Settlement Period or BM Unit ID can be wild card. Queries that cause more than 50 BM Units worth of data to be returned will not be displayed).

Option 8: Publish EUC

We consider that the solution to Option 7 is also sufficient for this solution.

Option 9: Dummy BM Units

Define a new BM Unit type.

Modify CRA-I015 so new BMU type not reported to ECVAA

Modify SAA-I014 so that new BMU type is reported correctly.

Option 10: SAA-I014 to include Disaggregated BSAD

Modify SAA-I014 to include Disaggregated BSAD.

Option 11: SAA-I014 to include EUC

Modify SAA-I014 to include EUC.

Option 12: SAA-I014 to Report Energy Imbalance Price Calculation Details

Modify Settlement Calculation process to store details of calculation.

Modify SAA-I014 to report the stored details.

Option 13: Freeze Main Price

New BMRA report for the Main Price and data that it was derived from.

New SAA loader to load data from BMRA.

Modify Settlement Calculation process to use Indicative Main Price.

Modify relevant data screens so that data can be entered into SAA and flagged as being related to a manifest error / trading dispute (i.e. to be used in the Main Price calculation).

Modify Settlement Calculation so that it can be used to re-calculate the Main Price as the result of a manifest error / trading dispute.

Possible modification of SAA-I014 to report data from which the Main Price was derived.

Option 14: Freeze Main Price Data

New BMRA report for the Main Price and data that it was derived from.

New SAA loader to load data from BMRA.

Modify Settlement Calculation process to calculate the Main Price using the Indicative Calculation's data.

Modify relevant data screens so that data can be entered into SAA and flagged as being related to a manifest error / trading dispute (i.e. to be used in the Main Price calculation).

Possible modification of SAA-I014 to report data from which the Main Price was derived.

Option 15: Price Cap

Dated parameter (assumption that there will be no more than 4 values per year).

Modify Settlement Calculation process to set the price to be the cap value if the price exceeds the cap value.

NOTES

- Option 3 – this price is not included in the base options (0, 1 & 2).
- Option 6 – a large percentage of the development costs of this option (>60%) relate

to the web interface historical data view.

- Option 13 and 14 – Prices for the modification of SAA-I014 to support these options has been included even though not directly requested.
- BMRA web pages – currently there are restrictions on the amount of data that can be returned via queries to the web pages in order to ensure the service cannot be impacted by high volume activity (such as generated by data trawlers). These restrictions will be enforced on all the new and updated web pages described in this assessment. LogicaCMG are aware that this might mean that the proposed solutions may therefore not necessarily meet those envisioned. There are a number of methods by which the restrictions can be reduced which can be explored further if required.
- Attached DCR - The attached DCR is included only as a means of illustrating LogicaCMG's understanding of the core changes to the Settlement Calculation process with BMRA and SAA. The terms used in the text and formulae are intended to demonstrate understanding and will, if the modification is implemented, be replaced by the terminology used in the BSC.

Deviation from ELEXON's Solution / Requirements					
None.					
Operational Solution and Impact					
None.					
Testing Strategy					
Unit	X	Change Specific	X	End to End	
Module	X	Operational Acceptance		Participant Testing	
System	X	Performance		Parallel Running	
Regression		Volume		Deployment/ Backout	
Other:					
<p>Performance testing of the SAA and BMRA changes is covered for those Options where it is applicable.</p> <p>No estimates for running CRA, CDCA, ECVAAs tests or Functional Area Tests (FAT) are included.</p> <p>Estimates have been provided for the EXTRA Regression testing required in future Full Releases for which Regression testing is already paid.</p> <p>Options 3 to 15 would not necessarily be tested with individual test scripts - it may be more appropriate to combine several options into 1 test.</p>					
Validated Assumptions					
None.					

Outstanding Issues							
None.							
Changes to Service							
Services Impacted							
	BMRA	CDCA	CRA	ECVAA	SAA	TAA	Other
Software							
IDD	3, 4, 5, 6, 7, 8, 13, 14		9		3, 10, 11, 12, 13, 14		
URS	0, 1, 2, 3, 4, 5, 6, 7, 8, 13, 14, 15		9		0, 1, 2, 3, 10, 11, 12, 13, 14, 15		
SS	0, 1, 2, 3, 5, 6, 7, 8, 13, 14, 15		9		0, 1, 2, 3, 9, 10, 11, 12, 13, 14, 15		
DS	0, 1, 2, 3, 5, 6, 13, 14, 15		9		0, 1, 2, 3, 9, 10, 11, 12, 13, 14, 15		
MSS							
OSM	6		9		13, 14		
LWIs							
RTP	Regression testing will involve all Regression tests: RT-01, RT-02, RT-04, RT-11, RT-33, R2T-27 and R2T-28.						
Comms							
Other							
Nature of Documentation Changes							
Documentation alterations as per option references.							

Nature / Size of System Changes	
Large	
Type of Release Costed:	Interim (Patch)
Deployment Issues, e.g. Outage Requirements:	Outage required for any changes involving BMRA.
Impact on Service Levels:	None.
Impact on System Performance:	None.
Responsibilities of ELEXON	
<ul style="list-style-type: none"> For all DCRs which are subject to review, LogicaCMG shall provide one draft issue and a maximum of 6 working days has been allowed for ELEXON to review and comment on the updates. Comments will be addressed and the final issue will be provided. A maximum of 2 working days has been allowed for review confirmation and signoff by ELEXON. Within reasonable levels, ELEXON will make available appropriate staff to assist LogicaCMG during the development of this change. 	
Acceptance Criteria	
This is covered by the acceptance criterion 2 in the "CVA Program – Release Acceptance Criteria" document for the Feb03 release.	
Any Other Information	
<p>The requirement is to assess Options 0 to 2, each combined with 4 to 15. Options 7 and 8 are exclusive - option 8 includes option 7. Options 6, 13 and 15 are also exclusive, also these do not directly relate to the key objectives of P137. So for example option 1 and options 3 to 15 (except 6, 7, 13, 14) would be a complete solution.</p>	
Attachments	
MP137 MP137 SAA URS draft DCR	

PRICING		
Price Breakdown		
Item description	Remarks	Price (ex VAT)
Change Specific Cost	MP137	£100 122
	<i>plus one of:</i>	
	Option 0	£601 638
	Option 1	£639 992
	Option 2	£526 317
	<i>and combinations of (within the limitations outlined in "Any Other Information"):</i>	
	Option 3	£141 542
	Option 4	£83 080
	Option 5	£149 526
	Option 6	£453 890
	Option 7	£77 820
	Option 8	£77 820
	Option 9	£67 127
	Option 10	£54 170
	Option 11	£54 170
	Option 12	£97 218
	Option 13	£395 905
Option 14	£362 021	
Option 15	£37 863	

Project Overhead	MP137	£191 766
	Option 0	£134 501
	Option 1	£140 375
	Option 2	£118 272
	Option 3	£76 705
	Option 4	£36 856
	Option 5	£65 822
	Option 6	£234 170
	Option 7	£31 688
	Option 8	£31 688
	Option 9	£16 050
	Option 10	£16 050
	Option 11	£16 050
	Option 12	£36 856
	Option 13	£182 259
	Option 14	£152 112
Option 15	£9 725	

<p>Total Price (ex VAT)</p>	<p>MP137 - £291 888</p> <p><i>plus one of:</i></p> <p>Option 0 - £736 139</p> <p>Option 1 - £780 367</p> <p>Option 2 - £644 589</p> <p><i>and combinations of (within the limitations outlined in "Any Other Information"):</i></p> <p>Option 3 - £218 247</p> <p>Option 4 - £119 936</p> <p>Option 5 - £215 348</p> <p>Option 6 - £688 060</p> <p>Option 7 - £109 508</p> <p>Option 8 - £109 508</p> <p>Option 9 - £83 177</p> <p>Option 10 - £70 220</p> <p>Option 11 - £70 220</p> <p>Option 12 - £134 074</p> <p>Option 13 - £578 164</p> <p>Option 14 - £514 133</p> <p>Option 15 - £47 588</p>
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<p>Project Duration</p>	<p><i>The summation of (whichever options chosen):</i> MP137 - 5 weeks</p> <p>Option 0 - 14 weeks Option 1 - 11 weeks Option 2 - 9 weeks</p> <p>Option 3 - 6 weeks Option 4 - 3 weeks Option 5 - 5 weeks Option 6 - 18 weeks Option 7 - 3 weeks Option 8 - 3 weeks Option 9 - 1 week Option 10 - 1 week Option 11 - 1 week Option 12 - 3 weeks Option 13 - 14 weeks Option 14 - 12 weeks Option 15 - 1 week</p>
<p>Operational Price (e.g. per annum or event) (ex VAT)</p>	<p>£0 per annum</p>
<p>Rationale</p>	
<p>n/a</p>	
<p>Annual Maintenance Price (ex VAT)</p>	<p>MP137 - £14 017</p> <p>Option 0 - £84 229 Option 1 - £89 599 Option 2 - £73 684</p> <p>Option 3 - £19 816 Option 4 - £11 631 Option 5 - £20 934 Option 6 - £63 545 Option 7 - £10 895 Option 8 - £10 895 Option 9 - £9 398 Option 10 - £7 584 Option 11 - £7 584 Option 12 - £13 611 Option 13 - £55 427 Option 14 - £50 683 Option 15 - £5 301</p>

Rationale	
<p>The Annual Maintenance Price is derived as 14% of the Change Specific Price.</p>	
Validity Constraints	
<ul style="list-style-type: none"> • Price and duration assume that this change is developed in isolation and the effects of other changes are excluded. • Price is for creating DCRs, not a formal documentation issue. • Maintain charges will be invoiced monthly in arrears. • No allowance has been included for supporting PwC activities. <p>The validity period for this quote is 30 days and the offer is based on the following payment milestones:-</p> <ul style="list-style-type: none"> • LogicaCMG will invoice 30% on receipt of Purchase Order or authorised start of work, 50% on completion of first build phase, 15% on live implementation and 5% made the earlier of either 1 month after the live implementation date or subject to the successful completion of the Success Criteria (to be agreed between Parties and defined in the Full Release Specification). 	
Authorised Signature	Date Signed

Modification Proposal	MP No: 137 <i>(mandatory by BSCCo)</i>
Title of Modification Proposal <i>(mandatory by proposer):</i> Revised Calculation of System Buy Price and System Sell Price	
Submission Date <i>(mandatory by proposer):</i> 1 August 2003	
<p>Description of Proposed Modification <i>(mandatory by proposer):</i></p> <p>The modification would set the main imbalance cash out price equal to the highest-priced untagged energy offer acceptance when the system is short and the lowest-priced untagged energy bid acceptance when the system is long. For these purposes, no distinction would be made between offers and bids accepted in the balancing mechanism and individual balancing services actions taken before gate closure by NGC. There would be no changes to the operation of the Balancing Mechanism and, in particular, balancing actions would continue to be paid at the respective offer or bid prices. The current P78 mechanism would also be retained with the main price being calculated on a marginal basis and the reverse price calculated – as now – from market index data. The existing tagging methodology would also be retained, but with the addition of tagging for offsetting bid and offer acceptances on individual BMUs and for forward energy trades which offset the net system imbalance. Attachment 1 to this proposal outlines the envisaged method for calculating SBP and SSP.</p> <p>Attachment 2 places the proposed BSC modifications in the context of a wider discussion on security and efficiency in the England and Wales electricity market and <i>inter alia</i> contains a detailed discussion of the proposed modification to the BSC and the analysis and justification underlying these modification proposals. However, for the avoidance of doubt, the scope of Attachment 2 means that it also includes analysis and proposals which fall outside the immediate scope of the proposed modifications to the BSC.</p>	
<p>Description of Issue or Defect that Modification Proposal Seeks to Address <i>(mandatory by proposer):</i></p> <p>The current calculation of cash-out prices fails to reflect the underlying costs of market shortage and, in particular:</p> <ul style="list-style-type: none"> - Weighted average pricing underestimates the marginal cost of balancing the system at times of shortage - The current tagging methodology leads to inappropriate tagging out of accepted offers at times of system shortage - the Buy-Price Adjustment fails to reflect the opportunity cost of using pre-contracted reserve (including standing reserve) on those occasions that the reserve is called since the option fees paid to reserve are averaged over those periods in which the reserve is made available rather than those periods in which it is actually used - The current calculation of SBP does not account for the use of standing reserve from non-BMU sources <p>Further details on the defects in the current pricing arrangements that the modification seeks to address are provided in Attachment 2.</p>	

Modification Proposal	MP No: 137 <i>(mandatory by BSCCo)</i>
Impact on Code <i>(optional by proposer):</i> Section T Paragraph 4 and Annex T-1 would need to be revised.	
Impact on Core Industry Documents <i>(optional by proposer):</i> None identified.	
Impact on BSC Systems and Other Relevant Systems and Processes Used by Parties <i>(optional by proposer):</i> Change to imbalance price calculation software	
Impact on other Configurable Items <i>(optional by proposer):</i> None	
Justification for Proposed Modification with Reference to Applicable BSC Objectives <i>(mandatory by proposer):</i> The proposal will promote effective competition in the generation and supply of electricity by ensuring that imbalance cash out prices better reflect the underlying opportunity costs of balancing the system, thereby promoting efficient market responses to emerging shortages (or surpluses) and efficient investment in generation capacity.	
Details of Proposer: Name: Paul Dawson Organisation: Barclays Bank Telephone Number: 020 7773 3957 Email Address: paul.dawson@barcap.com	
Details of Proposer's Representative: Name: Paul Dawson Organisation: Barclays Bank Telephone Number: 020 7773 3957 Email Address: paul.dawson@barcap.com	

Modification Proposal	MP No: 137 <i>(mandatory by BSCCo)</i>
Details of Representative's Alternate:	
Name: Christopher Day	
Organisation: Barclays Bank	
Telephone Number: 020 7773 8777	
Email Address: chris.day@barcap.com	
Attachments: Yes	
If Yes, Title and No. of Pages of Each Attachment:	
Attachment 1: Proposed Method for Setting Imbalance Prices – 2 pages	
Attachment 2: Promoting Efficiency and Security in the NETA Pricing Arrangements – 23 pages	

MP137 SAA URS draft DCR

Document Change Record	Reference and Version:	See file name in header See below for change history	<i>Document references are allocated by NETA Design authority.</i>
	Status:	1	<i>1--Draft Change; 2-Change For Review; 3-Change Accepted; 4-Change Applied; 5-Updated Document Awaiting Review; 6-Updated Document Approved</i>
	Acceptance document reference:		<i>Reference of letter or email from client accepting change (required to progress status to 3)</i>
	Related Change Record(s):		<i>Earlier change records which affect the same parts of the document this change relates to</i>
Change notice	Reference:	P137	<i>Identification of document leading to this change</i>
Baseline Document	Reference and title:	07-550104 SAA URS	<i>Logica file reference & title</i>
	Apply to Version:	6.0	<i>Last released version - should be an integer</i>
	Included in Version:		<i>Version incorporating the changes described in this document - set when status reaches 4</i>

Change History

version	date	comments	author
1	22/10/03	First draft	Jonathan Blott

Review (use where comments submitted as mark-up)

date	reviewer name	reviewer signature

Description of change**5.9 SAA-F009: Calculate energy imbalance prices**

Requirement ID: SAA-F009	Status: M	Title: Calculate energy imbalance prices	ITT reference: SAA SD 3.24.1, 3.24.2, 3.26, 3.27, 3.28, 3.29, SAA BPM 3.9, CR003, P8, P10, P18A, CP598, P71, P72, P78, <u>P137</u>
Man/auto: Automatic	Frequency: Once, on each settlement run.	Volumes:	
Functional Requirements:			
<p>A number of intermediate calculations are required to produce the energy imbalance prices. All calculation steps in this requirement are included here.</p> <p>(Note: In order that Energy Imbalance Prices may be calculated as soon as possible after a particular Settlement Period has ended, Energy Imbalance Prices will not be adjusted in order to account for volumes of non-delivered Bids and/or Offers.)</p>			
<p>1: Identify Short-Duration Acceptances.</p> <p>Short-Duration Acceptances are excluded from the price calculations as they may distort the results. The rules for identifying Short-Duration Acceptances are:</p> <ol style="list-style-type: none"> a. Acceptances for each BM Unit are grouped into sets of overlapping acceptances (for the avoidance of doubt, if the last spot time of one acceptance matches the first of another the two are considered to overlap). b. The overall duration of the group is computed (earliest spot time of any acceptance in a group to latest spot time of any acceptance in a group). c. If the overall duration is less than the Continuous Acceptance Duration Limit, $CADL_d$ then the Short Duration Acceptance flag for each acceptance in the group is set to show that it is a Short-Duration Acceptance. If $CADL_d = 0$ then no acceptances are “Short-Duration Acceptances”. $CADL_d$ will be an integer number of minutes from 0 to 30. d. All acceptance volumes (QAO_{ij}^n or QAB_{ij}^n) for periods intersected by one or more Short-Duration Acceptances (for the same BM Unit i) are “Short-Duration Volumes” and are excluded from the price calculations (if the last spot time of a Short-Duration Acceptance is on a period boundary then the 			

period starting at that spot time **is** intersected by the acceptance, similarly if the first spot time of a Short-Duration Acceptance is on a period boundary, the period ending at that spot time **is** intersected by the acceptance).

- e. Short-Duration volumes have priced acceptance volumes set to 0:

$$\begin{aligned} \text{QAPO}_{ij}^n &= 0 \\ \text{QAPB}_{ij}^n &= 0 \end{aligned}$$

All other volumes have priced acceptance volumes equal to acceptance volumes:

$$\begin{aligned} \text{QAPO}_{ij}^n &= \text{QAO}_{ij}^n \\ \text{QAPB}_{ij}^n &= \text{QAB}_{ij}^n \end{aligned}$$

2: Compute total volumes:

- a. Total Volume of Offers

$$\text{TQAO}_j = \sum_i \sum^n \text{QAO}_{ij}^n$$

\sum_i represents the sum over all BM Units;

\sum^n represents the sum over **all** accepted Offers

- b. Total Unpriced Volume of Offers

$$\text{TQUAO}_j = \sum_i \sum^n \text{QAO}_{ij}^n - \sum_i \sum^n \text{QAPO}_{ij}^n$$

\sum_i represents the sum over all BM Units;

\sum^n represents the sum over **all** priced accepted Offers;

- c. Total Volume of Bids

$$\text{TQAB}_j = \sum_i \sum^n \text{QAB}_{ij}^n$$

\sum_i represents the sum over all BM Units;

\sum^n represents the sum over **all** accepted Bids

- d. Total Unpriced Volume of Bids

$$\text{TQUAB}_j = \sum_i \sum^n \text{QAB}_{ij}^n - \sum_i \sum^n \text{QAPB}_{ij}^n$$

\sum_i represents the sum over all BM Units;

\sum^n represents the sum over **all** priced accepted Bids.

- e. Total Period Applicable Balancing Services Volume

$$\text{TQAS}_j = \sum_i \text{QAS}_{ij}$$

Σ_i represents the sum over all BM Units.

3: Identify “De Minimis Acceptance Volumes”.

Acceptances with a volume less than the De Minimis Acceptance Threshold (i.e. where values of $QAO_{ij}^n < DMAT_d$ or $QAB_{ij}^n > -DMAT_d$) are “De Minimis Acceptance Volumes” and are excluded from the price calculations as they may distort the results.

If $DMAT_d$ is set to 0, then no bid or offer volumes will be excluded in this way. $DMAT_d$ will always be a positive number or 0.

4: For each settlement period, all accepted offers and bids for all BM units are listed in order of offer price (PO_{ij}^n) and bid price (PB_{ij}^n) respectively, as illustrated in the following example:

BM unit	<u>Offers</u>		BM unit	<u>Bids</u>	
	Vol($QAPO_{ij}^n$)	Price(PO_{ij}^n)		Vol($QAPB_{ij}^n$)	Price(PB_{ij}^n)
1	12	50	6	10	25
2	24	45	7	15	8
3	15	43	8	5	7
4	50	40	9	5	4
5	20	10	10	10	2

5: Starting from the most expensive bid and least expensive offer, each offer and bid is inspected for arbitrage, i.e. where the bid price exceeds or is equal to the offer price. Any arbitrage volume (whole or part) is removed, with the following changes to the example:

<u>Offers</u>			<u>Bids</u>		
BM unit	Vol(QAPO ⁿ _{ij})	Price(PO ⁿ _{ij})	BM unit	Vol(QAPB ⁿ _{ij})	Price (PB ⁿ _{ij})
1	12	50	6	10	25
2	24	45	7	15	8
3	15	43	8	5	7
4	50	40	9	5	4
5	10	10	10	10	2

If, for a particular price, only a subset of the entire set of Bids (or Offers) can be matched, then every Bid (or Offer) in that price is tagged to the same degree (a fraction equal to amount matched, for that price, over the total volume available, for that price), rather than tagging some of the Bids (or Offers) entirely, and others not at all.

The removal (or not) of arbitrage offer and bid volumes shall be controlled by the Arbitrage Flag, a system parameter.

6: For Settlement Days before the P78 effective date apply Trade Tagging, as defined in SAA-F009a.

For Settlement Days before the P136 effective date but after, and including the P78 effective date apply NIV Tagging, as defined in SAA-F009b.

For Settlement Days after, and including the P136 effective date, apply NIV tagging as defined in SAA-F009c

Non-Functional Requirement:

5.9.3 SAA-F009bF009c: Apply Net Imbalance Volume Tagging

Requirement ID: SAA-F009bc	Status: M	Title: Apply Net Imbalance Volume Tagging	ITT reference: <u>P78P137</u>
Man/auto: Automatic	Frequency: Once, on each settlement run.	Volumes:	

Functional Requirements:

1: Apply BM Unit Undo Tagging (step 1):

For each BM Unit, for each settlement period, purchase and sale stacks are created by applying the following algorithms:

The Purchase Stack:

1. Derive the Purchase Price (PP_{ij}) and Purchase Volume (PV_{ij}) for each Priced Offer acceptance that is not a De-Minimis Offer Acceptance and which remains after Arbitrage by adding the price adjustment for the BM Unit (if any) to the offer price.

$$\underline{PP_{ij}^n = PO_{ij}^n + BPA_{ij}}$$

$$\underline{PV_{ij}^n = QPAO_{ij}^n \text{ (non-Arbitrage volume)}}$$

$$\underline{BPA_{ij} = 0 \text{ where no value has been received via SAA-I033}}$$

2. Derive the Purchase Price and Purchase Volume for each Energy Buy (BMU) BSAD trade.

$$\underline{PP_{tij} = BEBCA_{tij} / BEBVA_{tij}}$$

$$\underline{PV_{tij} = BEBVA_{tij}}$$

3. Stack all purchases in order of PP, highest price at the top.

For example:

BM Unit Purchase Stack

<u>Purchase Type</u>	<u>Price (£/MWh)</u>	<u>Volume (MWh)</u>
EBVA _j	100	10
QAPO _j	25	5
QAPO _j	20	20
EBVA _j	15	5
QAPO _j	10	35

The Sale stack:

1. Derive the Sale Price (SP_{ij}) and Sale Volume (SV_{ij}) for each Priced Bid acceptance that is not a De-Minimis Bid Acceptance and which remains after Arbitrage by adding the price adjustment for the BM Unit (if any) to the bid price.

$$\underline{SP_{ij}^n = PB_{ij}^n + SPA_{ij}}$$

$$\underline{SV_{ij}^n = QPAB_{ij}^n \text{ (non-Arbitrage volume)}}$$

$$\underline{SPA_{ij} = 0 \text{ where no value has been received via SAA-I033}}$$

2. Derive the Purchase Price and Purchase Volume for each Energy Sell (BMU) BSAD trade.

$$\underline{SP_{tij} = BESCA_{tij} / BESVA_{tij}}$$

$$\underline{SV_{tij} = BESVA_{tij}}$$

For example:

<u>BM Unit Sale Stack</u>		
<u>Sale Type</u>	<u>Price (£/MWh)</u>	<u>Volume (MWh)</u>
ESVA _j	15	15
QAPB _j	10	44
QAPB _j	5	5
QAPB _j	-10	7
ESVA _j -25	25	

2: Apply BM Unit Undo Tagging (step 2):

The two completed stacks are then compared, and the following conditions are applied:

1. Where purchase volume exceeds the sale volume then the least expensive priced purchase balancing actions are removed up to the sale volume.
2. Where the sale volume exceeds the purchase volume then the least expensive priced sale balancing actions are removed up to the sale volume.
3. Where the purchase volume and sale volume are equal then all priced (sale and purchase) balancing actions are removed for the BM Unit in question.

3: Apply BSAD Offset Tagging (step 1):

For each BM Unit, for each settlement period, purchase and sale stacks are created by applying the following algorithms:

The Purchase stack:

1. Derive the Purchase Price (PP_{ij}) and Purchase Volume (PV_{ij}) for each Priced Offer acceptance that is not a De-Minimis Offer Acceptance and which remains after Arbitrage and BM Unit Undo Tagging by adding the price adjustment for the BM Unit (if any) to the offer price.

$$PP_{ij}^n = PO_{ij}^n + BPA_{ij}$$

$$PV_{ij}^n = QPAO_{ij}^n \text{ (non-Arbitrage volume)}$$

$$BPA_{ij} = 0 \text{ where no value has been received via SAA-I033}$$

2. Derive the Purchase Price and Purchase Volume for each Energy Buy (non-BMU) BSAD trade.

$$PP_{tj} = EBCA_{tj} / EBVA_{tj}$$

$$PV_{tj} = EBVA_{tj}$$

3. Derive the Purchase Price and Purchase Volume for each Energy Buy (BMU) BSAD trade which remains after BM Unit Undo Tagging.

$$PP_{tij} = BEBCA_{tij} / BEBVA_{tij}$$

$$PV_{tij} = BEBVA_{tij}$$

4. Stack all purchases in order of PP, highest price at the top.

5. The non-zero Total System Un-priced Accepted Offer Volume (TQUAO_j) is placed at the top of the Purchase stack.

6. The non-zero (net) Buy Price Adjustment (System)(SBVA_j) is then inserted into the Purchase stack below the Total System Un-priced Accepted Offer Volume.

For example:

BSAD Purchase Stack

<u>Purchase Type</u>	<u>Price(£/MWh)</u>	<u>Volume (MWh)</u>
TQUAO _j	-	10
SBVA _j	-	0
QAPO _j	25	5
QAPO _j	20	20
EBVA _j	20	5
EBVA _j	15	10
QAPO _j	10	35
EBVA _j	5	5

The Sale stack:

1. Derive the Sell Price (SP) and Sell Volume (SV) for each Bid and Bid

4: Apply BSAD Offset Tagging (step 2):

The total BSAD energy buy volume remaining after BM Unit Undo tagging is compared to the total BSAD energy sell volume remaining after BM Unit Undo tagging.

If the buy volume exceeds the sell volume then, starting from the least expensive actions, tag a volume on the purchase stack equivalent to the total sell volume. In addition to this all the individual BSAD energy sell items are considered to be tagged on the sell stack.

For example, if the total BSAD energy sell volume remaining after BM Unit Undo tagging was 30MWh then the purchase stack would be tagged as follows:

BSAD Purchase Stack

Purchase Type	Price(£/MWh)	Volume (MWh)
TUOA _j	-	10
SBVA _j	-	0
QAPO _j	25	5
QAPO _j	20	20
EBVA _j	20	20
EBVA _j	15	10
QAPO _j	10	15
EBVA _j	5	5

BSAD Sale Stack

Sale Type	Price(£/MWh)	Volume (MWh)
ESVA _j	15	10
ESVA _j	10	5
QAPB _j	10	44
ESVA _j	5	15
QAPB _j	5	5
QAPB _j	-10	7
SSVA _j	-	25
TQUAB _j	-	4

If the sell volume exceeds the buy volume then, starting from the least expensive actions, tag a volume on the sale stack equivalent to the total buy volume. In addition to this all the individual BSAD energy buy items are considered to be tag on the purchase stack.

For example, if the total BSAD energy buy volume remaining after BM Unit Undo tagging was 30MWh then the sale stack would be tagged as follows:

BSAD Sale Stack

Sale Type	Price(£/MWh)	Volume (MWh)
ESVA _j	15	10
ESVA _j	10	5
QAPO _j	10	15
QAPB _j	10	29
ESVA _j	5	25
QAPB _j	5	5

15: For each settlement period, purchase and sale the offer and bid stacks are created for all BM units are then updated by applying the following algorithms:

The Purchase Offer (and purchase) stack:

1. Derive the Purchase Price (PP_{ij}) and Purchase Volume (PV_{ij}) for each Priced Offer acceptance that is not a De-Minimis Offer Acceptance and which remains after Arbitrage, BM Unit Undo Tagging, and BSAD Offset Tagging, by adding the price adjustment for the BM Unit (if any) to the offer price.

$$\underline{PP_{ij}^n = PO_{ij}^n + BPA_{ij}}$$

$$\underline{PV_{ij}^n = QPAO_{ij}^n \text{ (non-Arbitrage volume)}}$$

$$\underline{BPA_{ij} = 0 \text{ where no value has been received via SAA-I033}}$$

2. Derive the Purchase Price and Purchase Volume for each Energy Buy (non-BMU) BSAD trade which remains after BSAD Offset Tagging.

$$\underline{PP_{ij} = EBCA_{ij}/EBVA_{ij}}$$

$$\underline{PV_{ij} = EBVA_{ij}}$$

3. Derive the Purchase Price and Purchase Volume for each Energy Buy (BMU) BSAD trade which remains after BM Unit Undo Tagging and BSAD Offset Tagging.

$$\underline{PP_{tij} = BEBCA_{tij}/BEBVA_{tij}}$$

$$\underline{PV_{tij} = BEBVA_{tij}}$$

4. Stack all purchases in order of PP, highest price at the top.

~~1. The non-zero (net) Buy Price Volume Adjustment (Energy) (EBVA_i) is inserted into the Offer stack in order of price (derived from EBCA_i/EBVA_i, i.e. a £/MWh price).~~

~~2.5. The non-zero Total System Un-priced Accepted Offer Volume (TQUAO_j) is placed at the top of the Offer-Purchase stack.~~

~~3.6. The non-zero (net) Buy Price Adjustment (System)(SBVA_i) is then inserted into the Offer-Purchase stack below the Total System Un-priced Accepted Offer Volume.~~

For example: <need to amend examples throughout>

	Offer Stack	
Offer Type	Price (£/MWh)	Volume (MWh)
TQUAO _j	-	10

¹ The requirements are unclear on the required behaviour

SBVA _j	-	0
QAPO _j	25	5
QAPO _j	20	20
EBVA _j	15	5
QAPO _j	10	35

The ~~Bid~~ (and sale) Sale stack:

7. Derive the Sale Price (SP_{ij}) and Sale Volume (SV_{ij}) for each Priced Bid acceptance that is not a De-Minimis Bid Acceptance and which remains after Arbitrage, BM Unit Undo Tagging, and BSAD Offset Tagging, by adding the price adjustment for the BM Unit (if any) to the bid price.

$$\underline{SP_{ij}^n = PB_{ij}^n + SPA_{ij}}$$

$$\underline{SV_{ij}^n = QPAB_{ij}^n \text{ (non-Arbitrage volume)}}$$

$$\underline{SPA_{ij} = 0 \text{ where no value has been received via SAA-I033}}$$

8. Derive the Sale Price and Sale Volume for each Energy Sell (non-BMU) BSAD trade which remains after BSAD Offset Tagging.

$$\underline{SP_{tj} = ESCA_{tj} / ESVA_{tj}}$$

$$\underline{SV_{tj} = ESVA_{tj}}$$

9. Derive the Purchase Price and Purchase Volume for each Energy Sell (BMU) BSAD trade which remains after BM Unit Undo Tagging and BSAD Offset Tagging.

$$\underline{SP_{tj} = BESCOA_{tj} / BESVA_{tj}}$$

$$\underline{SV_{tj} = BESVA_{tj}}$$

1-10. Stack all purchases in order of SP, lowest price at the top.

The non-zero (net) Sell Price Volume Adjustment (Energy) (ESVA_j) is inserted into the Offer stack in order of price (derived from ESCA_j/ESVA_j, i.e. a £/MWh price).

2-11. The non-zero Total System Un-priced Accepted Bid Volume (TQUAB_j) is placed at the bottom of the ~~Bid~~ Sale stack.

3-12. The non-zero (net) Sell Price Adjustment (System) (SSVA_j) is then inserted into the ~~Bid~~ Sale stack above the Total System Un-priced Accepted Bid Volume.

For example:

<u>Bid Type</u>	Bid Stack	
	<u>Price (£/MWh)</u>	<u>Volume (MWh)</u>
ESVA _j	15	15

QAPB _j	10	44
QAPB _j	5	5
QAPB _j	-10	7
SSVA _j	-	25
TQUAB _j	-	4

~~26: Referencing the remaining offers and bids, and s~~Starting from the bottom of the Sale stack and the top of the Purchase stack~~least expensive bid and most expensive offer~~, Sales bids and Purchases offers are matched and tagged until the smaller (in total volume) of the two stacks is completely tagged.

If, for a particular price, only a subset of the entire set of Bids Sales (or Purchases Offers) can be matched, then an arbitrary choice is made as to which sales (or purchases), or parts of sales (or purchases) are tagged - the algorithm is only interested in establishing the marginal price every Bid (or Offer) in that price is tagged to the same degree (a fraction equal to amount matched, for that price, over the total volume available, for that price), rather than tagging some of the Bids (or Offers) entirely, and others not at all. If the Energy Volume Adjustment is at the same price, then this is treated as if it were another Bid (or Offer) at that same price - i.e. it is partially tagged in the same proportion.

In the example from above the Offer stack is the smaller (having only 70 MWh of total volume, as opposed to 100 MWh on the Bid Stack). The result of this process is that there will be, across the two stacks, a mixture of Tagged and Untagged NIV volumes. Continuing the example:

<u>Offer Stack</u>				<u>Bid Stack</u>			
Tagged Status	Offer Type	Price	Vol	Tagged Status	Bid Type	Price	Vol
T	TQUAO _j	-	10	U	ESVA _j	15	15
T	SBVA _j	-	0	U	QAPB _j	10	15
T	QAPO _j	25	5	T	QAPB _j	10	29
T	QAPO _j	20	20	T	QAPB _j	5	5
T	EBVA _j	15	5	T	QAPB _j	-10	7
T	QAPO _j	10	30	T	SSVA _j	-	25
				T	TQUAB _j	-	4

Note that for the £10 price range only 29 out of the 44 available MWh of Bids at that price can be tagged. Therefore each Bid in that price range would have tagged by an amount equal to 29/44 of their entire volumes. Expanding the example, and assuming that there are three Bids that make up the 44 MWh:

	Bid Item	Volume	Tagged Volume	Untagged
	Volume			
1	20	20 x 29/44 = 13.182	20 x 15/44 = 6.818	
2	10	10 x 29/44 = 6.591	10 x 15/44 = 3.409	
3	14	14 x 29/44 = 9.227	14 x 15/44 = 4.773	

~~37. It is now possible to calculate tagged elements of TQUAB_j, ESVA_j, SSVA_j, TQUAO_j, EBVA_j, and SBVA_j (TTQUAB_j, TESVA_j, TSSVA_j, TTQUAO_j, TEBVA_j, TSBVA_j respectively), as well as the untagged elements of EBVA_j and ESCA_j (UEBVA_j and UESCA_j respectively).~~

System BSAD (System Buy Price Volume Adjustment (SBVA_j) and System Sell Price Volume Adjustment (SSVA_j)):

Where none of the system BSAD volume is tagged out by the NIV Tagging, then the NIV Tagged volume is equal to zero (i.e. TSBVA_j = 0 or TSSVA_j = 0).

Where all of the system BSAD volume is tagged out by the NIV Tagging, then the NIV Tagged volume is equal to the original notified volume (i.e. TSBVA_j = SBVA_j or TSSVA_j = SSVA_j).

System (un-priced) Bid – Offer Acceptances (Total System Un-priced Bid Acceptance Volume (TQUAB_j) and Total System Un-priced Offer Acceptance Volume (TQUOB_j)):

Where none of the (CADL'ed) Un-priced Acceptance volume is tagged out by the NIV Tagging, then the NIV Tagged volume is equal to zero (i.e. TTQUAB_j = 0 or TTQUAO_j = 0).

Where all of the (CADL'ed) Un-priced Acceptance volume is tagged out by the NIV Tagging, then the NIV Tagged volume is equal to the original calculated volume (i.e. TTQUAB_j = TQUAB_j or TTQUAO_j = TQUAO_j).

~~Energy BSAD (Energy Buy Price Volume Adjustment (EBVA_j) and Energy Sell Price Volume Adjustment (ESVA_j)):~~

~~Where all of the energy BSAD volume is tagged out by the NIV Tagging, then the NIV Untagged volume is equal to zero (i.e. UEBVA_j = 0 or UESVA_j = 0). The NIV Untagged price (i.e. UEBCA_j and UESCA_j) is also equal to zero.~~

~~Where none of the energy BSAD volume is tagged out by the NIV Tagging, then the NIV Untagged volume is equal to the original notified volume (i.e. UEBVA_j = EBVA_j or UESVA_j = ESVA_j). The NIV Untagged price (i.e. UEBCA_j and UESCA_j) is also equal to the originally notified price.~~

~~Where a part of the volume is tagged out by the NIV Tagging, then the price associated with the untagged volume is to be derived as follows:~~

~~$$UEBCA_j = (EBCA_j / EBVA_j) * UEBVA_j;$$~~

~~$$UESCA_j = (ESCA_j / ESVA_j) * UESVA_j;$$~~

~~If for that Settlement Period EBVA_j is zero, then UEBCA_j = 0;~~

~~If for that Settlement Period ESVA_j is zero, then UESCA_j = 0.~~

48. The Total NIV Tagged Volume for a Settlement Period can now be calculated as:

$$TCQ_{ij} = \frac{\{(\sum_i \sum^{n^1} \underline{SV}_{ij}^n \underline{QAPB}_{ij}^n) + (\sum_t \underline{SV}_{ij}) + (\sum_i \sum_t \underline{SV}_{tij}) + TTQUAB_i + \underline{TESVA}_i + TSSVA_i\} - \{(\sum_i \sum^{n^*} \underline{PV}_i^n \underline{QAPO}_{ij}^n) + (\sum_t \underline{PV}_{ij}) + (\sum_i \sum_t \underline{PV}_{tij}) + TTQUAO_i + \underline{TEBVA}_i + TSBVA_i\}}{2}$$

where

\sum_i represents the sum over all BM Units;

\sum^{n^1} represents the sum over all ~~Sales Priced Acceptance Bids~~ which are NIV Tagged Bids;

\sum^{n^*} represents the sum over all ~~Purchases Priced Acceptance Offers~~ which are NIV Tagged Offers;

\sum_t represents the sum over all Sales which are not NIV Tagged Sales;

\sum_t^* represents the sum over all Purchases which are not NIV Tagged Purchases;

TTQUAB_j is the NIV Tagged TQUAB_j;

TESVA_j is the NIV Tagged ESVA_j;

TSSVA_j is the NIV Tagged SSVA_j;

TTQUAO_j is the NIV Tagged TQUAO_j;

TEBVA_j is the NIV Tagged EBVA_j, and;

TSBVA_j is the NIV Tagged SBVA_j.

59. The actual Net Imbalance Volume (NIV) for each Settlement Period can then be calculated as follows:

$$NIV_{ij} = \{ \sum_i \sum^n \underline{PV}_{ij}^n \underline{QAPO}_{ij}^n - \sum_t (-\underline{PV}_{ij}) + \sum_t \sum_t (-\underline{PV}_{tij}) + \underline{EBVA}_i + SBVA_i + TQUAO_i \} - \{ \sum_i \sum^n (-\underline{SV}_i^n \underline{QAPB}_{ij}^n) + \sum_t (-\underline{PV}_{ij}) + \sum_t \sum_t (-\underline{SV}_{tij}) + (-\underline{ESVA}_i) + (-SSVA_i) + (-TQUAB_i) \}$$

where

\sum_i represents the sum over all BM Units, ~~and~~;

\sum^n represents the sum over all Bid-Offer Pair Numbers for the BM Unit, ~~that are not De Minimis Accepted Bid Offer Pairs, and not Arbitrage Accepted Bid Offer Pairs;~~ and

\sum_t represents the sum over all BSAD trades.

610. The remaining offers and bid volumes shall be used in the calculation of the System Buy Price (SBP_j) as follows:

In respect of each Settlement Period, if the Net Imbalance Volume is **positive** and there is at least one Priced Offer or BSAD purchase in the Purchase Stack then

SBP_j = highest purchase price of any Priced Accepted Offer or BSAD purchase which is not NIV tagged.

If no such Purchase remains, then

SBP_j = lowest effective price of any Priced Accepted Offer or BSAD purchase which is NIV tagged.

~~, and the value of $\{\sum_i \sum^n \{QAPO_{ij}^n * TLM_{ij}\} + UEBVA_j\}$ is non-zero, then the System Buy Price will be determined as follows:~~

~~$$SBP_j = \frac{\{\sum_i \sum^n \{QAPO_{ij}^n * PO_{ij}^n * TLM_{ij}\} + UEBCA_j\}}{\{\sum_i \sum^n \{QAPO_{ij}^n * TLM_{ij}\} + UEBVA_j\}} + \{BPA_j\}$$~~²

where

\sum_i represents the sum over all BM Units;

\sum^n represents the sum over those accepted Priced Accepted Offers, that are not De Minimis Acceptance volumes and not Arbitrage Accepted Offers and not NIV Tagged Offers;

PO_{ij}^n is the Offer Price for the Offer acceptance n, BM Unit i and Settlement Period j;

$UEBCA_j$ is the NIV Untagged Buy Price Cost Adjustment (Energy);

$UEBVA_j$ is the NIV Untagged Buy Price Volume Adjustment (Energy); and

BPA_j is the Buy Price Price Adjustment.

If, for any Settlement Period, the Net Imbalance Volume is **negative**, then the System Buy Price will be determined as:

$$SBP_j = \sum_s \{PXP_{sj} * QXP_{sj}\} / \sum_s QXP_{sj}$$
³

where

\sum_s represents the sum over all Index Providers;

PXP_{sj} is the Market Index Price for Index Provider s and Settlement Period j;

QXP_{sj} is the Market Index Volume for Index Provider s and Settlement Period j.

(a) If for that Settlement Period $\sum_s QXP_{sj}$ is equal to zero, then $SBP_j = SSP_j$ ⁴;

(b) If for that Settlement Period $SBP < SSP$, i.e. there is a negative spread, then $SBP_j = SSP_j$ ⁵.

If, for any Settlement Period, the Net Imbalance Volume is **zero**⁶, or there is no Priced Offer or BSAD purchase in the purchase Stack or the value of $\{\sum_i \sum^n \{QAPO_{ij}^n * TLM_{ij}\} + UEBVA_j\}$ is zero⁷, then the System Buy Price will be determined as:

$$SBP_j = \sum_s \{PXP_{sj} * QXP_{sj}\} / \sum_s QXP_{sj}$$
⁸

where

\sum_s represents the sum over all Index Providers;

PXP_{sj} is the Market Index Price for Index Provider s and Settlement Period j;

QXP_{sj} is the Market Index Volume for Index Provider s and Settlement Period j.

² Price derivation codes A, B, C

³ Price derivation codes F, I

⁴ Price derivation codes H, J

⁵ Price derivation codes G

If for that Settlement Period $\sum_s QXP_{sj}$ is equal to zero, then $SBP_j = 0$ ⁹.

~~711~~. The remaining offers and bid volumes shall be used in the calculation of the System Sell Price (SSP_j) as follows:

In respect of each Settlement Period, if the Net Imbalance Volume is **negative** and there is at least one Priced Bid or BSAD sale in the Sale Stack then

SSP_j = lowest effective price of any Priced Accepted Bid or BSAD sale which is not NIV tagged.

If no such Sale remains, then

SSP_j = highest effective price of any Priced Accepted Bid or BSAD sale which is NIV tagged.

~~, and the value of $\{\sum_i \sum^n \{QAPB_{ij}^n * TLM_{ij}\} + UESVA_j\}$ is non-zero, then the System Sell Price will be determined as follows:~~

~~$$SSP_j = \frac{\{\sum_i \sum^n \{QAPB_{ij}^n * PB_{ij}^n * TLM_{ij}\} + UESCA_j\}}{\{\sum_i \sum^n \{QAPB_{ij}^n * TLM_{ij}\} + UESVA_j\}} + \{SPA_j\}$$
¹⁰~~

where

\sum_i represents the sum over all BM Units;

\sum^n represents the sum over those accepted Priced Accepted Bids, that are not De Minimis Acceptance volumes and not Arbitrage Accepted Bids and not NIV Tagged Bids;

PB_{ij}^n is the Bid Price for the Bid acceptance n, BM Unit i and Settlement Period j;

$UESCA_j$ is the NIV Untagged Sell Price Cost Adjustment (Energy);

$UESVA_j$ is the NIV Untagged Sell Price Volume Adjustment (Energy); and

SPA_j is the Sell Price Price Adjustment.

If for any Settlement Period the Net Imbalance Volume is **positive**, then the System Sell Price will be determined as follows:

$$SSP_j = \sum_s \{PXP_{sj} * QXP_{sj}\} / \sum_s QXP_{sj}$$
 ¹¹

where

\sum_s represents the sum over all Index Providers;

PXP_{sj} is the Market Index Price for Index Provider s and Settlement Period j;

QXP_{sj} is the Market Index Volume for Index Provider s and Settlement Period j.

(a) If for that Settlement Period $\sum_s QXP_{sj}$ is equal to zero, then $SSP_j = SBP_j$ ¹².

(b) If for that Settlement Period $SSP > SBP$, i.e. there is a negative spread, then $SSP_j = SBP_j$ ¹³.

⁶ Price derivation codes K, L

⁷ Price derivation codes D, E

⁸ Price derivation codes D, K

⁹ Price derivation codes E, L

¹⁰ Price derivation codes F, G, H

¹¹ Price derivation codes A, D

¹² Price derivation codes C, E

¹³ Price derivation codes B

If for any Settlement Period the Net Imbalance Volume is **zero**¹⁴, or there is no Priced Bid or BSAD sale in the Sale Stack the value of $\{\sum_i \sum^n \{QAPB_{ij}^n * TLM_{ij}\} + UESVA_{ij}\}$ is zero¹⁵, then the System Sell Price will be determined as:

$$SSP_j = \sum_s \{PXP_{sj} * QXP_{sj}\} / \sum_s QXP_{sj}^{16}$$

where

\sum_s represents the sum over all Index Providers;

PXP_{sj} is the Market Index Price for Index Provider s and Settlement Period j;

QXP_{sj} is the Market Index Volume for Index Provider s and Settlement Period j.

If for that Settlement Period $\sum_s QXP_{sj}$ is equal to zero, then $SSP_j = 0$ ¹⁷.

812: In respect of each Settlement Period, the Total Priced Volume of Offers will be determined as follows:

$$TQPAO_j = \sum_i \sum^n QAPO_{ij}^n$$

where

\sum_i represents the sum over all BM Units;

\sum^n represents the sum over those accepted Offers that are not De Minimis Acceptance volumes and not Arbitrage Accepted Offers and not NIV Tagged Offers;

In respect of each Settlement Period then the Total Priced Volume of Bids will be determined as follows:

$$TQPAB_j = \sum_i \sum^n QAPB_{ij}^n$$

where

\sum_i represents the sum over all BM Units;

\sum^n represents the sum over those accepted Bids that are not De Minimis Acceptance volumes and not Arbitrage Accepted Bids and not NIV Tagged Bids;

913. The BSAD price adjustment parameters shall be set through the automatic interface SAA-I026, as directed by SO. Note that if no adjustment data has been provided for Settlement Period j then a value of zero will be used for all **eight** parameters.

Price adjustment data shall be received through the automatic interface SAA-I033. Note that if no data is received in respect of BM Unit i for Settlement Period j then the adjustment for that BM Unit in that period shall be zero.

The system parameters like Arbitrage Flag, $DMAT_d$, and $CADL_d$ are received from BSCC Ltd through the manual flow SAA-I023.

¹⁴ Price derivation codes K, L

¹⁵ Price derivation codes I, J

¹⁶ Price derivation codes I, K

¹⁷ Price derivation codes J, L

<p>Market Index Data is received from Market Index Data Providers through the automatic flow SAA-I030.</p> <p>The SAA shall, for the purposes of performance reporting, record details of those cases where:</p> <ul style="list-style-type: none"> <u>3.1.</u> A value of zero was used for Market Index Price and Volume are used for a Settlement Period, for the purposes of the Initial Interim Settlement Calculation <u>4.2.</u> A Market Index Provider has failed to supply Market Index Data for any given Settlement Period, such that a default price and volume of zero are used for that Settlement Period, for the purposes of the Initial Interim Settlement Calculation. <p>The SAA shall for the purposes of reporting, record a Price Derivation Code (PDC_j) for each Settlement Period. This code will describe how the SBP and SSP were calculated. The possible values for the code, and their associated meaning, are defined in Appendix E.</p>
Non-Functional Requirement:

6.26 SAA-I026: Receive Adjustment Data

Requirement ID: SAA-I026	Status: Mandatory	Title: Receive Adjustment Data	ITT reference: MP008, P78, P137
Mechanism: Automatic	Frequency: continuous	Volumes: Each file will typically contain the data for one Settlement Date (a file may contain a data for a single period, or covering multiple dates). Data for each Settlement Period will normally appear in 2-4 files.	
Interface Requirement:			
<p>The SAA Service shall receive the following system parameter data from the SO via an automatic interface. For Settlement Days prior to the P78 effective date, this flow shall include:</p> <ul style="list-style-type: none"> Settlement Date Settlement Period (1-50) <ul style="list-style-type: none"> BCA_j (Buy-Price Cost Adjustment) BVA_j (Buy-Price Volume Adjustment) BPA_j (Buy-Price Price Adjustment) SCA_j (Sell-Price Cost Adjustment) SVA_j (Sell-Price Volume Adjustment) SPA_j (Sell-Price Price Adjustment) 			

Requirement ID: SAA-I026	Status: Mandatory	Title: Receive Adjustment Data	ITT reference: MP008, P78, P137
<p>For Settlement Days which are both before the P136 effective date and after, and including the P78 effective date, this flow shall include the following:</p> <p>Settlement Date Settlement Period (1-50) EBCA_j (Net Buy-Price Cost Adjustment)(Energy) EBVA_j (Net Buy-Price Volume Adjustment)(Energy) SBVA_j (Net Buy-Price Volume Adjustment)(System) BPA_j (Buy-Price Price Adjustment) ESCA_j (Net Sell-Price Cost Adjustment)(Energy) ESVA_j (Net Sell-Price Volume Adjustment)(Energy) SSVA_j (Net Sell-Price Volume Adjustment)(System) SPA_j (Sell-Price Price Adjustment)</p> <p>For Settlement Days after, and including the P136 effective date, this flow shall include the following:</p> <p>Settlement Date Settlement Period (1-50) SBVA_j (Net Buy-Price Volume Adjustment)(System) SSVA_j (Net Sell-Price Volume Adjustment)(System)</p> <p>Energy Buy BSAD (non BMU) t _____ BSAD Trade number EBCA_{tj} _____ Energy Buy price Cost adjustment (£) EBVA_{tj} _____ Energy Buy price Volume adjustment (MWh)</p> <p>Energy Buy BSAD (BMU) t _____ BSAD Trade number i _____ BM Unit BEBCA_{tij} _____ BM Unit Energy Buy price Cost adjustment (£) BEBVA_{tij} _____ BM Unit Energy Buy price Volume adjustment (MWh)</p> <p>Energy Sell BSAD (non BMU) t _____ BSAD Trade number ESCA_{tj} _____ Energy Sell Price Cost adjustment (£) ESVA_{tj} _____ Energy Sell Price Volume adjustment (MWh)</p> <p>Energy Sell BSAD (BMU) t _____ BSAD Trade number i _____ BM Unit BESCA_{tij} _____ BM Unit Energy Sell Price Cost adjustment (£) BESVA_{tij} _____ BM Unit Energy Sell Price Volume adjustment (MWh)</p>			

Requirement ID: SAA-I026	Status: Mandatory	Title: Receive Adjustment Data	ITT reference: MP008, P78, P137

6.33 SAA-I033: Receive Price Adjustment Data

<u>Requirement ID:</u> SAA-I033	<u>Status:</u> Mandatory	<u>Title:</u> Receive Price Adjustment Data	<u>ITT reference:</u> P137
<u>Mechanism:</u> Automatic	<u>Frequency:</u> continuous	<u>Volumes:</u> Each file will typically contain the data for one Settlement Date (a file may contain a data for a single period, or covering multiple dates). Data for each Settlement Period will normally appear in 2-4 files.	
<u>Interface Requirement:</u>			
<p>The SAA Service shall receive the following system parameter data from the SO via an automatic interface for Settlement Days after, and including the P136 effective date, this flow shall include the following:</p> <p>Buy</p> <p>BM Unit</p> <p>BPA_{ij} Buy Price Price Adjustment (£/MWh)</p> <p>effective ranges</p> <p>effective from settlement date</p> <p>effective from settlement period</p> <p>effective to settlement date</p> <p>effective to settlement period</p> <p>Sell</p> <p>BM Unit</p> <p>SPA_{ij} Sell Price Price Adjustment (£/MWh)</p> <p>effective ranges</p> <p>effective from settlement date</p> <p>effective from settlement period</p> <p>effective to settlement date</p> <p>effective to settlement period</p>			