



Settlement Administration Agent User Requirements Specification

Synopsis

The Settlement Administration Agent is responsible for calculating payments resulting from trades in both the Balancing Mechanism and Imbalance Settlement processes. This document describes the detailed requirements of this service.

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Amendment History

| Date | Version | Details of Change |
|-------------------|----------------|---|
| 05/11/2009 | 13.0 | P217, CP1283, CP1286 |
| 03/11/2011 | 14.0 | Document amended to remove details of interfaces included in the IDD Part 1 or Part 2, and to include changes for P253, as part of the November 2011 Release. |
| <u>29/11/2012</u> | <u>14.3</u> | <u>P278 for the Nov 12 Release</u> |

1 Management Summary

The Settlement Administration Agent (SAA) is one of the suite of seven services that support the operation of the Balancing and Settlement Code (BSC). The SAA role is critical to the successful operation of the BSC, as it calculates the credit and debit payments resulting both from trades made in the Balancing Mechanism (BM) and from imbalances between contracted and actual generation or consumption. The principal business processes involved may be summarised as:

- The capture of data relating to the operation of the BM and the settlement of imbalances in each half hour, from a range of sources;
- For each Settlement Day, execution of the BM and imbalance calculations as dictated by the Settlement Calendar, so that a minimum of six Settlement and Reconciliation runs are carried out for each day over a period of 14 months following the Settlement Date;
- Preparation and distribution of a series of Settlement reports to BSC Parties, the FAA and other parties, detailing the results of each day's Settlement calculations; and
- Support of the Disputes management process which enables BSC Parties to query the reported outcome of the Settlement and Reconciliation runs.

The purpose of this document is to provide a complete specification of the set of business requirements which the SAA service must satisfy for all of its various user types. These range from the BSC Parties to BSCCo Ltd and its various agents, including the operators of the SAA itself and the other BSC services. Similar documents will be produced to define the requirements for the other services. A convention has therefore been used for uniquely identifying the requirements in each document, so as to ensure that the fulfilment of each requirement can be unambiguously traced through the subsequent functional specification, design and implementation. This is of particular importance for the implementation of the SAA, CRA and CDCA services, which use a single integrated computer system. This document does not, however, attempt to describe the integration of those services, which would be inappropriate for this SAA User Requirement Specification (URS).

The requirements which have been identified have been divided into four categories:

- Functional requirements - those requirements relating to a specific business activity, usually requiring some degree of automated support;
- Interface requirements - the detailed requirements for the exchange of data between the SAA, the other BSC services shown above, and the external participants (and covered in more detail in the Interface Definition and Design (IDD) documents);
- Non-functional requirements - those requirements relating to such activities as security (both physical and user access related), audit, and system housekeeping (systems backups and archiving etc.). It is anticipated that the majority of these will be common to all of the services to be provided;

- Service requirements - the underlying service delivery requirements of the SAA service, including such as issues as performance, volumetrics, number of Settlement runs to be carried out.

These requirements are catalogued in sections 5 to 8 respectively.

2 Introduction

This document is the User Requirements Specification (URS) for the Settlement Administration Agent role within the Balancing and Settlement Code Services. It is one of a set of documents forming the baseline for requirements of the seven BSC central system services. This document set comprises:

- BMRA URS;
- CRA URS;
- SAA URS;
- ~~TAA URS;~~
- ECVAA URS;
- CDCA URS;
- FAA URS;
- SVAA URS;
- Interface Specification.

The objective of this document is to provide a complete specification of the requirements that the SAA service must meet, from the users' point of view. For this purpose, the "users" include BSCCo Ltd, Ofgem, National Grid as the balancing mechanism operator, other Service Providers, BSC Parties (including Distribution companies as parties), and the SAA Service Provider's own operators.

This User Requirements Specification forms the input to the System Specification for the SAA Service. The System Specification constitutes the definition of the computer system requirements to be built in support of the SAA Services.

It should be noted that whereas this URS describes the requirements of the SAA *Service* in isolation, the computer system built to support these requirements will be a combined SAA, CRA and CDCA system.

3 Scope of Specification

This document provides a specification of the requirements for the Settlement Administration Agent (SAA) Service within the BSC Services Agreement. The requirements are described from the point of view of the SAA Service users.

The document is divided into the following chapters.

- Chapter 4, Business and System Overview - describes the business context of the SAA Service;
- Chapter 5, Functional Requirements - describes the functional requirements of the Service from the point of view of the Service users;
- Chapter 6, Interfaces Requirements - describes the interfaces with the external users of the Service;
- Chapter 7, Non-Functional Requirements - describes the non-functional requirements of the Service, such as auditing, security and resilience;
- Chapter 8, Service Requirements - describes the service delivery requirements of the Service, such as performance and volumetrics;
- Chapter 9, User Roles and Activities - describes the roles supporting day to day operation of the Service and external users of the Service, such as other Service Providers and BSCCo Ltd;
- Appendix A: Glossary - includes a glossary of terms and acronyms;
- Appendix B: Requirements Compliance Matrix - shows the mapping of requirements defined by this document to requirements set out in the Customer's Tender Invitation documents;
- Appendix C: Logical Data Model;
- Chapter 14, Appendix D: Business Process Model.

4 Business and System Overview

This section provides an overview of the Settlement Administration Agent (SAA) business requirements and is for indicative purposes only. The definitive statement of requirements are given in the following chapters.

4.1 Summary of Business Requirements

The SAA will receive the inbound data, provided by other BSC Services, and perform calculations based on the validated data such that the financial debits and credits determined under the BSC of each BSC Party can be determined. The Funds Administration Agent will then be advised of the required financial transfers. This operation will be performed in accordance with the Settlement Timetable. The SAA service will also produce reports for distribution to BSC Parties and others, such as BSCCo Ltd and the System Operator.

The information the SAA service will calculate will include:

- Balancing Mechanism accepted bid/offer volumes and prices,
- System Buy and System Sell price,

- BM Unit Transmission Loss Multipliers,
- Interconnector Error Administrator's energy volumes,
- Information Imbalance Charges,
- Credited energy volumes,
- Non-delivery volumes and charges,
- Energy imbalance charges,
- Other costs, including System Operator charge, BSCCo Ltd administration charge, and SAA administration charge and Residual cash-flow reallocation.

Services will be provided to support the Disputes Process, including re-runs of the Settlement calculations as required.

In addition, the SAA service will produce and publish the Settlement Calendar.

4.2 The Settlement Calendar

The settlement rules require the SAA to perform at least six standard settlement runs in respect of each settlement day, together with any dispute requested under the auspices of the BSC. The set of settlement runs to be carried out for each settlement day will consist of:

- Interim Initial Settlement;
- Initial Settlement;
- Reconciliation Settlement (3 runs)
- Final Reconciliation;
- Settlement Dispute (runs as necessary).

The Settlement Calendar will be constructed so as to smooth the processing of these settlement runs, as necessary, across available working days with the aim of reducing the necessity of running more than ten settlements runs on any given working day and to meet the payment timetable as produced by the FAA.

The CDCA is required to supply the ECVAA with aggregated BM Unit Meter Volume data for Credit Cover purposes. Although not part of Settlement this 'Credit Cover Volume Allocation Run' will be scheduled from and be part of the Settlement Calendar.

4.3 Service Context

The following diagram illustrates the context of the SAA service within the wider market of the Balancing and Settlement Code. This is a simplified view for clarity; section 6 describes the interfaces from the SAA service to other parties in detail.

| Item | Description |
|---------------|--|
| Bank | A bank which receives debit and credit instructions from the Funds Administration Agent. |
| BMRA | Balancing Mechanism Reporting Agent. |
| BSC Party | A signatory to the Balancing and Settlement Code |
| BSCCo Ltd | The Balancing and Settlement Code Company. |
| CDCA | Central Data Collection Agent. |
| CRA | Central Registration Agent |
| Credit Agency | A credit agency which provides credit rating data on BSC Parties. |
| ECVAA | Energy Contract Volume Aggregation Agent. |
| ECVNA | Energy Contract Volume Notification Agent. |
| FAA | Funds Administration Agent. |
| IA | Interconnector Administrator. |
| IEA | Interconnector Error Administrator |
| Meter | A physical meter registered within the Balancing and Settlement Code arrangements. |
| MIDP | Market Index Data Provider |
| MVRNA | Metered Volume Reallocation Notification Agent |
| MOA | Meter Operation Agent. |
| Public | A member of the general public. |
| SAA | Settlement Administration Agent. |
| SO | System Operator |
| SVAA | Supplier Volume Aggregation Agent, equivalent to the current Initial Settlement and Reconciliation Agent (ISRA). |
| TAA | Technical Assurance Agent. |

4.4 Requirements Summary

The following table summarises the requirements of the SAA service. These are then described in detail in section 5, including the source reference for each requirement.

| Requirement ID. | User Requirement |
|-------------------|---|
| <i>Functional</i> | |
| SAA-F001 | Produce Settlement Calendar |
| SAA-F002 | Validate settlement data |
| SAA-F003 | Validate SVAA meter data |
| SAA-F004 | Calculate Supplier BM Unit Metered Volumes |
| SAA-F005 | Calculate balancing mechanism volumes |
| SAA-F006 | Calculate BM unit transmission loss multipliers |
| SAA-F007 | Calculate balancing mechanism cashflows |
| SAA-F008 | Calculate credit energy volumes |
| SAA-F009 | Calculate energy imbalance prices |
| SAA-F010 | Calculate interconnector error |
| SAA-F011 | Calculate energy imbalance cashflows |
| SAA-F012 | Validate Adjustment Data |
| SAA-F013 | Calculate information imbalance charges |
| SAA-F014 | Calculate non-delivery volumes |
| SAA-F015 | Calculate non-delivery charges |
| SAA-F016 | Calculate system operator BM cashflow |
| SAA-F017 | Calculate residual cashflows |
| SAA-F018 | Allocate BSCCo Ltd Costs (Redundant) |
| SAA-F019 | Aggregate charges and payments |
| SAA-F020 | Validate Market Index Data |
| SAA-F021 | Manage settlement disputes |
| SAA-F022 | Provide settlement reports |
| SAA-F023 | Process Market Index Data Provider Liquidity Thresholds |

| Requirement ID. | User Requirement |
|------------------------|---|
| SAA-F024 | Daily Check for Missing Settlement Calculation Data Flows |
| SAA-F025 | Process Withdrawals Party Settlement Details |
| SAA-F026 | Process Emergency Acceptance Data |
| <i>Interface</i> | |
| SAA-I001 | Receive Registration Data |
| SAA-I002 | Receive Credit Assessment Load Factor |
| SAA-I003 | Receive Balancing Mechanism Data |
| SAA-I004 | Receive Period Meter Data |
| SAA-I005 | <i>Requirement not currently used</i> |
| SAA-I006 | Receive Interconnector User BM Unit Metered Volumes |
| SAA-I007 | Receive BM Unit Allocated Demand Volume |
| SAA-I008 | Receive Energy Contract Data |
| SAA-I009 | Receive Transmission Loss Data |
| SAA-I010 | Receive BSCCo Ltd Cost Data (Redundant) |
| SAA-I011 | Receive Payment Calendar Data |
| SAA-I012 | Receive Dispute Notification |
| SAA-I013 | Issue Credit/Debit Reports (initial and revised) |
| SAA-I014 | Issue Settlement Reports |
| SAA-I015 | Issue BM Unit CAIC Data |
| SAA-I016 | Publish Settlement Calendar |
| SAA-I017 | Issue SAA Data Exception Reports |
| SAA-I018 | Issue Dispute Reports |
| SAA-I019 | Issue BSC Party Performance Reports (Redundant) |
| SAA-I020 | Issue SAA Performance Reports |
| SAA-I021 | Receive Acknowledgement of SAA Messages |
| SAA-I022 | Issue SAA Acknowledgement of Messages |
| SAA-I023 | Receive System Parameters |
| SAA-I025 | SAA BSC Section D Charging Data |
| SAA-I026 | Receive Balancing Services Adjustment Data |
| SAA-I027 | Report pre-settlement run validation failure |
| SAA-I028 | Receive settlement run decision |
| SAA-I029 | Receive settlement run instructions |
| SAA-I030 | Receive Market Index Data |
| SAA-I031 | Receive Market Index Data Provider Thresholds |
| SAA-I032 | Report Market Index Data Provider Thresholds |
| SAA-I033 | Receive Request for Data Change |
| SAA-I034 | Report Recommended Data Change |
| SAA-I035 | Receive Instruction for Data Change |
| SAA-I036 | Report Confirmation of Data Change |
| SAA-I037 | Issue Withdrawing Party Settlement Details |
| SAA-I038 | Receive Excluded Emergency Acceptance Pricing Information |
| SAA-I039 | Send Excluded Emergency Acceptance Dry Run Results |
| SAA-I040 | Receive Authorisation To Proceed With Full Settlement Run |
| <i>Non-Functional</i> | |
| SAA-N001 | Audit Requirements |
| SAA-N002 | Security Requirements |
| SAA-N003 | Operational Control |
| SAA-N004 | Euro Compliance |

4.6 Numbering Scheme for Requirement Definitions

As described in section 2, the set of baseline requirement documents includes a User Requirements Specification for each of the services of the central BSC systems (except FAA - see footnote 1). Within these documents each requirement across the set of services is uniquely identified to provide traceability of each individual

requirement from URS to System Specification (functional specification) and then to Design Specification (technical specification).

In keeping with industry good practise, this URS adopts a requirements numbering system that works as follows:

1. Each requirement is associated with either an individual service, or as common to all services supported by the central systems. (TAA is typically excluded from the latter.) If a requirement applies to more than one service, but not all (e.g. two out of six), then the requirement is restated for each, i.e. there would be two separately numbered requirements (which happen to be the same) in this example.

Each requirement is prefaced by one of the following codes, as a clear indicator as to which service generates the business need:

- CRA (Central Registration Agent);
 - SAA (Settlement Administration Agent);
 - CDCA (Central Data Collection Agent);
 - ECVAA (Energy Contract Volume Aggregation Agent);
 - BMRA (Balancing Mechanism Reporting Agent);
 - TAA (Technical Assurance Agent);
 - FAA (Funds Administration Agent);
 - GEN (General).
2. Requirements are categorised into the following headings:
 - Functional (F), a specific business requirement of the service.
 - Interface (I), a requirement for data exchange between services or to external parties.
 - Non-functional (N), which includes auditing, security, resilience etc. The majority of these will probably be associated with the General (GEN) service.
 - Service (S), which includes all time-related service delivery requirements, including performance and volumetrics.
 3. Within a service, each requirement has unique number in the range 001 to 999. Numbers are not unique across services. Leading zeroes are always included.

Combining 1, 2 and 3 thus gives the following format for numbering each requirement (including a separator character):

[Service]-[Category][Number]

For example:

- CRA-F001
- BMRA-S022
- GEN-N112
- SAA-I033

4.7 Attributes of Individual Requirements

For each identified requirement, the following items of information are represented in a tabular format:

Requirement ID: a unique identifier for the requirement, as described above.

Status: while the majority of SAA requirements will be mandatory for the Go Live date, others may not necessarily be. This field indicates whether the requirement is Mandatory (M) or Optional (O) in this context.

Title: a short descriptive title for the requirement.

BSC reference: a cross reference to the BSC documentation which is the original source of the business need. In most cases this will include a reference to the relevant Service Description and where appropriate, any Change Proposals or Modifications that have affected a particular requirement.

Man/auto: this field provides an indication as to whether a given requirement is likely to be satisfied by a manual, as opposed to automated, mechanism. For interface requirements an additional mechanism of 'via shared database' may be specified indicating that combined computer system will be built for the SAA, CRA and CDCA services. This mechanism statement is not however intended to be prescriptive, and the approach to supporting any individual requirement will be made definitively during the design phase.

Frequency: an indication of how often a business event will take place. Minimum, maximum and average frequencies, and any timing or scheduling requirements, are also identified here, as appropriate.

Volumes: data volumes associated with the requirement are identified here; this may include an estimate of the initial volume, and subsequent growth rates.

The requirement is then described in detail, with any associated specific non-functional and interface requirements separately identified. Any outstanding issues relating to the requirement definition are also identified.

5 Functional Requirements

This section describes the detailed set of business requirements for the Settlement Administration Service. To ensure traceability through to other deliverable documents such as the System Specification and Design Specification, each requirement is uniquely numbered, based on the convention described in section 4..

5.1 SAA-F001: Produce Settlement Calendar

| | | | |
|---|--------------------------|--|---|
| Requirement ID: SAA-F001 | Status: M | Title: Produce Settlement Calendar | BSC reference: SAA SD 5.2, SAA BPM 3.2, CP555, P215 |
| Man/auto: Manual | Frequency: On demand. | Volumes: | |
| <p>Functional Requirement:</p> <p>The SAA shall produce a Settlement Calendar that is consistent with the Payment Calendar (published by the Funds Administration Agent) and defines when the Settlement runs should take place for each Settlement Day, taking account for bank holidays etc. (See NETA Clarification Note CR_99813_06b: 2.1)</p> <p>The calendar shall also specify when data needs to be provided to the SAA from each party/agent providing data in order to enable the payment calendar to be complied with.</p> <p>The calendar shall also specify when data needs to be provided to the ECVAA from each party/agent for the purposes of Credit Cover.</p> <p>The Settlement Calendar shall be provided to all such parties/agents for comment and shall be approved by BSCCo Ltd.</p> | | | |
| <p>Non Functional Requirement:</p> <p>The Settlement Calendar shall cover the year starting 1st April.</p> <p>FAA will issue a draft Payment Calendar to SAA by January 15th, and SAA shall respond with any comments to BSCCo Ltd within 5 working days of receipt. After resolution of any issues, FAA will issue the authorised Payment Calendar, by 31st January.</p> <p>On receipt of the authorised Payment Calendar from FAA, SAA shall prepare and issue a draft Settlement Calendar to BSCCo Ltd, CDCA and SVAA within 10 working days. On receipt of approval of the Settlement Calendar from BSCCo Ltd, SAA shall issue the approved Settlement Calendar to CDCA, SVAA and BSC Parties within two working days.</p> | | | |
| Interfaces: | | | |
| Issues: | | | |

5.2 SAA-F002: Validate settlement data

| | | | |
|--|--|---|--|
| Requirement ID: SAA-F002 | Status: M | Title: Validate settlement data | BSC reference: SAA SD 2, CP598, CP639, P78 |
| Man/auto: Manual & Automatic | Frequency: Once, on each settlement run & on demand. | Volumes: | |
| <p>Functional Requirement:</p> <p>All received input data to the SAA shall be validated to confirm that it exists and is in the correct format to enable a settlement run to be executed.</p> <p>If expected settlement data is not received or is invalid the SAA shall take remedial action to obtain complete and corrected data from the relevant service, e.g. CRA, CDCA, ECVAA, BMRA SVAA , SO or BSC party.</p> <p>For all run types for the settlement day, the validation checks are:</p> <ul style="list-style-type: none"> • check FPN data has been loaded for all settlement periods for BM Units that have their FPN flag set, or for which BOD data has been loaded; • check BSAD data has been loaded for all settlement periods; • check Bid/Offer data has been loaded for all settlement periods in which any BM Unit has a Bid Offer Acceptance; • check Interconnector User BM Unit metered volumes have been received for each Interconnector; • check Account Bilateral Contract Volumes and Metered Volume Reallocation Data have been received from the ECVAA; • check appropriate CDCA Aggregation Run has taken place; <p>For Interim Initial settlement runs for Settlement Dates prior to the P253 effective date, the following additional check is performed:</p> <ul style="list-style-type: none"> • check that no data relating to this settlement day has been loaded from the SVAA. <p>In addition to the checks outlined above, the SAA will, on D+3, check that the required Market Index Data has been received.</p> <p>For Interim Initial settlement runs for Settlement Dates on or after the P253 effective date, and for all Initial Settlement and Reconciliation runs, the following additional check is performed:</p> <ul style="list-style-type: none"> • check that BM Unit Allocated Demand Volume data relating to this settlement day has been loaded from the SVAA. <p>The SAA will report any failures of the above checks to BSCCo through manual flow SAA-I027 and await instruction on how to proceed. BSCCo shall immediately respond to the SAA through SAA-I028 with an indication as to whether to proceed making use of default functionality in the system, or whether to suspend the run pending further instruction. Instruction on how to proceed other than by substituting system default data shall be received by SAA from BSCCo through SAA-I029.</p> | | | |

| |
|--|
| Non Functional Requirement: |
| Interfaces: See SAA-I027, SAA-I028, SAA-I029 |
| Issues: |

5.3 SAA-F003: Validate SVAA meter data

| | | | |
|------------------------------------|---|--|--|
| Requirement ID: SAA-F003 | Status: M | Title: Validate SVAA meter data | BSC reference: SAA SD 2.5.1, CP639 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |

Functional Requirement:

For Settlement Dates prior to the P253 effective date, the following validation shall be performed on receipt of BM Unit Allocated Demand Volume data at the Loader:

- check that the Interim Initial Settlement Run has been performed for that settlement date.

If the above check fails, the entire flow shall be rejected and the SAA will report the failure of the above check to BSCCo through manual flow SAA-I027 but will not take any further action. If the Interim Initial Settlement Run has been performed and/or the Settlement Date is on or after the P253 effective date, processing continues with the following:

- the CDCA Run Number & Settlement Date received from the SVAA matches the CDCA Run Number and Settlement Date received from the CDCA;
- the Aggregated Supplier Volume Allocation received from the SVAA matches the GSP Group Take provided by CDCA (accounting for tolerances);

The SAA will report the failure of the above check to BSCCo through manual flow SAA-I027 and await further instruction. BSCCo shall immediately respond to the SAA through SAA-I028 with an indication as to whether to proceed with the settlement run, or whether to suspend the run pending further instruction. Instruction on how to proceed shall be received by SAA from BSCCo through SAA-I029.

- all BM Unit identifiers reported in the BM Unit Allocated Demand Volume data shall be valid for the settlement day

Where this check fails, the metered volume shall be added into the Base BM Unit for the Supplier in the relevant GSP Group. The SAA will report the failure of the above check to BSCCo through manual flow SAA-I027 and await further instruction. The SAA shall notify BSCCo that it has undertaken the above defaulting in time for BSCCo to instruct the SAA otherwise, if deemed appropriate by BSCCo. BSCCo shall immediately respond to the SAA through SAA-I028 with an indication as to whether to proceed with the settlement run, or whether to suspend the run pending further instruction. Instruction on how to proceed shall

be received by SAA from BSCCo through SAA-I029.

The following Pre-Run additional checks shall be performed:

- BM Unit Allocated Demand Volume data has been received from SVAA.
- the SVAA has supplied data for all supplier BM Units

The SAA will report any failure of the above checks to BSCCo through manual flow SAA-I027 and await instruction on how to proceed. BSCCo shall immediately respond to the SAA through SAA-I028 with an indication as to whether to proceed with the settlement run, or whether to suspend the run pending further instruction. Instruction on how to proceed shall be received by SAA from BSCCo through SAA-I029.

- CDCA Run Number & Settlement Date received from SVAA matches that from CDCA.

If there is a discrepancy, the SAA will check with the SVAA and CDCA. If the discrepancy cannot be resolved, the SAA will report the failure of the above check to BSCCo through manual flow SAA-I027 and await instruction on how to proceed. BSCCo shall immediately respond to the SAA through SAA-I028 with an indication as to whether to proceed with the settlement run, or whether to suspend the run pending further instruction. Instruction on how to proceed shall be received by SAA from BSCCo through SAA-I029.

Note that where a volume is not specified for a Supplier BM Unit, no value is loaded. Where that volume is required in processing functions, a default value of zero is applied by the processing function.

Non Functional Requirement:

The SAA Service shall receive BM Unit Allocated Demand Volume in accordance with the Settlement Calendar.

Interfaces:

See SAA-I007, SAA-I027, SAA-I028, SAA-I029

Issues:

5.4 SAA-F004: Calculate Supplier BM Unit Metered Volumes

| | | | |
|------------------------------------|--|---|---|
| Requirement ID: SAA-F004 | Status: M | Title: Calculate Supplier BM Unit Metered Volumes | BSC reference: Modification P2, CP632 |
| Man/auto: Automatic | Frequency: Once on each Settlement Run | Volumes: | |

Functional Requirement:

For Interim Initial settlement runs for Settlement Dates on or after the P253 effective date, and for all Initial Settlement and subsequent Settlement Runs, the SAA shall use the BM Unit Allocated Demand Volume received from SVAA via interface SAA-I007.

For Interim Initial Settlement Runs for Settlement Dates prior to the P253 effective date only, where this data is not available, the SAA shall calculate QM_{ij} for Supplier BM Units using data from previous Settlements Days and Periods, as follows.

1: Determine the previous Settlement Day d' to use in estimating the Supplier BM Unit Metered Volumes for Settlement Day d as follows:

Settlement Day d' shall be the most recent Settlement Day prior to d that is:

- a) the same day of the week as day d ,
- b) not a clock change day, and
- c) a day on which an Initial Settlement (SF) Run has taken place.

2: Determine the Settlement Period j' on Settlement Day d' to use in estimating the Supplier BM Unit Metered Volumes for Settlement Period j of Settlement Day d as follows:

- a) If day d is not a clock change day, then $j' = j$
- b) If day d is a short clock change day, then:
 - i) If $j \leq 2$ then $j' = j$
 - ii) If $j > 2$ then $j' = j + 2$
- c) If day d is a long clock change day, then:
 - i) If $j \leq 4$ then $j' = j$
 - ii) If $j > 4$ then $j' = j - 2$

3: Finally, having determined the variables j' and d' , the BM Unit Metered Volume for Supplier BM Units in the Interim Initial Run shall be calculated as:

$$QM_{ij} = \text{GSPGT}_{ij} * QM_{ij}' / \text{GSPGT}_{ij}'$$

Where:

GSPGT_{ij} is the GSP Group Take for the GSP Group associated with BM Unit i in Settlement Period j on Settlement Day d

QM_{ij}' is the BM Unit Metered Volume for BM Unit i in Settlement Period j' on Settlement Day d'

GSPGT_{ij}' is the GSP Group Take for the GSP Group associated with BM Unit i in Settlement Period j' on Settlement Day d'

If there is no BM Unit Metered Volume for BM Unit i in Settlement Period j' on Settlement Day d' (for example, because the BM Unit was not effective on that Day), then QM_{ij} shall be set to 0.

Non Functional Requirement:

Interfaces:

Issues:

5.5 SAA-F005: Calculate balancing mechanism volumes

| | | | |
|--|--|--|---|
| Requirement ID: SAA-F005 | Status: M | Title: Calculate balancing mechanism volumes | BSC reference: SAA BPM 3.5 SAA SD 3.2.2-7, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.17.1, 3.18, 3.19, CP632, P71, CP754. |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |
| <p>Functional Requirements:</p> <p>A large number of intermediate calculations are required to produce the balancing mechanism volumes. All calculation steps in this requirement are included here.</p> <p>Whilst all half-hourly integrated MWh energy quantities should be explicitly calculated as part of the settlement process, it is not intended that these continuous functions of time should actually be calculated or reported. The variables to which this applies are as follows:</p> <p>Final Physical Notification ($FPN_{ij}(t)$) Bid-Offer Volume ($qBO^n_{ij}(t)$) Bid-Offer Upper Range ($BOUR^n_{ij}(t)$) Bid-Offer Lower Range ($BOLR^n_{ij}(t)$) Acceptance Volume ($qA^k_{ij}(t)$) Accepted Bid-Offer Volume ($qABO^{kn}_{ij}(t)$) Accepted Offer Volume ($qAO^{kn}_{ij}(t)$) Accepted Bid Volume ($qAB^{kn}_{ij}(t)$)</p> | | | |
| <p>1: The value of Final Physical Notification, $FPN_{ij}(t)$ shall be defined for times, t, falling within Settlement Period j by linear interpolation from the values of Point FPN (${}^fFPN_{it}$), submitted for that Settlement Period j, for BM Unit i.</p> | | | |
| <p>2: For any value of Bid-Offer Number, n, the Bid-Offer Volume ($qBO^n_{ij}(t)$) at any time t shall be defined by linear interpolation from the values of Point Bid-Offer Volume (${}^f qBO^n_{it}$) submitted for Settlement Period j for BM Unit i.</p> | | | |
| <p>3: Define Bid-Offer Upper Range for Bid-Offer Pairs with positive Bid-Offer Pair Numbers, and define the Bid-Offer Lower Range for Bid-Offer Pairs with negative Bid-Offer Pair Numbers. The Bid-Offer Upper Range is defined as follows:</p> <p>$BOUR^n_{ij}(t) = FPN_{ij}(t) + \Sigma^{n+} qBO^n_{ij}(t)$; and</p> <p>$BOUR_{ij}^0(t) = FPN_{ij}(t)$</p> <p>Where Σ^{n+} represents a sum over all positive Bid-Offer Pairs, 1 to n.</p> <p>For Bid-Offer Pairs for which the associated Bid-Offer Pair Number $n < 0$, the Bid-Offer</p> | | | |

Lower Range BOLRⁿ_{ij}(t) is defined for all times in Settlement Period j as:

$$\text{BOLR}_{ij}^n(t) = \text{FPN}_{ij}(t) + \sum^{-n} q\text{BO}_{ij}^n(t); \text{ and}$$

$$\text{BOLR}_{ij}^0(t) = \text{FPN}_{ij}(t)$$

Where \sum^{-n} represents a sum over all negative Bid-Offer Pairs, -1 to n.

On occasion, the SO may issue acceptances which exceed the Bid-Offer ranges:

In the following equations,

\sum^{+} represents a sum over all positive Bid-Offer Pairs (zero if there are none)

\sum^{-} represents a sum over all negative Bid-Offer Pairs (zero if there are none)

$qA_{ij}^k(t)$ is the acceptance level for acceptance k

If, for any k, $qA_{ij}^k(t) > \text{FPN}_{ij}(t) + \sum^{+} q\text{BO}_{ij}^n(t)$

then:

if $\text{FPN}_{ij}(t) \geq 0$ and there is at least one positive bid-offer pair,

the highest numbered Bid-Offer pair is extended up to $\text{Max}^k(qA_{ij}^k(t))$

otherwise,

a new bid-offer pair is created with pair number one greater than the highest (or 1 if none exist) with:

$$\text{BOUR}_{ij}^n(t) = \text{Max}\{ \text{FPN}_{ij}(t) + \sum^{+} q\text{BO}_{ij}^n(t), \text{Max}^k(qA_{ij}^k(t)) \}$$

If, for any k, $qA_{ij}^k(t) < \text{FPN}_{ij}(t) + \sum^{-} q\text{BO}_{ij}^n(t)$

then:

if $\text{FPN}_{ij}(t) \leq 0$ and there is at least one negative bid-offer pair,

the lowest numbered Bid-Offer pair is extended down to $\text{Min}^k(qA_{ij}^k(t))$

otherwise,

a new bid-offer pair is created with pair number one lower than the lowest (or -1 if none exist) with:

$$\text{BOLR}_{ij}^n(t) = \text{Min}\{ \text{FPN}_{ij}(t) + \sum^{-} q\text{BO}_{ij}^n(t), \text{Min}^k(qA_{ij}^k(t)) \}$$

4: The Acceptance Volume ($qA_{ij}^k(t)$) attributable to each Bid-Offer Acceptance shall be defined. This is undertaken through processing the Point Acceptance Volumes that define the MW output levels that the System Operator requested the BM Unit to operate for certain times within the Balancing Mechanism Window Period.

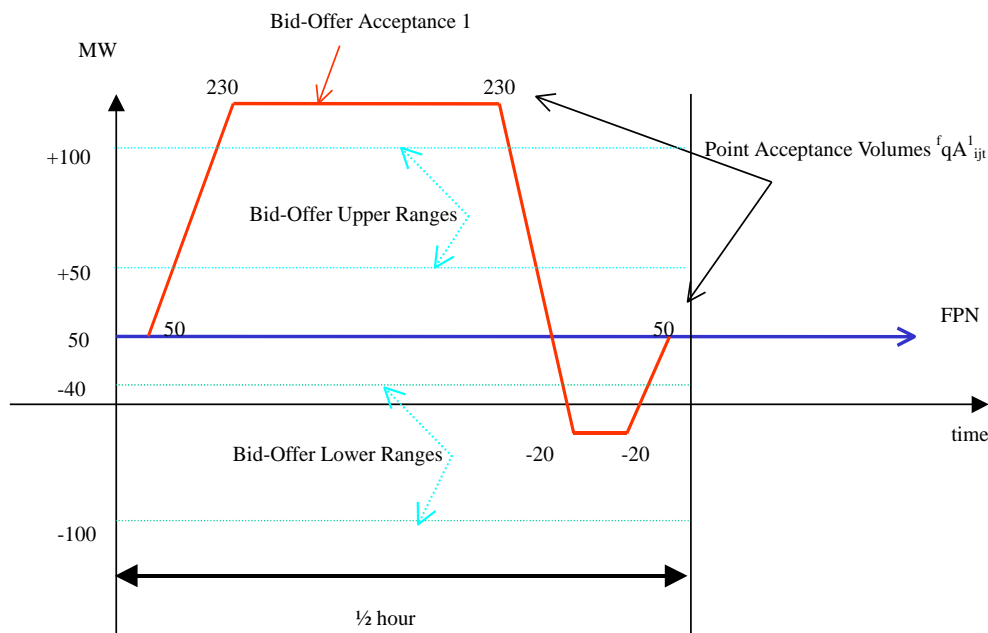
Linear interpolation shall be used to define the profile of power output in MW expected to

be delivered in each Settlement Period within the Balancing Mechanism Window Period as a result of Bid-Offer Acceptance, k.

For times within the Balancing Mechanism Window Period prior to the first value Point Acceptance Volume for Bid-Offer Acceptance k, or after the last value, the value of the Acceptance Volume is set to the last calculated value of Acceptance Volume for those times. If no such previously calculated value of Acceptance Volume exists, then the Acceptance Volume will be set to the value of Final Physical Notification (FPN_{ij}(t)) for those times.

Acceptance Volumes are then ordered by reference to increasing values of k.

The diagram below shows a Bid-Offer Acceptance in relation to Point Acceptance Volumes and the Bid-Offer Upper and Lower Ranges.



5: The Accepted Bid-Offer Volumes ($qABO^{kn}_{ij}(t)$) shall be defined in MW of a Bid or Offer from Bid-Offer Pair n accepted as a result of Bid-Offer Acceptance k in Settlement Period j from BM Unit i. This is determined as follows:

For $n > 0$,

$$qABO^{kn}_{ij}(t) = \text{Max}\{\text{Min}(qA^k_{ij}(t), \text{BOUR}^n_{ij}(t)), \text{BOUR}^{n-1}_{ij}(t)\} - \text{Max}\{\text{Min}(qA^k_{ij}(t), \text{BOUR}^n_{ij}(t), \text{BOUR}^{n-1}_{ij}(t))\}$$

For $n < 0$,

$$qABO^{kn}_{ij}(t) = \text{Min}\{\text{Max}(qA^k_{ij}(t), \text{BOLR}^n_{ij}(t)), \text{BOLR}^{n+1}_{ij}(t)\} - \text{Min}\{\text{Max}(qA^k_{ij}(t), \text{BOLR}^n_{ij}(t), \text{BOLR}^{n+1}_{ij}(t))\}$$

Where, from all Bid-Offer Acceptances for which an Acceptance Volume has been

determined for Settlement Period j , k - represents the last Bid-Offer Acceptance preceding k which covers time t .

If there is no such Bid-Offer Acceptance, the value of $qA^{k-}_{ij}(t) = FPN_{ij}(t)$.

6: The Accepted Offer Volume ($qAO^{kn}_{ij}(t)$) and Accepted Bid Volume $qAB^{kn}_{ij}(t)$ shall be defined in MW by splitting the positive and negative parts of the Bid-Offer Acceptance Volume.

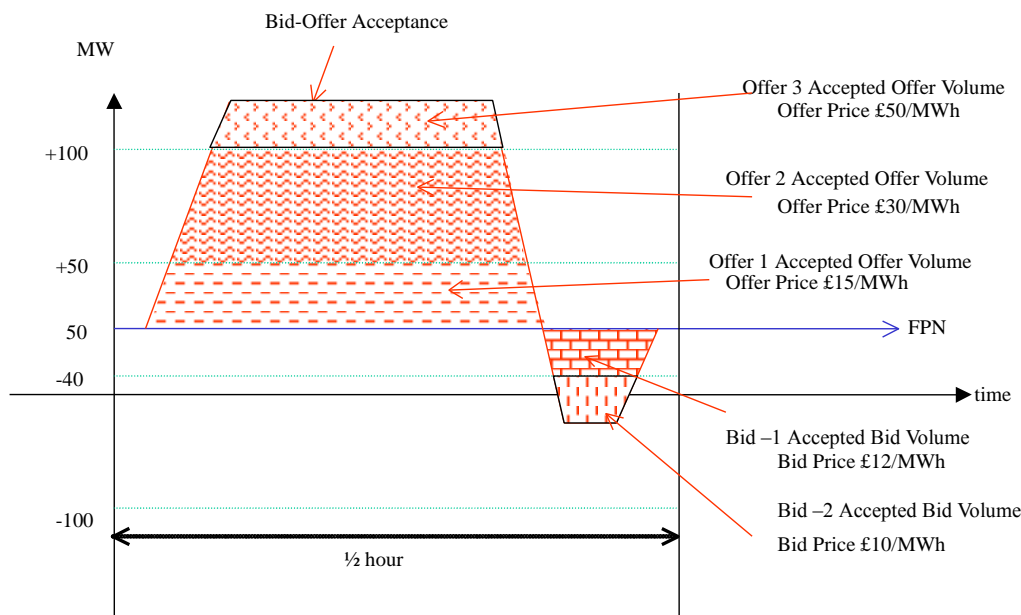
The Accepted Offer Volume ($qAO^{kn}_{ij}(t)$) represents the volume (in MW) of Offer n accepted as a result of Bid-Offer Acceptance k from BM Unit i at times t within Settlement Period j . It is the positive part of the Bid-Offer Acceptance Volume, defined by:

$$qAO^{kn}_{ij}(t) = \text{Max} \{qABO^{kn}_{ij}(t), 0\}$$

Similarly, the Accepted Bid Volume ($qAB^{kn}_{ij}(t)$) represents the volume of Bid n accepted as a result of Bid-Offer Acceptance k from BM Unit i at times t within Settlement Period j . It is the negative part of the Bid-Offer Acceptance Volume, defined by:

$$qAB^{kn}_{ij}(t) = \text{Min} \{qABO^{kn}_{ij}(t), 0\}$$

The diagram below represents the volumes of Bids and Offers bought or sold as a result of a Bid-Offer Acceptance.



7: The Period Accepted Offer Volume (QAO^{kn}_{ij}) and Period Accepted Bid Volume (QAB^{kn}_{ij}) shall be calculated by integrating the Accepted Offer Volume and Accepted Bid Volume over all times in the Settlement Period.

The Period Accepted Offer Volume (QAO^{kn}_{ij}) is determined by integrating the Accepted Offer Volume over all times t in Settlement Period j . It represents the half-hourly integrated

volume of Offer n, in MWh, accepted as a result of Bid-Offer Acceptance k.

The Period Accepted Bid Volume (QAB_{ij}^{kn}) is determined by integrating the Accepted Bid Volume over all times, t, in Settlement Period, j. It represents the half-hourly integrated volume of Bid n, in MWh, accepted as a result of Bid-Offer Acceptance k.

8: The Period BM Unit Total Accepted Offer Volume shall be calculated as follows:

$$QAO_{ij}^n = \sum^k QAO_{ij}^{kn}$$

The Period BM Unit Total Accepted Bid Volume shall be calculated as follows:

$$QAB_{ij}^n = \sum^k QAB_{ij}^{kn}$$

This is the total MWh volume of Offer or Bid n accepted from all Bid-Offer Acceptances.

Where either of QAO_{ij}^n or QAB_{ij}^n is non-zero, a flag (NZ_i^n) is set to record that a non-zero value has been calculated for the Settlement Period [see SAA-I014 sub flow 2 in IDD part 2].

9: The Period BM Unit Balancing Services Volume shall be calculated as follows:

$$QBS_{ij} = \sum^n (QAO_{ij}^n + QAB_{ij}^n) + QAS_{ij}$$

where

\sum^n represents the sum over all Bid-Offer Pair numbers for the BM Unit

QAS_{ij} is the BM Unit Applicable Balancing Services Volume

This represents the net volume of Balancing Services accepted in Settlement Period j for BM Unit i

10: The Period FPN (FPN_{ij}) shall be calculated for each BM Unit i, by integrating the value of Final Physical Notification $FPN_{ij}(t)$ across all times t, falling within Settlement Period j. The Period FPN is quoted in MWh.

Non-Functional Requirement:

Interfaces:

Issues:

5.6 SAA-F006: Calculate BM unit transmission loss multipliers

| | | | |
|--|--|--|--|
| Requirement ID: SAA-F006 | Status: M | Title: Calculate BM unit transmission loss multipliers | BSC reference: SAA SD 3.1, SAA BPM 3.6, SAA WS1 Action 24 CP1222, P278 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |
| Functional Requirements: | | | |
| A number of intermediate calculations are required to produce the transmission loss multipliers. All calculation steps in this requirement are included here. | | | |
| <p>1: All BM unit metered volumes shall be summed over their associated Trading Units to determine the net Import or Export meter volumes for each Trading Unit. Where the total Trading Unit meter volume is positive, all BM Units associated with this Trading Unit shall be classified as delivering to the Total System. Where the total Trading Unit meter volume is negative, all BM Units associated with this Trading Unit shall be classified as offtaking from the Total System.</p> <p><u>Note that, by default, a BM Unit not comprising a Trading Unit with other BM Units shall be considered to be a ‘Sole Trading Unit’ for the purposes of these calculations. The “delivering” and “offtaking” status of such a Trading Unit shall therefore be determined using the metered volume of the single BM Unit comprising that Trading Unit.</u></p> <p>This calculation takes place in each Settlement Period.</p> | | | |
| <p>2: The Transmission Loss Multipliers ($TLMO_j^+$ and $TLMO_j^-$) shall be calculated for the Settlement Period j. These are calculated as follows:</p> $TLMO_j^+ = - \{ \alpha(\Sigma^+QM_{ij} + \Sigma^-QM_{ij}) + \Sigma_{(non-I)}^+(QM_{ij} * TLF_{ij}) \} / \Sigma_{(non-I)}^+QM_{ij};$ $TLMO_j^- = \{ (\alpha-1)(\Sigma^+QM_{ij} + \Sigma^-QM_{ij}) - \Sigma_{(non-I)}^-(QM_{ij} * TLF_{ij}) \} / \Sigma_{(non-I)}^-QM_{ij};$ $TLMO_j^{+-} = \frac{- \{ \alpha(\Sigma^-QM_{ij} + \Sigma^+QM_{ij}) + \Sigma^+(QM_{ij} * TLF_{ij}) \}}{\Sigma^+QM_{ij}}; \text{ and}$ $TLMO_j^{-+} = \frac{\{ (\alpha-1)(\Sigma^+QM_{ij} + \Sigma^-QM_{ij}) - \Sigma^-(QM_{ij} * TLF_{ij}) \}}{\Sigma^-QM_{ij}}$ <p>Where:</p> <p>Σ^+ represents a sum over all BM Units in Trading Units that are net deliverers of energy in Settlement Period j; and</p> <p>Σ^- represents a sum over all BM Units in Trading Units that are net offtakers of energy in Settlement Period j;</p> <p><u>$\Sigma_{(non-I)}^+$ represents a sum over all BM Units other than Interconnector BM Units in Trading Units that are net deliverers of energy in Settlement Period j; and</u></p> <p><u>$\Sigma_{(non-I)}^-$ represents a sum over all BM Units other than Interconnector BM Units in Trading Units that are net offtakers of energy in Settlement Period j.</u></p> | | | |
| 3: The BM Unit Transmission Loss Multiplier shall be calculated for each BM Unit in each | | | |

settlement period. This shall be calculated as:

$TLM_{ij} = 1 + TLF_{ij} + TLMO^+_j$ for all non-Interconnector BM Units that are in Trading Units that are net deliverers of energy in Settlement Period j,

$TLM_{ij} = 1 + TLF_{ij} + TLMO^-_j$ for all non-Interconnector BM Units that are in Trading Units that are net offtakers of energy in Settlement Period j,

$TLM_{ij} = 1$ for all Interconnector BM Units irrespective of whether they are in Trading Units that are net deliverers or offtakers of energy in Settlement Period j.

Where TLF_{ij} is the Transmission Loss Factor assigned to each BM Unit. This will allow imports and exports volumes to be scaled by location, as well as for adjusting the relative contributions to the total cost of losses from imports and exports. The values of α and TLF_{ij} will, in general be determined by the BSC. Initially the value of α will be set to 0.45 and TLF_{ij} be set to zero. It should be noted that TLMs and TLFs are BM Unit specific variables.

Non-Functional Requirement:

Interfaces:

Issues:

5.7 SAA-F007: Calculate balancing mechanism cashflows

| | | | |
|--|--|--|--|
| Requirement ID: SAA-F007 | Status: M | Title: Calculate balancing mechanism cashflows | BSC reference: SAA SD 3.13, 3.14, 3.15, 3.16, 3.2.1, 3.2.8, SAA BPM 3.7 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |
| Functional Requirements: | | | |
| A number of intermediate calculations are required to produce the balancing mechanism cashflows. All calculation steps in this requirement are included here. | | | |
| 1: The Period Acceptance Offer Cashflow CAO^{kn}_{ij} shall be calculated as: $CAO^{kn}_{ij} = QAO^{kn}_{ij} * PO^n_{ij} * TLM_{ij}$. The Period Acceptance Bid Cashflow CAB^{kn}_{ij} shall be calculated as: $CAB^{kn}_{ij} = QAB^{kn}_{ij} * PB^n_{ij} * TLM_{ij}$ Where QAB^{kn}_{ij} is the Period Accepted Bid Volume; QAO^{kn}_{ij} is the Period Accepted Offer Volume; PB^n_{ij} is the Bid Price for the corresponding Bid; PO^n_{ij} is the Offer Price for the corresponding Offer; and TLM_{ij} is the Transmission Loss Multiplier for BM Unit i and Settlement Period j. | | | |

The Period Acceptance Bid Cashflow (CAB_{ij}^{kn}) and Period Acceptance Offer Cashflow (CAO_{ij}^{kn}) represent the Transmission Loss adjusted cashflow relating to BM Unit I for Balancing Mechanism action in Settlement Period j, allocated to Offer or Bid n, as a result of Bid-Offer Acceptance k. Under normal circumstances, the Period Acceptance Bid Cashflow will be negative as QAB_{ij}^{kn} is negative and PB_{ij}^n is normally positive.

The Period Acceptance Bid Cashflow and the Period Acceptance Offer Cashflow need to be stored if required for reporting purposes.

2: The Period BM Unit Offer Cashflow (CO_{ij}^n) shall be calculated as:

$$CO_{ij}^n = QAO_{ij}^n * PO_{ij}^n * TLM_{ij} (= \sum^k CAO_{ij}^{kn})$$

The Period BM Unit Bid Cashflow (CB_{ij}^n) shall be calculated as:

$$CB_{ij}^n = QAB_{ij}^n * PB_{ij}^n * TLM_{ij} (= \sum^k CAB_{ij}^{kn})$$

These represent the Transmission Loss adjusted cashflows relating to BM Unit i for Balancing Mechanism action in Settlement Period j, allocated to Offer or Bid n. Under normal circumstances the Period BM Unit Bid Cashflow will be negative.

3: The Period BM Unit Cashflow (CBM_{ij}) shall be calculated as:

$$CBM_{ij} = \sum^n CO_{ij}^n + \sum^n CB_{ij}^n$$

This represents the total payment to BM Unit i as a result of accepted Balancing Mechanism action in Settlement Period j

4: The Total System BM Cashflow ($TCBM_j$) shall be calculated as:

$$TCBM_j = \sum_i CBM_{ij}$$

This represents the total payments and charges in respect of Balancing Mechanism action for all BM Units (excluding any non-delivery adjustments) in Settlement Period j.

Non-Functional Requirement:

Interfaces:

Issues:

5.8 SAA-F008: Calculate credit energy volumes

| | | | |
|--|---|---|---|
| Requirement ID: SAA-F008 | Status: M | Title: Calculate credit energy volumes | BSC reference: RETA CR 005, RETA ERR 1, SAA SD 3.31, 3.32.1, SAA BPM 3.8, P71 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |
| <p>Functional Requirements:</p> <p>A number of intermediate calculations are required to produce the credit energy volumes. All calculation steps in this requirement are included here.</p> <p>1: The Credited Energy Volume QCE_{iaj} from each BM Unit i, shall be allocated to each Energy Account a of each Subsidiary Energy Account for each Settlement Period j, as follows:</p> $QCE_{iaj} = \{(QM_{ij} - QBS_{ij}) * (QMPR_{iaj}/100) + QMFR_{iaj}\} * TLM_{ij} ,$ <p>Where</p> <ul style="list-style-type: none"> $a \neq A$, and A is the Lead Energy Account for BM Unit i; $QMFR_{iaj}$ is the Metered Volume Fixed Reallocation, a fixed volume in MWh, assigned to Energy Account a from BM Unit i in Settlement Period j; $QMPR_{iaj}$ is the Metered Volume Percentage Reallocation, the percentage of the BM Unit Metered Volume that remains after Balancing Actions have been deducted, which is allocated to Energy Account a from BM Unit i in Settlement Period j; and QM_{ij} is the BM Unit Metered Volume.” <p>QCE_{iaj} are rounded down to the nearest kWh.</p> <p>2: The Lead Party Credited Energy Volume shall be calculated for the Lead Energy Account, for each BM Unit i, in each Settlement Period j, as follows:</p> $QCE_{iAj} = (QM_{ij} * TLM_{ij}) - \sum_{a \neq A} QCE_{iaj}$ <p>Where $\sum_{a \neq A}$ represents a sum over all Energy Accounts, other than the Lead Energy Account.</p> <p>This allocates any residual metered volume, including any Balancing Mechanism action to the Lead Energy Account. This ensures that all the BM Unit Metered Volume flow is always allocated in full.</p> | | | |

| |
|--|
| 3: The Account Credited Energy Volume ($QACE_{aj}$).shall be calculated for each Energy Account a, as follows: $QACE_{aj} = \sum_i QCE_{iaj}$ |
| Non-Functional Requirement: |
| Interfaces: |
| Issues: |

5.9 SAA-F009: Calculate energy imbalance prices

| | | | |
|--|---|---|---|
| Requirement ID: SAA-F009 | Status: M | Title: Calculate energy imbalance prices | BSC 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, P194, P217 |
| Man/auto: Automatic | Frequency: Once, on each Settlement Run. | Volumes: | |
| Functional Requirements: | | | |
| A number of intermediate calculations are required to produce the energy imbalance prices. All calculation steps in this requirement are included here. (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.) | | | |
| For Settlement Days before the P217 effective date apply PAR Tagging in addition to NIV Tagging, as defined in SAA-F009a. For Settlement Days after, and including, the P217 effective date apply Replacement Price Classification, as defined in SAA-F009b. | | | |
| Non-Functional Requirement: | | | |

5.9.1 SAA-F009a: Apply Net Imbalance Volume and Price Averaging Reference Tagging

| | | | |
|------------------------------|--|---|------------------------------|
| Requirement ID: SAA-F009a | Status: M | Title: Apply Net Imbalance Volume and Price Averaging Reference Tagging | BSC reference: P194, P217 |
| Man/auto: Automatic | Frequency: Once, on each Settlement Run. | Volumes: | |

Functional Requirements:

1: Identify Short-Duration Acceptances.

Short-Duration Acceptances are excluded from the price calculations as they may distort the results. The rules for identifying Short-Duration Acceptances are:

- 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:

$$QAPO_{ij}^n = 0$$

$$QAPB_{ij}^n = 0$$

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

$$QAPO_{ij}^n = QAO_{ij}^n$$

$$QAPB_{ij}^n = QAB_{ij}^n$$

2: Compute total volumes:

- a. Total Volume of Offers

$$TQAO_j = \sum_i \sum^n QAO_{ij}^n$$

\sum_i represents the sum over all BM Units;

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

- b. Total Unpriced Volume of Offers

$$TQUAO_j = \Sigma_i \Sigma^n QAO_{ij}^n - \Sigma_i \Sigma^n QAPO_{ij}^n$$

Σ_i represents the sum over all BM Units;

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

- c. Total Volume of Bids

$$TQAB_j = \Sigma_i \Sigma^n QAB_{ij}^n$$

Σ_i represents the sum over all BM Units;

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

- d. Total Unpriced Volume of Bids

$$TQUAB_j = \Sigma_i \Sigma^n QAB_{ij}^n - \Sigma_i \Sigma^n QAPB_{ij}^n$$

Σ_i represents the sum over all BM Units;

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

- e. Total Period Applicable Balancing Services Volume

$$TQAS_j = \Sigma_i QAS_{ij}$$

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:

| Offers | | | Bids | | |
|---------|----------------------|----------------------|---------|----------------------|----------------------|
| BM unit | Vol($QAPO_{ij}^n$) | Price(PO_{ij}^n) | BM unit | 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:

| Offers | | | Bids | | |
|---------|----------------------|----------------------|--------------|----------------------|-----------------------|
| BM unit | Vol($QAPO_{ij}^n$) | Price(PO_{ij}^n) | BM unit | 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 | 2010 | 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 each Settlement Period, the offer and bid stacks for all BM units are then updated by applying the following algorithms:

The Offer (and purchase) stack:

1. The non-zero (net) Buy Price Volume Adjustment (Energy) (EBVA_j) is inserted into the Offer stack in order of price (derived from EBCA_j/EBVA_j, i.e. a £/MWh price).
2. The non-zero Total System Un-priced Accepted Offer Volume (TQUAO_j) is placed at the top of the Offer stack.
3. The non-zero (net) Buy Price Adjustment (System)(SBVA_j) is then inserted into the Offer stack below the Total System Un-priced Accepted Offer Volume.

For example:

| Offer Stack | | |
|--------------------|---------------------|---------------------|
| <u>Offer 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 | 15 | 5 |
| QAPO _j | 10 | 30 |

The Bid (and sale) stack:

1. 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. The non-zero Total System Un-priced Accepted Bid Volume (TQUAB_j) is placed at the bottom of the Bid stack.
3. The non-zero (net) Sell Price Adjustment (System)(SSVA_j) is then inserted into the Bid stack above the Total System Un-priced Accepted Bid Volume.

For example:

| Bid Stack | | |
|-------------------|---------------------|---------------------|
| <u>Bid 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 |
| SSVA _j | - | 25 |

TQUAB_j - 4

7: Referencing the remaining offers and bids, and starting from the least expensive bid and most expensive offer, bids and 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 (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. 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 |
| NT | TQUAO _j | - | 10 | U | ESVA _j | 15 | 15 |
| NT | SBVA _j | - | 0 | U | QAPB _j | 10 | 15 |
| NT | QAPO _j | 25 | 5 | NT | QAPB _j | 10 | 29 |
| NT | QAPO _j | 20 | 20 | NT | QAPB _j | 5 | 5 |
| NT | EBVA _j | 15 | 5 | NT | QAPB _j | -10 | 7 |
| NT | QAPO _j | 10 | 30 | NT | SSVA _j | - | 25 |
| | | | | NT | 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 |

8. Referencing the remaining Offer or Bid Stack (depending on whichever stack has items remaining after NIV tagging), and starting from the most expensive Bid priced item or least expensive Offer priced item, Bids or Offers are tagged until the total remaining priced volume in the stack is not more than the Price Average Reference Volume (PAR_d) for the target Settlement Date.

If, for a particular price, only a subset of the entire set of Bids (or Offers) at that price are to be tagged, then every Bid (or Offer) at 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. For an example which demonstrates the principle of this mechanism see the section describing NIV tagging above.

Continuing the example from above: All items in the Offer stack are NIV Tagged, and only two items remain untagged in the Bid Stack, leaving a total of 30 MWh untagged volume. Assuming a PAR_d value of 20 MWh, this would mean that 10 of the remaining 30 MWh should be PAR Tagged (to leave us with the required 20 MWh), leaving the stacks as follows:

| <u>Offer Stack</u> | | | | <u>Bid Stack</u> | | | |
|--------------------|--------------------|-------|-----|------------------|-------------------|-------|-----|
| Tagged Status | Offer Type | Price | Vol | Tagged Status | Bid Type | Price | Vol |
| NT | TQUAO _j | - | 10 | PT | ESVA _j | 15 | 10 |
| NT | SBVA _j | - | 0 | U | ESVA _j | 15 | 5 |

| | | | | | | | |
|----|-------------------|----|----|----|--------------------|-----|----|
| NT | QAPO _j | 25 | 5 | U | QAPB _j | 10 | 15 |
| NT | QAPO _j | 20 | 20 | NT | QAPB _j | 10 | 29 |
| NT | EBVA _j | 15 | 5 | NT | QAPB _j | 5 | 5 |
| NT | QAPO _j | 10 | 30 | NT | QAPB _j | -10 | 7 |
| | | | | NT | SSVA _j | - | 25 |
| | | | | NT | TQUAB _j | - | 4 |

Note that where, after NIV Tagging, the remaining volume is less than or equal to the PAR_j then no items will be PAR Tagged.

9. 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, NTESVA_j, PTESVA_j, TSSVA_j, TTQUAO_j, TEBVA_j, NTEBVA_j, PTEBVA_j, TSBVA_j respectively), as well as the untagged elements of EBCA_j and ESCA_j (UEBCA_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)):

NIV Tagged Energy Volumes (NTESVA_j and NTEBVA_j) will be the volume of Energy BSAD removed by the NIV Tagging.

PAR Tagged Energy Volumes (PTESVA_j and PTEBVA_j) will be the volume of Energy BSAD removed by the PAR Tagging.

The total tagged and untagged Energy BSAD Volumes can then be calculated as follows:

$$TEBVA_j = NTEBVA_j + PTEBVA_j;$$

$$TESVA_j = NTESVA_j + PTESVA_j;$$

$$UEBVA_j = EBVA_j - TEBVA_j;$$

$$UESVA_j = ESVA_j - TESVA_j;$$

Where all of the energy BSAD volume is tagged out by the combined NIV and PAR Tagging, then the Untagged volume is equal to zero (i.e. UEBVA_j = 0 or UESVA_j = 0). The 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 combined NIV and PAR Tagging, then the Untagged volume is equal to the original notified volume (i.e. UEBVA_j = EBVA_j or UESVA_j = ESVA_j). The 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 combined NIV and PAR 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 $UESCA_j = 0$.

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

$$TCQ_j = \{ \{ (\sum_i \sum^{n'} QAPB_{ij}^n) + TTQUAB_j + NTESVA_j + TSSVA_j \} - \{ (\sum_i \sum^{n*} QAPO_{ij}^n) + TTQUAO_j + NTEBVA_j + TSBVA_j \} \} / 2$$

where

\sum_i represents the sum over all BM Units;

$\sum^{n'}$ represents the sum over all Priced Acceptance Bids which are NIV Tagged Bids;

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

$TTQUAB_j$ is the NIV Tagged TQUAB_j;

$NTESVA_j$ is the NIV Tagged ESVA_j;

$TSSVA_j$ is the NIV Tagged SSSVA_j;

$TTQUAO_j$ is the NIV Tagged TQUAO_j;

$NTEBVA_j$ is the NIV Tagged EBVA_j, and;

$TSBVA_j$ is the NIV Tagged SBVA_j.

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

$$NIV_j = \{ \sum_i \sum^n QAPO_{ij}^n + EBVA_j + SBVA_j + TQUAO_j \} - \{ \sum_i \sum^n (-QAPB_{ij}^n) + (-ESVA_j) + (-SSVA_j) + (-TQUAB_j) \}$$

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.

12. 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 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:

$$SBP_j = \frac{\{ \sum_i \sum^n \{ QAPO_{ij}^n * PO_{ij}^n * TLM_{ij} \} + UEBCA_j \} + \{ BPA_j \}^1}{\{ \sum_i \sum^n \{ QAPO_{ij}^n * TLM_{ij} \} + UEBVA_j \}}$$

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 and not PAR 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 Untagged Buy-Price Cost Adjustment (Energy);

$UEBVA_j$ is the 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:

$$SBP_j = \sum_s \{ PXP_{sj} * QXP_{sj} \} / \sum_s QXP_{sj}^2$$

¹ Price derivation codes A, B, C

² Price derivation codes F, I

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 $SBP_j = SSP_j^3$;

(b) If for that Settlement Period $SBP < SSP$, i.e. there is a negative spread, then $SBP_j = SSP_j^4$.

If, for any Settlement Period, the Net Imbalance Volume is **zero**⁵, or the value of $\{\sum_i \sum^n \{QAPO_{ij}^n * TLM_{ij}\} + UEBVA_j\}$ is zero⁶, then the System Buy Price will be determined as:

$$SBP_j = \sum_s \{PXP_{sj} * QXP_{sj}\} / \sum_s QXP_{sj}^7$$

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 $SBP_j = 0^8$.

13. 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 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:

$$SSP_j = \frac{\{\sum_i \sum^n \{QAPB_{ij}^n * PB_{ij}^n * TLM_{ij}\} + UESCA_j\} + \{SPA_j\}^9}{\{\sum_i \sum^n \{QAPB_{ij}^n * TLM_{ij}\} + UESVA_j\}}$$

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 and not PAR 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 Untagged Sell-Price Cost Adjustment (Energy);

UESVA_j is the 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:

$$SSP_j = \sum_s \{PXP_{sj} * QXP_{sj}\} / \sum_s QXP_{sj}^{10}$$

where

³ Price derivation codes H, J

⁴ Price derivation codes G

⁵ Price derivation codes K, L

⁶ Price derivation codes D, E

⁷ Price derivation codes D, K

⁸ Price derivation codes E, L

⁹ Price derivation codes F, G, H

¹⁰ Price derivation codes A, D

\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 $SSP_j = SBP_j$ ¹¹.

(b) If for that Settlement Period $SSP > SBP$, i.e. there is a negative spread, then $SSP_j = SBP_j$ ¹².

If for any Settlement Period the Net Imbalance Volume is **zero**¹³, or the value of $\{\sum_i \sum^n \{QAPB_{ij}^n * TLM_{ij}\} + UESVA_j\}$ is zero¹⁴, then the System Sell Price will be determined as:

$$SSP_j = \sum_s \{PXP_{sj} * QXP_{sj}\} / \sum_s QXP_{sj}$$
¹⁵

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 $SSP_j = 0$ ¹⁶.

14: 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;

15. The 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.

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

Market Index Data is received from Market Index Data Providers through the automatic flow SAA-I030.

The SAA shall, for the purposes of performance reporting, record details of those cases where:

1. 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

¹¹ Price derivation codes C, E

¹² Price derivation codes B

¹³ Price derivation codes K, L

¹⁴ Price derivation codes I, J

¹⁵ Price derivation codes I, K

¹⁶ Price derivation codes J, L

2. 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.

The SAA shall for the purposes of reporting, record a Price Derivation Code (PDC_i) 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.

Non-Functional Requirement:

5.9.2 SAA-F009b: Apply Replacement Price Classification

| | | | |
|---|--|---|------------------------|
| Requirement ID: SAA-F009b | Status: M | Title: Apply Replacement Price Classification | BSC reference: P217 |
| Man/auto: Automatic | Frequency: Once, on each Settlement Run. | Volumes: | |
| Functional Requirements: | | | |
| 1: Identify Short-Duration Acceptances. | | | |
| The rules for identifying Short-Duration Acceptances are: | | | |
| a. Acceptances for each BM Unit are grouped into sets of overlapping acceptances (for the avoidance of doubt, if two acceptances are contiguous, i.e. the last spot time of one acceptance matches the first of another, then 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. | | | |
| Short-Duration Acceptances will be considered to be "CADL Flagged" for the purposes of the System Price Calculation process. | | | |
| 2: Compute Total Volumes: | | | |
| a. Total Volume of Offers | | | |
| $TQAO_j = \sum_i \sum^n QAO_{ij}^n$ | | | |
| where: \sum_i represents the sum over all BM Units; \sum^n represents the sum over all accepted Offers | | | |
| b. Total Volume of Bids | | | |
| $TQAB_j = \sum_i \sum^n QAB_{ij}^n$ | | | |
| where: \sum_i represents the sum over all BM Units; \sum^n represents the sum over all accepted Bids | | | |
| c. Total Period Applicable Balancing Services Volume | | | |
| $TQAS_j = \sum_i QAS_{ij}$ | | | |
| where: \sum_i represents the sum over all BM Units; | | | |
| d. Total Balancing Services Adjustment Buy Volume | | | |

$$TBVA_j = \sum^m QBSAB^m_j$$

where: \sum^m represents the sum over all Balancing Services Adjustment Buy Actions.

e. Total Balancing Services Adjustment Sell Volume

$$TSVA_j = \sum^m QBSAS^m_j$$

where: \sum^m represents the sum over all Balancing Services Adjustment Sell Actions.

3: Identify “De Minimis Acceptance Volumes” (De Minimis Tagging).

Acceptances with a Total Accepted Volume less than the De Minimis Acceptance Threshold (i.e. where values of $|QAO^m_{ij}| < DMAT_d$ or $|QAB^m_{ij}| < DMAT_d$) are identified as “De Minimis Acceptance Volumes” and are therefore considered to be De Minimis Tagged.

Balancing Services Adjustment Actions with a Volume less than the De Minimis Acceptance Threshold (i.e. where values of $|QBSAB^m_j| < DMAT_d$ or $|QBSAS^m_j| < DMAT_d$) are identified as “De Minimis Acceptance Volumes” and are therefore considered to be De Minimis Tagged.

De Minimis Tagged System Actions are excluded from the price calculations as they may distort the results.

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

4: Build Buy and Sell Stacks.

Buy System Actions (QSB^w_j) are considered to be:

- i. All those Accepted Offers (QAO^{kn}_{ij}) which are not “De Minimis Acceptance Volumes”; and
- ii. All Balancing Services Adjustment Buy Actions ($QBSAB^m_j$) which are not “De Minimis Acceptance Volumes”.

Sell System Actions (QSS^w_j) are considered to be:

- i. All those Accepted Bids (QAB^{kn}_{ij}) which are not “De Minimis Acceptance Volumes”; and
- ii. All Balancing Services Adjustment Sell Actions ($QBSAS^m_j$) which are not “De Minimis Acceptance Volumes”.

The price of a System Action is considered to be (SAP^w_j):

- i. In the case of an accepted Offer, the Offer Price PO^m_{ij} ;
- ii. In the case of an accepted Bid, the Bid Price PB^m_{ij} ;
- iii. In the case of Balancing Services Adjustment Actions, Balancing Services Adjustment Price $BSAP^m_j$ (derived from Cost/Volume, i.e. a £/MWh price);

For each Settlement Period, all System Actions are listed in descending order of price, within the relevant Stack. Unpriced Balancing Services Adjustment Actions are placed at the top of the Buy Stack (as if most expensive) or the bottom of the Sell Stack (as if least expensive), as appropriate. For example:

| Buy Stack | | Sell Stack | |
|----------------------------------|------------------------------------|----------------------------------|------------------------------------|
| <u>Vol(QSB^w_j)</u> | <u>Price(SAP^w_j)</u> | <u>Vol(QSS^w_j)</u> | <u>Price(SAP^w_j)</u> |
| 12 | - | 7 | 25 |
| 24 | 45 | 15 | 8 |
| 15 | 40 | 5 | 7 |
| 50 | 10 | 5 | 4 |

| | | | |
|----|----|----|---|
| 20 | 10 | 10 | - |
|----|----|----|---|

5: Apply Arbitrage Tagging.

Starting from the most expensive Sell Action and least expensive Buy Action, each System Action is inspected for arbitrage, i.e. where the Sell Action's price exceeds or is equal to the Buy Action's price. Where arbitrage exists then equivalent amounts of volume are tagged out from both stacks until arbitrage no longer exists.

Actions with the same price which are on the same stack are combined into a single item for the purpose of Arbitrage inspection. If, for a particular price, only a subset of the combined Buy (or Sell) Actions can be matched, then every Buy (or Sell) Action at 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 individual Actions entirely, and others not at all.

Extending the example from above:

| Buy Stack | | Sell Stack | |
|------------------------------------|--------------------------------------|------------------------------------|--------------------------------------|
| Vol(QSB ^{w_j}) | Price(SAP ^{w_j}) | Vol(QSS ^{w_j}) | Price(SAP ^{w_j}) |
| 12 | - | 7 | 25 |
| 24 | 45 | 15 | 8 |
| 15 | 40 | 5 | 7 |
| 50 45 | 10 | 5 | 4 |
| 20 18 | 10 | 10 | - |

In this example there are two Buy Actions (total volume = 70 MWh, price = £10) matched to a single Sell Action (volume = 7 MWh, price = £25). The two Buy Actions therefore have an amount tagged equal to 7/70 times their volume (5 and 2 MWh respectively, for a total of 7 MWh tagged volume)

Unpriced Balancing Services Adjustment Actions are ignored for the purposes of Arbitrage – i.e. once all Priced Actions on a Stack have been Arbitrage tagged then no further Arbitrage tagging can occur.

The process of Arbitrage Tagging will only be carried out for Settlement Dates where the Arbitrage Flag (a dated system parameter) is set.

6: Determine System Action Classification

For each Settlement Period, the Buy and Sell Stacks are then updated by applying the following algorithm:

All the First-Stage Flagged and Unflagged System Actions are identified on each Stack. A First-Stage Flagged System Action is one which is either:

- A Short-Duration (CADL Flagged) Acceptance;
- A SO-Flagged Acceptance; or
- A SO-Flagged Balancing Services Adjustment Action.

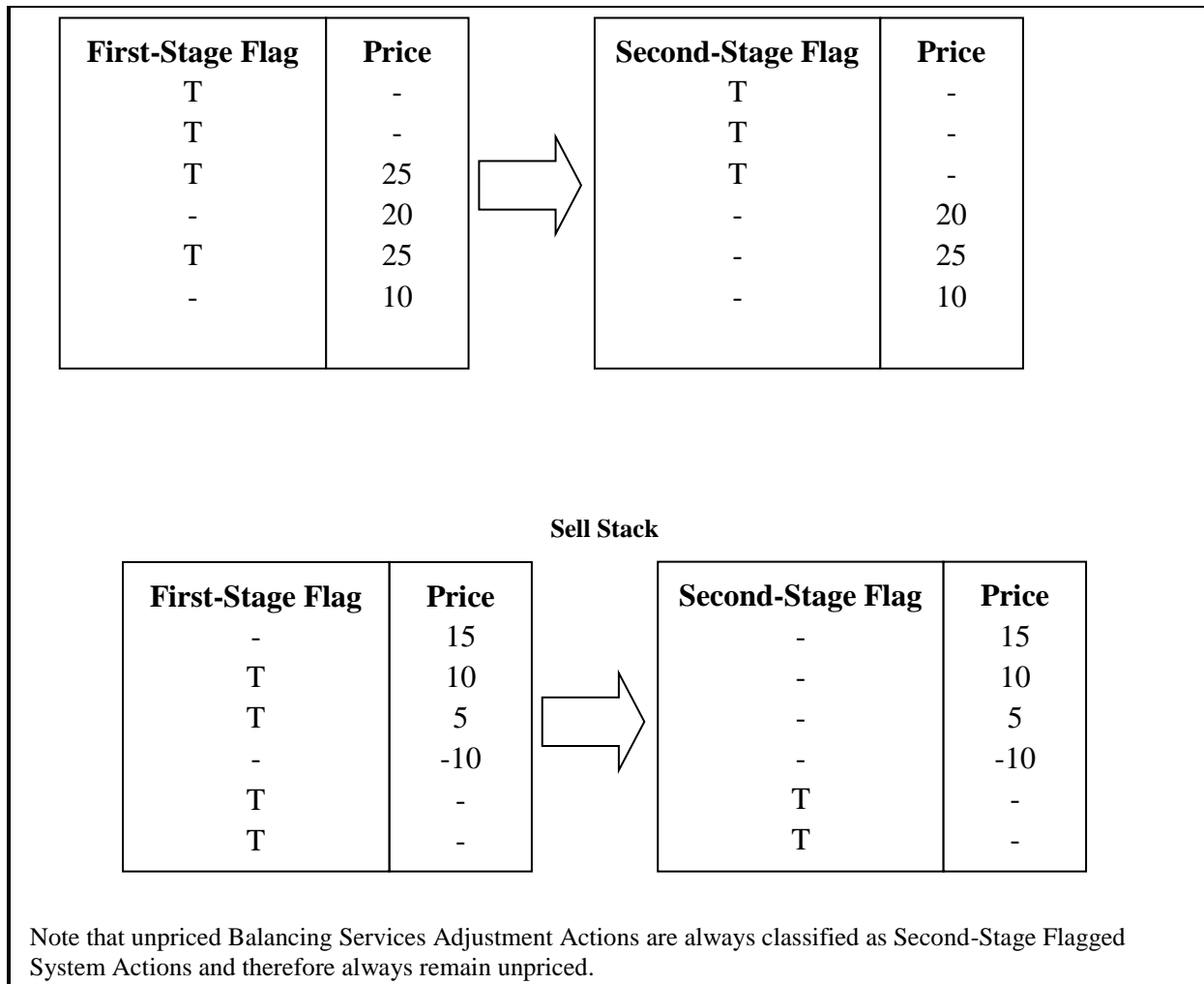
A First-Stage Unflagged System Action is one which is not a First-Stage Flagged System Action.

Then, for the Buy Stack, all First-Stage Flagged System Actions with a price which is higher than the most expensive First-Stage Unflagged System Action are classified as Second-Stage Flagged System Actions. And, for the Sell Stack, all First-Stage Flagged System Actions with a price which is lower than the least expensive First-Stage Unflagged System Action are classified as Second-Stage Flagged System Actions.

All Second-Stage Flagged System Actions are considered to be unpriced.

For example:

Buy Stack



7: Apply NIV Tagging

Starting from the least expensive Sell Action and most expensive Buy Action, Actions from the two stacks are matched and tagged until the smaller (in total volume) of the two stacks is completely tagged. Unpriced Actions are included in NIV Tagging. Unpriced Sell Actions are considered to be the least expensive Sell Actions and Unpriced Buy Actions are considered to be the most expensive Buy Action – i.e. where present they are the first Actions to be considered during the NIV Tagging process.

Actions with the same price which are on the same stack are combined into a single item for the purpose of matching. If, for a particular price, only a subset of the combined Buy (or Sell) Actions can be matched, then every Buy (or Sell) Action at 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 individual Actions entirely, and others not at all. Unpriced items are considered to be at the same price for the purpose of NIV Tagging.

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

| Buy Stack | | | Sell Stack | | |
|---------------|-------|-----|---------------|-------|-----|
| Tagged Status | Price | Vol | Tagged Status | Price | Vol |
| Tagged | - | 10 | Untagged | 15 | 15 |
| Tagged | - | 0 | Untagged | 10 | 15 |
| Tagged | 25 | 5 | Tagged | 10 | 29 |
| Tagged | 20 | 20 | Tagged | 5 | 5 |
| Tagged | 15 | 5 | Tagged | -10 | 7 |
| Tagged | 10 | 30 | Tagged | - | 25 |
| | | | Tagged | - | 4 |

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

| Sell Action | 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 |

8: Calculate and Apply Replacement Price

The Replacement Price is calculated from a selection of those untagged items remaining after the NIV Tagging process which are priced System Actions (i.e. Unflagged Second-Stage System Actions). This selection is determined by the Replacement Price Average Reference (RPAR) Volume, and is defined as that volume of the most expensive priced System Action items remaining after NIV Tagging which is equivalent to the RPAR Volume (where necessary only part of an item's volume will be considered selected in order that the total selected volume is equal to the RPAR Volume). Where the total remaining volume of untagged, priced System Action items is less than the RPAR Volume then all untagged, priced System Action items are selected.

The Replacement Price is calculated as the volume weighed average price of the selected items.

If NIV is positive then:

$$RP_j = \frac{\sum^{w'} (QSB_j^{w'} * SAP_j^{w'})}{\sum^{w'} QSB_j^{w'}}$$

and if NIV is negative then:

$$RP_j = \frac{\sum^{w'} (QSS_j^{w'} * SAP_j^{w'})}{\sum^{w'} QSS_j^{w'}}$$

Where $\sum^{w'}$ is the sum over all RPAR Volume selected untagged, priced System Actions.

Where no priced System Action items remain after NIV Tagging then the Replacement Price is the Market Price. If the Market Price is undefined then the Replacement Price is zero.

The actual volume of Actions used to calculate the Replacement Price is defined as the Replacement Price Calculation Volume. If the Replacement Price is derived from the Market Price then Replacement Price Calculation Volume will be considered to be zero.

Once calculated the Replacement Price is assigned to those remaining untagged stack items which are classified as Second-Stage Flagged System Actions, All such affected System Actions are considered to be "Repriced" System Actions.

9: Apply PAR Tagging

Referencing the remaining Buy or Sell Stack (depending on whichever stack has untagged items remaining after NIV tagging), and starting from the most expensive Sell Stack item or least expensive Buy Stack item, Buy or Sell Stack items are tagged until the total remaining priced volume in the stack is not more than the Price Average Reference Volume (PAR_d).

Actions with the same price which are on the same stack are combined into a single item for the purpose of matching. If, for a particular price, only a subset of the entire set of combined Sell Actions (or Buy Actions) can be matched, then every Sell Action (or Buy Action) at 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 individual Sell Actions (or Buy Actions) entirely, and others not at all. For an example which demonstrates the principle of this mechanism see the section describing NIV tagging above.

Continuing the example from above: All items in the Buy Stack are NIV Tagged, and only two items remain untagged in the Sell Stack, leaving a total of 30 MWh untagged volume. For example, if PAR_d was defined to have a value of 20 MWh, this would mean that 10 of the remaining 30 MWh should be PAR Tagged (to leave us with the required 20 MWh), leaving the stacks as follows:

| Buy Stack | | | Sell Stack | | |
|---------------|-------|-----|---------------|-------|-----|
| Tagged Status | Price | Vol | Tagged Status | Price | Vol |
| NIV Tagged | - | 10 | PAR Tagged | 15 | 10 |
| NIV Tagged | - | 0 | Untagged | 15 | 5 |
| NIV Tagged | 25 | 5 | Untagged | 10 | 15 |
| NIV Tagged | 20 | 20 | NIV Tagged | 10 | 29 |
| NIV Tagged | 15 | 5 | NIV Tagged | 5 | 5 |
| NIV Tagged | 10 | 30 | NIV Tagged | -10 | 7 |
| | | | NIV Tagged | - | 25 |
| | | | NIV Tagged | - | 4 |

Note that where, after NIV Tagging, the remaining volume is less than or equal to the PAR_d then no items will be PAR Tagged.

10. Calculate Reported Period BM Unit Volumes

It is now possible to calculate the following reported derived values:

- Period BM Unit Tagged Volume of Offers ($QTAO_{ij}^n$) and Bids ($QTAB_{ij}^n$) are the amounts of QAO_{ij}^n and QAB_{ij}^n respectively which were excluded from the System Price Stacks by De Minimis Tagging, Arbitrage Tagging, NIV Tagging and/or PAR Tagging.
- Period BM Unit Repriced Accepted Volume of Offers ($QRAO_{ij}^n$) and Bids ($QRAB_{ij}^n$) are the amounts

| |
|---|
| <p>of QAO_{ij}^n and QAB_{ij}^n respectively which were not NIV tagged (i.e. remain on the System Price Stacks after NIV Tagging) but which were Classified as Second-Stage Flagged and therefore subject to the Replacement Price.</p> <p>c. Period BM Unit Originally-priced Accepted Volume of Offers ($QOAO_{ij}^n$) and Bids ($QOAB_{ij}^n$) are the amounts of QAO_{ij}^n and QAB_{ij}^n respectively which were not NIV tagged (i.e. remain on the System Price Stacks after NIV Tagging) and were not Classified as Second-Stage Flagged and therefore not subject to the Replacement Price.</p> |
| <p>11. Calculate Reported Acceptance Volumes</p> <p>It is now possible to calculate the following reported derived values:</p> <p>a. The System Total Priced Accepted Volume of Offers ($TQPAO_j$) and Bids ($TQPAB_j$) are the sum of QAO_{ij}^n and QAB_{ij}^n respectively which were not Classified as Second-Stage Flagged.</p> <p>b. System Total Tagged Accepted Volume of Offers ($TQTAO_j$) and Bids ($TQTAB_j$) are the sum of QAO_{ij}^n and QAB_{ij}^n respectively which were excluded from the System Price Stacks by De Minimis Tagging, Arbitrage Tagging, NIV Tagging and/or PAR Tagging.</p> <p>c. System Total Repriced Accepted Volume of Offers ($TQRAO_j$) and Bids ($TQRAB_j$) are the sum of QAO_{ij}^n and QAB_{ij}^n respectively which were not NIV tagged (i.e. remain on the System Price Stacks after NIV Tagging) but which were Classified as Second-Stage Flagged and therefore subject to the Replacement Price.</p> <p>d. System Total Originally-priced Accepted Volume of Offers ($TQOAO_j$) and Bids ($TQOAB_j$) are the sum of QAO_{ij}^n and QAB_{ij}^n respectively which were not NIV tagged (i.e. remain on the System Price Stacks after NIV Tagging) and were not Classified as Second-Stage Flagged and therefore not subject to the Replacement Price.</p> |
| <p>12. Calculate Reported Adjustment Volumes</p> <p>It is now possible to calculate the following reported derived values:</p> <p>a. Total System Adjustment Volume of Buy Items ($TSVA_j$) and Sell Items ($TBSVA_j$) are the sum of $QBSAB_j^m$ and $QBSAS_j^m$ respectively.</p> <p>b. Total System Tagged Adjustment Volume of Buy Items ($TSTVA_j$) and Sell Items ($TBSVA_j$) are the sum of $QBSAB_j^m$ and $QBSAS_j^m$ respectively which were excluded from the System Price Stacks by De Minimis Tagging, Arbitrage Tagging, NIV Tagging and/or PAR Tagging.</p> <p>c. Total System Repriced Adjustment Volume of Buy Items ($TSRVA_j$) and Sell Items ($TBRVA_j$) are the sum of $QBSAB_j^m$ and $QBSAS_j^m$ respectively which were not NIV tagged (i.e. remain on the System Price Stacks after NIV Tagging) but which were Classified as Second-Stage Flagged and therefore subject to the Replacement Price.</p> <p>d. Total System Originally-priced Adjustment Volume of Buy Items ($TSOVA_j$) and Sell Items ($TBOVA_j$) are the sum of $QBSAB_j^m$ and $QBSAS_j^m$ respectively which were not NIV tagged (i.e. remain on the System Price Stacks after NIV Tagging) and were not Classified as Second-Stage Flagged and therefore not subject to the Replacement Price.</p> |
| <p>13. The Total NIV Tagged Volume for a Settlement Period can now be calculated as:</p> $TCQ_j = \{ \sum_w QSB_j^w - \sum_w QSS_j^w \} / 2$ <p>where</p> <p>\sum_w represents the sum over all System Actions which are NIV Tagged.</p> |
| <p>14. The actual Net Imbalance Volume (NIV) for each Settlement Period can then be calculated as follows:</p> $NIV_j = \sum_w QSB_j^w - \sum_w (-QSS_j^w)$ <p>where</p> <p>\sum_w represents the sum over all System Actions that are not De Minimis Tagged System Actions, and not Arbitrage Tagged System Actions.</p> |

15. 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** then the System Buy Price will be determined as follows:

$$SBP_j = \frac{\{\sum_i \sum^n \sum^k \{QAO_{ij}^{kn} * PO_{ij}^n * TLM_{ij}\} + \sum^m \{QBSAB_j^m * BSAP_j^m\}\} + \{BPA_j\}}{\{\sum_i \sum^n \sum^k \{QAO_{ij}^{kn} * TLM_{ij}\} + \sum^m QBSAB_j^m\}} \quad 17$$

where

\sum_i represents the sum over all BM Units;

\sum^k represents the sum over all Acceptances;

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

PO_{ij}^n is the Price for the Offer acceptance n, for BM Unit i and Settlement Period j (which may be the Replacement Price);

\sum^m represents the sum over those Balancing Services Adjustment Buy Actions that are not De Minimis Tagged and not Arbitrage Tagged Actions and not NIV Tagged Actions and not PAR Tagged Actions;

$BSAP_j^m$ is the Price for the Balancing Services Adjustment Buy Action m for Settlement Period j (which may be the Replacement Price); 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:

$$SBP_j = \sum_s \{PXP_{sj} * QXP_{sj}\} / \sum_s QXP_{sj} \quad 18$$

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 $SBP_j = SSP_j$ ¹⁹ ;

(b) If for that Settlement Period $SBP < SSP$, i.e. there is a negative spread, then $SBP_j = SSP_j$ ²⁰ .

If, for any Settlement Period, the Net Imbalance Volume is **zero** ²¹ then the System Buy Price will be determined as:

$$SBP_j = \sum_s \{PXP_{sj} * QXP_{sj}\} / \sum_s QXP_{sj} \quad 22$$

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.

¹⁷ Price derivation codes A, B, C

¹⁸ Price derivation codes F

¹⁹ Price derivation codes H

²⁰ Price derivation codes G

²¹ Price derivation codes K, L

²² Price derivation codes K

If for that Settlement Period $\sum_s QXP_{sj}$ is equal to zero, then $SBP_j = 0$ ²³.

16. 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** then the System Sell Price will be determined as follows:

$$SSP_j = \frac{\{\sum_i \sum^n \sum^k \{QAB_{ij}^{kn} * PB_{ij}^n * TLM_{ij}\} + \sum^m \{QBSAS_j^m * BSAP_j^m\}\} + \{SPA_j\}^{24}}{\{\sum_i \sum^n \sum^k \{QAB_{ij}^{kn} * TLM_{ij}\} + \sum^m QBSAS_j^m\}}$$

where

\sum_i represents the sum over all BM Units;

\sum^k represents the sum over all Acceptances;

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

PB_{ij}^n is the Price for the Bid acceptance n, for BM Unit i and Settlement Period j (which may be the Replacement Price);

\sum^m represents the sum over those Balancing Services Adjustment Sell Actions that are not De Minimis Tagged and not Arbitrage Tagged Actions and not NIV Tagged Actions and not PAR Tagged Actions;

$BSAP_j^m$ is the Price for the Balancing Services Adjustment Buy Action m for Settlement Period j (which may be the Replacement Price); 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:

$$SSP_j = \sum_s \{PXP_{sj} * QXP_{sj}\} / \sum_s QXP_{sj}$$
²⁵

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 $SSP_j = SBP_j$ ²⁶.

(b) If for that Settlement Period $SSP > SBP$, i.e. there is a negative spread, then $SSP_j = SBP_j$ ²⁷.

If for any Settlement Period the Net Imbalance Volume is **zero**²⁸ then the System Sell Price will be determined as:

$$SSP_j = \sum_s \{PXP_{sj} * QXP_{sj}\} / \sum_s QXP_{sj}$$
²⁹

where

²³ Price derivation codes L

²⁴ Price derivation codes F, G, H

²⁵ Price derivation codes A

²⁶ Price derivation codes C

²⁷ Price derivation codes B

²⁸ Price derivation codes K, L

²⁹ Price derivation codes K

\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 $SSP_j = 0$ ³⁰.

17. The 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 both of the Price Adjustment parameters.

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

Market Index Data is received from Market Index Data Providers through the automatic flow SAA-I030.

The SAA shall, for the purposes of performance reporting, record details of those cases where:

1. 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
2. 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.

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.

Non-Functional Requirement:

³⁰ Price derivation codes L

5.10 SAA-F010: Calculate interconnector error

| | | | |
|---|--|---|---|
| Requirement ID: SAA-F010 | Status: M | Title: Calculate interconnector error | BSC reference: SAA BPM 3.10, RETA ERR 3, CP555, CP632 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |
| Functional Requirements: | | | |
| A number of intermediate calculations are required to produce the interconnector error. All calculation steps in this requirement are included here. | | | |
| <p>1: The BM Unit Metered Volumes for Interconnector Users (QM_{ij}) shall be summed by Interconnector. These values are received from the Interconnector Administrator.</p> <p>Note that where a volume is not specified for an Interconnector User BM Unit, no value is loaded. Where that volume is required in processing functions, a default value of zero is applied by the processing function.</p> <p>Where a revised, or late, flow is received from an External Interconnector Administrator after the Interim Information Settlement Run has been issued for the relevant Settlement Day (s), then the flow shall not be automatically loaded, but instead the SAA should contact BSCCo Ltd and ask what action should be taken. BSCCo Ltd will then indicate to SAA whether or not to load the data. The SAA must be able to manually load the data if instructed to do so by BSCCo Ltd.</p> | | | |
| <p>2: The aggregated BM Unit Metered Volumes for Interconnector Users (ΣQM_{ij}) (obtained above) shall be compared with the aggregated meter reading (IMV_j) (obtained from the Interconnector Metered Flow from the CDCA). The difference is the Interconnector Error Administrator Volume ($ErrorVol_j$) which shall be allocated to the Interconnector Error Administrator BM Unit (or IEA BM unit).</p> <p>A positive (or zero) Error Volume is assigned to the production IEA BM Unit with zero assigned to the consumption IEA BM Unit; a negative Error Volume is assigned to the consumption IEA BM Unit with zero is assigned to the production IEA BM Unit.</p> <p>Formally:</p> $ErrorVol_j = IMV_j - \Sigma_i QM_{ij}$ <p>where $ErrorVol_j$ is the error volume for the Interconnector in period j and Σ_i is the sum over all Interconnector User BM Units for the Interconnector</p> <p>For the production IEA BM Unit for the Interconnector $QM_{ij} = \text{Max} (ErrorVol_j, 0)$</p> <p>For the consumption IEA BM Unit for the Interconnector $QM_{ij} = \text{Min} (ErrorVol_j, 0)$</p> <p>Note: All Interconnector Users will have 2 BMU Units i.e. One for Production and Consumption respectively.</p> | | | |

| |
|------------------------------------|
| Non-Functional Requirement: |
| |
| Interfaces: |
| |
| Issues: |
| |

5.11 SAA-F011: Calculate energy imbalance cashflows

| | | | |
|---|--|---|--|
| Requirement ID: SAA-F011 | Status: M | Title: Calculate energy imbalance cashflows | BSC reference: SAA SD 3.24.3, 3.30.1, 3.33, 3.34, 3.35, 3.36, 3.37, SAA BPM 3.11, CR028, P71 |
| 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 cashflows. All calculation steps in this requirement are included here.</p> <p>The SAA shall exclude the System Operator Production and Consumption Imbalance Volumes from the calculations in steps 3, 4, and 5 below.</p> <p>The System Operator Production Imbalance and System Operator Consumption Imbalance shall be reported to all parties on a Settlement Period basis.</p> <p>1: The Account Period Balancing Services Volume, $QABS_{aj}$, shall be calculated as follows:</p> $QABS_{aj} = \sum_{i \in a} QBS_{ij} * TLM_{ij}$ <p>Where</p> <ul style="list-style-type: none"> $\sum_{i \in a}$ represents a sum over all BM Units i for which Energy Account a is the Lead Energy Account; QBS_{ij} is the Period BM Unit Balancing Services Volume and TLM_{ij} is the Transmission Loss Multiplier for BM Unit i in Settlement Period j. <p>The Account Period Bid-Offer Volume represents the net volume of accepted Balancing Mechanism Bids and Offers attributable to each Energy Account a, in Settlement Period j.</p> <p>2: The Account Energy Imbalance, $QAEI_{aj}$, attributable to each Energy Account a in Settlement Period j, shall be calculated. This shall be determined by subtracting the Total Energy Contract Volume ($QABC_{aj}$) and Account Period Balancing Services Volume ($QABS_{ij}$) from the Account Credited Energy Volume ($QACE_{aj}$), as follows:</p> $QAEI_{aj} = QACE_{aj} - QABS_{aj} - QABC_{aj}$ | | | |

Where the Total Energy Contract Volumes for each Energy Account is obtained from the Energy Contract Volume Aggregation Agent.

3: The Total System Energy Imbalance Volume TQEI_j (summed across all Energy Accounts a) shall be calculated as follows:

$$TQEI_j = \sum_a QAEI_{aj}$$

Where \sum_a is the sum of all Energy Accounts for Settlement Period j and a \neq SO Energy Account(s).

4: The Energy Imbalance Cashflow (CAEI_{aj}).shall be calculated for each Energy Account a, in Settlement Period j as follows:

If $QAEI_{aj} > 0$, then

$$CAEI_{aj} = -QAEI_{aj} * SSP_j,$$

Otherwise,

$$CAEI_{aj} = -QAEI_{aj} * SBP_j,$$

Where SSP_j is the System Sell Price and SBP_j is the System Buy Price for Settlement Period j and a \neq SO Energy Account(s).

Thus, the price that applies to the Energy Imbalance Volume of a particular Energy Account shall depend on the net Energy Imbalance Position of that that Energy Account.

5: The Total System Energy Imbalance Cashflow, TCEI_j shall be calculated as:

$$TCEI_j = \sum_a CAEI_{aj}$$

Where a \neq SO Energy Account(s)

This represents the total cashflow relating to settlement of energy imbalances in Settlement Period j.

Non-Functional Requirement:

Interfaces:

Issues:

5.12 SAA-F012: Validate Adjustment Data

| | | | |
|---|--------------------------------|---|------------------------------|
| Requirement ID: SAA-F012 | Status: M | Title: Validate Adjustment Data | BSC reference: P78 |
| Man/auto: Automatic | Frequency: On demand | Volumes: | |
| Functional Requirements: | | | |
| The SAA shall validate Adjustment Data, on receipt, to ensure that: <ol style="list-style-type: none"> One of Energy SVA and Energy BVA must be zero; One of System SVA and System BVA must be zero. Where this is not the case, then the SAA will generate an exception to the Transmission Company (via the SAA-I017) detailing the reason for the exception. | | | |
| Non-Functional Requirement: | | | |
| This function only applies to BSAD data for Settlement Days after, and including the P78 effective date. | | | |
| Interfaces: | | | |
| SAA-I026, SAA-I017 | | | |

5.13 SAA-F013: Calculate information imbalance charges

| | | | |
|---|--|--|--|
| Requirement ID: SAA-F013 | Status: M | Title: Calculate information imbalance charges | BSC reference: SAA SD 3.17.2, 3.20, 3.21, 3.22, 3.23, SAA BPM 3.13, CP596, P71 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |
| Functional Requirements: | | | |
| A number of intermediate calculations are required to produce the information imbalance charges. All calculation steps in this requirement are included here. | | | |
| 1: The Period Expected Meter Volume shall be calculated for each BM Unit in each Settlement Period as follows: $QME_{ij} = FPN_{ij} + QBS_{ij}$ Where FPN_{ij} is the Period FPN and QBS_{ij} is the Period BM Unit Balancing Services Volume. This is the volume of energy that a particular BM Unit is expected to produce or consume in Settlement Period j. | | | |

2: The Period Information Imbalance Volume (QII_{ij}) shall be calculated for each BM Unit in each Settlement Period as follows:

$$QII_{ij} = |QM_{ij} - QME_{ij}|$$

This is the modulus of the difference between the Period Metered Volume (QM_{ij}) and the Period Expected Metered Volume QME_{ij}

3: The Information Imbalance Charge (CII_{ij}) shall be calculated for each BM Unit in each Settlement Period. CII_{ij} is calculated by multiplying the Information Imbalance Volume, QII_{ij} , by the appropriate Information Imbalance Price, ($IIP1_{ij}$ or $IIP2_{ij}$).

FPN flags apply to BM Units, the Lead Party will identify BM Units for which the flag will be set to 'N', the default value will be 'Y'. This flag will be used to indicate whether a Party is required to submit an accurate FPN for a particular BM Unit or not. The Lead Party will set these FPN flags through the CRA Interfaces.

The Information Imbalance Charge will be calculated as follows:

```

If FPN Flag is set to 'Y' then
  CIIij = QIIij * IIP1ij
Else
  CIIij = QIIij * IIP2ij
Endif

```

where

IIP1_{ij} is the Information Imbalance Price 1 and
IIP2_{ij} is the Information Imbalance Price 2.

These are both half-hourly variables, SAA will be notified by BSCCo Ltd. Both variables will initially be set to zero for all Settlement Periods.

4: The Total System Information Imbalance Charge, $TCII_j$, shall be calculated for each settlement period as:

$$TCII_j = \sum_i CII_{ij}$$

Where \sum_i is the sum over all values of BM Unit i.

Non-Functional Requirement:

Interfaces:

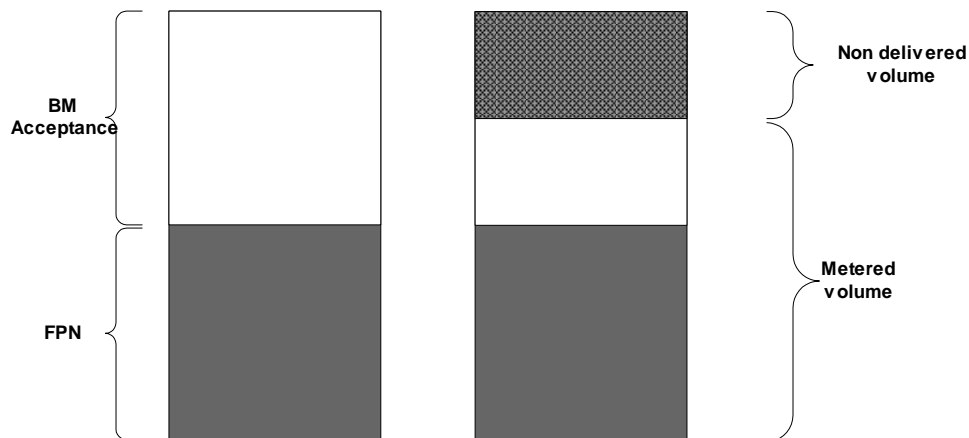
Issues:

5.14 SAA-F014: Calculate non-delivery volumes

| | | | |
|-----------------------------|--|--|--|
| Requirement ID: SAA-F014 | Status: M | Title: Calculate non-delivery volumes | BSC reference: SAA SD 3.38, 3.39, 3.40, 3.41, 3.42, SAA BPM 3.14 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |

Functional Requirement:

Non-delivery arises when there is a BM Unit imbalance in the opposite direction to the volume of accepted Offers and Bids, integrated over the Settlement Period. The following diagram illustrates a non-delivered volume.



A large number of intermediate calculations are required to produce the non delivery volumes. All calculation steps in this requirement are included here.

1: The Period BM Unit Non-Delivered Offer Volume ($QNDO_{ij}$) shall be calculated for each BM Unit i in each Settlement Period j by processing the Period Expected Metered Volume (QME_{ij}), Period Meter Volume (QM_{ij}), and Period Accepted Offer Volume ($\sum^n QAO^n_{ij}$) as follows:

$$QNDO_{ij} = \text{Min}\{\text{Max}\{QME_{ij} - QM_{ij}, 0\}, \sum^n QAO^n_{ij}\}$$

2: The Period BM Unit Non-Delivered Bid Volume ($QNDB_{ij}$) shall be calculated for each BM Unit I in each Settlement Period j by processing the Expected Period Meter Volume (QME_{ij}), Period Meter Volume (QM_{ij}), and Period Accepted Bid Volume ($\sum^n QAB^n_{ij}$) as follows:

$$QNDB_{ij} = \text{Max}\{\text{Min}\{QME_{ij} - QM_{ij}, 0\}, \sum^n QAB^n_{ij}\}$$

Note that Bid volumes are negative, and so is the non-delivered Bid volume by this

definition.

3: The Offer Non-Delivery Volume ($QNDO_{ij}^n$) shall be calculated as follows.

If $QNDO_{ij} > 0$, then the Period BM Unit Non-Delivered Offer Volume is apportioned across accepted Offers to determine values of Offer Non-Delivery Volume.

In each Settlement Period, the set of all accepted Offers (i.e. Offers for which $QAO_{ij}^n > 0$) is considered. This set of Offers is then ranked from highest price to lowest price. The Non-Delivery Order Number u is used for this purpose. The Offer with the highest price is allocated a Non-Delivery Order Number of $u=1$, the next highest priced Offer is allocated a Non-Delivery Order Number $u=2$ and so on until all Offers in the Settlement Period is allocated a Non-Delivery Order Number.

The set of Offers $\{QAO_{ij}^{n1}, QAO_{ij}^{n2}, \dots, QAO_{ij}^{nu}\}$ is therefore the ranked set of Offers. The Offer Non-Delivery Volume is allocated to the highest priced Offers first. The apportionment continues until the Period BM Unit Non-Delivered Offer Volume is fully apportioned or all available Offer Volumes have been used up.

Thus, the Offer Non Delivery Volume for Offer n , is:

$$QNDO_{ij}^n = \text{Min}(QAO_{ij}^{nu}, RQNDO_{ij}^{u-1})$$

Where $RQNDO_{ij}^{u-1}$ is the Remaining Period BM Unit Non-Delivered Offer Volume determined as:

$$RQNDO_{ij}^u = RQNDO_{ij}^{u-1} - QNDO_{ij}^{u-1}$$

$$\text{and } RQNDO_{ij}^0 = QNDO_{ij},$$

$$\text{and } QNDO_{ij}^{n0} = 0$$

4: The Bid Non-Delivery Volume ($QNDB_{ij}^n$) shall be calculated as follows

If $QNDB_{ij} < 0$, then the Period BM Unit Non-Delivered Bid Volume is apportioned across accepted Bids to determine values of Bid Non-Delivery Volume.

In each Settlement Period, the set of all accepted Bids (i.e. Bids for which $QAB_{ij}^n < 0$) is considered. This set of Bids is then ranked from lowest price to highest price. The Non-Delivery Order Number, u is used for this purpose. The Bid with the lowest price is allocated a Non-Delivery Order Number of $u=1$, the next lowest priced Offer is allocated a Non-Delivery Order Number $u=2$ and so on until all Bids in the Settlement Period are allocated a Non-Delivery Order Number.

The set of Bids $\{QAB_{ij}^{n1}, QAB_{ij}^{n2}, \dots, QAB_{ij}^{nu}\}$ is therefore the ranked set of Bids.

The Bid Non-Delivery Volume is allocated to the lowest priced Bids first. The apportionment continues until the Period BM Unit Non-Delivered Bid Volume is fully apportioned or all available Bid Volumes have been used up.

Thus, the Bid Non Delivery Volume for Bid n , is:

$$QNDB_{ij}^n = \text{Max}(QAB_{ij}^{nu}, RQNDB_{ij}^{u-1})$$

Where $RQNDB^{u-1}_{ij}$ is the Remaining Period BM Unit Non-Delivered Bid Volume determined as:

$$RQNDB^u_{ij} = RQNDB^{u-1}_{ij} - QNDB^{nu-1}_{ij}$$

$$\text{and } RQNDB^0_{ij} = QNDB_{ij}$$

$$\text{and } QNDB^{no}_{ij} = 0$$

Non-Functional Requirement:

Interfaces:

Issues:

5.15 SAA-F015: Calculate non-delivery charges

| | | | |
|---|---|---|---|
| Requirement ID: SAA-F015 | Status: M | Title: Calculate non-delivery charges | BSC reference: SAA SD 3.43, 3.44, 3.45, 3.46, SAA BPM 3.14, SAA WK1 Action 30 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |
| Functional Requirement: | | | |
| A number of intermediate calculations are required to produce the non delivery charges. All calculation steps in this requirement are included here. | | | |
| <p>1: The Non-Delivered Offer Charge (CNDOⁿ_{ij}) shall be calculated for the non-delivery of Offer n in Settlement Period j from BM Unit i, as follows:</p> $CNDO_{ij}^n = QNDO_{ij}^n * \text{Max} \{ (PO_{ij}^n - SBP_j), 0 \} * TLM_{ij}$ <p>Where SBP_j is the System Buy Price, POⁿ_{ij} is the Offer Price and TLM_{ij} is the Transmission Loss Multiplier for that BM Unit and Settlement Period.</p> | | | |
| <p>1: The Non-Delivered Offer Charge (CNDOⁿ_{ij}) shall be calculated for the non-delivery of Offer n in Settlement Period j from BM Unit i, as follows:</p> $CNDO_{ij}^n = QNDO_{ij}^n * \text{Max} \{ (PO_{ij}^n - SBP_j), 0 \} * TLM_{ij}$ <p>Where SBP_j is the System Buy Price, POⁿ_{ij} is the Offer Price and TLM_{ij} is the Transmission Loss Multiplier for that BM Unit and Settlement Period.</p> | | | |
| <p>2: The Non-Delivered Bid Charge (CNDBⁿ_{ij}) shall be calculated for the non-delivery of Bid n in Settlement Period j from BM Unit i, as follows:</p> $CNDB_{ij}^n = QNDB_{ij}^n * \text{Min} \{ (PB_{ij}^n - SSP_j), 0 \} * TLM_{ij}$ <p>Where SSP_j is the System Sell Price, PBⁿ_{ij} is the Bid Price and TLM_{ij} is the Transmission Loss Multiplier for that BM Unit and Settlement Period.</p> <p>Note that this is a product of two negative numbers that results in a positive charge (or zero).</p> | | | |
| <p>2: The Non-Delivered Bid Charge (CNDBⁿ_{ij}) shall be calculated for the non-delivery of Bid n in Settlement Period j from BM Unit i, as follows:</p> $CNDB_{ij}^n = QNDB_{ij}^n * \text{Min} \{ (PB_{ij}^n - SSP_j), 0 \} * TLM_{ij}$ <p>Where SSP_j is the System Sell Price, PBⁿ_{ij} is the Bid Price and TLM_{ij} is the Transmission Loss Multiplier for that BM Unit and Settlement Period.</p> | | | |

| |
|--|
| Note that this is a product of two negative numbers that results in a positive charge (or zero). |
| 3: The BM Unit Period Non-Delivery Charge (CND _{ij}) shall be calculated for the non-delivery of Bids and Offers in Settlement Period j from BM Unit i, as follows: |
| $CND_{ij} = \sum^n (CNDO_{ij}^n + CNDB_{ij}^n)$ |
| 4: The Total System Non-Delivery Charge (TCND _j) shall be calculated for the non-delivery of Bids and Offers in Settlement Period j, summed across all BM Units, as follows: |
| $TCND_j = \sum_i CND_{ij}$ |
| Non-Functional Requirement: |
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| Interfaces: |
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| Issues: |
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5.16 SAA-F016: Calculate system operator BM cashflow

| | | | |
|---|---|---|---|
| Requirement ID: SAA-F016 | Status: M | Title: Calculate system operator BM cashflow | BSC reference: SAA SD 3.48, SAA BPM 3.15, CP632 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |
| Functional Requirement: | | | |
| The System Operator BM cashflow (CSOBM _j) shall be calculated by subtracting the Total System Non-Delivery Charge (TCND _j) from the Total System BM Cashflow (TCBM _j) for each Settlement Period. Specifically: | | | |
| $CSOBM_j = TCBM_j - TCND_j$ | | | |
| Non-Functional Requirement: | | | |
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| Interfaces: | | | |
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| Issues: | | | |
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5.17 SAA-F017: Calculate residual cashflows

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|--|--|---|--|
| Requirement ID: SAA-F017 | Status: M | Title: Calculate residual cashflows | BSC reference: SAA SD 3.49.1, 3.50, 3.51, 3.52, SAA BPM 3.16, CR016, CP632, CP532 CP1222 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |
| Functional Requirement: | | | |
| A number of intermediate calculations are required to produce the residual cashflows. All calculation steps in this requirement are included here. | | | |
| 1: The Total System Residual Cashflow (TRC_j) shall be calculated as follows: $TRC_j = TCII_j + CSOBM_j + TCND_j - TCBM_j + TCEI_j$ This represents any net difference between total payments and receipts to and from BSC Parties for a particular Settlement Period. It therefore considers the Total System Information Imbalance Charge ($TCII_j$), Total System Non-Delivery Charge ($TCND_j$), System Operator BM Cashflow ($CSOBM_j$), Total System BM Cashflow ($TCBM_j$) and Total System Energy Imbalance Cashflow ($TCEI_j$). | | | |
| 2: The Residual Cashflow Reallocation Proportion ($RCRP_{aj}$) to be allocated to each Energy Account (excluding the SO's account) in each Settlement Period shall be calculated as follows: $RCRP_{aj} = \{ \sum_i^+ (QCE_{aij}) + \sum_i^- (-QCE_{aij}) \} / \sum_a \{ \sum_i^+ (QCE_{aij}) + \sum_i^- (-QCE_{aij}) \}$ where \sum_i^+ is, for each Account a in Settlement Period j, the sum over all BM Units i that are in delivering Trading Units (i.e. every Trading Unit t where $\sum_{i \in t} QM_{ij} \geq 0$), and \sum_i^- is, for each Account a in Settlement Period j, the sum over all BM Units i that are in offtaking Trading Units (i.e. every Trading Unit t where $\sum_{i \in t} QM_{ij} < 0$) is a Consumption Account. | | | |
| Note that $\sum_a RCRP_{aj}$ should be equal to one. This represents the proportion of the Credited Energy Volume attributed to each Energy Account a for all BM Units i in each Settlement Period j divided by the Total Credited Energy across all Energy Accounts and all BM Units in that Settlement Period. | | | |
| 3: The Residual Cashflow Reallocation Denominator ($RCRD_j$) in each Settlement Period shall be defined as the denominator in the expression for $RCRP_{aj}$ above. | | | |
| 4: The Residual Cashflow Reallocation Cashflow ($RCRC_{aj}$) shall be calculated by multiplying the Residual Cashflow Reallocation Proportion with the Total System Residual Cashflow, as follows: $RCRC_{aj} = RCRP_{aj} * TRC_j$ This represents the proportion of the Total System Residual Cashflow allocated to the | | | |

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| Energy Account a. |
| Non-Functional Requirement: |
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| Interfaces: |
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| Issues: |
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5.18 SAA-F018: Allocate BSCCo Ltd Costs (Redundant)

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|---|---|---|--|
| Requirement ID: SAA-F018 | Status: M | Title: Allocate BSCCo Ltd Costs | BSC reference: SAA SD 3.47, SAA BPM 3.16, CR016, CR028 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |
| Functional Requirement: | | | |
| A number of intermediate calculations are required to produce the allocation of BSCCo Ltd costs. All calculation steps in this requirement are included here. | | | |
| 1: The Balancing and Settlement Code Company (BSCCo Ltd) Costs shall be notified to the SAA by BSCCo Ltd. | | | |
| 2: A proportion of these BSC Co costs be charged out pro-rata as explained below, and the remaining proportion be charged out pro-rata on the modulus of all notified Energy Contract volumes (ECQ _{zba_j}). The System Operators' (SO) Energy Contract Volumes and Credited Energy Volumes will be excluded from these calculations. | | | |
| (i) $\Sigma^{+}(QCE_{aij})$, where Σ^{+} is, for each Account a in Settlement Period j, the sum over all BM Units i that are in delivering Trading Units (i.e. each Trading Unit t where $\Sigma_{i \in t} QM_{ij} \geq 0$); and | | | |
| (ii) $\Sigma^{-}(QCE_{aij})$, where Σ^{-} is, for each Account a in Settlement Period j, the sum over all BM Units i that are in offtaking Trading Units (i.e. each Trading Unit t where $\Sigma_{i \in t} QM_{ij} < 0$) | | | |
| 3: BSCCo Ltd costs shall be recovered monthly, based on a cost forecast, and will reconcile this at year end to total actual costs. | | | |
| Non-Functional Requirement: | | | |
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| Interfaces: | | | |
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| Issues: | | | |
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5.19 SAA-F019: Aggregate charges and payments

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|---|--|---|---|
| Requirement ID: SAA-F019 | Status: M | Title: Aggregate charges and payments | BSC reference: SAA 3.53, SAA BPM 3.17, CP632 |
| Man/auto: Automatic | Frequency: Once, on each settlement run. | Volumes: | |
| Functional Requirement: | | | |
| A number of intermediate calculations are required to produce the aggregated charges and payments. All calculation steps in this requirement are included here. | | | |
| 1: All separate charges and payments shall be aggregated by BSC Party, Settlement Day and charge type, including the following: Balancing Mechanism Cashflows; Residual Cashflow Reallocation Cashflows; Non-Delivery Charges; Information Imbalance Charges; Energy Imbalance Cashflows; System Operator BM Cashflow; BSCCo Ltd Charges. NB: These seven individual charges are calculated separately for each individual BSC Party for each Settlement Day. | | | |
| 2: In addition, the Total Account Charge/Payment shall be calculated by aggregating all the net cashflows for each charge type calculated above to produce a net charge/payment by BSC Party per Settlement Day. (This shall be calculated for reporting purposes only.) | | | |
| Non-Functional Requirement: | | | |
| Interfaces: | | | |
| Issues: | | | |

5.20 SAA-F020: Validate Market Index Data

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|---|--------------------------------|---|------------------------------|
| Requirement ID: SAA-F020 | Status: M | Title: Validate Market Index Data | BSC reference: P78 |
| Man/auto: Automatic | Frequency: On demand | Volumes: | |
| Functional Requirement: | | | |
| The SAA shall validate Market Index Data, on receipt, to ensure that the Market Index Volume is either zero, or it equals or exceeds the Liquidity Threshold for the relevant Market Index Data Provider, Settlement Day, and Settlement Period. If a non-zero Market Index | | | |

Volume is below the defined threshold, then the SAA will default the invalid Market Index Volume and its associated Price to zero, for that Settlement Period.

The occurrence of below threshold, non-zero Market Index Volume is recorded by the SAA for the purposes of performance reporting.

Unless a specific clock change day Liquidity Threshold has been submitted, then, where an Liquidity Threshold is defined for a range of days that spans a 'long' or 'short' day, the following rules will be applied:

For a 'short' day, having 46 Settlement Periods (i.e. the spring clock change when 1am GMT changes to 2am BST):

- Settlement Periods 1 to 2 (00:00 to 01:00 GMT) of the 'short' day take the values of Settlement Periods 1 to 2 (00:00 to 01:00 local time) of the 'normal' day data;
- Settlement Periods 3 to 46 (02:00 to 24:00 BST) of the 'short' day take the values of Settlement Periods 5 to 48 (02:00 to 24:00 local time) of the 'normal' day data;
- Settlement Periods 3 and 4 of the 'normal' day data are not used on a short day.

For a 'long' day, having 50 Settlement Periods (i.e. the autumn clock change when 2am BST changes to 1am GMT):

- Settlement Periods 1 to 4 (00:00 to 02:00 BST) of the 'long' day take the values of Settlement Periods 1 to 4 (00:00 to 02:00 local time) of the 'normal' day data;
- Settlement Periods 5 to 6 (01:00 to 02:00 GMT) of the 'long' day take the values of Settlement Periods 3 to 4 (01:00 to 02:00 local time) of the 'normal' day data;
- Settlement Periods 7 to 50 (02:00 to 24:00 GMT) of the 'long' day take the values of Settlement Periods 5 to 48 (02:00 to 24:00 local time) of the 'normal' day data.

Non-Functional Requirement:

Interfaces:

SAA-I030

Issues:

5.21 SAA-F021: Manage settlement disputes

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|---|---------------------------------|---|--|
| Requirement ID: SAA-F021 | Status: M | Title: Manage settlement disputes | BSC reference: SAA SD 5.1, SAA BPM 3.18 |
| Man/auto: Manual & auto | Frequency: On demand. | Volumes: | |
| Functional Requirement: | | | |
| 1: The SAA shall perform settlement runs in support of disputes, on instruction from BSCCo Ltd. | | | |
| 2: It shall be possible for SAA system operators to create new data or amend existing data for input to a dispute settlement run. | | | |
| 3: The dispute run shall invoke the required calculations for a specific Settlement Period to be re-run. | | | |
| 4: The output from any dispute run, shall be forwarded to the Funds Administration Agent for processing and funds transfer. The SAA provides only the new calculated values to the FAA; the SAA is not required to provide the difference between the new values and the original values. | | | |
| 5: Where the FPN is disputed, an Amended FPN shall be determined. The dispute run (and any future runs pertaining to the disputed Settlement Period) shall be performed against the amended FPN. | | | |
| Non-Functional Requirement: | | | |
| <p>A Dispute may be raised by a BSC Party, the System Operator or by BSCCo Ltd if they object to the results of a Settlement when they believe that the calculation has been undertaken using the wrong data or the calculation does not follow the rules. The Settlement Administration Agent may raise a dispute on behalf of BSC Parties if errors in calculations or data are detected or suspected.</p> <p>The Settlement Administration Agent shall be able to receive individual Dispute notifications from BSC Parties and shall take appropriate action to process the dispute. All dispute notifications shall be logged.</p> <p>The Settlement Administration Agent shall, when requested by the Customer, undertake evaluation, or analysis if requested, of a dispute to determine the facts and its materiality.</p> <p>The Settlement Administration Agent shall, when requested by the Balancing and Settlement Code Company or Panel submit written evidence concerning a particular Dispute, to the Balancing and Settlement Code Panel.</p> <p>The Settlement Administration Agent shall carry out actions in support of disputes within timescales agreed with BSCCo Ltd.</p> | | | |
| Interfaces: | | | |
| The interface requirements SAA-I012 and SAA-I018 describe the Dispute Notifications received by SAA from external parties, and the Dispute Reports produced by the SAA. | | | |

Issues:**5.22 SAA-F022: Provide settlement reports**

| | | | |
|---|--|---|---|
| Requirement ID: SAA-F022 | Status: M | Title: Provide settlement reports | BSC reference: SAA SD, SAA BPM 3.19 |
| Man/auto: Manual & auto | Frequency: Once following each settlement run & on demand. | Volumes: | |
| Functional Requirement: | | | |
| 1: The SAA shall produce all settlement reports in accordance with the Settlement Calendar, listed as external interfaces in section 6. | | | |
| 2: Reports shall be provided to all BSC Parties for general market information, and only to authorised BSC Parties where the information is party specific. The reporting requirements and access rights of each BSC party will be maintained to ensure that reports are only distributed to interested and authorised BSC parties. | | | |
| 3: The SAA shall support an interface to enable changes to reporting requirements and access rights to be administered. | | | |
| 4: Ad-hoc reports shall be supplied to the Customer or BSC Parties, as requested. | | | |
| Non-Functional Requirement: | | | |
| Interfaces: | | | |
| The data requirements for settlement reports are described in SAA-I014. | | | |
| The physical format of externally distributed files is described in the NETA Central Systems Interface Specification. | | | |
| Issues: | | | |

5.23 SAA-F023: Process Market Index Data Provider Liquidity Thresholds

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|--|--------------------------------|--|------------------------------|
| Requirement ID: SAA-F023 | Status: M | Title: Process Market Index Data Provider Liquidity Thresholds | BSC reference: P78 |
| Man/auto: Manual/ Automatic | Frequency: On demand | Volumes: | |
| Functional Requirement: | | | |
| The SAA shall carry out the following validation on MIDP Liquidity Thresholds: | | | |
| (a) Where the Action is 'Insert', then the effective date range of the Liquidity Threshold record must not overlap with any existing record for that MIDP; | | | |
| (b) Where the Action is 'Update', then the 'Effective From Settlement Date' must match the Effective From Settlement Date of an existing Liquidity Threshold record for that MIDP; | | | |

- (c) Where the Action is 'Delete', then the 'Effective From Settlement Date' must match the Effective From Settlement Date of an existing Liquidity Threshold record for that MIDP.

In cases where a change in MIDP Liquidity Threshold would be retrospective, the SAA will confirm correctness with BSCCo before applying the update.

If a retrospective change to MIDP Liquidity Thresholds requires Market Index Data to be resubmitted (in order to be revalidated), then a check will be made by SAA to confirm that this does occur. BSCCo will communicate the details of what files will be resubmitted, from which Market Index Data Providers, along with details of the timeframe in which this should occur. Where files are not re-submitted within the expected timeframe, then this will be escalated to BSCCo.

Changes to Liquidity Thresholds, retrospective or otherwise, will not be applied to existing Market Index Data.

Where a Liquidity Threshold record fails validation then it is rejected, and the details of the rejection are reported back to BSCCo.

After applying an update, or set of updates, for a given MIDP, the Liquidity Threshold data for current and future dates is reported back to BSCCo, using the SAA-I032 flow.

Non-Functional Requirement:

Interfaces:

SAA-I031, SAA-I032

Issues:

5.24 SAA-F024: Daily Check for Missing Settlement Calculation Data Flows

| | | | |
|---|--|--|---|
| Requirement ID: SAA-F024 | Status: N/a | Title: Daily Check for Missing Settlement Calculation Data Flows | BSC reference: SAA SD 2.1.1, CP639, P71 |
| Man/auto: Manual & Automatic | Frequency: Daily (not related to specific run types) | Volumes: | |
| Functional Requirement: | | | |
| The SAA shall validate certain incoming data flows to check for potential out of sequence files, which would indicate missing Settlement Calculation data. This check will be carried out for the following types of data: <ul style="list-style-type: none"> • Bid Offer Acceptance data; | | | |

| |
|--|
| <ul style="list-style-type: none"> BM Unit Applicable Balancing Services Volume data. <p>The SAA will report a failure of the above check to BSCCo through manual flow SAA-I027 and await further instruction. BSCCo shall immediately respond to the SAA through SAA-I028 with an indication as to whether to proceed with the settlement run, or whether to suspend the run pending further instruction. Instruction on how to proceed shall be received by SAA from BSCCo through SAA-I029. Missing data should be provided within 2 days, otherwise the matter will be escalated.</p> |
| Non Functional Requirement: |
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| Interfaces: |
| See SAA-I027, SAA-I028, SAA-I029 |
| Issues: |
| |

5.25 SAA-F025: Process Withdrawing Party Settlement Details

| | | | |
|--|---------------------------------|--|--------------------------------|
| Requirement ID: SAA-F025 | Status: Mandatory | Title: Process Withdrawing Party Settlement Details | BSC reference: CP974 |
| Man/auto: Manual | Frequency: On request | Volumes: Low | |
| Functional Requirement: | | | |
| The SAA shall provide the information specified by Interface Requirement SAA-I037 to CRA, on request. | | | |
| Settlement details shall be matched to the request by means of the participant name and / or participant id registered in SAA. | | | |
| Non Functional Requirement: | | | |
| | | | |
| Interfaces: | | | |
| SAA-I037: Issue Withdrawing Party Settlement Details. | | | |

5.26 SAA-F026: Process Emergency Acceptance Data

| | | | |
|---|---------------------------------|---|-------------------------------|
| Requirement ID: SAA-F026 | Status: Mandatory | Title: Process Emergency Acceptance Data | BSC reference: P172 |
| Man/auto: Manual | Frequency: On request | Volumes: Low | |
| Functional Requirement: | | | |
| The SAA shall receive from the SO requests for data changes from time to time via the manual interface SAA-I033, which is then agreed between the SAA and BSCCo via the | | | |

manual interfaces SAA-I034 and SAA-I035, and then reported to the SO via the manual interface SAA-I036. These requests may relate to Emergency Instructions, and if so, will be clearly marked 'EMERGENCY INSTRUCTION'. In addition, where the Emergency Instruction is to be treated as an 'Excluded Emergency Acceptance', the request will also include the words 'EXCLUDED EMERGENCY ACCEPTANCE'. Where it is not to be treated as an 'Excluded Emergency Acceptance' the words 'EMERGENCY ACCEPTANCE' will be included in the request.

The SAA shall enter this data manually and perform the next Settlement Run (usually the II Run).

If the Instruction has been determined by the SO to be treated as an Excluded Emergency Acceptance, the following steps should also be performed:

The SAA shall receive recalculated Energy Imbalance Prices to be achieved in the next run from BSCCo via manual interface SAA-I038.

SAA shall calculate and apply any adjustments required:

$$\text{Adjusted BPA}_j = \text{existing BPA}_j + \text{BPA adjustment}_j$$

$$\text{Adjusted SPA}_j = \text{existing SPA}_j + \text{SPA adjustment}_j$$

SAA shall carry out an additional settlement 'dry run' and send confirmation to BSCCo, via manual interface SAA-I039, that the adjustments to BSAD have given the required Energy Imbalance Prices. The SAA will liaise with BSCCo until such time as it is able to confirm that the adjustments to BSAD have generated the required Energy Imbalance Prices. The 'dry run' will only be carried out once the associated CDCA Aggregation Run has been completed. In order to allow sufficient lead time between the 'dry run' and the 'live run' the SAA will not wait for receipt of the relevant data from SVAA (via SAA-I007) but instead use SVAA data from the most recent Settlement Run for the purposes of carrying out the 'dry run'.

The SAA will not conduct the actual live Settlement Run without prior authorisation to do so from BSCCo via manual interface SAA-I040.

The SAA will check and confirm that the amended BSAD has not been overwritten by any other subsequently submitted BSAD data, and that, consequently, the amended BSAD data is used in the live Settlement Run.

Note: Subsequent adjustments for later runs will be processed by iterations of the above manual processing.

Non Functional Requirement:

Interfaces:

SAA-I033: Receive Request for Data Change.
 SAA-I034: Report Recommended Data Change
 SAA-I035: Receive Instruction for Data Change
 SAA-I036: Report Confirmation of Data Change

SAA-I038: Receive Excluded Emergency Acceptance Pricing Information

SAA-I039: Send Excluded Emergency Acceptance Dry Run Results.

SAA-I040: Receive Confirmation of Additional Run Results.

6 Interface Requirements

The SAA Service shall provide an interface to the following external parties.

Other Service Providers:

- Central Registration Agent (CRA)
- Central Data Collection Agent (CDCA)
- Funds Administration Agent (FAA)
- Balancing Mechanism Reporting Agent (BMRA)
- Energy Contract Volume Aggregation Agent (ECVAA)
- Supplier Volume Allocation Agent (SVAA)

Other external parties:

- BSC Party
- BSCCo Ltd
- System Operator (SO)
- Interconnector Administrator (IA)
- Interconnector Error Administrator (IEA)

The SAA Service shall provide inbound and outbound interfaces as summarised in the following table. Each interface requirement is described in detail below.

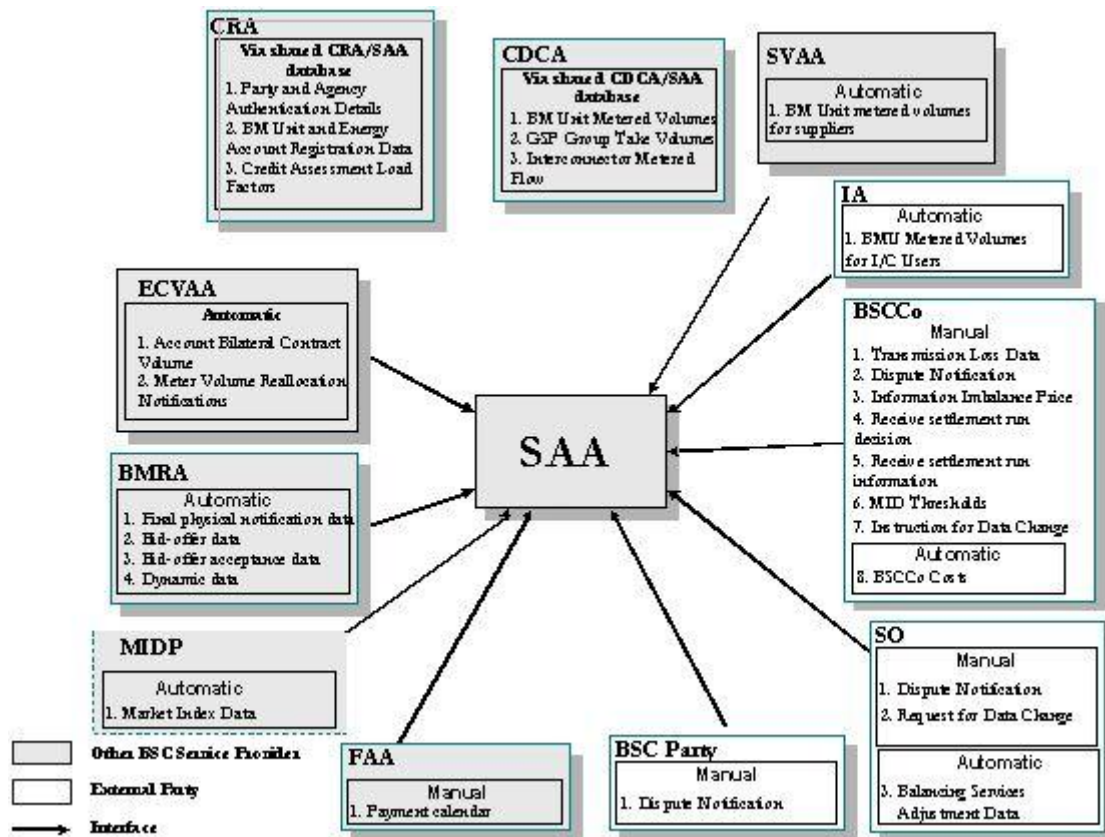
It is the intention that the SAA URS and the IDD should be fully consistent. However, in the event that some inconsistency is found, the definition in the IDD should be assumed to take precedence until such time as the inconsistency can be corrected at the next release of the document.

It is anticipated that the SAA Service will acquire correct and complete operational data from market participants on an ongoing basis. The SAA Service will not be migrating bulk data from any source.

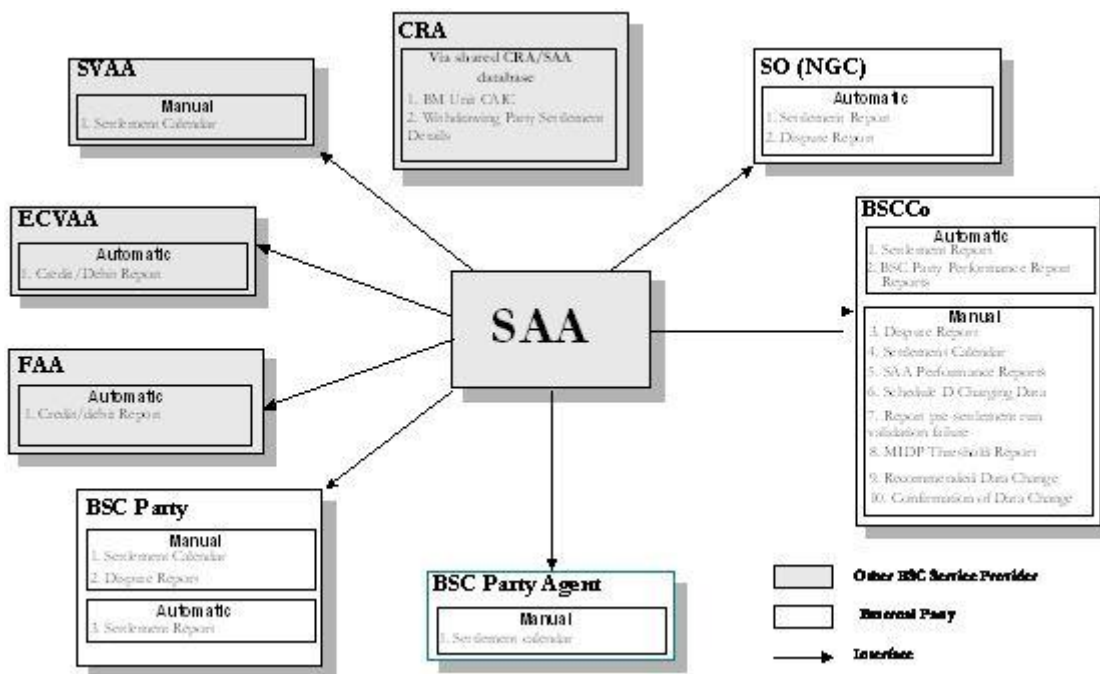
| Req't No. | Interface Requirement | Inbound/ Outbound | Interface User (IU) | Mechanism |
|-----------|---------------------------------------|----------------------|------------------------|---------------------|
| SAA-I001 | Receive Registration Data | Inbound | CRA | Via shared database |
| SAA-I002 | Receive Credit Assessment Load Factor | Inbound | CRA | Via shared database |
| SAA-I003 | Receive Balancing Mechanism Data | Inbound | BMRA | Automatic |
| SAA-I004 | Receive Period Meter Data | Inbound | CDCA | Via shared database |
| SAA-I005 | <i>Requirement not currently used</i> | | | |

| Req't No. | Interface Requirement | Inbound/ Outbound | Interface User (IU) | Mechanism |
|-----------|---|----------------------|--|---------------------|
| SAA-I006 | Receive BM Unit Metered Volumes for Interconnector Users | Inbound | IA | Automatic |
| SAA-I007 | Receive BM Unit Allocated Demand Volume | Inbound | SVAA | Automatic |
| SAA-I008 | Receive Energy Contract Data | Inbound | ECVAA | Automatic |
| SAA-I009 | Receive Transmission Loss Data | Inbound | BSCCo Ltd | Manual |
| SAA-I010 | Receive BSCCo Ltd Costs (Redundant) | Inbound | BSCCo Ltd | Automatic |
| SAA-I011 | Receive Payment Calendar Data | Inbound | FAA | Manual |
| SAA-I012 | Receive Dispute Notification | Inbound | BSC Party, BSCCo Ltd, SO | Manual |
| SAA-I013 | Issue Credit/Debit Reports | Outbound | FAA, ECVAA | Automatic |
| SAA-I014 | Issue Settlement Reports | Outbound | BSC Party, BSCCo Ltd, SO | Automatic |
| SAA-I015 | Issue BM Unit Credit Assessment Import Capability Data | Outbound | CRA | Via shared database |
| SAA-I016 | Publish Settlement Calendar | Outbound | BSC Party, BSC Party Agent, SVAA, BSCCo Ltd | Manual |
| SAA-I017 | Issue SAA Data Exception Reports | Outbound | ECVAA, SO, SVAA, IA, MIDP | Automatic |
| SAA-I018 | Issue Dispute Reports | Outbound | BSC Party, BSCCo Ltd, SO | Manual |
| SAA-I019 | Issue BSC Party Performance Reports (Redundant) | Outbound | BSCCo Ltd | Automatic |
| SAA-I020 | Issue SAA Performance Reports | Outbound | BSCCo Ltd | Manual |
| SAA-I021 | Receive Acknowledgement of SAA Messages | Inbound | All automatic outbound IU | Automatic |
| SAA-I022 | Issue SAA Acknowledgement of Messages | Outbound | All automatic inbound IU | Automatic |
| SAA-I023 | Receive System Parameters | Inbound | BSCCo Ltd | Manual |
| SAA-I025 | SAA BSC Section D Charging Data | Outbound | BSCCo Ltd | Manual |
| SAA-I026 | Receive Balancing Services Adjustment Date | Inbound | SO | Automatic |
| SAA-I027 | Report pre-settlement run validation failure | Outbound | BSCCo Ltd | Manual |
| SAA-I028 | Receive settlement run decision | Inbound | BSCCo Ltd | Manual |
| SAA-I029 | Receive settlement run instructions | Inbound | BSCCo Ltd | Manual |
| SAA-I030 | Receive Market Index Data | Inbound | MIDP | Automatic |
| SAA-I031 | Receive Market Index Data Provider Thresholds | Inbound | BSCCo Ltd | Manual |
| SAA-I032 | Report Market Index Data Provider Thresholds | Outbound | BSCCo Ltd | Manual |
| SAA-I033 | Receive Request for Data Change | Inbound | SO | Manual |
| SAA-I034 | Report Recommended Data Change | Outbound | BSCCo Ltd | Manual |
| SAA-I035 | Receive Instruction for Data Change | Inbound | BSCCo Ltd | Manual |
| SAA-I036 | Report Confirmation of Data Change | Outbound | BSCCo Ltd, SO | Manual |
| SAA-I037 | Issue Withdrawals Checklist - Settlement Data | Outbound | CRA | Via shared database |
| SAA-I038 | Receive Excluded Emergency Accepted Pricing Information | Inbound | BSCCo Ltd | Manual |
| SAA-I039 | Send Excluded Emergency Acceptance Dry Run Results | Outbound | BSCCo Ltd | Manual |
| SAA-I040 | Receive Authorisation To Proceed With Full Settlement Run | Inbound | BSCCo Ltd | Manual |

The following diagrams illustrate these interface requirements.



SAA Service: Inbound Interface Requirements



SAA Service: Outbound Interface Requirements³¹

³¹ Note that details of the SAA-I017 (Data Exception Report) flow have not been included in this diagram, in order to avoid excessive clutter.

| | | | |
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7 Non-functional Requirements

This section specifies the specific non-functional requirements of the SAA Services. Common non-functional requirements are described in CRA URS - Appendix D.

7.1 SAA-N001: Audit Requirements

| | | | |
|--|---|---|--|
| Requirement ID: SAA-N001 | Status: M | Title: Audit Requirements | BSC reference: SAA SD: 5.3.2 |
| Man/auto: Automatic | Frequency: All business transactions | Volumes: Audit information shall be associated with each set of data created by any business transaction. Volumes will be established during detailed design | |
| Non Functional Requirement: | | | |
| <ol style="list-style-type: none"> 1. Sufficient information shall be stored such that the service provider shall be able to demonstrate how the results of any individual settlement calculations were derived. 2. It shall be possible to re-run any individual settlement process to recreate the results exactly as originally generated, as a historic report. This shall include the facility to exclude later versions of business data, for instance meter readings, which were received after the settlement process was originally run. Standard reconciliation runs shall include the current version of all current business data relevant to the trading day of the run, including any data received after the settlement process was originally run. 3. It shall be possible to maintain separate settlement calculation rules applicable to individual trading days, since these rules may change over time. In performing subsequent reconciliations of individual trading days, it shall be possible to apply either the calculation rule which was in force at the date on which the trading day was first settled, or alternatively to apply retrospectively an amended calculation rule if deemed necessary. This application of alternative calculation rules shall also be possible for a historic report which uses the same business data as the original settlement run. 4. Should any settlement run or other report process generate informational, warning or error logs as part of its processing, these logs should be available for inspection by an operator. 5. The Service Provider shall facilitate the following specific requirements of the BSCCo Ltd appointed Auditor. The Service Provider shall facilitate any reasonable audit requirements to ensure: <ol style="list-style-type: none"> a) Data quality is of the required standards for settlement. b) Settlement issues/disputes can be investigated. | | | |

7.2 SAA-N002: Requirement not currently used

| | | | |
|-----------------------------|------------|--|-----------------------|
| Requirement ID: SAA-N002 | Status: | Title: Requirement not currently used | BSC reference: |
| Man/auto: | Frequency: | Volumes: | |
| Non Functional Requirement: | | | |
| | | | |

7.3 SAA-N003: Operational Control

| | | | |
|--|---------------------------|-------------------------------|-----------------------|
| Requirement ID: SAA-N003 | Status: M | Title: Operational Control | BSC reference: |
| Man/auto: Manual & Automatic | Frequency: As required | Volumes: | |
| Non Functional Requirement: The SAA Service operational procedures will be fully defined in the Operational Services Manual. Procedures are likely to include, but not be limited to, the following. | | | |
| <ol style="list-style-type: none"> 1. It shall be possible to perform settlement runs to satisfy “what if” scenarios, especially in order to gauge materiality in the event of disputes. The results of such “what if” calculations should not be available to subsequent reconciliation runs for the relevant trading day unless so confirmed by a suitably authorised operator. 2. The system shall be sized to support the provision of at least ten settlement runs over the course of each working day in order to comply with the requirements of the Settlement Calendar. 3. It shall be possible to run settlement calculations associated with balancing mechanism requirements prior to, and separately from, calculations associated with imbalancing mechanism settlement. 4. Settlement reports associated with a particular settlement run shall be made available for release to all relevant recipients at approximately the same time. Note that the time of receipt of a given report by a particular BSC Party after release by the central system will be dependent on the type and grade of communications service which that BSC Party has chosen to purchase. | | | |

7.4 SAA-N004: Requirement not currently used

| | | | |
|-----------------------------|------------|--|-----------------------|
| Requirement ID: SAA-N004 | Status: | Title: Requirement not currently used | BSC reference: |
| Man/auto: | Frequency: | Volumes: | |
| Non Functional Requirement: | | | |
| | | | |

8 Service Requirements

There are no specific service requirements for the SAA Services. All common service requirements including indicative volumetrics and performance criteria are described in CRA URS - Appendix.

9 User Roles and Activities

The following table describes the user roles which will support the day to day operation of the SAA service.

| Role | Activities |
|----------------------|--|
| System Administrator | Database management Specific aspects of system configuration User account and security management |
| Supervisor | Management of operators Management of standing data updates Co-ordination of creation of the Settlement Calendar Management of planned operational activities to meet Settlement Calendar timescales and service level requirements |

| Role | Activities |
|--------------------|---|
| | Creation of management information reports Support for communication with external parties |
| Operator | Performance of procedures to monitor receipt and processing of information from external parties. Performance of procedures to initiate and monitor settlement runs and reports. Second level support for ad hoc queries raised by external parties |
| Help Desk Operator | First level support for ad hoc queries raised by external parties. Note that the Help Desk facility shall be shared by more than one service provision. |
| Auditor | There shall be a specific user security configuration which allows an external auditor to review data within the system, but prevents the initiation of batch processes or logical edits to business data. |

These roles and activities will be refined and developed in more detail during detailed business process definition.

The following parties are associated with the SAA business processes in the wider context, and may thus be considered as “users” of the service. The detailed functional requirements and data interfaces necessary to support these parties are described earlier in this chapter.

| Role | Summary of Activities related to SAA |
|----------------------------------|---|
| BSCCo Ltd | Receives summary settlement reports from SAA at periodic intervals (daily, weekly, monthly). |
| Balancing Mechanism Operator | Transmits balancing mechanism data (via the BMRA service) to be settled by the SAA service according to Settlement Calendar timescales. |
| BSC Party | Receives detailed settlement reports daily from SAA. |
| CRA | Provides registration data to the SAA which defines the set of items such as the BM Units relevant to each trading period. |
| ECVAA | Provides total energy contract volume associated with each energy account and settlement period. |
| CDCA | Provides metered volumes for BM Units, Interconnectors and GSP Groups as input to the settlement process performed by SAA. |
| SVAA | Provides Supplier Take Energy volumes as input to the settlement process performed by SAA. |
| Interconnector Administrator | Provides BM Unit Metered Volumes for Interconnector Users as input to the settlement process performed by SAA. |
| Funds Administration Agent (FAA) | Receives debit/credit instructions from SAA in order to perform funds clearance. Provides payment calendar annually. |

Appendix A Glossary

A standard NETA glossary is included in the Appendix of the CRA URS.

Appendix B Requirements Compliance Matrix

The following tables show the mapping of requirements defined in this URS document to the requirements set out in the Service Description for Settlement Administration, Change Notices and Clarification Notes.

| Service Description Requirement Number | URS Requirement Reference Number | Notes |
|--|----------------------------------|---|
| 1 | | Overview section therefore no mapping of requirements |
| 2.1.1 | SAA-I003 SAA-F002 | Balancing Mechanism data received from BMRA not SO |
| 2.1.2 | SAA-I026 | |
| 2.2.1 | SAA-I004 SAA-F002 | |
| 2.3.1 | SAA-I008 SAA-F002 | |
| 2.3.2 | SAA-I008 SAA-F002 | |
| 2.4.1 | SAA-I006 SAA-F002 | |
| 2.5.1 | SAA-I007 SAA-F002 SAA-F003 | |
| 2.6.1 | SAA-I001 SAA-F002 | |
| 2.6.2 | SAA-I010 SAA-F002 | |
| 2.6.3 | SAA-I023 | |
| 2.6.4 | SAA-I023 | |
| 2.7.1 | SAA-I001 SAA-I002 SAA-F002 | |
| 2.8.1 | SAA-I011 SAA-F002 | |
| 2.9.1 | SAA-I012 SAA-F002 | |
| 3.1.1 | SAA-F006 | |
| 3.1.2 | SAA-F006 | |
| 3.1.3 | SAA-F006 | |
| 3.2.1 | SAA-F007 | |
| 3.2.2 | SAA-F005 | |
| 3.2.3 | SAA-F005 | |
| 3.2.4 | SAA-F005 | |
| 3.2.5 | SAA-F005 | |
| 3.2.6 | SAA-F005 | |
| 3.2.7 | SAA-F005 | |
| 3.2.8 | SAA-F007 | |
| 3.3.1 | SAA-F005 | |
| 3.3.2 | SAA-F005 | |
| 3.4.1 | SAA-F005 | |
| 3.4.2 | SAA-F005 | |

| Service Description Requirement Number | URS Requirement Reference Number | Notes |
|--|----------------------------------|-------|
| 3.5.1 | SAA-F005 | |
| 3.5.2 | SAA-F005 | |
| 3.5.3 | SAA-F005 | |
| 3.5.4 | SAA-F005 | |
| 3.6.1 | SAA-F005 | |
| 3.7.1 | SAA-F005 | |
| 3.8.1 | SAA-F005 | |
| 3.9.1 | SAA-F005 | |
| 3.9.2 | SAA-F005 | |
| 3.9.3 | SAA-F005 | |
| 3.10.1 | SAA-F005 | |
| 3.11.1 | SAA-F005 SAA-F010 | |
| 3.11.2 | SAA-F010 | |
| 3.12.1 | SAA-F005 | |
| 3.12.2 | SAA-F005 | |
| 3.13.1 | SAA-F005 | |
| 3.13.2 | SAA-F005 | |
| 3.14.1 | SAA-F005 | |
| 3.15.1 | SAA-F007 | |
| 3.15.2 | SAA-F007 | |
| 3.16.1 | SAA-F007 | |
| 3.16.2 | SAA-F007 | |
| 3.17.1 | SAA-F007 | |
| 3.18.1 | SAA-F007 | |
| 3.19.1 | SAA-F005 | |
| 3.19.2 | SAA-F013 | |
| 3.19.3 | SAA-F013 | |
| 3.20.1 | SAA-F005 | |
| 3.21.1 | SAA-F005 | |
| 3.22.1 | SAA-F013 | |
| 3.22.2 | SAA-F013 | |
| 3.23.1 | SAA-F013 | |
| 3.24.1 | SAA-F013 | |
| 3.25.1 | SAA-F013 | |
| | | |
| | | |
| | | |
| | | |
| 3.26.1 | SAA-F009 | |
| 3.27 | SAA-F009 | |
| 3.28 | SAA-F009 | |
| 3.29 | SAA-F005 | |
| 3.30 | SAA-F005 | |
| 3.31.1 | SAA-F009 | |
| 3.31.2 | SAA-F009 | |
| 3.32.1 | SAA-F009 | |
| 3.32.2 | SAA-F009 | |
| 3.33.1 | SAA-F011 | |
| 3.34.1 | SAA-F008 | |
| 3.34.2 | SAA-F008 | |
| 3.34.3 | SAA-F008 | |
| 3.35.1 | SAA-F008 | |
| 3.36.1 | SAA-F011 | |

| Service Description Requirement Number | URS Requirement Reference Number | Notes |
|--|----------------------------------|-------|
| 3.37.1 | SAA-F011 | |
| 3.38.1 | SAA-F011 | |
| 3.39.1 | SAA-F011 | |
| 3.40.1 | SAA-F011 | |
| 3.41.1 | SAA-F014 | |
| 3.41.2 | SAA-F014 | |
| 3.41.3 | SAA-F014 | |
| 3.42.1 | SAA-F014 | |
| 3.43.1 | SAA-F014 | |
| 3.44.1 | SAA-F014 | |
| 3.44.2 | SAA-F014 | |
| 3.44.3 | SAA-F014 | |
| 3.45.1 | SAA-F014 | |
| 3.45.2 | SAA-F014 | |
| 3.45.3 | SAA-F014 | |
| 3.46.1 | SAA-F015 | |
| 3.47.1 | SAA-F015 | |
| 3.48.1 | SAA-F015 | |
| 3.49.1 | SAA-F015 | |
| 3.50.1 | SAA-F018 | |
| 3.50.2 | SAA-F018 | |
| 3.51.1 | SAA-F016 | |
| 3.52.1 | SAA-F017 | |
| 3.53.1 | SAA-F017 | |
| 3.54.1 | SAA-F017 | |
| 3.55.1 | SAA-F017 | |
| 3.56.1 | SAA-F019 | |
| 3.56.2 | SAA-F019 SAA-I013 | |
| 3.56.3 | SAA-F019 | |
| 3.57.1 | SAA-I013 SAA-I014 | |
| 4.1.1 | SAA-I013 SAA-I014 | |
| 4.1.2 | SAA-I013 SAA-I014 | |
| 4.1.3 | SAA-I013 SAA-I014 | |
| 4.1.4 | SAA-I013 SAA-I014 | |
| 4.2.1 | SAA-I013 SAA-I014 | |
| 4.2.2 | SAA-I013 SAA-I014 | |
| 4.2.3 | SAA-I013 SAA-I014 | |
| 5.1.1 | SAA-F021 | |
| 5.1.2 | SAA-F021 | |
| 5.1.3 | SAA-F021 | |
| 5.1.4 | SAA-F021 SAA-I018 | |
| 5.1.5 | SAA-F021 | |
| 5.1.6 | SAA-F021 | |
| 5.2.1 | SAA-F001 SAA-I016 | |

| Service Description Requirement Number | URS Requirement Reference Number | Notes |
|--|----------------------------------|-------|
| 5.2.2 | SAA-F001 | |
| 5.3.1 | SAA-I001 | |
| 5.3.2 | SAA-N001 | |
| 5.3.3 | SAA-I001 | |

| Change Notice or Clarification Note | URS Requirement Reference Number | Notes |
|-------------------------------------|----------------------------------|--|
| CR002 | SAA-F010 | |
| CR003 | SAA-F006 SAA-F009 | |
| CR004 | | not applicable to SAA |
| CR005 | SAA-F008 SAA-I008 | |
| CR006 | SAA-F005 | |
| CR007 | SAA-F018 | |
| CR008 | | not applicable to SAA |
| CR009 | SAA-F005 | |
| CR_18_990909 | | not applicable to SAA |
| CR_990813_06a | | not applicable to SAA |
| CR_990813_06b | SAA-F022 SAA-I014 SAA-N003 | |
| CR_990813_07 | | not applicable to SAA |
| CR_991027_06a | SAA-I014 | |
| CR_991027_06b | | not applicable to SAA |
| CR065 | SAA-I025 | |
| CP555 | SAA-F001 | |
| | SAA-F010 | |
| | SAA-I006 | |
| | SAA-I011 | |
| | SAA-I016 | |
| | SAA-I024 | |
| CP598 | SAA-F002 | |
| CP595 | SAA-I017 | |
| CP596 | SAA-F013 | |
| P8 | SAA-I014 | |
| P18A | SAA-I014 | |
| P2 | SAA-F004 | |
| | SAA-I013 | |
| P71 | SAA-F005 | |
| | SAA-F024 | |
| | SAA-I003 | |
| | SAA-I014 | SAA-I014 changes for P71 are documented in the IDD, however they are included in this cross reference for completeness |
| P78 | SAA-F002 | |
| | SAA-F009 | |
| | SAA-F009a | |
| | SAA-F009b | |
| | SAA-F012 | |
| | SAA-F020 | |
| | SAA-F023 | |

| Change Notice or Clarification Note | URS Requirement Reference Number | Notes |
|-------------------------------------|--|--|
| | SAA-I014 | The SAA-I014 changes for P78 are documented in the IDD, however they are included in this cross reference for completeness |
| | SAA-I017 | |
| | SAA-I020 | |
| | SAA-I026 | |
| | SAA-I030 | |
| | SAA-I031 | |
| | SAA-I032 | |
| CP754 | SAA-I014 | The SAA-I014 changes for CP754 are documented in the IDD, however they are included in this cross reference for completeness |
| CP797 | SAA-I014 | The SAA-I014 changes for CP797 are documented in the IDD, however they are included in this cross reference for completeness |
| CP915 | SAA-I006 | |
| CP975 | SAA-I001 | |
| CP995 | SAA-I003 SAA-I033 SAA-I034 SAA-I035 SAA-I036 | |
| CP974 | SAA-F025 SAA-I037 | |
| P215 | SAA-F001 | |
| CP1283 | SAA-I034 SAA-I035 SAA-I036 | |
| CP1286 | SAA_I003 | |
| P217 | SAA-F009 SAA-I003 SAA-I014 SAA-I023 SAA-I026 | |

Appendix E Price Derivation Code Definitions

The possible values of the Price Derivation Code are defined in the table below. The description gives a brief summary of what the code represents, and the condition detail defines the relevant conditions that cause this related code to be true. Refer to the description of how the System Buy Price and System Sell Price are calculated for further understanding of what these conditions mean.

For Settlement Dates prior to the P217 effective date:

| Code | Description | Condition Detail |
|------|---------------------------------------|---|
| A | SBP = Main price; SSP = Reverse Price | NIV is positive Σ QXP is non zero SBP = NIV; SSP = PXP; QAPO + UEBVA is not zero; SSP is not greater than SBP |
| B | SSP Capped to SBP | NIV is positive Σ QXP is non zero SBP = NIV; SSP = NIV; QAPO + UEBVA is not zero; SSP is greater than SBP |
| C | SSP Defaulted to SBP | NIV is positive Σ QXP is zero SBP = NIV; SSP = NIV; QAPO + UEBVA is not zero |
| D | SBP & SSP Defaulted to Market Price | NIV is positive Σ QXP is non zero SBP = PXP; SSP = PXP; QAPO + UEBVA is zero |
| E | SSP & SBP Defaulted to Zero | NIV is positive Σ QXP is zero SBP = 0; SSP = 0; QAPO + UEBVA is zero |
| F | SSP = Main Price; SBP = Reverse Price | NIV is negative Σ QXP is non zero SBP = PXP; SSP = NIV; QAPB + UESVA is not zero; SSP is not greater than SBP |
| G | SBP Capped to SSP | NIV is negative Σ QXP is non zero SBP = NIV; SSP = NIV; QAPB + UESVA is not zero; SSP is greater than SBP |

| Code | Description | Condition Detail |
|------|-------------------------------------|---|
| H | SBP Defaulted to SSP | NIV is negative $\sum QXP$ is zero SBP = NIV; SSP = NIV; QAPB + UESVA is not zero |
| I | SBP & SSP Defaulted to Market Price | NIV is negative $\sum QXP$ is non zero SBP = PXP; SSP = PXP; QAPB + UESVA is zero |
| J | SSP & SBP Defaulted to Zero | NIV is negative $\sum QXP$ is zero SBP = 0; SSP = 0; QAPB + UESVA is zero |
| K | SSP & SBP Defaulted to Market Price | NIV is zero $\sum QXP$ is non zero SBP = PXP; SSP = PXP; |
| L | SSP & SBP Defaulted to Zero | NIV is zero $\sum QXP$ is zero SBP = 0; SSP = 0; |

For Settlement Dates on or after the P217 effective date (note: Price Derivation Codes D, E, I, and J are not applicable for P217 effective dates):

| Code | Description | Condition Detail |
|------|--|--|
| A | SBP = Main price; SSP = Reverse Price | NIV is positive $\sum QXP$ is non zero SBP = NIV; SSP = PXP; SSP is not greater than SBP |
| B | SSP Capped to SBP | NIV is positive $\sum QXP$ is non zero SBP = NIV; SSP = NIV; SSP is greater than SBP |
| C | SSP Defaulted to SBP | NIV is positive $\sum QXP$ is zero SBP = NIV; SSP = NIV; |
| F | SSP = Main Price; SBP = Reverse Price | NIV is negative $\sum QXP$ is non zero SBP = PXP; SSP = NIV; SSP is not greater than SBP |

| Code | Description | Condition Detail |
|------|-------------------------------------|--|
| G | SBP Capped to SSP | NIV is negative $\sum QXP$ is non zero SBP = NIV; SSP = NIV; SSP is greater than SBP |
| H | SBP Defaulted to SSP | NIV is negative $\sum QXP$ is zero SBP = NIV; SSP = NIV; |
| K | SSP & SBP Defaulted to Market Price | NIV is zero $\sum QXP$ is non zero SBP = PXP; SSP = PXP; |
| L | SSP & SBP Defaulted to Zero | NIV is zero $\sum QXP$ is zero SBP = 0; SSP = 0; |