PUBLIC

P407 ‘Project MARI’

Proposed Solution Summary

Matthew Roper – Design Authority

Version 1.0

16 June 2020

CONTENTS

INTRODUCTION 3
WHAT IS 'PROJECT MARI'? 4
WHAT IS MFRR? 5
PRODUCT DEFINITION 5
TSO-TSO EXCHANGED SHAPE 6
HOW IS EU MFRR ACTIVATED 7
GENERAL EU MFRR PROCESS 8
WHO CAN PARTICPATE? 9
LEGAL DEADLINE 9
SETTLEMENT SOLUTION OVERVIEW 10
TSO INTERFACE 11
PRODUCT SETTLEMENT 12
IMBALANCE SETTLEMENT 17
REPORTING 18
PROPOSED BUSINESS REQUIREMENTS 19

© ELEXON 2020

INTRODUCTION

P407 seeks to align the Balancing and Settlement Code (BSC) with the European Balancing Project MARI (Manually Activated Reserves Initiative) requirements.

This will implement the standard EU mFRR balancing energy product at national level and enable compliance with the obligations stemming from the European Electricity Balancing Guideline (EB GL).

About this document

This is a summary document of the P407 'Project Mari' proposed BSC solution, which ELEXON has submitted to P407 Workgroup members ahead of the first workgroup. It is expected that workgroup members will read and consider the information contained within in order to promote constructive discussion during the workgroups.

There are three parts to this document:

- This is the main document. It provides details of Project MARI, solution and proposed implementation approach. It also contains details of the Workgroup's membership and its full Terms of Reference.

- The proposed Business Requirements that will be used to develop the BSC Systems and P407 legal text.

- Implementation Framework for the European platform for the exchange of balancing energy from frequency restoration reserves with manual activation (hereby referred to as **mFRRIF**) the GB solution is based upon.

© ELEXON 2020

WHAT IS 'PROJECT MARI'?

Project MARI is a balancing product implementation project, developed by European Transmission System Operators (TSOs), including National Grid. It will fulfil the legal requirements on TSOs mandated in the European Electricity Balancing Guideline (EB GL). The EB GL requires those TSOs that use frequency restoration reserves with manual activation (mFRR) to implement and make operational a new European platform for the exchange of energy.

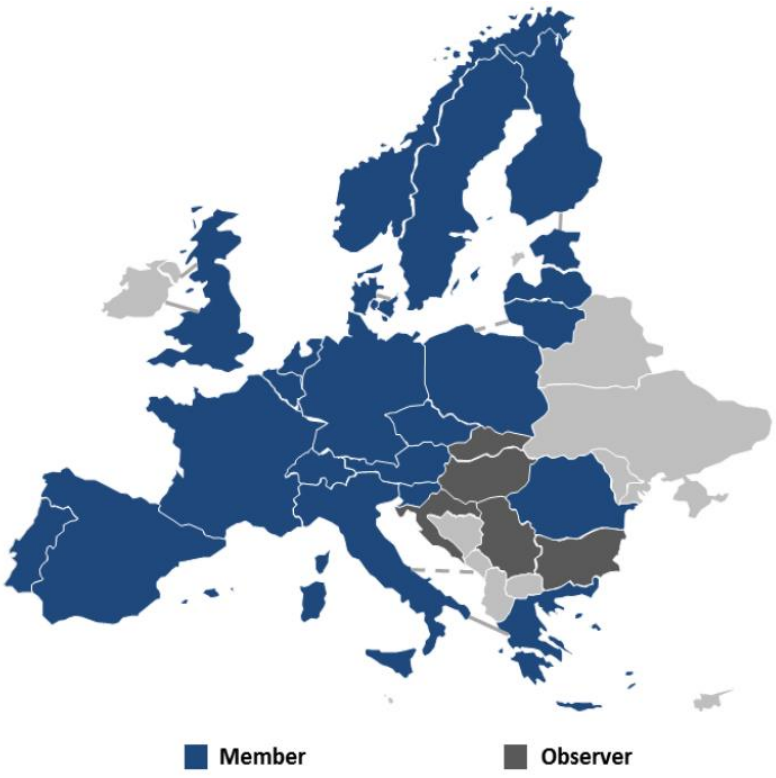


Figure 2: Overview of members and observers as of 29.03.2018

There are currently 24 members of Project MARI and 5 project observers.

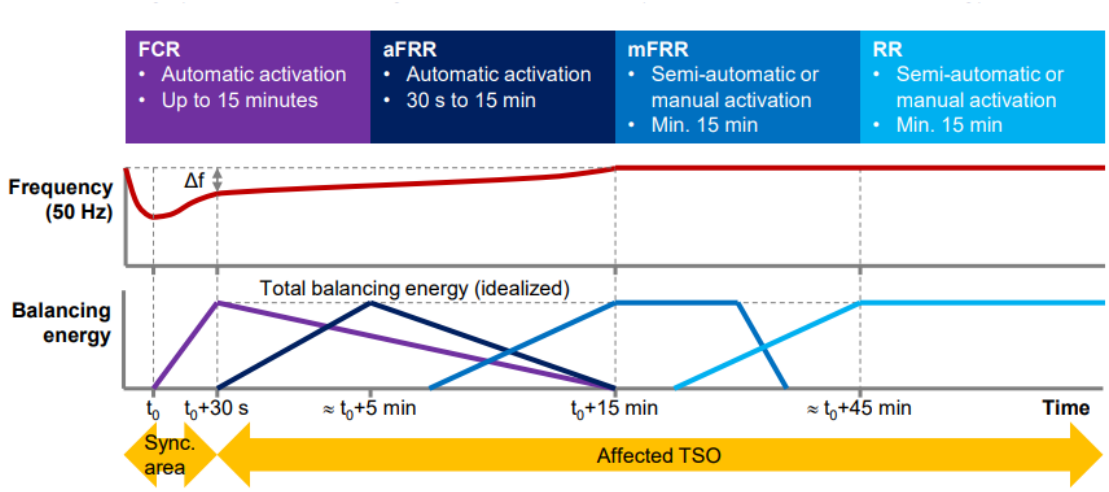
WHAT IS MFRR?

Definition of frequency restoration reserves or 'FRR' means the active power reserves available to restore system frequency to the nominal frequency.

mFRR therefore means Frequency Restoration Reserves with Manual Activation

It is designed work with, and in parallel with the other EU Standard Balancing Products

- Frequency Containment Reserves (FCR)
- Automatic FRR (aFRR)*
- Manual FRR (mFRR)
- Replacement Reserves (RR)



PRODUCT DEFINITION

The standard mFRR balancing energy product has been defined by the central project as follows:

Mode of Activation	Manual
Activation Type	Direct (DA) or Scheduled (SA)
Full Activation Time (FAT)	12.5 minutes
Minimum Quantity	1 MW
Bid Granularity	1 MW
Maximum Quantity	9,999 MW

Minimum Duration of Delivery Period	5 minutes
Price Resolution	0.01 EUR/MWh
Validity Period	Scheduled activation can take place at the point of scheduled activation only. Direct activation can take place at any time during the 15 minutes after the point of scheduled activation.

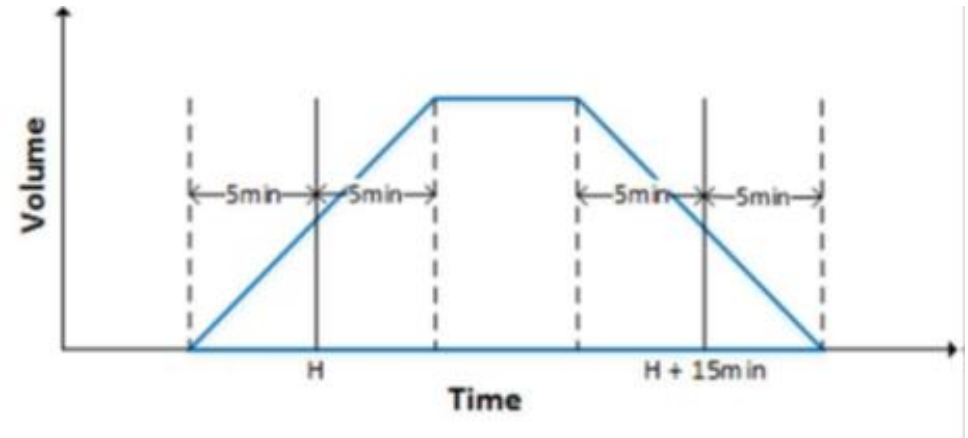
Note that many characteristics have purposefully not been defined by the project and are to be defined locally (i.e. by the TSO) and subject to EBGL Article 18 'Terms and Conditions relating to balancing'.

The full mFRR balancing energy product characteristics are explored in detail in future workgroups.

TSO-TSO EXCHANGED SHAPE

The TSO-TSO exchanged shape refers to how the changes in physical flows resulting from activations of the platform are realized. The TSO-TSO exchanged shape is defined according to the standard product characteristics.

Currently, the TSOs foresee using a linear ramp of 10 minutes for the cross-border exchange. A 10-minute ramp equals the ramp which is already in use for scheduled programs of exchange across Continental Europe.



© ELEXON 2020

The 'BSP-TSO delivered shape' refers to the actual delivery/withdrawal of certain units.

Deviations between the TSO-TSO exchanged shape and BSP-TSO delivered shape will lead to imbalances in the connecting TSOs imbalance area.

Each TSO has the opportunity to define certain product characteristics nationally (e.g. the preparation period, the ramping period, deactivation period, maximum duration of delivery period) in order to incentivize BSPs to follow the TSO-TSO exchanged shape or to incentivize BSPs to react faster.

HOW IS EU MFRR ACTIVATED

mFRR (MARI) has two types of activation **Scheduled Activation (SA)**

- Auction every 15 minutes paid at the clearing price

And Continuous **Direct Activations (DA)**

- Effectively an auction is held every minute from T-7.5 to T+7.5 using bid data for the period T to T+15
- Paid using a conditional price based upon £ DA and £ SA of bid and delivery period.

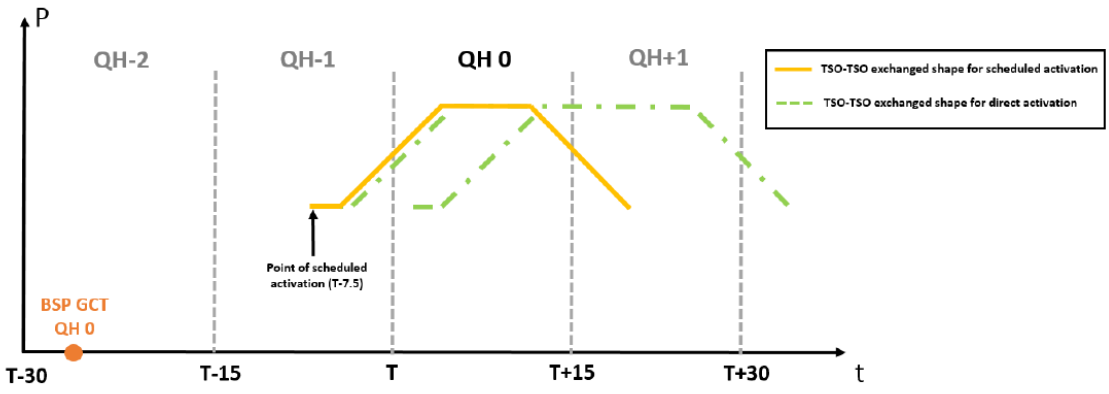


Figure 5: Illustration of the shape of the cross border exchange for a schedule activation and various direct activations

© ELEXON 2020

GENERAL EU MFRR PROCESS

1.5. General mFRR Process

Figure 4 below explains the general process as foreseen for the mFRR-Platform:

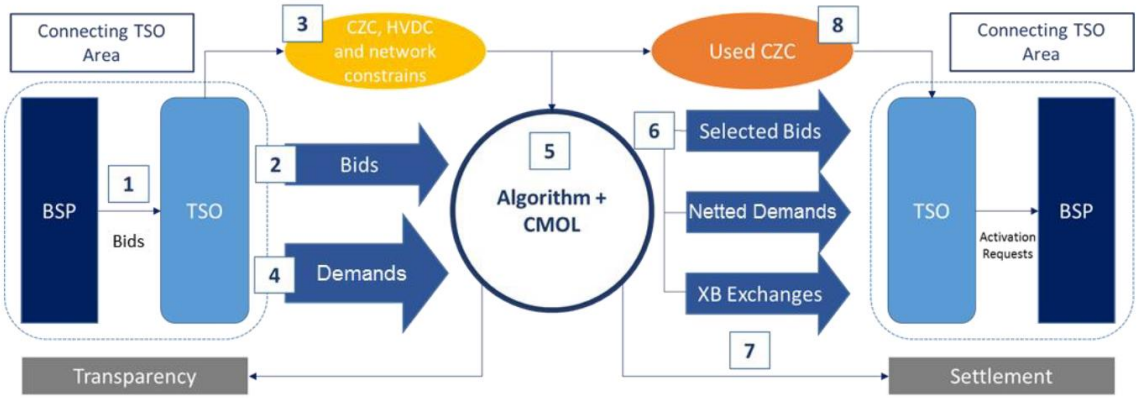
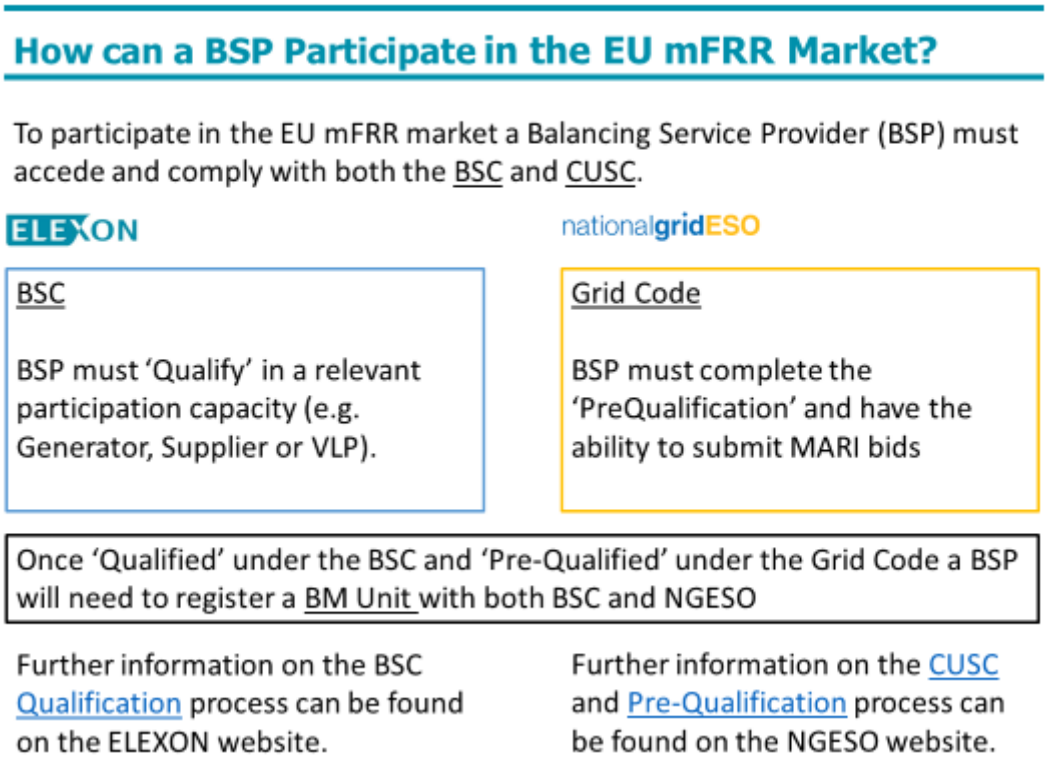


Figure 4: General Process of mFRR Activation

The MARI processes can be summarised as follows:

1. NGESO will collect mFRR bids from Balance Service Providers (BSPs);
2. NGESO will send the collated bids to the mFRR platform;
3. NGESO will also send their need / demand and to the mFRR platform;
4. NGESO will also send the cross border capacity of the relevant interconnectors to the mFRR platform;
5. Platform will run an algorithm to choose which bids are activated;
6. Platform will send activated bids, Clearing Price, Need / Demand Met and cross border schedules to NGESO;
7. Platform sends the relevant information sent to TSO-TSO settlement function.
8. Platform sends the used cross border capacity to NGESO

WHO CAN PARTICPATE?



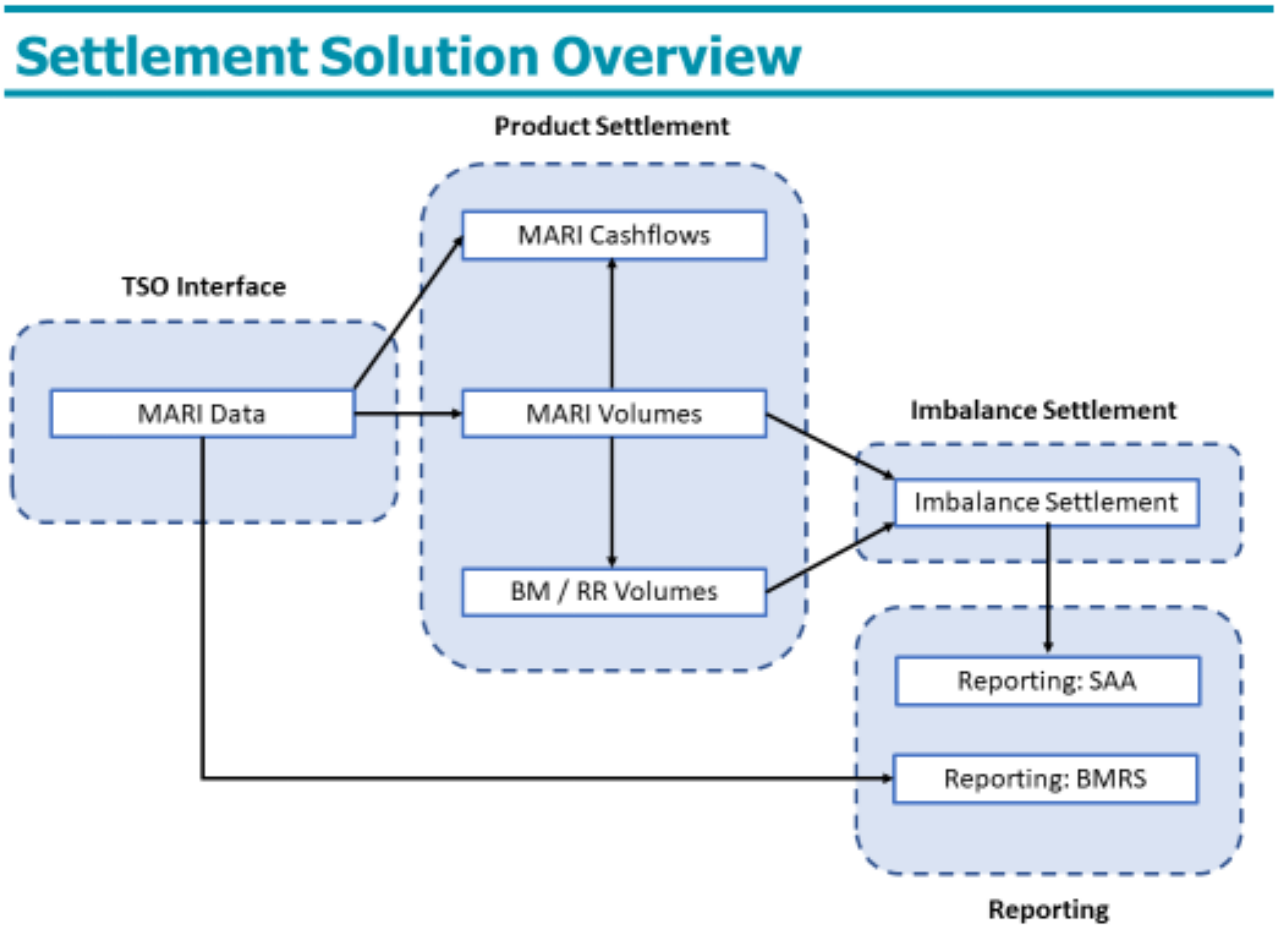
Note no changes are proposed to the BSC Qualification process and so won't form part of the solution.

LEGAL DEADLINE

The EB GL entered into Force on 18 December 2017, and the legal deadline for NGESO to utilise the MARI platform for GB balancing of mFRR products was December 2021. But because the final implementation framework could not be agreed it was referred to ACER who issued a final implementation framework with a new legal deadline of June 2022.

SETTLEMENT SOLUTION OVERVIEW

The BSC solution to implement the Project MARI arrangements will be split into the following sections:



TSO INTERFACE

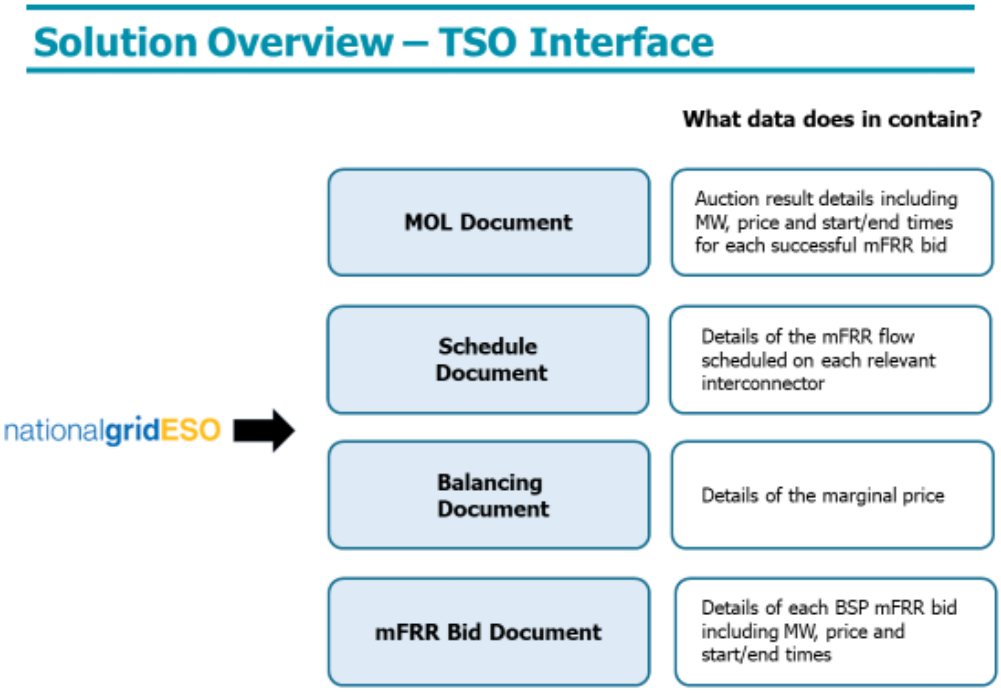
This section will detail the BSC MARI data requirements. Notably what data is required by Settlement, when it will be received and how it will be validated and loaded

It is expected that the ENTSO-E defined files and formats utilised for the exchange of Replacement Reserve data (Project TERRE) will be amended to incorporate mFRR data.

Therefore BSC Settlement will need to be able to receive, validate and load the following files from NGESO (which will originate with the central MARI platform):

- mFRR Bid Document file
  - BSP MARI bids *
- MOL Document file
  - Volume of GB need met (MWh); and
  - mFRR Activation data;
- Schedule Document
  - Interconnector schedules for mFRR
- Balancing Document
  - mFRR Clearing Price

(BR1)



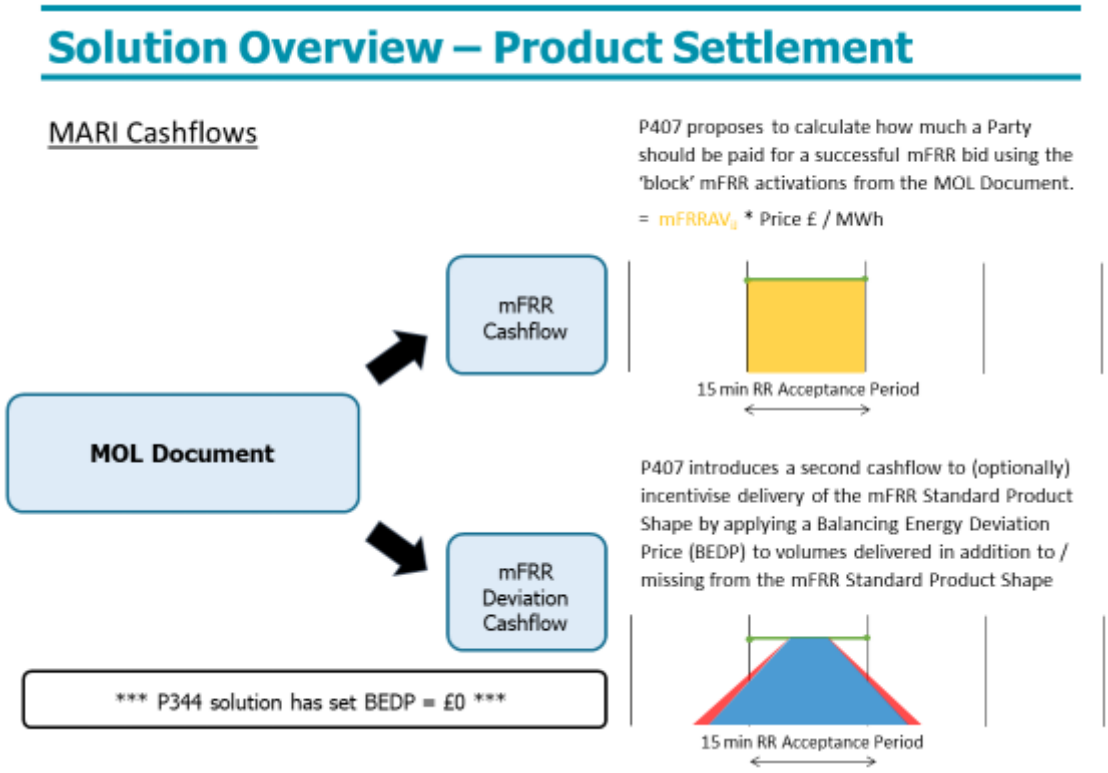
* Note the BSC solution will place no requirements around mFRR Bids other than it must be in accordance with Grid Code

PRODUCT SETTLEMENT

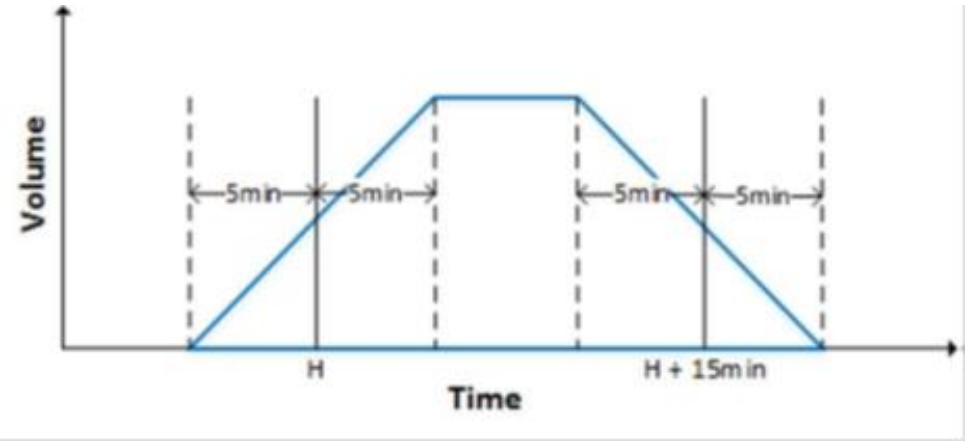
This section will detail how the new mFFR Balancing Energy Products will be settled including:

How mFRR Activations be paid (BR2/3/6/8/9/10/11)

The settlement of these mFRR Activations (blocks) will be handled under a new process whereby settlement systems multiply the mFRR Activation Level (for a given BM Unit and quarter-hour) by the Activation Price (i.e. MARI Clearing price) for that quarter-hour.



A further settlement process will be introduced to calculate the volume difference between the EU mFRR Standard Product Shape (shaded blue in the above and detailed below) and the TSO dispatched shape.



The European mFRR Standard Product Shape represents the preferred delivery shape of RR Activation 'blocks'. This particular shape is preferred as it aligns to the EU interconnector delivery shape.

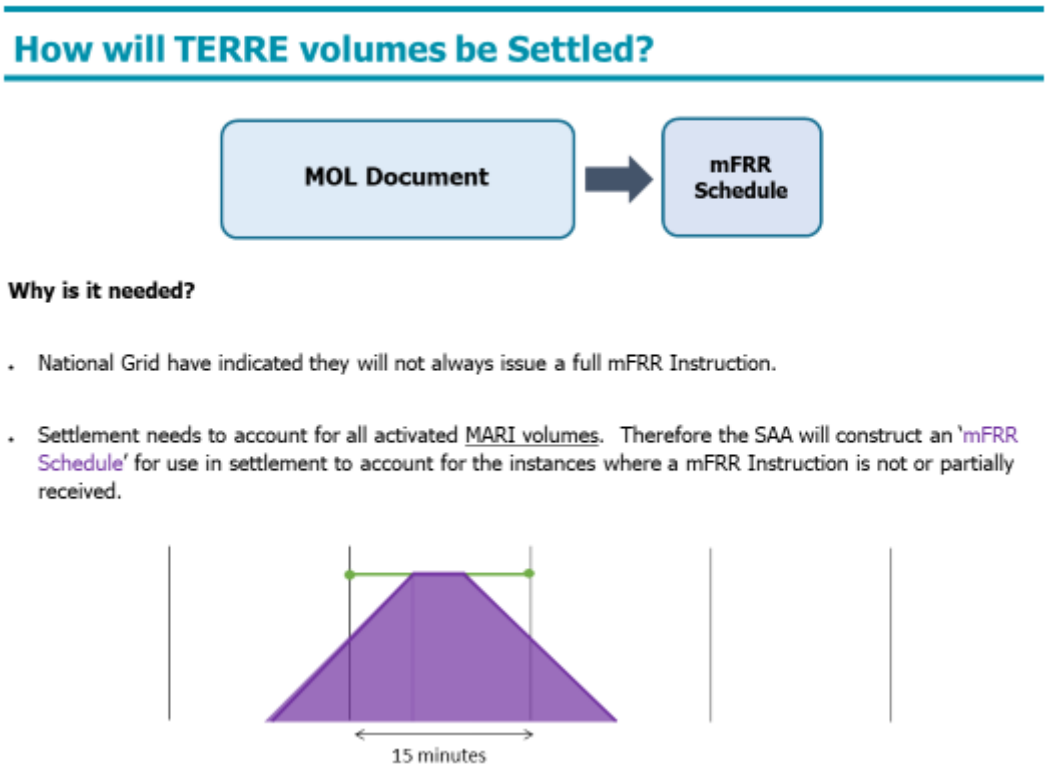
However within GB a decision has been made to not actively incentivise delivery of the European mFRR Standard Product Shape and therefore any deviation from this shape will be settled at the Balancing Energy Deviation Price (BEDP) which has been set to zero. This is consistent with the TERRE settlement solution.

mFRR Cashflow shall be included in the calculation of System Operator Cashflow for each Settlement Period.

How mFRR volumes be calculated (BR4/5)

Upon receiving the mFRR Activation 'blocks' from the central MARI Platform, NGESO will interpret the data and intend to issue an appropriate mFRR Instructions directing them to deliver the mFRR Activation. However a number of scenarios have been identified where issuing the mFRR Instruction won't be in the best interest of the GB system. In those instances, NGESO has indicated they will not issue a mFRR Instruction.

© ELEXON 2020



Therefore to facilitate accurate Settlement the SAA will construct an mFRR Schedule for use in settlement to account for the instances where a mFRR Instruction is not or partially received. These mFRR Schedules are treated by settlement systems just like any other instruction (i.e. setting a new baseline), except that they do not create Accepted Volumes that are payable.

The mFRR Schedule will respect the mFRR Standard Product shape and align with TSO mFRR Dispatch Principles (as and when defined by NGESO) including:

- Where a mFRR Activation is deemed to be feasible;
    - mFRR Schedule will respect submitted Dynamic Data Set parameters
    - The full MW delivery will be achieved between 0-5 mins into the 15min mFRR Auction Period
    - There will be a minimum duration of full MW delivery of the mFRR Activation of 5 mins

© ELEXON 2020

- Run-Up Rates and Run-Down Rates < 10 min mFRR Standard Product Ramp rates will be dispatched symmetrical to the 15 min MARI Auction Period boundary

- Where the mFRR Activation is not deemed to be feasible;

  - mFRR Schedule will not respect submitted Dynamic Data Set parameters
  - The full MW delivery will be achieved between 5 mins into the 15min RR Auction Period
  - There will be a duration of full MW delivery of the mFRR Activation of 5 mins o Run-Up Rates and Run-Down Rates will be determined as the maximum feasible rate

How NGESO mFRR Instructions be treated (BR7)

The P407 solution will not calculate payable volumes for mFRR Instructions as these volumes are already accounted for in the mFRR Schedule. The mFRR Instruction is intended to act as a baseline for subsequent acceptances and so will re-use the existing accepted volume methodology used for the BM. This is in order to minimise cost and complexity and align calculations with both TERRE and the BM.

The solution assumes that in almost all cases NGESO will also forward instructions that it has issued to the BM Unit pursuant to satisfying the mFRR Activation. It also assumes that in almost all cases this instruction will match the mFRR Schedule and as such there will be no difference in volume.

Cases where there is a difference in volume between the mFRR Schedule and mFRR Instruction will be captured by the existing BM processes i.e. 'under delivery' against the mFRR Schedule will be subject to existing Non-Delivery rules and 'over delivery' against the mFRR Schedule will be taken into account in a Trading Party's Imbalance position (a Virtual Lead Party with a Virtual Balancing Account will not be adjusted).

© ELEXON 2020

How mFFR volumes interact with BM/RR Volumes (BR12)

Due to the delay between the submission of a mFRR bid and receiving the mFRR Activations there exists a possibility for the TSO to issue BOAs and/or RR Instructions to a BM Unit that is then subsequently accepted for MARI. Analysis of the scenarios that result from these circumstances has identified a particular instance where BOAs and/or RR Instructions is not compatible with the mFRR Schedule i.e. settlement integrity is comprised.

Therefore to maintain Settlement integrity the mFRR Schedule Volumes shall take priority over BOA and/or RR volumes. To clarify this only takes effect where NGESO issues a BOA after mFRR Gate closure and before the mFRR Activations are received and the BM Unit has been activated in the same direction in both markets.

How non-delivery will be handled (BR13)

Deemed Standard Product Volumes and mFRR Instructed Offer/Bid Deviation Volumes will be included in the existing Non-Delivery Charge calculation to ensure all RR Schedule volumes can be associated with a RR Activation price (where appropriate).

The Deemed Standard Product Volumes and mFRR Instructed Offer/Bid Deviation will be priced at the GB MARI clearing / Activation price and Balancing Energy Deviation Price accordingly during the allocation of Non-Delivery Order Numbers (alongside any BOAs) to Non-Delivered Volumes process to ensure that there is no benefit in a BSP Non-Delivering on an mFRR Activation

© ELEXON 2020

IMBALANCE SETTLEMENT

This section will detail the impact of mFRR volumes on imbalance settlement including:

How energy imbalance positions will be impacted (BR15)

Calculation of Energy Imbalance Volume will account for MARI volumes via Account Period Balancing Services Volume

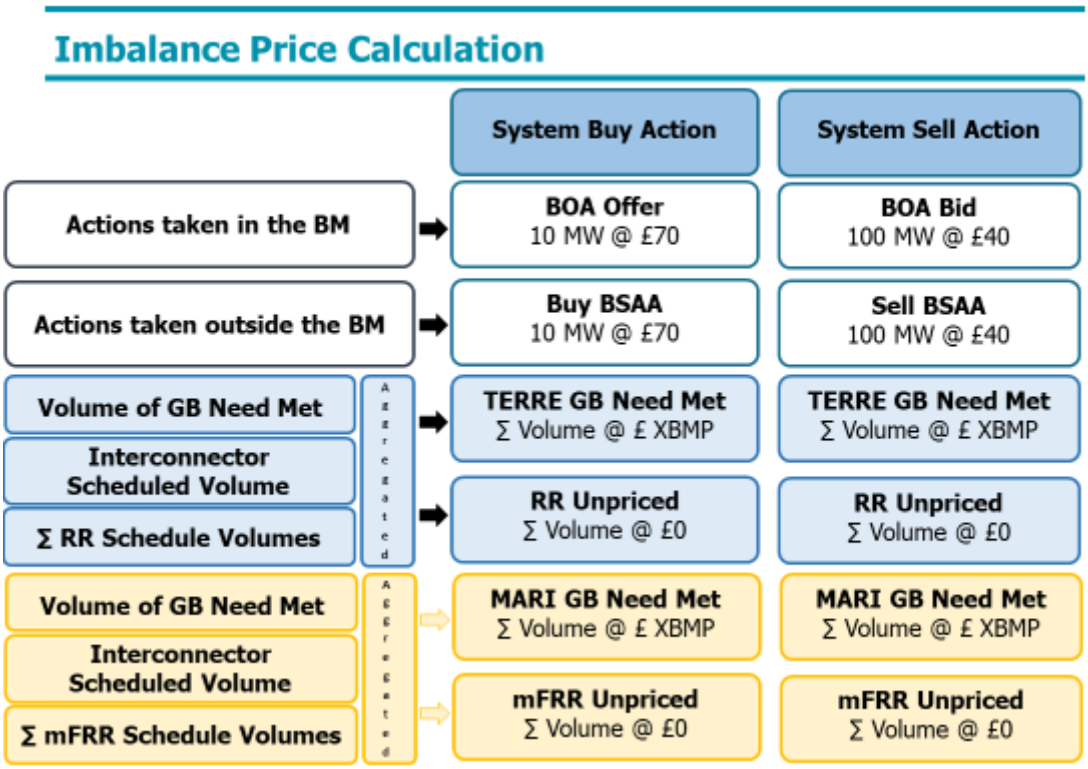
How the imbalance price be impacted (BR14)

The calculation of imbalance prices should include all the physical actions taken on the GB system to balance the system, i.e. only actions taken to balancing purposes.

mFRR is a balancing energy product that NGESO can use to balance the GB system. Therefore mFRR actions should be taken into account within the imbalance price calculation.

The mFRR actions to be considered are:

- the Volume of GB need met as declared by MARI
- the sum of mFRR Schedule volume (i.e. GB BSP despatch);
- the sum of Interconnector volumes for each Interconnector scheduled by MARI



REPORTING

This section will detail the reporting arrangements to be introduced for Project MARI including:

- How the SAA-I014 settlement report will be amended (BR16)
- How BMRS will be amended to publish mFRR data items (BR17/18)
- How EU Transparency Reporting will be amended (BR19)
- How the Credit Cover arrangements will be amended (BR20)

© ELEXON 2020

PROPOSED BUSINESS REQUIREMENTS

Area	Ref	Business Requirement
TSO interface	BR1	SAA & BMRA shall receive, validate and process new MARI-specific data from NGESO: mFRR Bid Document mFRR MOL Document mFRR Schedule Document mFRR Balancing Document
mFRR Activation Settlement	BR2	SAA shall calculate the mFRR Cashflow for each BM Unit for each quarter-hour.
mFRR Activation Settlement	BR3	Daily Party mFRR Cashflow shall be a new Trading Charge, included on Trading Charge Advice Notes that are sent to Parties participating in MARI.
mFRR Activation Settlement	BR4	SAA shall create a mFRR Schedule acceptance data for each MARI Auction
mFRR Activation Settlement	BR5	SAA shall process the mFRR Schedule. In practice an mFRR Schedule will be similar to (and processed in a similar way to) any other acceptance data • SAA shall calculate mFRR Schedule Volumes, separate to QAO^{kn}_{ij} / QAB^{kn}_{ij} and $RRAO^{kn}_{ij}$ / $RRAB^{kn}_{ij}$
mFRR Activation Settlement	BR6	SAA will probably need to calculate Period Deemed Standard Product Offer Volumes ($DSPO^{J}_{ij}$) and Period Deemed Standard Product Bid Volumes ($DSPB^{J}_{ij}$) for MARI
mFRR Instruction Settlement	BR7	SAA shall receive and process mFRR Instructions from NGESO. In practice an mFRR Instruction will be indistinguishable from (and processed in the same way as) any other acceptance data

		i.e. no equivalent QAO^{kn}_{ij} / QAB^{kn}_{ij} will be calculated and $qA^{k}_{ij}(t)$ are used for baseline only
mFRR Instruction Settlement	BR8	SAA shall calculate the difference between the mFRR Schedule and the Deemed Standard Product Shape
mFRR Instruction Settlement	BR9	SAA shall calculate the MARI Period Instruction Deviation Cashflow (based off BR8)
mFRR Instruction Settlement	BR10	Daily Party MARI Instruction Deviation Cashflow shall be a new Trading Charge, included on Trading Charge Advice Notes that are sent to Parties participating in TERRE.
mFRR Instruction Settlement	BR11	Total System mFRR Cashflow shall be included in the calculation of System Operator Cashflow for each Settlement Period.
BOA Settlement	BR12	SAA shall compare each Bid-Offer acceptance data received against previous acceptance data. If the previously accepted data relates to a RR Schedule or mFRR Schedule and is of the same direction (i.e. offer/offer or bid/bid) and the Bid-Offer acceptance MW value is less than RR Activation MW value then Settlements shall **not** calculate Acceptance Volumes $qA^{k}_{ij}(t)$ for that time (t)

© ELEXON 2020

Non-Delivery	BR13	SAA shall include mFRR Activations Deemed Standard Product Volumes with MARI Instructed Offer/Bid Deviation Volumes in the existing Non-Delivery Charge calculations.
Imbalance settlement	BR14	SAA shall include MARI-specific actions in the calculation of the System Buy / Sell Price
Imbalance settlement	BR15	SAA shall include mFRR Activation Volumes in the calculation of Energy Imbalance Volumes.
Reporting	BR16	The SAA-I014 Settlement Report shall contain new MARI-specific data items.
Reporting	BR17	New MARI-specific data shall be published to BMRS.
Reporting	BR18	New indicative MARI-specific data shall be calculated by BMRS
Reporting	BR19	ETR and EBGL reporting will likely be impacted by MARI
Credit	BR20	Daily Party mFRR Cashflow shall be included in the calculation of Actual Energy Indebtedness.

© ELEXON 2020