

## **MODIFICATION PROPOSAL P136 AND P137 MECHANISMS**

### **1. OVERVIEW**

Modification Proposal P136 'Marginal Definition of the 'Main' Energy Imbalance Price' (P136) was raised by National Grid Transco on 1 August 2003.

Modification Proposal P137 'Revised Calculation of System Buy Price and System Sell Price' (P137) was raised by Barclays Bank on 1 August 2003.

Both Modification Proposals seek to amend the Energy Imbalance Price calculation, and thus both were submitted to a parallel three month Assessment Procedure, by the Panel at its meeting of 14 August 2003. The assessment of P136 and P137 is being undertaken by the Pricing Issues Standing Modification Group (PSMG).

This document seeks to explain the mechanisms proposed by the two Modifications.

The PSMG are currently considering the fundamentals of the mechanisms proposed for P136 and P137 and believe the following to be the key issues for consideration in relation to the mechanisms:

- The treatment of energy BSAD for P136 (outlined below);
- The treatment of Option fees (section 3) for P136 and P136;
- The formulation of the NIV stacks (section 4), particularly in respect of the 'completeness' of the balancing actions represented, and in respect of availability of such balancing actions for prompt pricing; and
- The issue as to whether a non delivered balancing action should set the marginal price (both in respect of Bid – Offer Acceptances and Energy BSAD volumes).

These key issues have not yet been concluded on by the PSMG and thus this document makes certain assumptions in respect of these issues, pending further deliberation by the PSMG.

It can be seen that the fundamental mechanism that both Modifications seek to implement is very similar, with P137 building on / adding to the mechanism proposed by P136 by undertaking two additional steps where offsetting actions on a single BM Unit are removed (referred to as undo tagging), and energy BSAD trades on the smaller stack are netted off the main stack (referred to as offsetting tagging) prior to the NIV derivation.

P137 proposes BSAD amendments, and although amendments to BSAD do not fall within the vires of the Code, the Transmission Company has indicated that the deliberations of the PSMG will inform a consultation on BSAD and therefore the amendments detailed within this document provide an indication of the types of amendments to BSAD that the PSMG would like to see in order to give effect to P136 and P137. It should be noted that the amendments to BSAD will be consulted on, as a separate exercise, by the Transmission Company at some point in the future, and therefore the BSAD amendments detailed in this document should not assumed to be definitive, and may change as a result of the outcome of the BSAD consultation.

Furthermore, it should be noted that P137 is prescriptive as to the amendments to BSAD required to support the proposal, whereas P136 is silent. The PSMG have not determined the amendments to BSAD required for P136, and it should be noted that there is the potential for the PSMG to define a solution for P136 that does not have any BSAD changes away from the current formulation, or to define a solution based on some or all variations of the changes required for P137, or to define a solution that does not use BSAD at all.

## 2. CURRENT MECHANISM

In order to provide some context and comparison, the current Energy Imbalance Price mechanism should be briefly explained; currently the main Energy Imbalance Price (i.e. the price applied to imbalances in the same direction as the system, SBP when the system is short (Net Imbalance Volume (NIV) > 0) and SSP when it is long (NIV < 0) are derived from a volume weighted average of the balancing actions remaining in the NIV, i.e. energy balancing actions.

In order to derive the NIV, balancing actions, Bid – Offer Acceptances and BSAD, are stacked; accepted Bids and sell BSAD on one stack (the **sell stack**) and accepted Offers and buy BSAD on the other (the **buy stack**). The volume of the smaller stack is netted off the larger stack, most expensive<sup>1</sup> actions first, deeming all actions removed by this netting (NIV Tagging) to have been taken for system purposes. Worked example (a) provides an illustration of the current mechanism for deriving the main Energy Imbalance Price.

Balancing Services Adjustment Data (BSAD) is provided in the form of a net average volume for each of system (SBVA or SSVA) and energy components (EBVA (and associated average price EBVA) or ESVA (and associated average price ESCA)), plus option fees as a price adjuster (BPA and / or SPA) to be added on to the resulting Energy Imbalance Price, as appropriate (BPA to the SBP when the SBP is the main price and SPA to the SSP when the SSP is the main price).

## 3. P137: TREATMENT OF OPTION FEES (BPA AND SPA)

P137 proposes amendment to the way in which option fees are used in the Energy Imbalance Price calculation. As described in section 2, currently the option fees are provided as a Price adjuster which is added to the volume weighted average price derived from balancing actions remaining in the NIV.

The contribution to BSAD of standing reserve option payments is currently calculated with reference to the total option payment for a Settlement Period and the total contracted capability, effectively allocating the overall cost of the option fees into the Settlement Periods for which the service is available.

P137 seeks to amend this such that option fees are targeted at those Settlement Periods for which the standing reserve is actually used ('called off'). It seeks to do this by deriving an expected utilisation cost for the standing reserve ahead of use, which is then added to the price of the instruction when the service is called off, thus giving the 'effective cost' of the standing reserve, and in the opinion of the Proposer of P137, making the option fees more reflective of the costs incurred in using that standing reserve. The Proposer's rationale for this treatment of option fees is set out in the second attachment to the Modification Proposal 'Promoting Efficiency and Security in the NETA Pricing Arrangements' dated July 2003, specifically section 4.1.3.

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<sup>1</sup> Most expensive, in this context, is in respect of the expense to the system. In the case of buy balancing actions (including Offers), the most expensive are those that have cost the system the most to buy (i.e. the highest positive price). In the case of sell balancing actions (including Bids), since a positive price represents a payment to the system, the most expensive are those that have either bought the system in the least money (the lowest positive price), or that the system has had to pay for where the price is negative (the highest negative price is the most expensive).

It is envisaged that the expected utilisation cost be derived by the Transmission Company based on an assessment of how many times the standing reserve will be called off, and for what volume, and by apportioning the option fee for the contract across the expected usage. For a hypothetical example, the Transmission Company buys a standing reserve contract at £2000, the service is available for 20 Settlement Periods, but they only expect to use it ten times for 10 MWh per time, resulting in an expected utilisation cost of £20 / MWh ( $£2000 / (10 * 10)$ ), as opposed to the current mechanism which would result in a price adjuster of £10 per Settlement Period in the service availability window of 20 Settlement Periods.

P137 then proposes that each time the standing reserve is called off:

- For Balancing Mechanism participants a Bid – Offer Acceptance is taken. When placing this action into the relevant stack for NIV Tagging, the expected utilisation cost will be added to the acceptance price, such that the acceptance price is adjusted for the expected utilisation cost; and
- For non Balancing Mechanism participants a BSAD volume and price is notified, where the volume is the volume of standing reserve delivered, and the price is the price for delivering the standing reserve, adjusted by the Transmission Company to include the expected utilisation cost for that contract.

The proposal is that the expected utilisation cost for each standing reserve contract be derived by the Transmission Company and published once the standing reserve auction has completed. It should be noted that the intent is to publish the BM Unit and the expected utilisation cost, against the service availability window. The intent is to protect some of the information, such that BSC Parties should not be able to determine the actual contract cost, as they will not know the Transmission Company's assessment of the expected utilisation.

The PSMG have noted that this approach may result in an overstatement of the option fees for a contract where standing reserve is called off more than the Transmission Company expected, and an understatement where the standing reserve is called off less than the Transmission Company expected. However, it is not feasible use an actual utilisation cost derived on completion of the service availability window, as this is not available until well after real time.

Furthermore, this approach requires amendment to BSAD, and therefore the solution will be dependent on the outcome of the future BSAD consultation. It should be noted that the Transmission Company explores the issue of amending options fees for this winter (2003 / 2004), and covers some of the considerations arising from the approach detailed by P137, in its latest BSAD consultation ('Proposed revisions to the BSAD Methodology Statement Treatment of Standing Reserve Option fees', Consultation by National Grid September 2003).

#### **4. FORMULATION OF THE NET IMBALANCE VOLUME**

The PSMG believe that the composition of the NIV in order to determine the system length accurately is important under a volume weighted average price. However, the PSMG believe that implementation of a marginal methodology for deriving the main Energy Imbalance Price makes the composition of the NIV crucial. In order to get the 'right' marginal price, i.e. the marginal energy balancing action, the NIV calculation should contain as accurate a representation of all the volumes associated with balancing the system as possible.

The PSMG noted that the current Net Imbalance Volume calculation omits certain volumes from the calculation, namely the volumes deemed to have been delivered by Parties in Frequency Response, and the volumes associated with non BM Unit delivered standing reserve. Therefore, since these volumes have been delivered at the request of the Transmission Company, there is an argument to say that these

volumes are balancing actions and should be included in the derivation of the NIV. Therefore the PSMG are considering the appropriateness of extending the volumes contributing to the NIV to include these additional volumes not currently included in BSAD / represented by a Bid – Offer Acceptance.

It should be noted that P137 specifically requires the inclusion of standing reserve volumes delivered by non BM Unit specific / Balancing Mechanism participant sources in BSAD for the NIV derivation.

There are issues with the inclusion of Frequency Response volumes, for example timeliness of the availability of data for prompt price reporting and accuracy of the volumes and whilst these volumes are included in the NIV derivation for the purposes of illustrating the mechanism via the worked examples, it should not be assumed that this represents the final solution in respect of these volumes.

Furthermore, the route for notification of these volumes will be BSAD, and therefore inclusion of these volumes in the solution will be dependent on the outcome of the future BSAD consultation. Noting this dependency and the continuing deliberations of the PSMG in respect of including these volumes, the following sections (a) and (b) explore further the mechanism for notifying each type of volume for the purposes of supporting the illustrations of each mechanism.

Thus, where these volumes are to be included in the NIV:

**Frequency Response:** Is deemed to have been taken for system balancing purposes, thus the Transmission Company can include the relevant Applicable Balancing Services Volumes in the aggregated system BSAD (without an associated price, as it is a system action); and

**Non BM Standing Reserve:** Is deemed to be an energy balancing service, so in order to provide an equivalence with the treatment of standing reserve for BM participants the Transmission Company can determine the expected usage for each contract, and derive the expected utilisation cost from the option fees (derived as a £/MWh value) (see section 3);

Thus, whenever the service is called off, the Transmission Company will determine the volume deemed to have been delivered, and will notify it as an energy BSAD volume, with a price, in £/MWh, derived from the price agreed for delivery under the contract, and including the expected utilisation cost.

## 5. WORKED EXAMPLES: BALANCING ACTIONS

In order to illustrate the fundamentals of each mechanism, and to illustrate differences in the mechanisms and the resulting price, the following example balancing actions will be used in worked examples to derive the SBP for P136, P137 and the current mechanism, assuming the system is short.

For a specific Settlement Period, after CADL and De Minimis Tagging (there are no balancing actions that need to be arbitrated out, so there is no Arbitrage tagging), the following balancing actions remain to go forward to the derivation of NIV:

EUC – is the Expected Utilisation Cost referred to in the preceding sections.

Balancing Action (Buy stack)	Volume (MWh)	Price (£/MWh)
Total Un-priced Accepted Offer Volume (TQUAO) i.e. the total CADL'ed acceptance volume	15	N/A
Net System Buy Price Volume Adjustment (SBVA)	60	N/A
Energy Buy Price Volume Adjustment (EBVA 1) PGBT on BM Unit A taken for energy purposes, pre Gate	20	£200

<b>Balancing Action (Buy stack)</b>	<b>Volume (MWh)</b>	<b>Price (£/MWh)</b>
Closure		
Energy Buy Price Volume Adjustment (EBVA 2) PGBT on BM Unit B taken for energy purposes, pre Gate Closure	25	£50
Energy Buy Price Volume Adjustment (EBVA 3) P/Ex trade for energy purposes, pre Gate Closure	10	£20
Energy Buy Price Volume Adjustment (EBVA 4) P/Ex trade for energy purposes, pre Gate Closure	100	£15
Energy Buy Price Volume Adjustment (EBVA 5) Standing reserve, no BM Unit, no BM Action	10	£275 (incl. EUC)
Energy Buy Price Volume Adjustment (EBVA 6) Standing reserve, no BM Unit, no BM Action	15	£75 (incl. EUC)
Period Priced Accepted Offer Volume (QAPO 1) Offer Acceptance on BM Unit A under Standing Reserve contract	30	£1100 (incl. EUC of £1000)
Period Priced Accepted Offer Volume (QAPO 2) Offer Acceptance on BM Unit A under Standing Reserve contract	20	£1150 (incl. EUC of £1000)
Period Priced Accepted Offer Volume (QAPO 3) Offer Acceptance on BM Unit C	30	£25
Period Priced Accepted Offer Volume (QAPO 4) Offer Acceptance on BM Unit D	20	£30

<b>Balancing Action (Buy stack)</b>	<b>Volume (MWh)</b>	<b>Price (£/MWh)</b>
Total Un-priced Accepted Bid Volume (TQUAB) i.e. the total CADL'ed acceptance volume	35	N/A
Net System Sell Price Volume Adjustment (SSVA)	0 (Net volume in buy stack)	N/A
Energy Sell Price Volume Adjustment (ESVA 1) P/Ex trade for energy purposes, pre Gate Closure	20	£25
Energy Sell Price Volume Adjustment (ESVA 2)	10	£25

<b>Balancing Action (Buy stack)</b>	<b>Volume (MWh)</b>	<b>Price (£/MWh)</b>
P/Ex trade for energy purposes, pre Gate Closure		
Energy Sell Price Volume Adjustment (ESVA 3) Energy balancing service, no BM Unit, no BM Action	20	£50
Period Priced Accepted Bid Volume (QAPB 1) Bid Acceptance on BM Unit A	60	£20
Period Priced Accepted Bid Volume (QAPB 2) Bid Acceptance on BM Unit F	50	£16
Period Priced Accepted Bid Volume (QAPB 3) Bid Acceptance on BM Unit G	20	-£25

## 6. ENERGY IMBALANCE PRICING MECHANISM: P136

Noting that the PSMG has not concluded as to the BSAD amendments required for P136, and noting that there is the potential for the PSMG to define a solution for P136 that does not have any BSAD changes away from the current formulation, or to define a solution based on some or all variations of the changes required for P137, or to define a solution that does not use BSAD at all, for the purposes of this description and the following worked example only, it is assumed that the same amendments to BSAD will be made for P136 as for P137, namely:

- Option fees will be amended in accordance with section 3, namely an expected utilisation cost will be derived, and reflected in the Bid – Offer acceptance price, or BSAD price for volumes instructed under the relevant contract; and
- Disaggregated energy BSAD, such that each 'trade' is provided as a volume with a price. Thus there will be a volume and a price notified for each of the following:
  - Energy Pre Gate Closure BM Unit Transactions (PGBTs), BM Unit specific;
  - Energy forward trades; and
  - Non Balancing Mechanism standing reserve (noting section 4).

This approach to BSAD for P136, specifically in reference to the worked example, allows a direct comparison of the P136 and P137 mechanisms.

In summary the P136 mechanism is:

- CADL and De Minimis Tagging is undertaken, as currently defined;
- All balancing actions – Bid – Offer Acceptances, disaggregated Energy BSAD buys and sells, and net aggregated System BSAD are stacked in price order, least expensive first;
- Arbitrage Tagging is performed, which removes an equal and opposite volume from both the sell stack and the buy stack to remove balancing actions where the Offer / buy Price is less than the Bid / sell price for the balancing actions;

- The expected utilisation cost is added to the Bid – Offer price of Bid – Offer Acceptances made under standing reserve contracts, and the stacks are re-ordered, if required to maintain price ordering;
- NIV Tagging, as currently defined, is undertaken; and
- The main Energy Imbalance Price will then be the most expensive energy balancing action remaining in the NIV, noting that this may be a partial balancing action remaining in the NIV after NIV Tagging.

### **a) P136 Energy Imbalance Price Calculation: Mechanism**

The resulting mechanism will be as follows.

The following balancing actions are taken by the Transmission Company and volumes are derived / calculated / instructed, as relevant:

1. System BSAD (SBVA / SSVVA) will not be disaggregated, and will continue to be provided for each Settlement Period as a net volume without any associated price;

It should be noted that it is assumed that volumes associated with system to system trades is reported and included in BSAD in real time. The potential for this volume to include Frequency Response volumes, in accordance with section 4, should be noted.

2. Energy BSAD will be disaggregated, and for each energy trade, a volume (MWh), price (£/MWh) and BM Unit Id will be provided. Where there is no associated BM Unit, then no Id will be provided. For example, power exchange forward trades will not have a BM Unit Id, whereas (energy) Pre Gate Closure BM Unit Transactions (PGBTs) will have a BM Unit Id associated.
3. Bid – Offer Acceptances are taken in the same way as currently.

All of these balancing actions are notified to the BSC Central Service Agent.

The BSC Central Service Agent (BMRA or SAA, depending on the timescales – BMRA real time, and SAA for Settlement Runs) will, for each Settlement Period:

1. 'CADL' tag the Bid – Offer Acceptances. This results in:
  - A set of Priced Acceptances, i.e. non CADL BOAs, deemed to have been taken for energy purposes, pending NIV Tagging; and
  - A set of Unpriced Acceptances, i.e. CADL'ed BOAs, deemed to have been taken for system purposes, and used only in the derivation of the NIV;
2. De Minimis tag the Bid – Offer Acceptances, resulting in the removal of small (<1MWh), 'unreal' acceptances;
3. Arbitrage tag all balancing actions, resulting in the removal of an equal and opposite volume from both the sell stack and the buy stack to remove balancing actions where the Offer / buy Price is less than the Bid / sell price for the balancing actions; and
4. For the remaining (Period) Bid – Offer Acceptances, use the expected utilisation cost 'look up table', provided by the Transmission Company (and published to BSC Parties (section 3)) to determine whether there are any expected utilisation costs to be reflected in the Bid – Offer prices for affected BM Units. Where a BM Unit has an expected utilisation cost (EUC), then the £/MWh Bid – Offer Price will be adjusted to include the EUC (which is also a £/MWh value), for all acceptances on the BM Unit, as specified by the look up table.

The remaining balancing actions go forward to NIV Tagging, undertaken as currently, and therefore not explored further. The main Energy Imbalance Price will then be the most expensive action remaining in the NIV. Figure 1 shows the general composition of the buy stack, and Figure 2, the sell stack.

Where the most expensive action remaining in the NIV is 'known' system balancing (i.e. system BSAD, system balancing services or CADL'ed acceptances), then **the most expensive energy balancing action in the NIV will set the marginal System Buy Price.**

<b>TQUAO</b>		} <b>System balancing</b>
<b>SBVA</b>		
<b>QAPO</b>	£195/MWh	} <b>Energy balancing Actions in price order</b>
<b>EBVA</b>	£175/MWh	
<b>QAPO</b>	£150/MWh	
<b>EBVA</b>	£30/MWh	
<b>QAPO</b>	£25/MWh	
<b>QAPO</b>	£20/MWh	
<b>EBVA</b>	£15/MWh	

**Figure 1: Composition of the Buy Stack**

<b>ESVA</b>	£25/MWh	} <b>Energy balancing actions in price order</b>
<b>QAPB</b>	£20/MWh	
<b>QAPB</b>	£15/MWh	
<b>ESVA</b>	£10/MWh	
<b>QAPB</b>	£5/MWh	
<b>ESVA</b>	- £5/MWh	
<b>QAPB</b>	- £15/MWh	
<b>SSVA</b>		} <b>System balancing</b>
<b>TQUAB</b>		

**Figure 2: Composition of the Buy Stack**

For the avoidance of doubt, NIV Tagging tags inwards (so on both the Bid and the Offer stack, the system balancing actions are the first to be tagged out).

**b) P136 Worked Example: System Short**

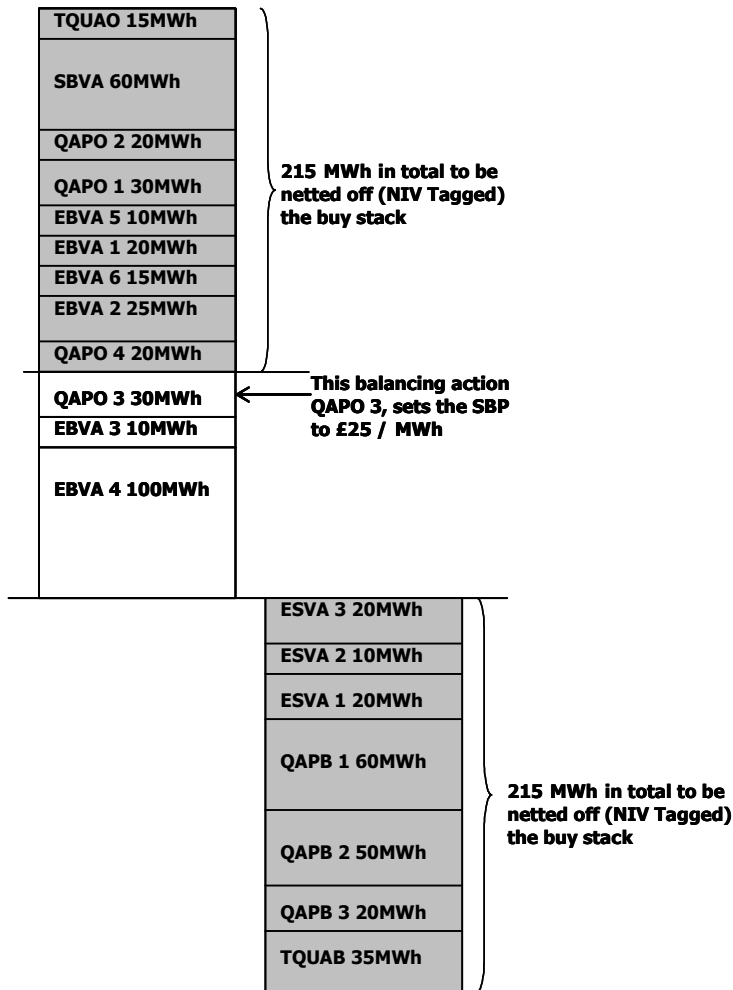
For a specific Settlement Period, after CADL, De Minimis and Arbitrage Tagging, the balancing actions specified in section 5 remain to go forward to the derivation of NIV:

The balancing actions set out above go straight into NIV Tagging, as follows:

Balancing Action (Offer stack)	Volume (MWh)	Price (£/MWh)
<del>Total Un-priced Accepted Offer Volume (TQUAO)</del>	15	N/A
<del>Net System Buy Price Volume Adjuster (SBVA)</del>	60	N/A
<del>Period Priced Accepted Offer Volume (QAPO 2)</del>	20	£1150
<del>Period Priced Accepted Offer Volume (QAPO 1)</del>	30	£1100
<del>Energy Buy Price Volume Adjustment (EBVA 5)</del>	10	£275
<del>Energy Buy Price Volume Adjustment (EBVA 1)</del>	20	£200
<del>Energy Buy Price Volume Adjustment (EBVA 6)</del>	15	£75
<del>Energy Buy Price Volume Adjustment (EBVA 2)</del>	25	£50
<del>Period Priced Accepted Offer Volume (QAPO 4)</del>	20	£30
Period Priced Accepted Offer Volume (QAPO 3)	30	£25
Energy Buy Price Volume Adjustment (EBVA 3)	10	£20
Energy Buy Price Volume Adjustment (EBVA 4)	100	£15

Balancing Action (Bid stack)	Volume (MWh)	Price (£/MWh)
<del>Energy Buy Price Volume Adjustment (ESVA 3)</del>	20	£50
<del>Energy Buy Price Volume Adjustment (ESVA 1)</del>	20	£25
<del>Energy Buy Price Volume Adjustment (ESVA 2)</del>	10	£25
<del>Period Priced Accepted Bid Volume (QAPB 1)</del>	60	£20
<del>Period Priced Accepted Bid Volume (QAPB 2)</del>	50	£16
<del>Period Priced Accepted Bid Volume (QAPB 3)</del>	20	-£25
<del>Net System Sell Price Volume Adjuster (SSVA)</del>	0	N/A
<del>Total Un-priced Accepted Bid Volume (TQUAB)</del>	35	N/A

So, going forward for NIV Tagging, shown by Figure 3, balancing actions remaining after De Minimis, Arbitrage and CADL tagging are stacked in price order, and NIV Tagged, most expensive actions first:



**Figure 3: NIV Tagging for the P136 example Short System**

Thus the marginal System Buy Price is derived from balancing action QAPO 3, which is **£25 / MWh**.

If a weighted average price were derived from the NIV for this example, this would be **£17.50 / MWh**.

## 7. ENERGY IMBALANCE PRICING MECHANISM: P137

For P137, the amendments to BSAD are proposed to be:

- Option fees will be amended in accordance with section 3, namely an expected utilisation cost will be derived, and reflected in the Bid – Offer acceptance price, or BSAD price for volumes instructed under the relevant contract; and
- Disaggregated energy BSAD, such that each 'trade' is provided as a volume with a price. Thus there will be a volume and a price notified for each of the following:
  - Energy Pre Gate Closure BM Unit Transactions (PGBTs), BM Unit specific;
  - Energy forward trades; and
  - Non Balancing Mechanism standing reserve (noting section 4).

In summary the P137 mechanism is:

- CADL and De Minimis Tagging is undertaken, as currently defined;
- All balancing actions – Bid – Offer Acceptances, disaggregated Energy BSAD buys and sells, and net aggregated System BSAD are stacked in price order, least expensive first;
- BM Unit undo tagging is performed to 'net off' balancing actions taken in opposite directions taken on the same BM Unit. The expected utilisation cost is added to the Bid – Offer price of Bid – Offer Acceptances made under standing reserve contracts, for the purposes of this undo tagging;
- Arbitrage Tagging is performed, which removes an equal and opposite volume from both the sell stack and the buy stack to remove balancing actions where the Offer / buy Price is less than the Bid / sell price for the balancing actions, noting that expected utilisation costs are not reflected in the Bid – Offer Acceptance prices for the purposes of Arbitrage;
- The expected utilisation cost is then added back onto to the Bid – Offer price of Bid – Offer Acceptances made under standing reserve contracts, and the stacks are re-ordered, if required to maintain price ordering;
- Energy BSAD offsetting tagging is performed, which takes the smaller of the total energy BSAD buy volume and the total energy BSAD sell volume, and takes an equivalent volume from the least expensive balancing actions (i.e. the bottom) of the relevant NIV stack prior to NIV Tagging;
- NIV Tagging, as currently defined, is undertaken; and
- The main Energy Imbalance Price will then be the most expensive energy balancing action remaining in the NIV.

### **a) P137 Energy Imbalance Price Calculation: Mechanism**

The resulting mechanism will be as follows.

The following balancing actions are taken by the Transmission Company and volumes are derived / calculated / instructed, as relevant:

1. System BSAD (SBVA / SSVA) will not be disaggregated, and will continue to be provided for each Settlement Period as a net volume without any associated price;

It should be noted that it is assumed that volumes associated with system to system trades is reported and included in BSAD in real time. The potential for this volume to include Frequency Response volumes, in accordance with section 4, should be noted.

2. Energy BSAD will be disaggregated, and for each energy trade, a volume (MWh), price (£/MWh) and BM Unit Id will be provided. Where there is no associated BM Unit, then no Id will be provided. For example, power exchange forward trades will not have a BM Unit Id, whereas (energy) Pre Gate Closure BM Unit Transactions (PGBTs) will have a BM Unit Id associated.
3. Bid – Offer Acceptances are taken in the same way as currently.

All of these balancing actions are notified to the BSC Central Service Agent.

The BSC Central Service Agent (BMRA or SAA, depending on the timescales – BMRA real time, and SAA for Settlement Runs) will, for each Settlement Period:

1. 'CADL' tag the Bid – Offer Acceptances. This results in:
  - A set of Priced Acceptances, i.e. non CADL BOAs, deemed to have been taken for energy purposes, pending NIV Tagging; and
  - A set of Unpriced Acceptances, i.e. CADL'ed BOAs, deemed to have been taken for system purposes, and used only in the derivation of the NIV;
2. De Minimis tag the Bid – Offer Acceptances, resulting in the removal of small (<1MWh), 'unreal' acceptances;
3. BM Unit Undo tagging (see below);
4. Arbitrage tag all balancing actions, resulting in the removal of an equal and opposite volume from both the sell stack and the buy stack to remove balancing actions where the Offer / buy Price is less than the Bid / sell price for the balancing actions;

It should be noted that Bid – Offer Acceptances are arbitrated according to the Bid – Offer price accepted by the Transmission Company, i.e. before any expected utilisation cost is applied.

5. For the remaining (Period) Bid – Offer Acceptances, use the expected utilisation cost 'look up table', provided by the Transmission Company to determine whether there are any expected utilisation costs to be reflected in the Bid – Offer prices for affected BM Units. Where a BM Unit has an expected utilisation cost (EUC), then the £/MWh Bid – Offer Price will be adjusted to include the EUC (which is also a £/MWh value), for all acceptances on the BM Unit, as specified by the look up table; and
6. BSAD Offsetting tagging (see below).

The remaining balancing actions go forward to NIV Tagging, undertaken as currently, and therefore not explored further. The main Energy Imbalance Price will then be the most expensive action remaining in the NIV.

### **BM Unit Undo Tagging**

In accordance with the processing order set out above, **for each BM Unit**, the BSC Central Service Agent will:

1. Stack all the acceptances (BOAs and energy BSAD trades) for the BM Unit to determine any undo volumes, offer and equivalent volumes, on one stack (the buy volume), and bid and equivalent volumes on the other (the sell volume);
2. Where the buy volume exceeds the sell volume, then the least expensive<sup>2</sup> priced buy balancing actions are removed up to the sell volume; or
3. Where the sell volume exceeds the buy volume, then the least expensive priced sell balancing actions are removed up to the buy volume;
4. The remaining acceptances go forward to the NIV Tagging process.

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<sup>2</sup> Least expensive, in this context, is in respect of the expense to the system. In the case of buy balancing actions (including Offers), the least expensive are those that have cost the system the least to buy (i.e. the lowest positive price (and if present, the highest negative price). In the case of sell balancing actions (including Bids), the least expensive are those that have bought the system in the most money (the highest positive price), or, where there are no positively priced sell balancing actions, the actions that the system has had to pay least for where the price is negative (the lowest negative price is the least expensive).

For the avoidance of doubt, where there are no offsetting actions on a specific BM Unit, then all actions on that BM Unit will go forward to the Energy Imbalance Price calculation.

The Proposer's rationale for this treatment of 'undo actions' is set out in the second attachment to the Modification Proposal 'Promoting Efficiency and Security in the NETA Pricing Arrangements' dated July 2003, specifically section 4.1.1.

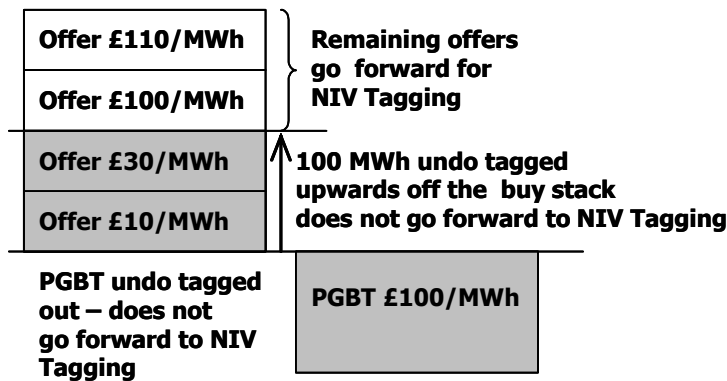
**For example:**

BM Unit A has a PGBT sale taken for energy purposes ahead of Gate Closure. During the Settlement Period Offers are accepted at different prices. At the end of the Settlement Period, and following CADL and De Minimis tagging, the offsetting actions are stacked for undo tagging.

The acceptances are stacked in price order.

The volume of the sell stack is tagged off the buy stack, least expensive acceptances first.

The balancing actions, or part of, remaining on the offer stack go forward to the NIV calculation, so in this example, illustrated by figure 4, it will be the Offer volumes at £100 / MWh and £110 / MWh.



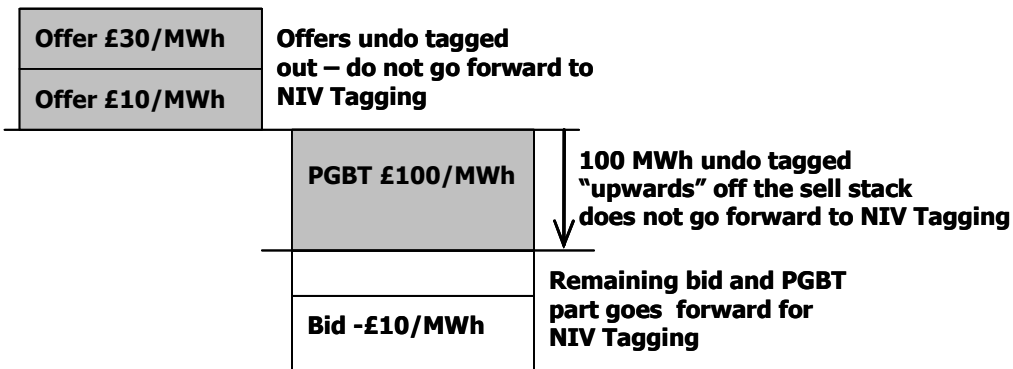
**Figure 4: Buy Volume exceeds Sell Volume**

**For example:**

BM Unit B has a PGBT sale taken for energy purposes ahead of Gate Closure. During the Settlement Period a Bid (negatively priced) and Offers are accepted at different prices. At the end of the Settlement Period, and following CADL and De Minimis tagging, the actions are stacked for undo tagging.

The acceptances are stacked in price order and the volume of the buy stack is tagged off the sell stack, least expensive acceptances first.

The balancing actions, or part of, remaining on the offer stack go forward to the NIV calculation, so in this example, illustrated by figure 5, it will be the Bid volume at -£10 / MWh and the untagged portion of the PGBT at £100 / MWh.

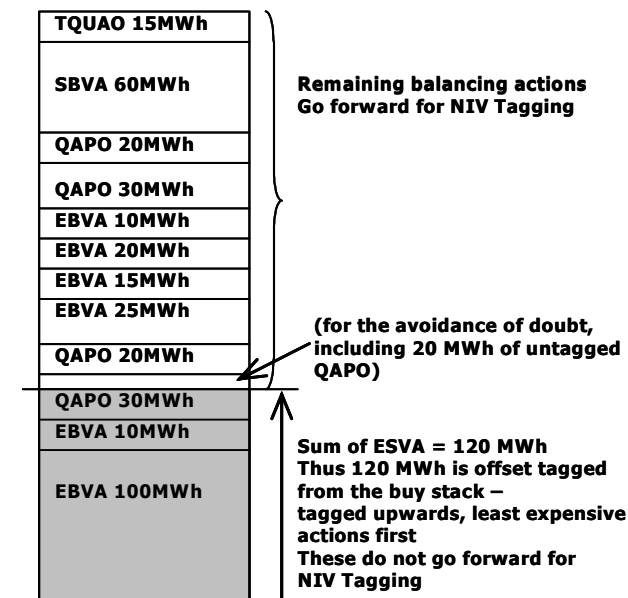


**Figure 5: Sell Volume exceeds Buy Volume**

**BSAD Offsetting Tagging**

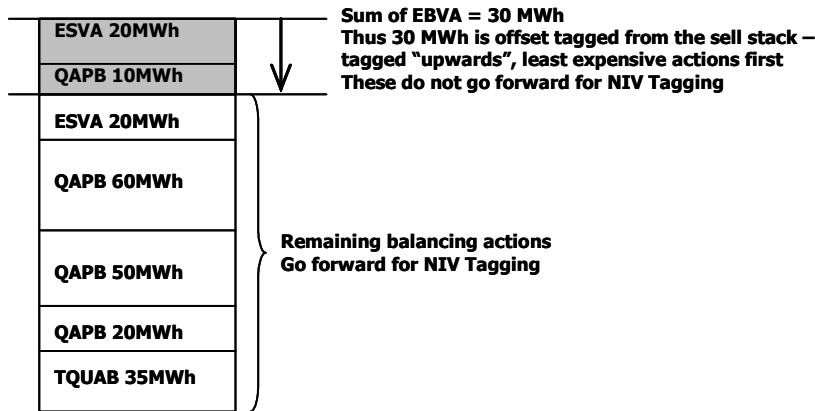
In accordance with the processing order set out above, the BSC Central Service Agent will derive the total volume of energy BSAD buys (sum of all EBVA volumes) and the total volume of energy sells (sum of all ESVA volumes).

Where the BSAD energy buy volume is greater than the energy BSAD sell volume, the BSC Central Service Agent will tag the buy stack, least expensive actions first, to the total volume of energy sells, illustrated in figure 7.



**Figure 7: Offset Tagging for BSAD Forward Trades, buys greater than sells**

Where the BSAD energy sell volume is greater than the energy BSAD buy volume, the BSC Central Service Agent will tag the sell stack, least expensive actions first, to the total volume of energy buys, illustrated in figure 8.



**Figure 8: Offset Tagging for BSAD Forward Trades, sells greater than buys**

The Proposer’s rationale for this treatment of offsetting BSAD actions is set out in the second attachment to the Modification Proposal ‘Promoting Efficiency and Security in the NETA Pricing Arrangements’ dated July 2003, specifically section 4.1.2.

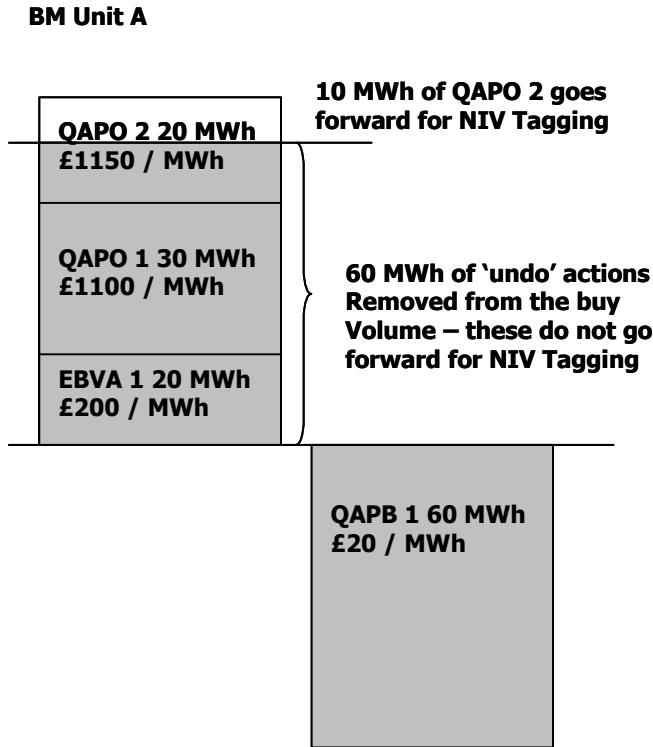
Once all of the processing set out above completes, the remaining balancing actions can go forward to NIV Tagging, undertaken as currently, and therefore not explored further. The main Energy Imbalance Price will then be the most expensive action remaining in the NIV.

Where the most expensive action remaining in the NIV is ‘known’ system balancing (i.e. system BSAD, system balancing services or CADL’ed acceptances), then **it is assumed that the most expensive energy balancing action in the NIV will set the marginal System Buy Price.**

**c) P137 Worked Example: System Short**

The actions detailed in the table in section 5 go forward for offsetting tagging.

Only BM Unit A has undo actions, i.e. actions in opposite directions, and so the undo tagging calculation is as indicated by Figure 9.



**Figure 9: BM Unit A, Undo Tagging mechanism**

Then BSAD offsetting tagging is performed, as illustrated by Figure 10.

The total volume of energy BSAD buys is compared to the total volume of energy BSAD sells:

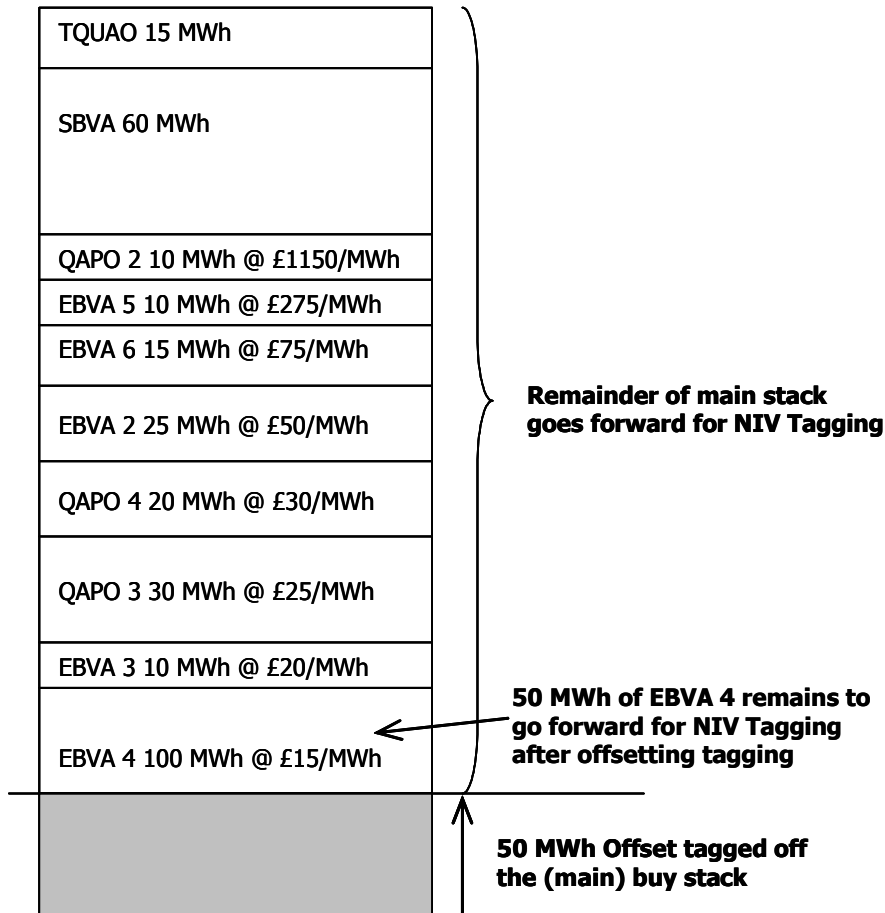
<b>Buy Trade</b>	<b>Volume (MWh)</b>	<b>Sell Trade</b>	<b>Volume (MWh)</b>
EBVA 1	0 (undo tagged)	ESVA 1	20
EBVA 2	25	ESVA 2	10
EBVA 3	10	ESVA 3	20
EBVA 4	100		
EBVA 5	10		
EBVA 6	15		

Total EBVA volume (energy BSAD buys) is 160 MWh

Total ESVA volume (energy BSAD sells) is 50 MWh.

Therefore 50 MWh should be offset tagged from the main stack, the buy stack.

Thus all the balancing actions on the buy stack are stacked in price order, least expensive first.



**Figure 10: Energy BSAD Offsetting mechanism**

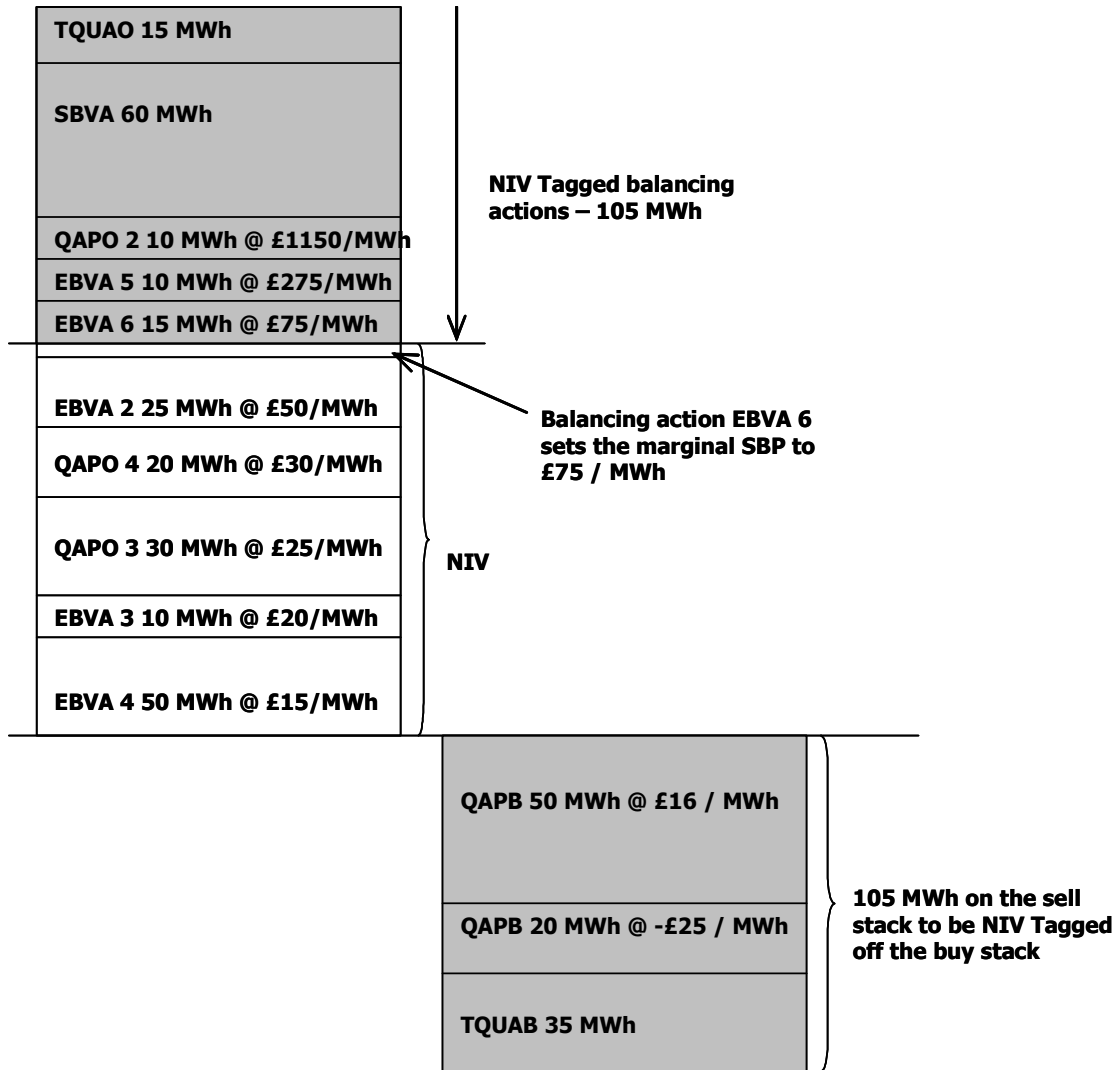
The effect of the offsetting calculation can be seen when the table of balancing actions is amended to reflect the undo and offsetting tagging: redlining indicates removal of actions, or amendment to volumes going forward

The remaining balancing actions, as set out in the table below, go forward for NIV Tagging, illustrated by Figure 11.

Balancing Action (Offer stack)	Volume (MWh)	Price (£/MWh)
Total Un-priced Accepted Offer Volume (TQUAO)	15	N/A
Net System Buy Price Volume Adjuster (SBVA)	60	N/A
<del>Energy Buy Price Volume Adjustment (EBVA 1)</del> Removed by BM Unit Undo Tagging	<del>20</del>	<del>£200</del>
Energy Buy Price Volume Adjustment (EBVA 2)	25	£50
Energy Buy Price Volume Adjustment (EBVA 3)	10	£20

<b>Balancing Action (Offer stack)</b>	<b>Volume (MWh)</b>	<b>Price (£/MWh)</b>
Energy Buy Price Volume Adjustment (EBVA 4) Adjusted by BSAD Offsetting Tagging	<del>100</del> 50	£15
Energy Buy Balancing Services Volume (EBVA 5)	10	£275
Energy Buy Balancing Services Volume (EBVA 6)	15	£75
<del>Period Priced Accepted Offer Volume (QAPO 1)</del> Removed by BM Unit Undo Tagging	<del>30</del>	<del>£1100</del>
Period Priced Accepted Offer Volume (QAPO 2) Adjusted by BM Unit Undo Tagging	<del>20</del> 10	£1150
Period Priced Accepted Offer Volume (QAPO 3)	30	£25
Period Priced Accepted Offer Volume (QAPO 4)	20	£30

<b>Balancing Action (Bid stack)</b>	<b>Volume (MWh)</b>	<b>Price (£/MWh)</b>
Total Un-priced Accepted Bid Volume (TQUAB)	35	N/A
Net System Sell Price Volume Adjuster (SSVA)	0	N/A
<del>Energy Buy Price Volume Adjustment (ESVA 1)</del> Removed by BSAD Offsetting Tagging	<del>20</del>	<del>£25</del>
<del>Energy Buy Price Volume Adjustment (ESVA 2)</del> Removed by BSAD Offsetting Tagging	<del>10</del>	<del>£25</del>
<del>Energy Buy Price Volume Adjustment (ESVA 3)</del> Removed by BSAD Offsetting Tagging	<del>20</del>	<del>£50</del>
<del>Period Priced Accepted Bid Volume (QAPB 1)</del> Removed by BM Unit Undo Tagging	<del>60</del>	<del>£20</del>
Period Priced Accepted Bid Volume (QAPB 2)	50	£16
Period Priced Accepted Bid Volume (QAPB 3)	20	-£25



**Figure 11: NIV Tagging for the P137 example Short System**

Thus the marginal System Buy Price is derived from balancing action EBVA 6, which is **£75 / MWh**.

If a weighted average price were derived from the NIV for this example, this would be **£28.04 / MWh**.

The table shows the effect of the NIV Tagging:

Balancing Action (Offer stack)	Volume (MWh)	Price (£/MWh)
<del>Total Un-priced Accepted Offer Volume (TQUAO)</del>	<del>15</del>	<del>N/A</del>
<del>Net System Buy Price Volume Adjuster (SBVA)</del>	<del>60</del>	<del>N/A</del>
<del>Period Priced Accepted Offer Volume (QAPO 2)</del>	<del>10</del>	<del>£1150</del>
<del>Energy Buy Balancing Services Volume (EBVA 5)</del>	<del>10</del>	<del>£275</del>
Energy Buy Balancing Services Volume (EBVA 6)	15	£75
Energy Buy Price Volume Adjustment (EBVA 2)	25	£50

Balancing Action (Offer stack)	Volume (MWh)	Price (£/MWh)
Period Priced Accepted Offer Volume (QAPO 4)	20	£30
Period Priced Accepted Offer Volume (QAPO 3)	30	£25
Energy Buy Price Volume Adjustment (EBVA 3)	10	£20
Energy Buy Price Volume Adjustment (EBVA 4)	50	£15

Balancing Action (Bid stack)	Volume (MWh)	Price (£/MWh)
<del>Period Priced Accepted Bid Volume (QAPB-2)</del>	<del>50</del>	<del>£16</del>
<del>Period Priced Accepted Bid Volume (QAPB-3)</del>	<del>20</del>	<del>-£25</del>
<del>Total Un-priced Accepted Bid Volume (TQUAB)</del>	<del>35</del>	<del>N/A</del>

## 8. CURRENT MECHANISM WORKED EXAMPLE: SYSTEM SHORT

Under the current mechanism, the System Buy Price would have been **£37.80 / MWh**, assuming a simple volume weighted average net BSAD (to approximate the current derivation, and use of aggregated BSAD, which results in an EBVA of 125 MWh, with a £/MWh cost of £45), and excludes the balancing services volumes (EBVA 5 and EBVA 6, and ESVA 3) which are not in the current derivation of NIV. QAPO 1 and QAPO 2, have had the expected utilisation cost removed, as this does not form part of the current NIV derivation. SBVA is also 10 MWh less than for P136 and P137 mechanisms, as there is assumed to be 10 MWh of Frequency Response volume in the net SBVA for that balancing service under P136 and P137.

The table below contains the balancing actions that would contribute to the stack under the current mechanism, and NIV Tagging was applied (redlining in the table shows what was tagged out).

Thus the remaining actions were used in a simple volume weighted average calculation (sum of volume \* price for all actions, divided by the volume). Thus the SBP that would result from the current mechanism for the P136 / P137 example was approximated.

Balancing Action (Offer stack)	Volume (MWh)	Price (£/MWh)	Balancing Action (Bid stack)	Volume (MWh)	Price (£/MWh)
<del>TQUAO</del>	<del>15</del>	<del>N/A</del>	<del>QAPB-1</del>	<del>60</del>	<del>£20</del>
<del>SBVA</del>	<del>50</del>	<del>N/A</del>	<del>QAPB-2</del>	<del>50</del>	<del>£16</del>
<del>QAPO-2</del>	<del>20</del>	<del>£150</del>	<del>QAPB-3</del>	<del>20</del>	<del>-£25</del>
<del>QAPO-1</del>	<del>30</del>	<del>£100</del>	<del>TQUAB</del>	<del>35</del>	<del>N/A</del>
EBVA	<del>125</del> -75	£45			
QAPO 4	20	£30			
QAPO 3	30	£25			